UM0546
User manual

PTB801DB

Evaluation board for ABS valve drivers system

1 Description

This document concern the main features of PTB801DB valve drivers for ABS board with 2 x L9347 and L9352B devices.

1.1 Introduction

The PTB801DBis a complete demonstrator of an ABS and ESC system based on STMicroelectronics devices. The board implements a flexible and open design demonstrating the capability of the STMicroelectronics 16/32 bit microcontrollers and devices for ABS applications. The PTB801DB mounts two L9347 and L9352B devices and accept external signal coming from PTB801 MB.

1.2 Main components

- L9347 valve drivers
- L9352B valve drivers
- Connector for valves
- Connector for V_{BATT} power supply
- Standardized CPU board connector providing access to off board I/O, PWM, SPI and power supply

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2 Evaluation board description

The PTB801DB is a valve drivers board for ABS and ESC system based on STMicroelectronics devices. The board implements a flexible and open design demonstrating the capability of the STMicroelectronics for ABS and ESC applications. The PTB801DB mounts two L9347 and L9352B devices, the control caming from PTB801 MB.

The board has opened connectivity to external valves.

2.1 Features

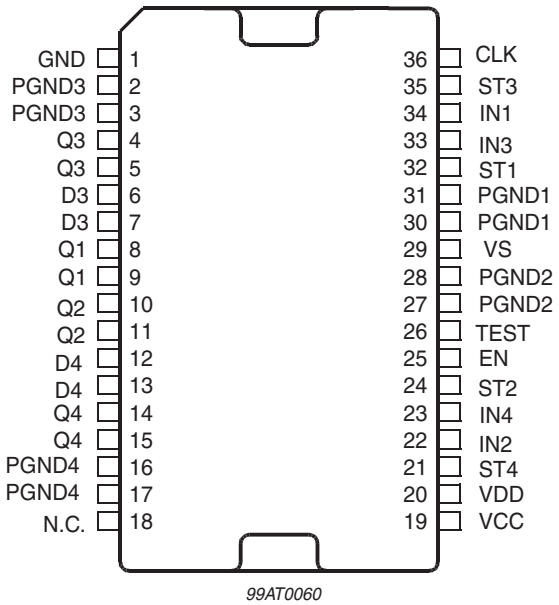
General features of this board are:

- Full evaluation and development system based on the system basis chip L9347 and L9352B
- Full system evaluation: integration, basic and safety functionalities

2.1.1 L9347 quad intelligent power low-side switch

The L9347 is an integrated quad low-side power switch to drive inductive loads like valves used in ABS systems. Two of the four channels are current regulators with current range from 250 mA to 2.25 A and an accuracy of 10 %. All channels are protected against fail functions. They are monitored by a status output.

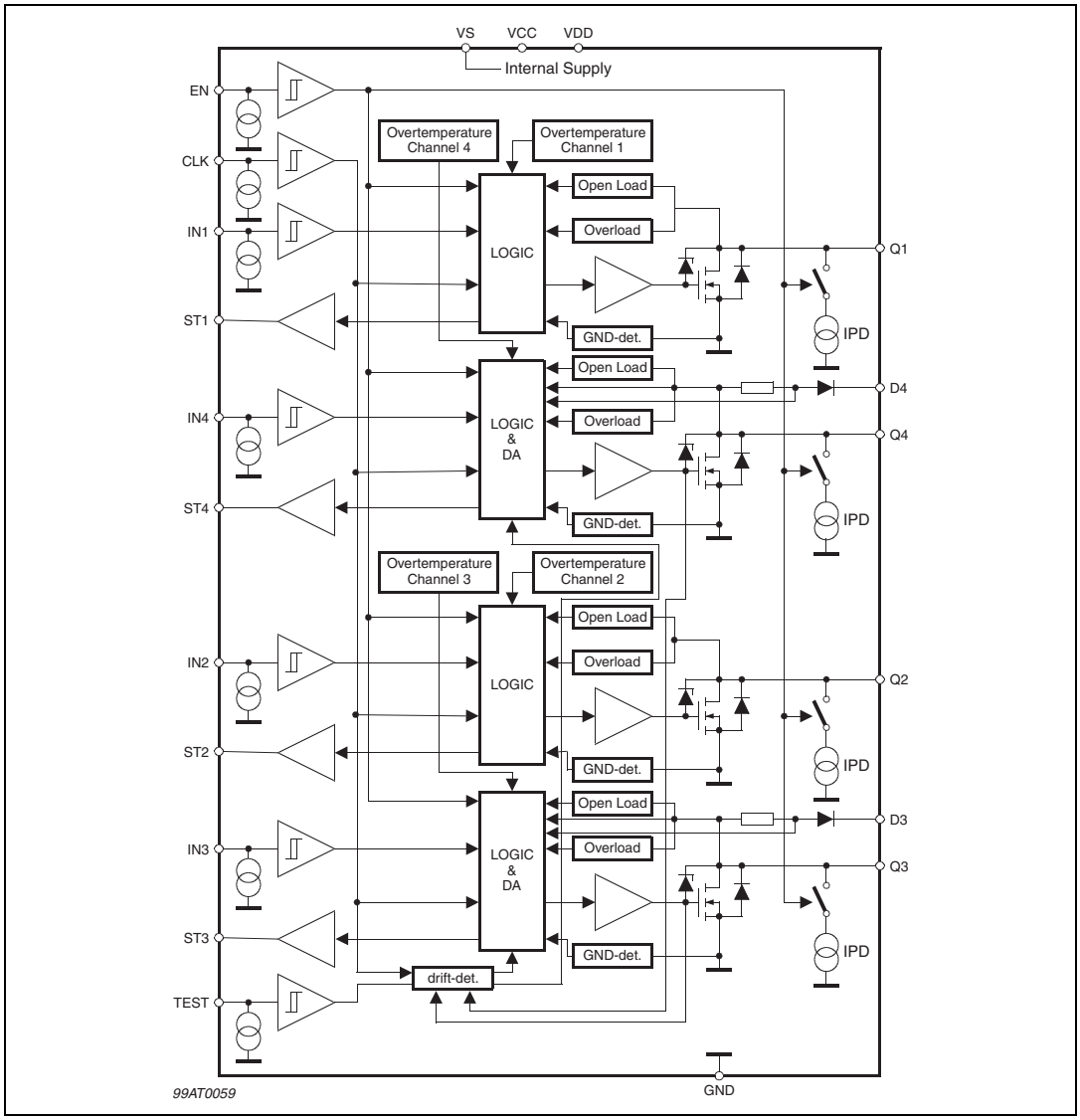
Figure 1. L9347 pin connection (top view)



The L9347 is a quad low-side switch with following functions:

- 2 x 5 A designed as conventional switch
- 2 x 2.5 A designed as switched currentregulator
- Low ON resistance 2 x 0.2 Ohm, 2 x 0.35 Ohm (typ.)
- PowerSO-36 package with integrated cooling area
- Integrated free wheeling and clamping Z diodes
- Output slope control
- Short circuit protection
- Selective overtemperature shutdown
- Open load detection
- Ground and supply loss detection
- External clock control
- Recirculation control
- Regulator drift detection
- Regulator error control
- Regulator resolution 5 mA
- Status monitoring
- Status push-pull stages
- Electrostatic discharge (ESD) protection

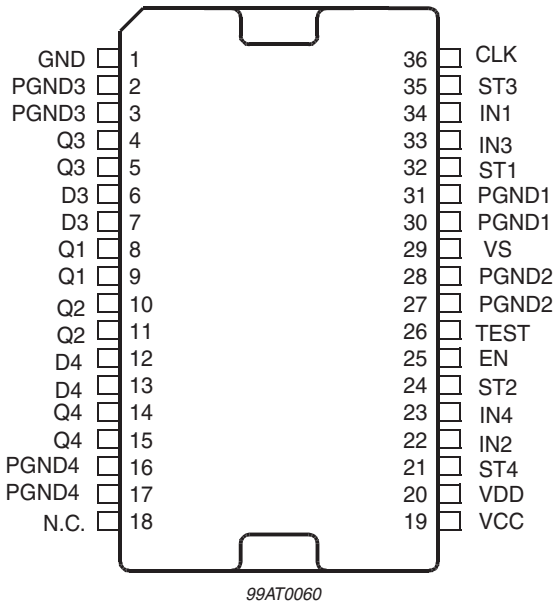
Figure 2. L9347 block diagram



2.1.2 L9352B quad low-side switch

The L9352B is an integrated quad low-side power switch to drive inductive loads like valves used in ABS systems. Two of the four channels are current regulators with current range from 0mA to 2.25 A. All channels are protected against fail functions.
They are monitored by a status output.

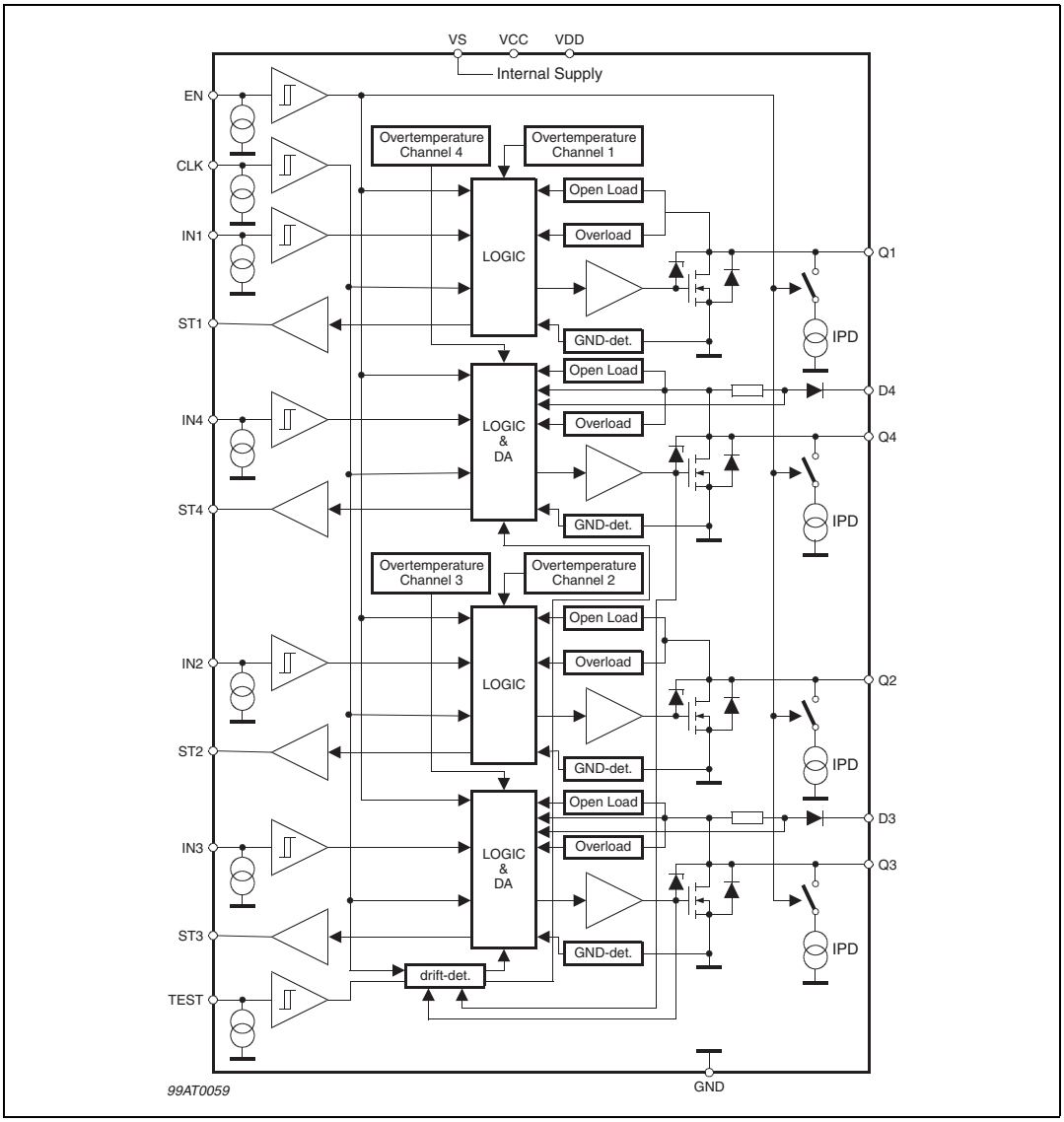
Figure 3. L9352B pin connection



The L9352B is a quad low-side switch with following functions:

- Quad low-side switch
- 2 x 5 A designed as conventional switch
- 2 x 2.5 A designed as switched current-regulator
- Low ON-resistance 4 x 0.2 Ohm (typ.)
- PowerSO-36 package with integrated cooling area
- Integrated free-wheeling and clamping Z-diodes
- Output slope control
- Short circuit protection
- Selective overtemperature shutdown
- Open load detection
- Ground and supply loss detection
- External clock control
- Recirculation control
- Regulator drift detection
- Regulator error control
- Regulator resolution 5 mA
- Status monitoring
- Status push-pull stages
- Electrostatic discharge (ESD) protection

Figure 4. L9352B block diagram



2.2 Board connections

PTB801DB has many connector to comunicate with:

- PTB801 mother board;
- External valves;
- I/O signals to control valve drivers.

Figure 5. 4 valves controlled by first L9347

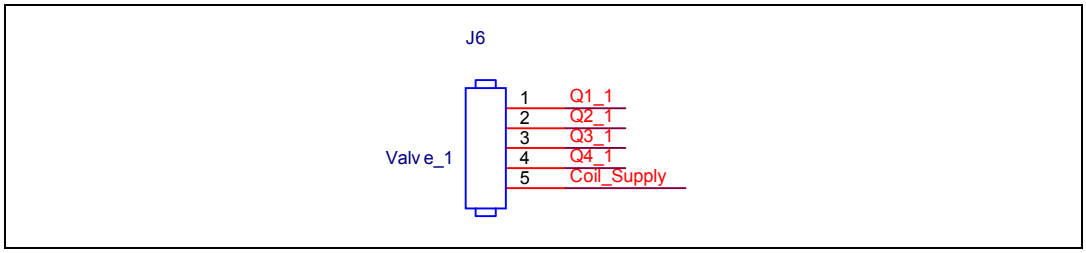


Figure 6. 4 valves controlled by second L9347

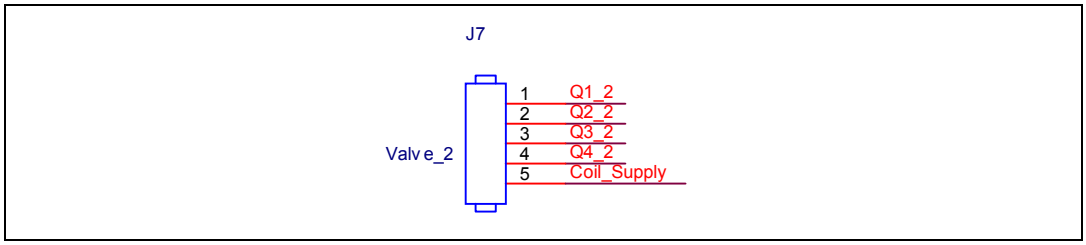
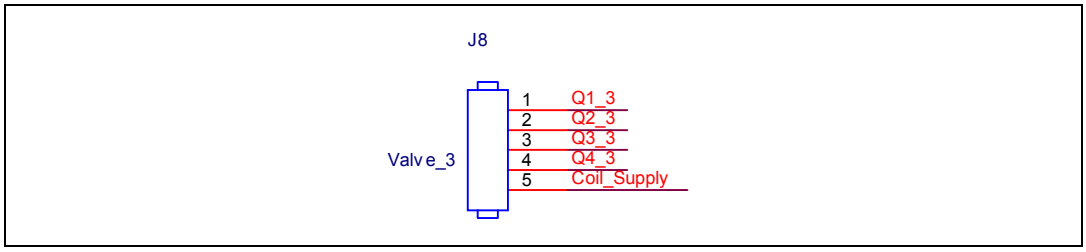


Figure 7. 4 valves controlled by L9352B



The *Table 1* describes the pin out of the valve connectors J5 and J6:

Table 1. Valve connectors J6, J7 and J8

Name	Figure	Description
J6Pin 1	*Figure 5*	Output Q1 of first L9347
J6 Pin 2		Output Q2 of first L9347
J6 Pin 3		Output Q3 of first L9347
J6 Pin 4		Output Q4 of first L9347
J6 Pin 5		Coil Supply

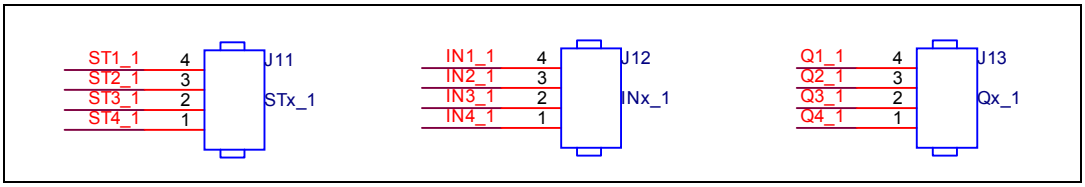
Table 1. Valve connectors J6, J7 and J8 (continued)

Name	Figure	Description
J7 Pin 1	*Figure 6*	Output Q1 of second L9347
J7 Pin 2		Output Q2 of second L9347
J7 Pin 3		Output Q3 of second L9347
J7 Pin 4		Output Q4 of second L9347
J7 Pin 5		Coil Supply
J8 Pin 1	*Figure 7*	Output Q1 of L9352B
J8 Pin 2		Output Q2 of L9352B
J8 Pin 3		Output Q3 of L9352B
J8 Pin 4		Output Q4 of L9352B
J8 Pin 5		Coil Supply

2.2.1 L9347 first valve drivers

On the board, there are three connectors to monitoring the input (INx_1), output (Qx_1), and status (STx_1) of the fist L9347 drivers.

Figure 8. First L9347 signals monitoring connectors



The *Table 2* describes the pin out of the first signals monitoring connectors J11, J12 and J13:

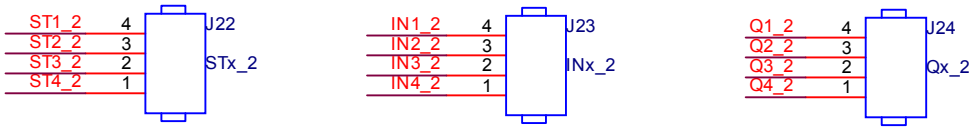
Table 2. Valve connectors J11, J12 and J13

Name	Figure	Description
J11Pin 1	*Figure 8.*	Status Q1 of first L9347 driver
J11 Pin 2		Status Q2 of first L9347 driver
J11 Pin 3		Status Q3 of first L9347 driver
J11 Pin 4		Status Q4 of first L9347 driver
J12 Pin 1		Input Q1 of first L9347 driver
J12 Pin 2		Input Q2 of first L9347 driver
J12 Pin 3		Input Q3 of first L9347 driver
J12 Pin 4		Input Q4 of first L9347 driver
J13 Pin 1		Output Q1 of first L9347 driver
J13 Pin 2		Output Q2 of first L9347 driver
J13 Pin 3		Output Q3 of first L9347 driver
J13 Pin 4		Output Q4 of first L9347 driver

2.2.2 L9347 second valve drivers

On the board, there are three connectors to monitoring the input (INx_2), output (Qx_2), and status (STx_2) of the second L9347 drivers.

Figure 9. Second L9347 signals monitoring connectors



The *Table 3* describes the pin out of the second L9347 signals monitoring connectors J22, J23 and J24:

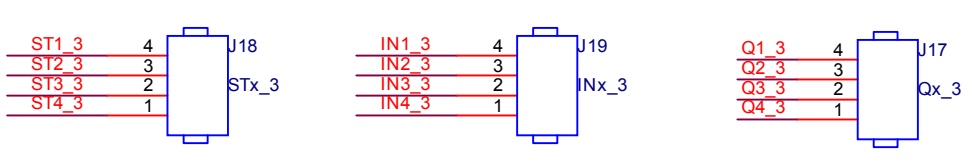
Table 3. Valve connectors J22, J23 and J24

Name	Figure	Description
J22 Pin 1	*Figure 9.*	Status Q1 of second L9347 driver
J22 Pin 2		Status Q2 of second L9347 driver
J22 Pin 3		Status Q3 of second L9347 driver
J22 Pin 4		Status Q4 of second L9347 driver
J23 Pin 1		Input Q1 of second L9347 driver
J23 Pin 2		Input Q2 of second L9347 driver
J23 Pin 3		Input Q3 of second L9347 driver
J23 Pin 4		Input Q4 of second L9347 driver
J24 Pin 1		Output Q1 of second L9347 driver
J24 Pin 2		Output Q2 of second L9347 driver
J24 Pin 3		Output Q3 of second L9347 driver
J24 Pin 4		Output Q4 of second L9347 driver

2.2.3 L9352B valve drivers

On the board, there are three connectors to monitoring the input (INx_2), output (Qx_2), and status (STx_2) of the L9352B drivers.

Figure 10. L9352B signals monitoring connectors



The *Table 4* describes the pin out of the L9352B signals monitoring connectors J18, J19 and J17:

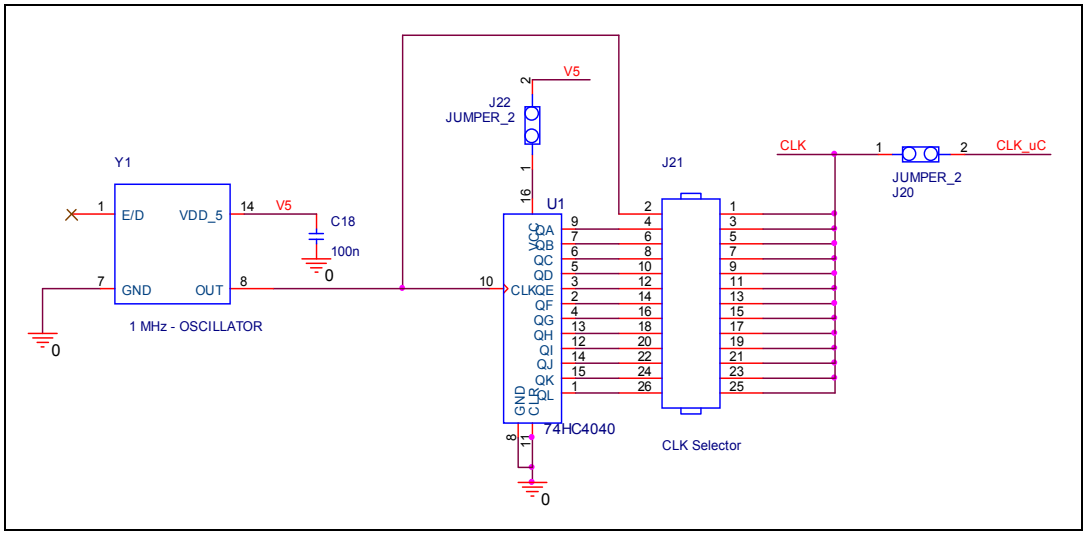
Table 4. Valve connectors J17, J18 and J19

Name	Figure	Description
J18 Pin 1	*Figure 10.*	Status Q1 of L9352B driver
J18 Pin 2		Status Q2 of L9352B driver
J18 Pin 3		Status Q3 of L9352B driver
J18 Pin 4		Status Q4 of L9352B driver
J19 Pin 1		Input Q1 of L9352B driver
J19 Pin 2		Input Q2 of L9352B driver
J19 Pin 3		Input Q3 of L9352B driver
J19 Pin 4		Input Q4 of L9352B driver
J17 Pin 1		Output Q1 of L9352B driver
J17 Pin 2		Output Q2 of L9352B driver
J17 Pin 3		Output Q3 of L9352B driver
J17 Pin 4		Output Q4 of L9352B driver

2.2.4 Oscillator block

To obtain clock at 250 kHz frequency, has been used an oscillator to 1 MHz and a counter (for frequency division). In this way is possible obtain the 250 kHz needed fot L9352B, from different oscillator. Otherwise, is possible connect the CLK line with line caming from µC.

Figure 11. Oscillator and clock selector



The following table describes the pin out of connectors J20, J21 and J22:

Table 5. Oscillator connectors J20, J21 and J22

Name	Figure	Description
J20 Pin 1	Figure 11.	CLK og L9352B driver
J20 Pin 2		CLK_uC caming from uC
J21 Pin 1 and 2		Oscillator CLK/1
J21 Pin 3 and 4		Oscillator CLK/2
J21 Pin 5 and 6		Oscillator CLK/4
J21 Pin 7 and 8		Oscillator CLK/8
J21 Pin 9 and 10		Oscillator CLK/16
J21 Pin 11 and 12		Oscillator CLK/32
J21 Pin 13 and 14		Oscillator CLK/64
J21 Pin 15 and 16		Oscillator CLK/128
J21 Pin 17 and 18		Oscillator CLK/256
J21 Pin 19 and 20		Oscillator CLK/512
J21 Pin 21 and 22		Oscillator CLK/1024
J21 Pin 23 and 24		Oscillator CLK/2048
J21 Pin 25 and 26		Oscillator CLK/4096
J22 Pin 1		74HC4040 Vcc
J22 Pin 2		Vcc 5V

3 Before you start

This section describes operations needed before powering up the board.

Before powering up the mother board, could connect:

- Daughter board PTB801DB
- Wheel speed sensor board
- µC mini module (ST10/JPC family)

3.1 How to exercise diagnostic functionality

The PTB801DB has many diagnostic features. Please see the L9347 and L9352B datasheet for detail.

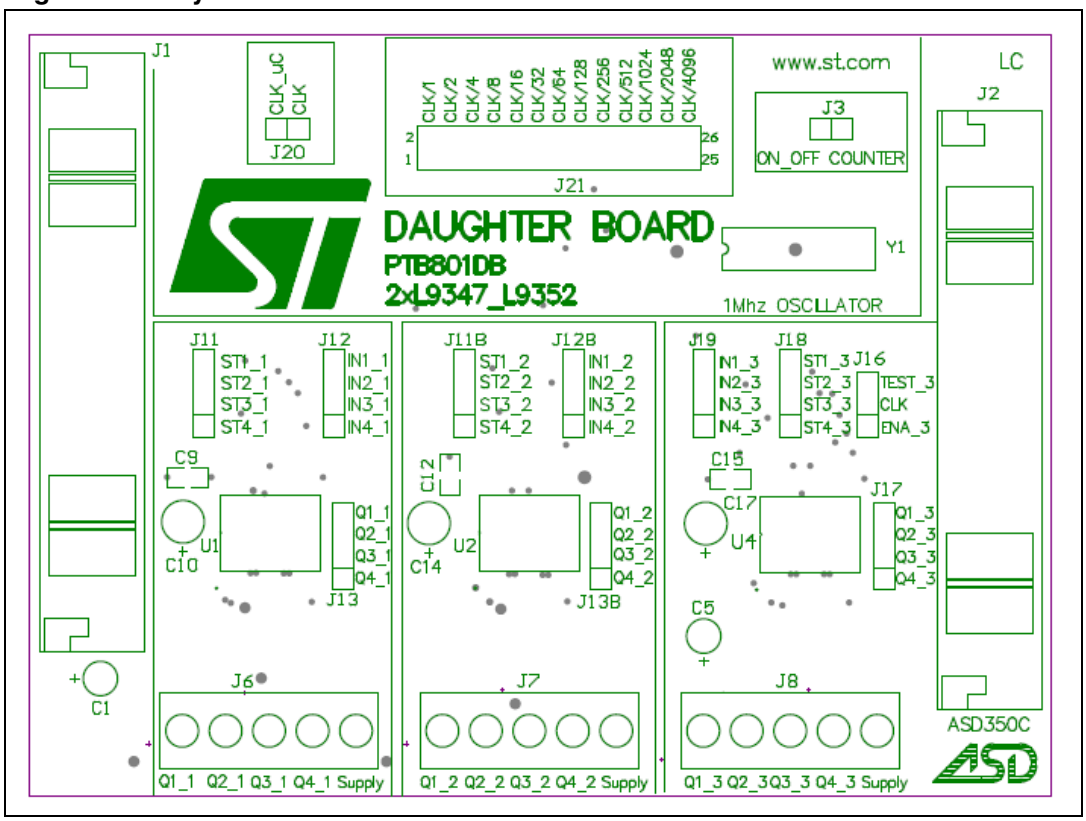
4 Hardware

This chapter describes all the hardware modules of the board.

4.1 Overview

The PTB801DB is a specific platform for ABS and ESC valve drivers system with parallel interface.

Figure 12. Layout of 2 x L9347 and L9352B devices



5 Revision history

Table 6. Document revision history

Date	Revision	Changes
28-May-2009	1	Initial release.
17-Sep-2013	2	Updated Disclaimer.

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