Discovery kit for the ST25DV-PWM series Dynamic NFC Tags

Introduction

The ST25DV-PWM-eSET (shown in *Figure 1*) is a dynamic NFC tag evaluation board based on the ST25DV02K-W2 device.

The ST25DV02K-W1/W2 devices are NFC/RFID tag ICs with PWM outputs, embedding a 2-Kbit EEPROM that can be partitioned to enhance flexibility. The PWM outputs can be programmed independently and securely by contactless interface, allowing the user to address a large number of applications. These ICs also provide live update of PWM parameters.

The EEPROM is operated from a 13.56 MHz RFID reader or by any NFC mobile phone, while PWM outputs require external power supply. The contactless interface is based on ISO/IEC 15693 and NFC Forum Type 5 tag standards.

Figure 1. ST25DV-PWM-eSET board

Contents

List of tables

List of figures

1 Features

- Ready-to-use printed circuit board with:
  - ST25DV02K-W2 NFC/RFID Tag in SO8N ECOPACK2$^®$ package
  - 22 x 38 mm^2 single layer inductive antenna, etched on the PCB
  - Two LEDs ramp illustrating duty cycle of PWM outputs
- Contactless interface
  - Based on ISO/IEC 15693 and NFC Forum Type 5
  - Internal tuning capacitance: 28.5 pF
- Memory and Data protection
  - 2-Kbit EEPROM
  - Up to four independent areas
  - TruST25™ digital signature mechanism for authentication

2 Description

The ST25DV-PWM-eSET is a ready-to-use demonstration board intended to evaluate the ST25DV02-W, a dynamic NFC/RFID tag IC with Pulse Width Modulation (PWM) outputs embedding a 2-Kbit EEPROM, supporting the NDEF Tag Application for NFC Forum Type 5.

The board is based on the ST25DV02K-W2 chip and a 22 x 38 mm^2 antenna (see *Figure 2*).

Figure 2. ST25DV-PWM-eSET functional block diagram
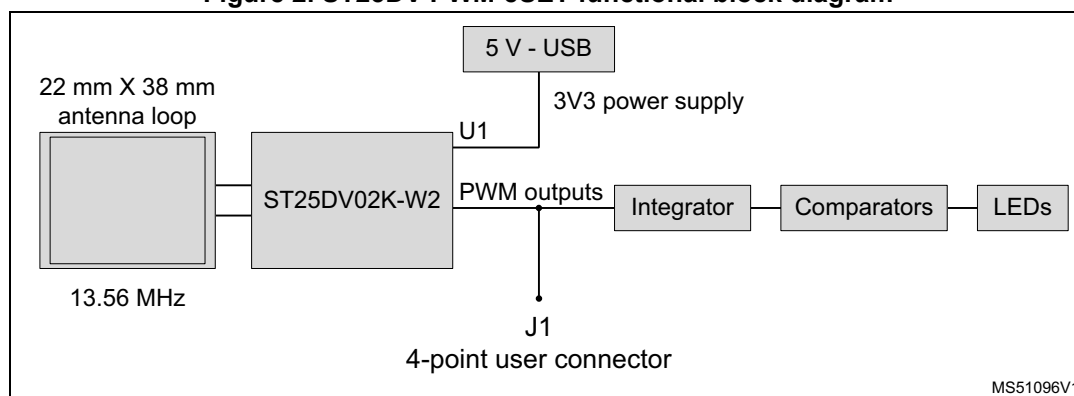
The board is powered through an USB connector and both PWM outputs of the ST25DV02K-W2 are connected to an integrator whose output is compared with various voltages. Depending on the result of the comparison, a number of LEDs corresponding to duty cycle of each PWM output are turned on (see *Table 1*). In parallel, both PWM outputs are made available.

Table 1. Correspondence between ON LED reference and PWM signal duty cycle

LED ON designator (PWM1 / PWM2)	Approximated duty cycle (%)
0 / 8	0 to 14
1 / 9	14 to 24
2 / 10	24 to 33
3 / 11	33 to 49
4 / 12	49 to 63
5 / 13	63 to 75
6 / 14	75 to 91
7 / 15	91 to 100

3 ST25DV-PWM-eSET powering and startup

The ST25DV- PWM-eSET board is powered either through a USB microC connector or the J1 user connector. In the latter case, power supply voltage has to be 3.3V.

Once done, program each PWM output with the expected value, LEDs ramp will turn on accordingly, and signals will be available on the J1 connector.

By default ST25DV-PWM-eSET is programmed with a 50% duty cycle.

4   Schematics

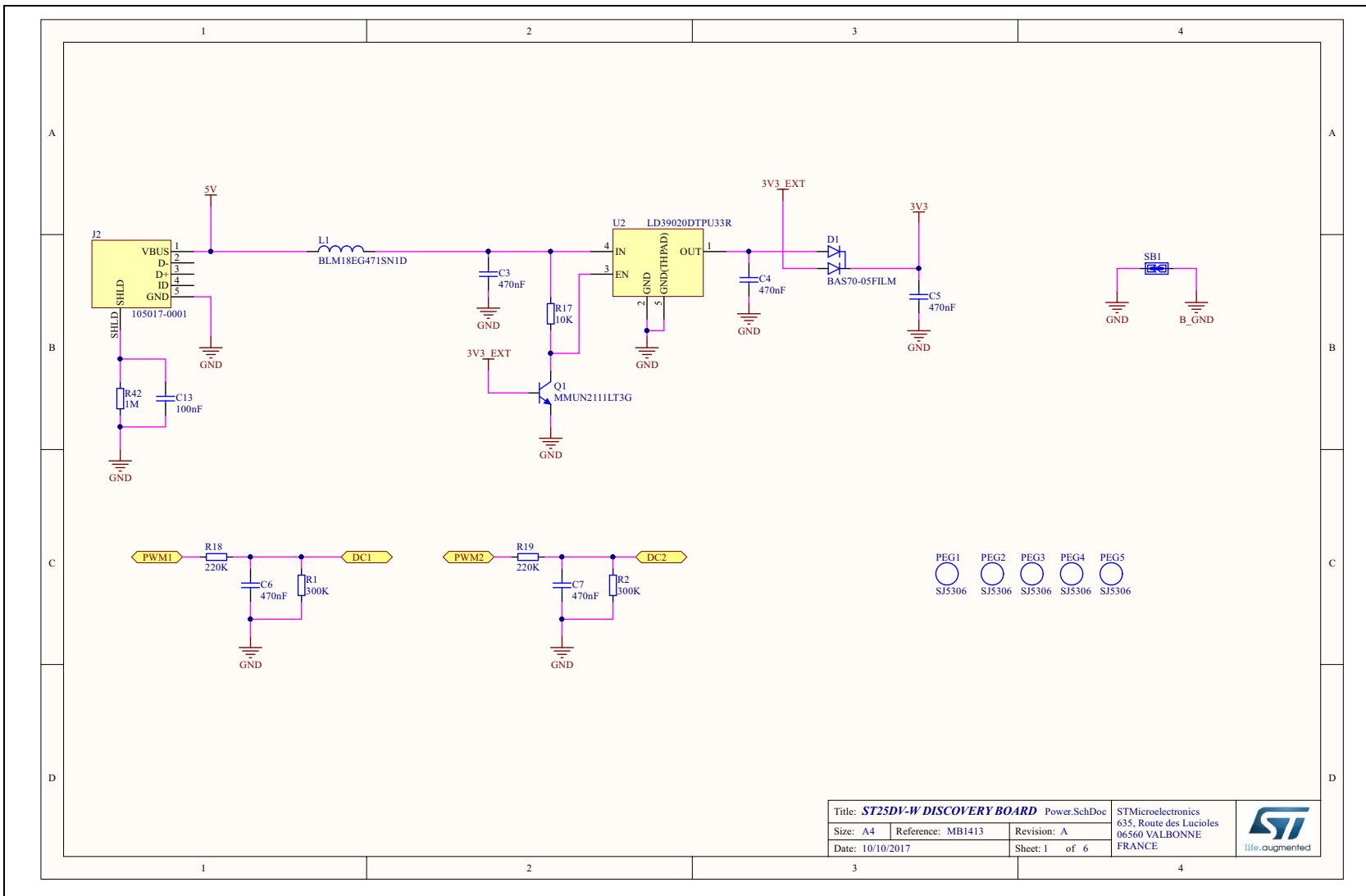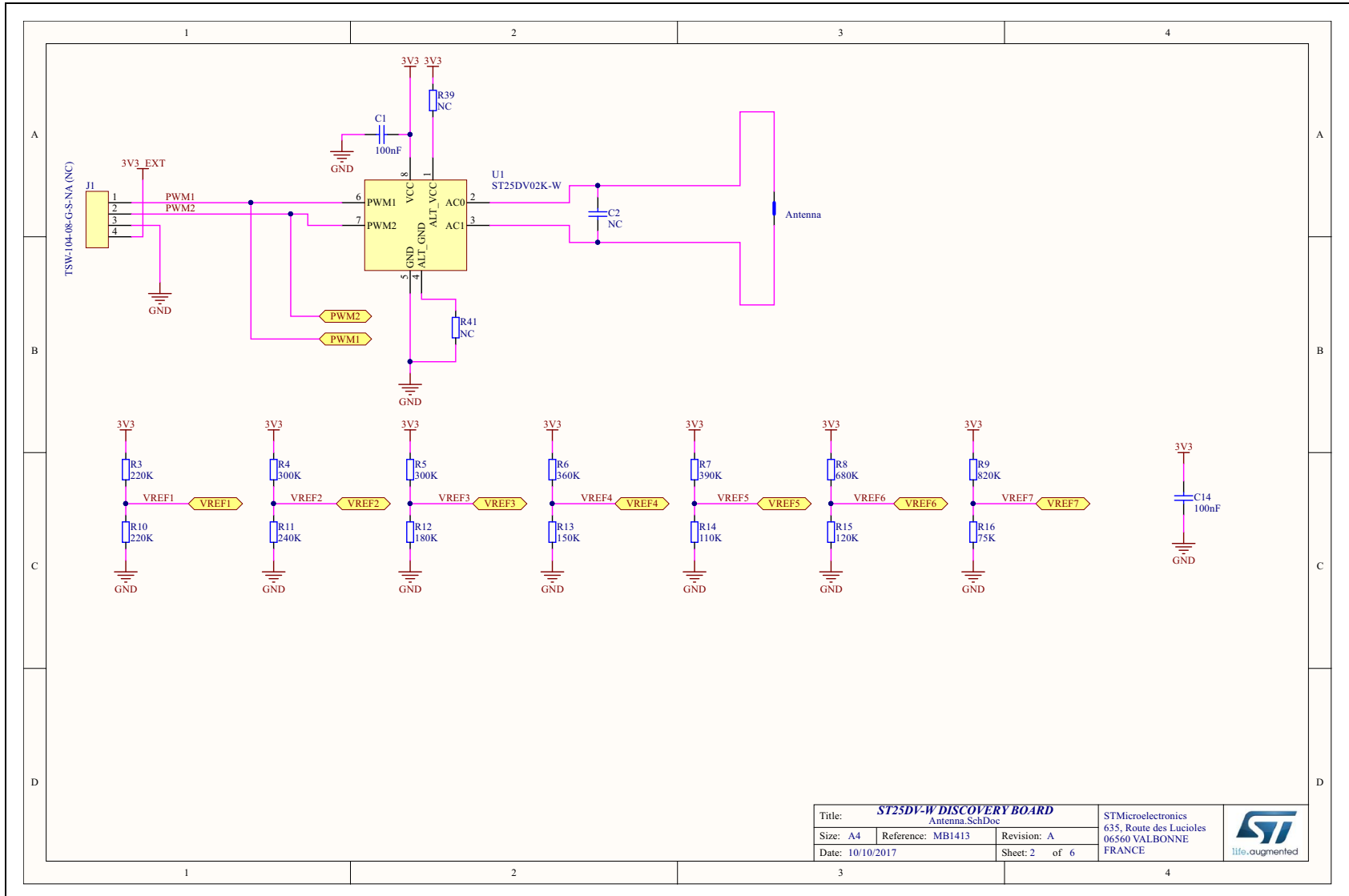**Figure 3. ST25DV-PWM-eSET - Power**

Figure 4. ST25DV-PWM-eSET - Antenna

Figure 5. ST25DV-PWM-eSET - LED PWM1 (1 to 4)

Title:	ST25DV-W DISCOVERY BOARD	STMicroelectronics
	LED PWM1 1-4.SchDoc	635, Route des Lucioles
Size: A4	Reference: MB1413	Revision: A
		06560 VALBONNE
Date: 10/10/2017	Sheet: 3 of 6	FRANCE

Figure 6. ST25DV-PWM-eSET - LED PWM1 (5 to 7)

Title:	ST25DV-W DISCOVERY BOARD
	LED PWM1 5-7.SchDoc
Size: A4	Reference: MB1413	Revision: A
Date: 10/10/2017	Sheet: 4 of 6

STMicroelectronics
635, Route des Lucioles
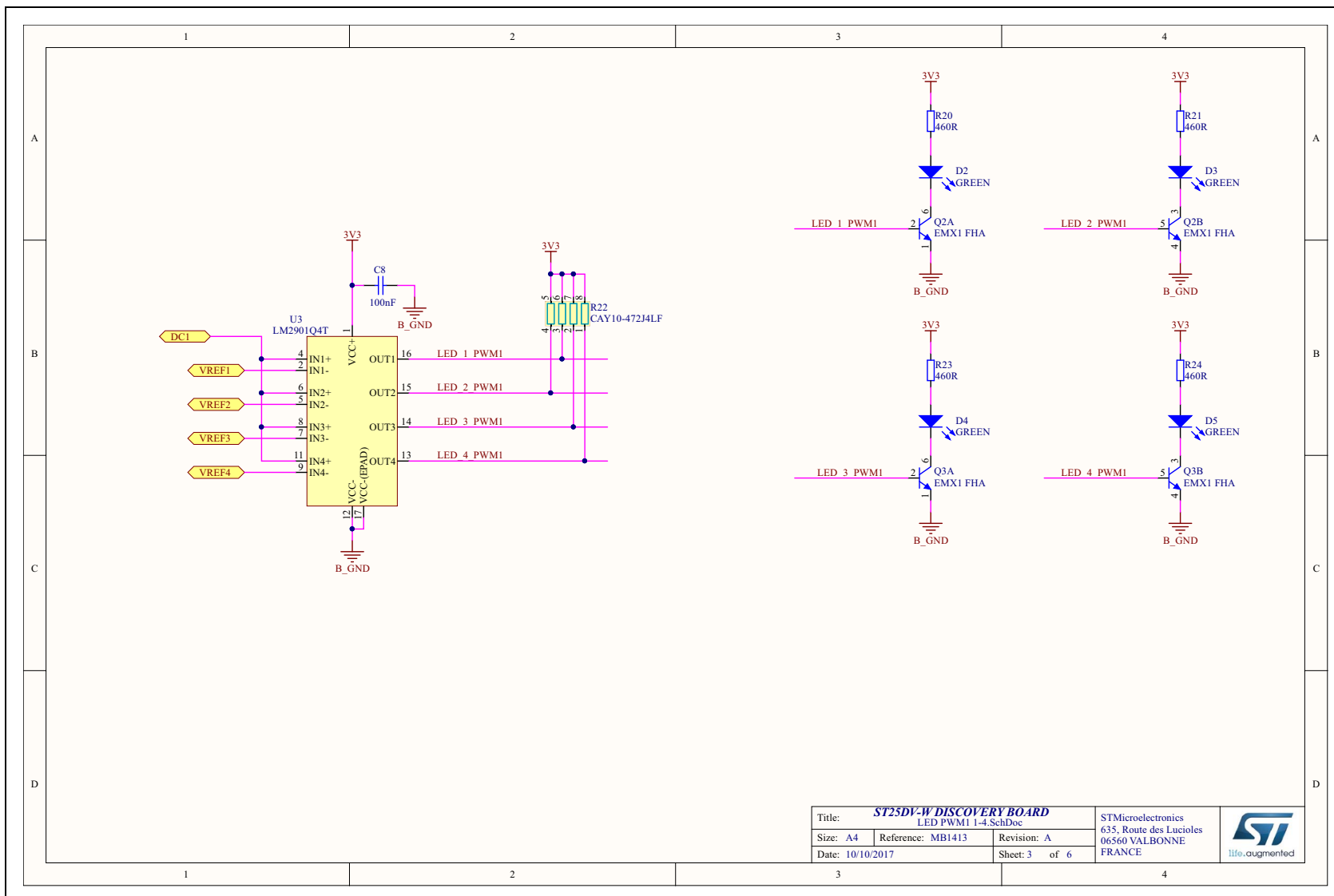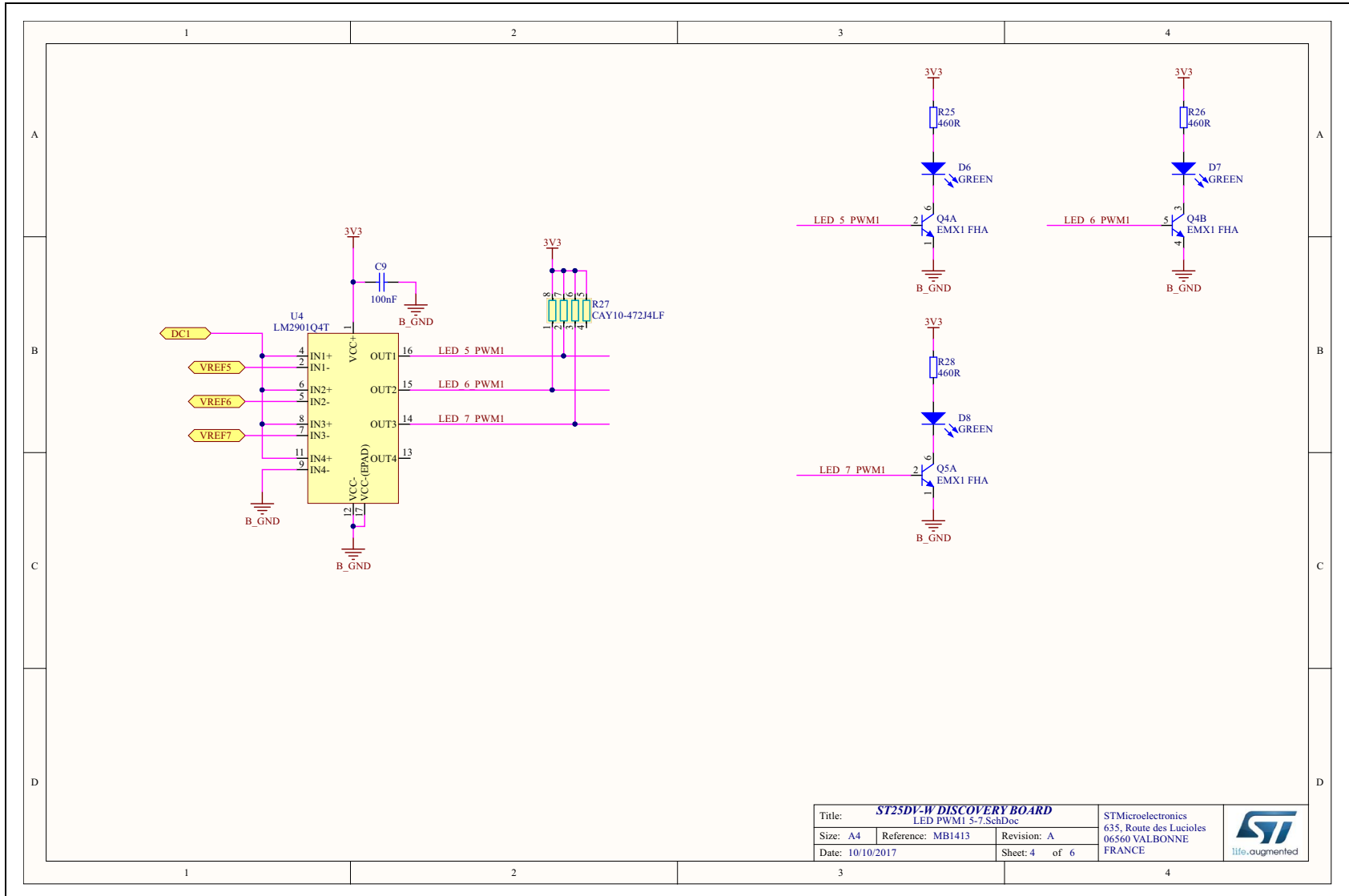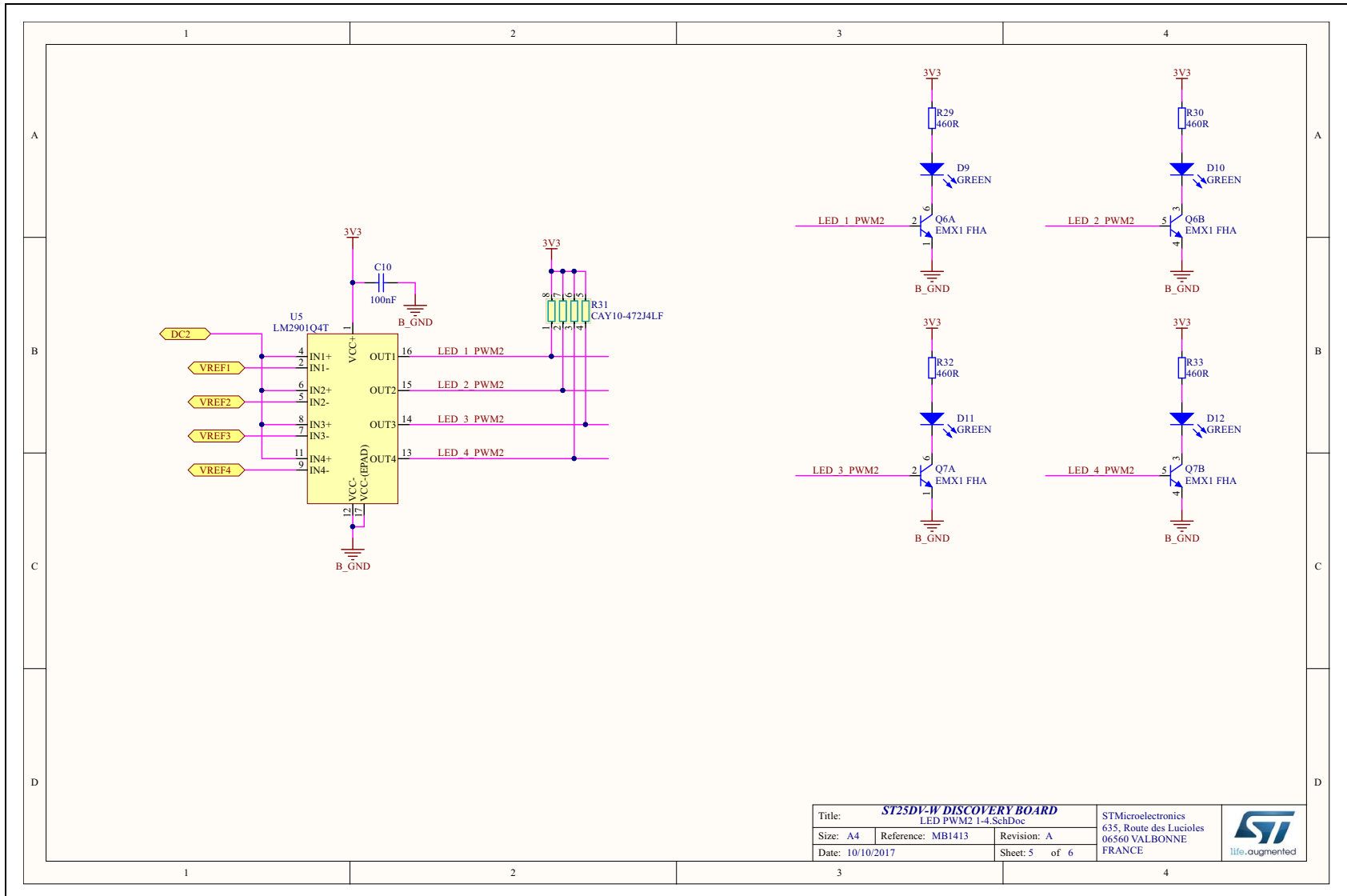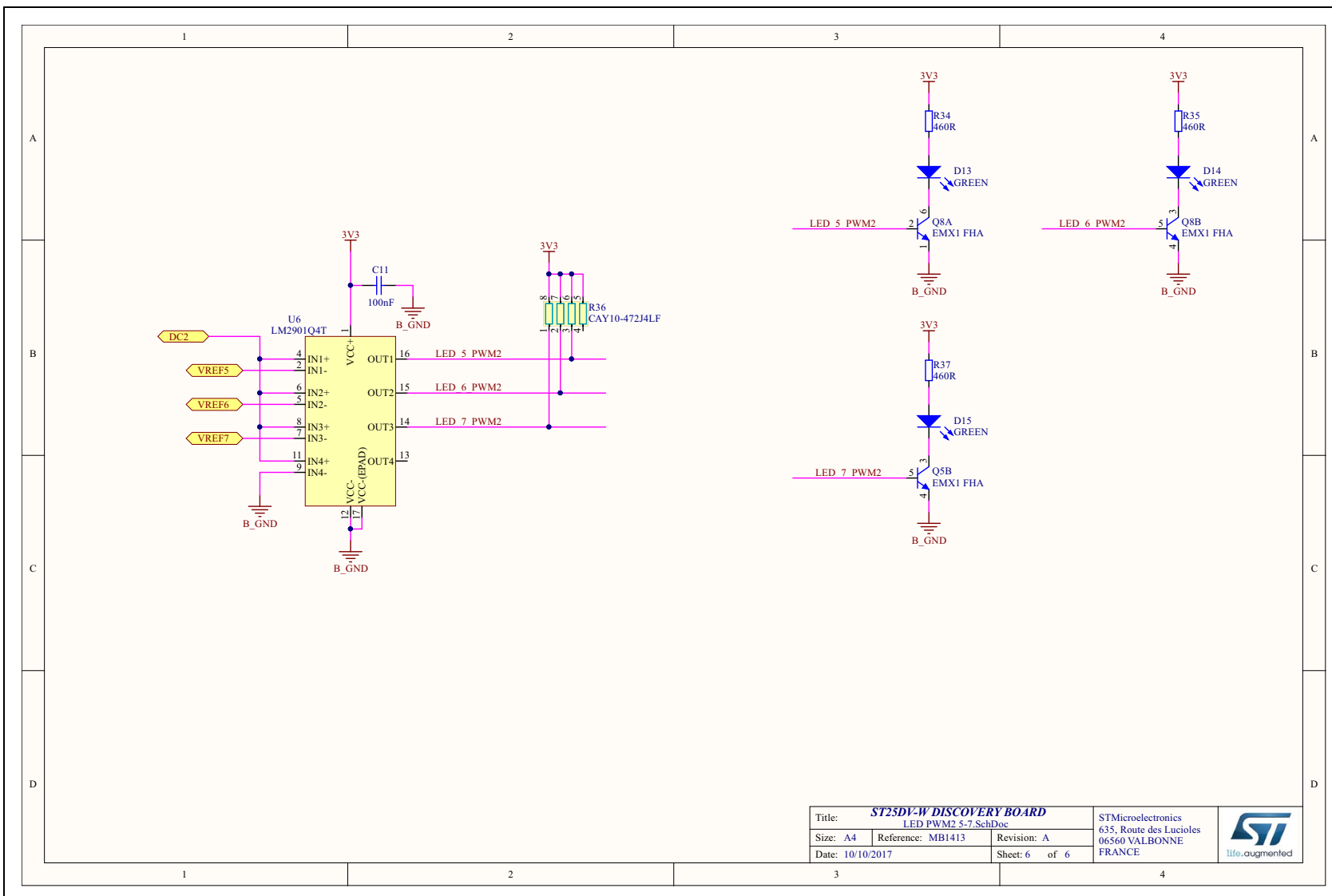06560 VALBONNE
FRANCE

Figure 7. ST25DV-PWM-eSET - LED PWM2 (1 to 4)

Figure 8. ST25DV-PWM-eSET - LED PWM2 (5 to 7)

5 Federal Communications Commission (FCC) and Industry Canada (IC) compliance statements

5.1 FCC Compliance Statement

5.1.1 Part 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

5.1.2 Part 15.105

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference's by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

5.1.3 Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

5.2 IC Compliance Statement

5.2.1 Compliance Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation.

5.2.2 Déclaration de conformité

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout

brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

6 Revision history

Table 2. Document revision history

Date	Revision	Changes
07-Sep-2018	1	Initial release.

IMPORTANT NOTICE – PLEASE READ CAREFULLY