EVAL-L9001 evaluation board

Introduction

EVAL-L9001 is a low cost tool designed to evaluate L9001, a smart power device designed by STMicroelectronics in advanced BCD technology.

L9001 Simple Power Supply (SPS) device is a multiple output power regulator for automotive applications with one buck regulator, one configurable buck or linear regulator and one linear regulator. Its output voltages are configurable via discrete pins.

On top of the regulators, this device integrates a watchdog functional block, and a diagnosis functional block (under/over voltage, output current and temperature).

Device is capable of low power operation mode with main regulators still active and reduced power consumption from battery. EVAL-L9001 embeds a typical configuration for SPC5x microcontroller family supplying:

- Buck 5 V output for peripheral supply
- Buck 1.2 V output for core supply
- LDO 5 V output for ADC reference supply

The expansion connector allows to monitor the different diagnostic reset signal, to enable the regulator and, if activated, to service the windows watchdog.

1 Hardware description

EVAL-L9001 is intended as low cost tool with pre-defined configuration that exemplify a typical application of L9001 as power supply for SPC5x family microcontroller. An optimized BOM for the proposed configuration has been analyzed:

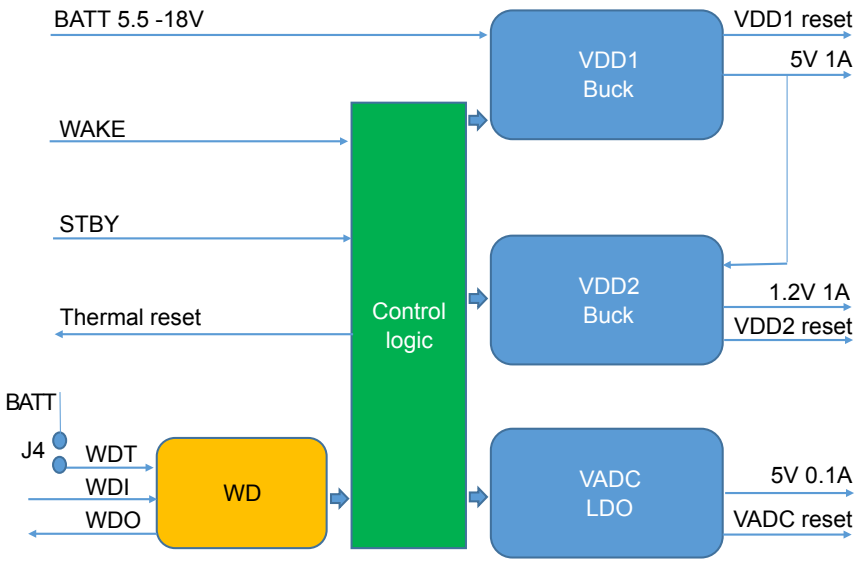
- All components are automotive grade (AEC-Q100)
- Dimensioning have been made taking into account the real application range and cost

Here below the main electrical characteristic of EVAL-L9001:

- Operative input voltage: 5.5 V – 18 V
- Output voltage in normal mode:
  - VDD1 = 5 V ± 3%, 1 A
  - VDD2 = 1.2 V ± 3%, 1 A
  - VADC = 5 V ± 2%, 100 mA
- WD windows length: 40 ms ± 10%
- Wake input
- Standby input
- Reset signals on expansion connector
- Independent WD reset output
- Terminal available for wire soldering
- 50 x 50 mm 2 layers PCB

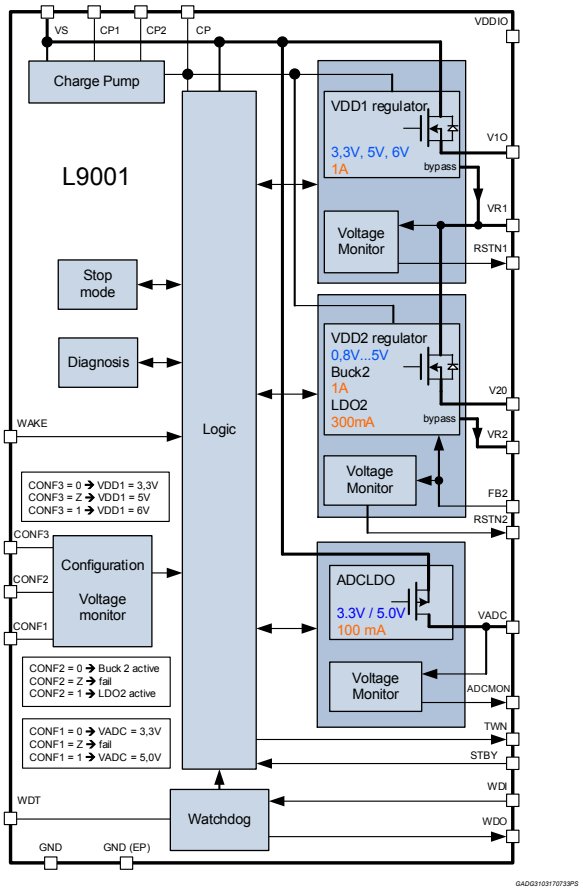
1.1 Block diagram

Figure 1. EVAL-L9001 block diagram



2 L9001 block diagram

Figure 2. **L9001 block diagram**



3 L9001 pin connection and description

Figure 3. **L9001 pins connection diagram (top view)**

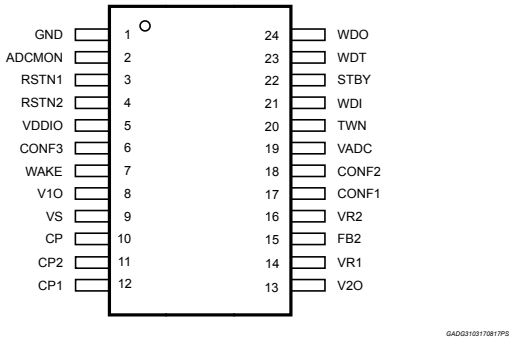


Table 1. **L9001 pin description**

Pin Number	Pin Name	Description	Class	I/O Type
EP	GND	Exposed pad: connected to GND	Supply	Global
1	GND	Power GND	Supply	Global
2	ADCMON	ADCLDO monitor (reset)	O	Local
3	RSTN1	VDD1 monitor (reset)	O	Local
4	RSTN2	VDD2 monitor (reset)	O	Local
5	VDDIO	Input voltage reference	Supply	Local
6	CONF3	Configuration input 3	I	Local
7	WAKE	Wake-up input	I	Local
8	V1O	VDD1 switching pin	Supply	Local
9	VS	Battery supply voltage	Supply	Global
10	CP	Charge pump output	Supply	Local
11	CP2	Charge pump capacitor pin 2	Supply	Local
12	CP1	Charge pump capacitor pin 1	Supply	Local
13	V2O	BUCK2 switching pin/LDO2 output voltage	Supply	Local
14	VR1	VDD1 BYP output voltage /VDD2 supply pin	Supply	Global
15	FB2	VDD2 feedback voltage pin	I	Local
16	VR2	VDD2 BYP output voltage	Supply	Local
17	CONF1	Configuration input 1	I	Local
18	CONF2	Configuration input 2	I	Local
19	VADC	ADCLDO output voltage	Supply	Global
20	TWN	Thermal warning output flag	O	Local
21	WDI	Watchdog input	I	Local
22	STBY	Stand-by input	I	Local
23	WDT	Watchdog timer input	I/O	Local
24	WDO	Watchdog error flag output	O	Local

4 Board layout

Figure 4. TOP layer

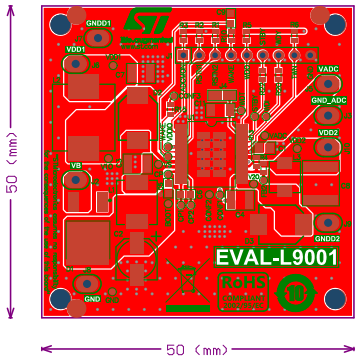


Figure 5. BOTTOM layer

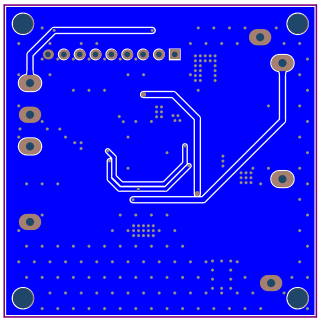
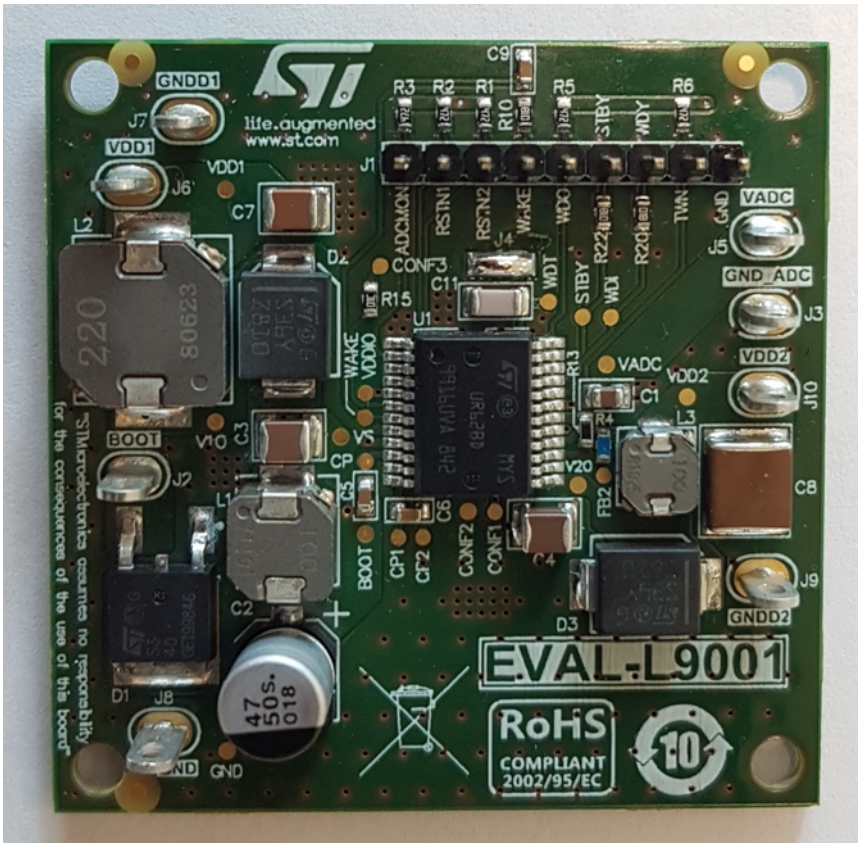
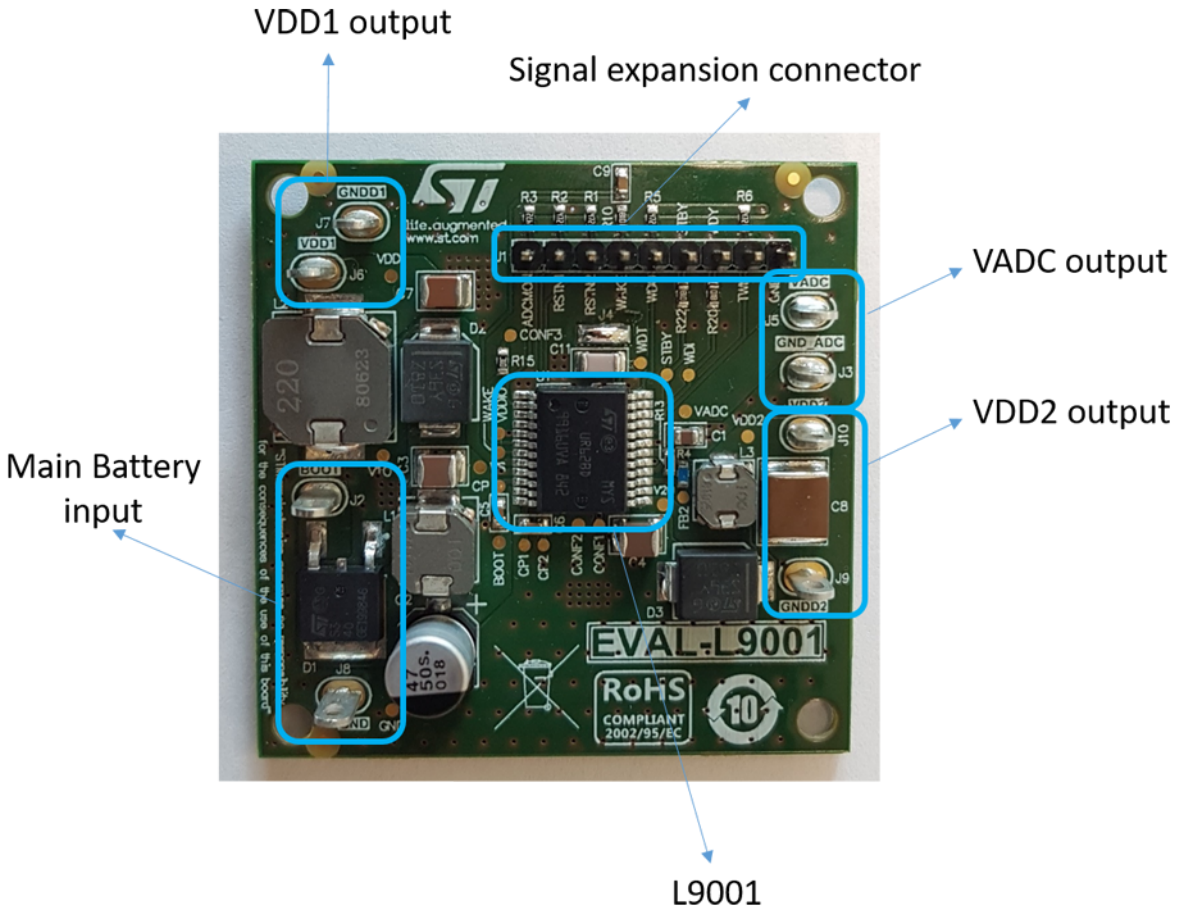


Figure 6. **Assembly TOP**



5 Main components and connectors

Figure 7. **Components and connectors details**



6 Jumpers and connectors

Table 2. Jumpers

Name	Description	Type
J1	Expansion connector (Enable signal, Reset signals, Watchdog)	Multi-pin connector
J2	Main battery positive connector (VB)	Terminal
J3	VADC GND connector	Terminal
J4	Watchdog disable	Solder jumper: Closed (default) = Watchdog disabled Open = Watchdog enabled
J5	VADC positive connector	Terminal
J6	VDD1 positive connector	Terminal
J7	VDD1 GND connector	Terminal
J8	Main battery GND connector	Terminal
J9	VDD2 GND connector	Terminal
J10	VDD2 positive connector	Terminal

Table 3. Expansion connector

Pin	Description
1	ADCMON: VADC monitor flag (reset)
2	RSTN1: VDD1 monitor flag (reset)
3	RSTN2: VDD2 monitor flag (reset)
4	WAKE_EXT : Wake-up pin (to be > 3.25 V to enable power supply)
5	WDO: Watchdog output (output is driven low in case of watchdog fault)
6	STBY: Standby input (The state can be entered by ACTIVE state by rising STBY pin. Depending on the active VDD regulators (i.e. the regulators which have not been disabled in the application), the low power mode is managed in a different way). Please refer to L9001 Datasheet for further information
7	WDI: Windows watchdog input. Please refer to L9001 Datasheet for further information
8	TWN: Thermal warning flag output
9	GND : Ground

7 Functional description

7.1 Default jumper setting

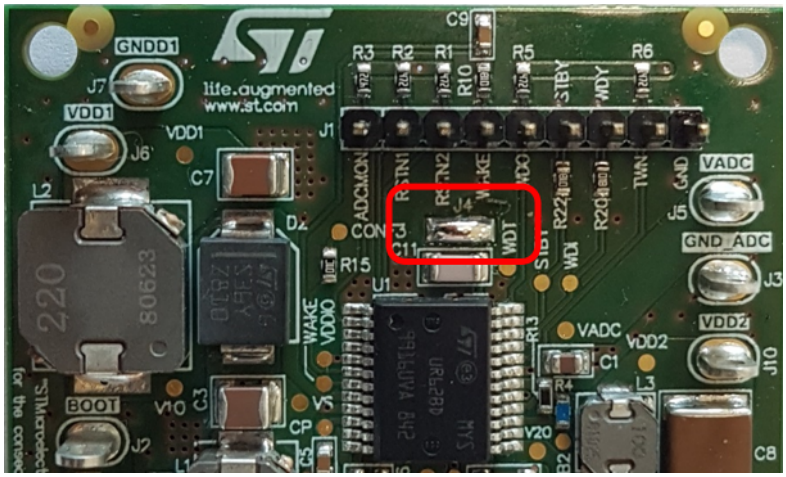
Table 4. Jumper configuration

Name	Description	Configuration
J4	Watchdog disable	Soldered

7.2 Getting started

Make sure jumper [**J4**] is closed:

Figure 8. Jumper J4 detail



Step 1. Connect power supply positive output to [**J2**] and ground to [**J8**].

Step 2. Configure the power supply to 13.5 V and limit the current to 3 A

Step 3. Switch on the power supply

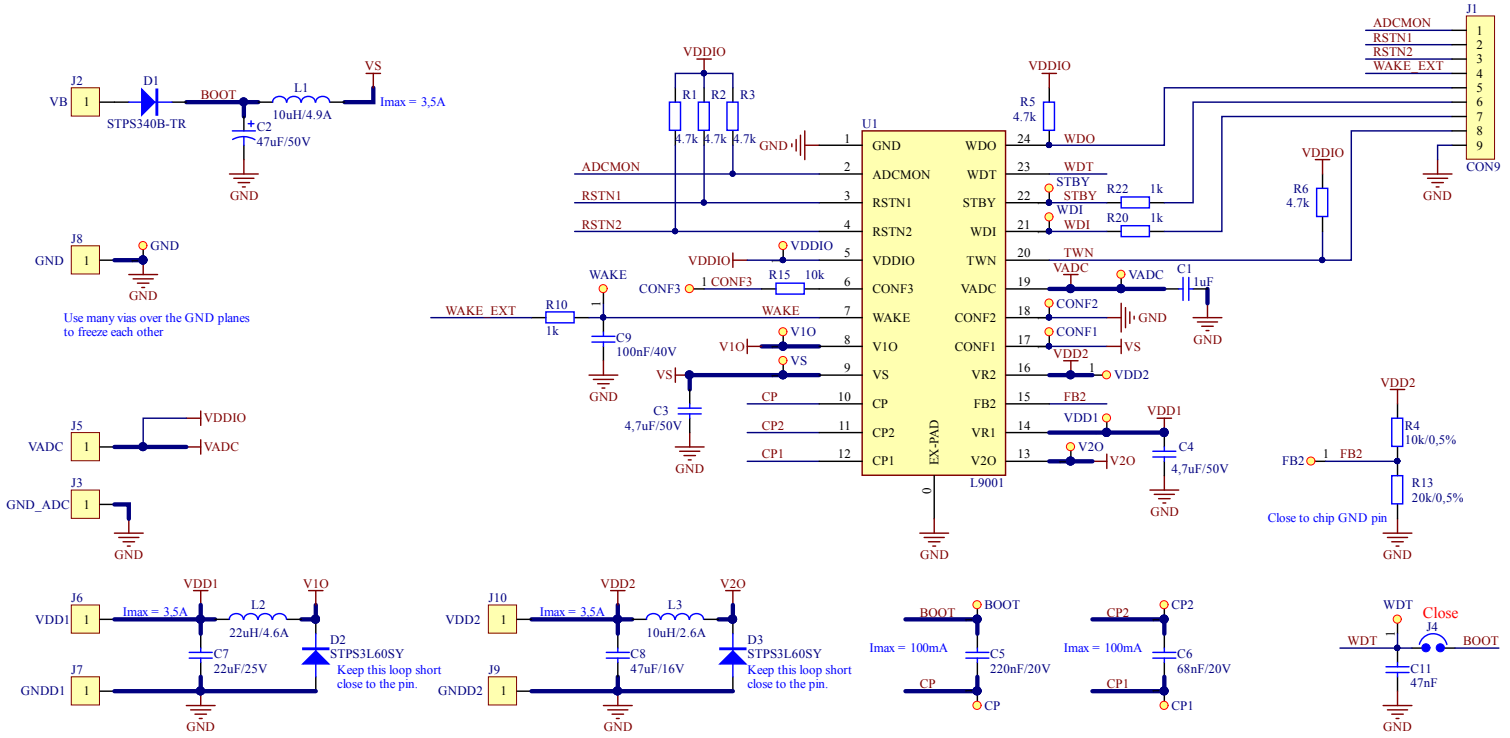
Step 4. Connect the Wake_ext (pin 4 of expansion connector) to a voltage > 3.25 V

Step 5. Use a multimeter, in voltage measurement setting, to measure following voltages:

- 5 V between [**J6 (+)**] and [**J7 (-)**]
- 1.2 V between [**J10 (+)**] and [**J9 (-)**]
- 5 V between [**J5 (+)**] and [**J3 (-)**]

8 EVAL-L9001 board schematic

Figure 9. **Board schematic**



Revision history

Table 5. **Document revision history**

Date	Version	Changes
03-Jun-2019	1	Initial release.

Contents

List of tables

List of figures