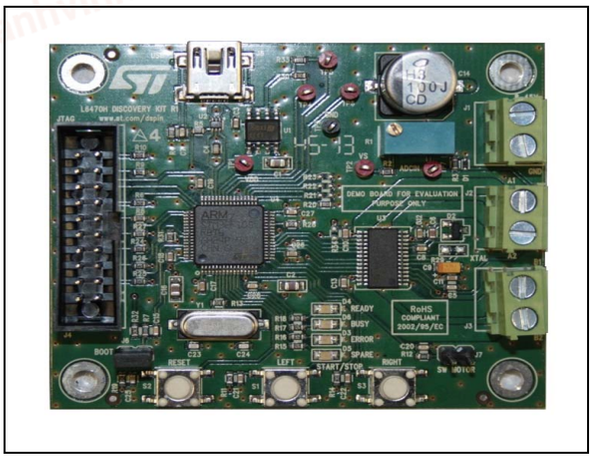
chanhvinh.com

EVAL6470H-DISC

dSPIN™ Discovery: development tool to explore dSPIN™ (L6470) motor driver

Data brief



Features

- Voltage mode driving featuring extreme smoothness
- Up to 1/128 microstepping
- Fully autonomous solution embedding an STM32™ MCU and the L6470H stepper motor driver
- Compatible with SPIN family evaluation software
- Wide voltage range from 8 V to 45 V
- High phase current up to 3 $A_{r.m.s}$
- Footprint optimized for external resonator or crystal
- Switch motor input control
- Keys start/left - stop/right - reset
- Ready, busy, error LED indicators
- Spare LED indicators for specific design
- Adjustable supply voltage compensation

Description

The dSPIN™ Discovery is a low cost development tool to explore the dSPIN™ (L6470) motor driver.

An ideal starter-kit for both beginners and experienced users, it is autonomous and can be used with a software interface or with a custom firmware thanks to the embedded microcontroller.

Through the available GUI the user can easily set the full configuration of application parameters.

“Plug and Play” tool it offers high motor control flexibility thanks to the wide operating voltage range from 8 V to 45 V and the current capability up to 3 $A_{r.m.s}$. It is equipped with LED indicators for specific ready, busy, error warning.

For further information contact your local STMicroelectronics sales office. www.st.com

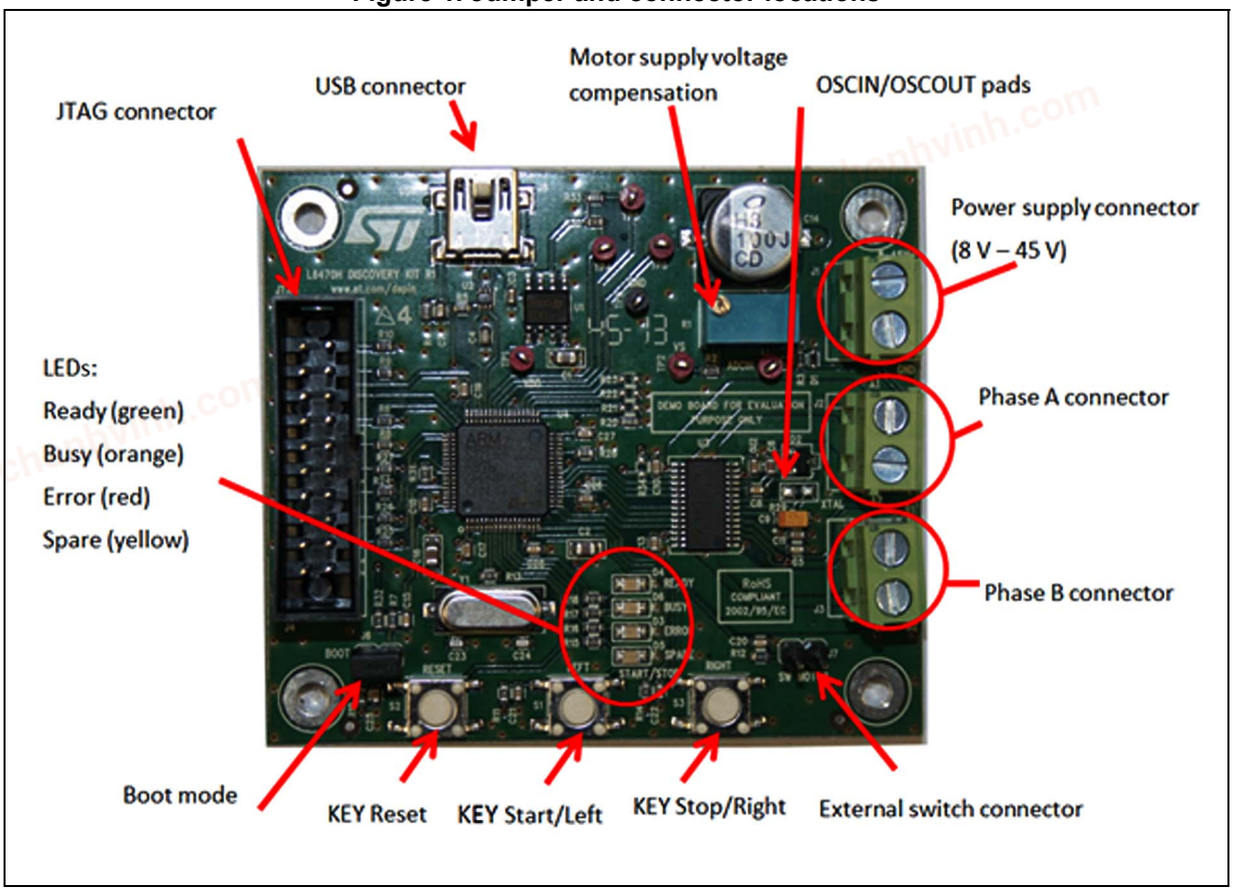
chanhvinh.com

Board description

Table 1. Electrical specifications

Parameter	Value
Supply voltage (V_S)	8 to 45 V
Maximum output current (each phase)	3 $A_{r.m.s}$
Logic supply voltage (V_{REG})	3 V (internal supply)
Logic interface voltage (V_{DD})	3.3 V (internal supply)
Low level logic inputs voltage	0 V
High level logic input voltage	V_{DD}
Stepping	Up to 1/128 microstepping
Operating temperature	-25 to 125 °C

Figure 1. Jumper and connector locations



chanhvinh.com

Table 2. Jumpers and connectors

Name	Function
J1	Motor supply voltage
J2	Bridge B output
J3	Bridge A output
J4	Debug JTAG function
J5	USB function
J6	Boot mode
J7	External switch input
R29	OSCIN and OUSCOUT pins
TP1	V_{DD} - logic supply voltage
TP2	V_S - motor supply voltage
TP3	GND - ground test point
TP4	UART RX - debug test point
TP5	UART TX - debug test point
TP6	UART CK - debug test point
TP7	Motor voltage compensation test point

Table 3. JTAG connector pinout (J4)

Name	Type	Function
1 - 2	Supply	EXT_VDD
3	Digital I/O	External RESET
5	Digital I/O	INPUT (TDI)
7	Digital I/O	Mode select (TMS)
9	Digital I/O	Clock (TCK)
13	Digital I/O	OUTPUT (TDO)
15	Digital I/O	Internal RESET
11 - 17 - 19	Digital I/O	Pull-down
4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20	Ground	Ground

chanhvinh.com

Figure 2. Schematic (power supply part)

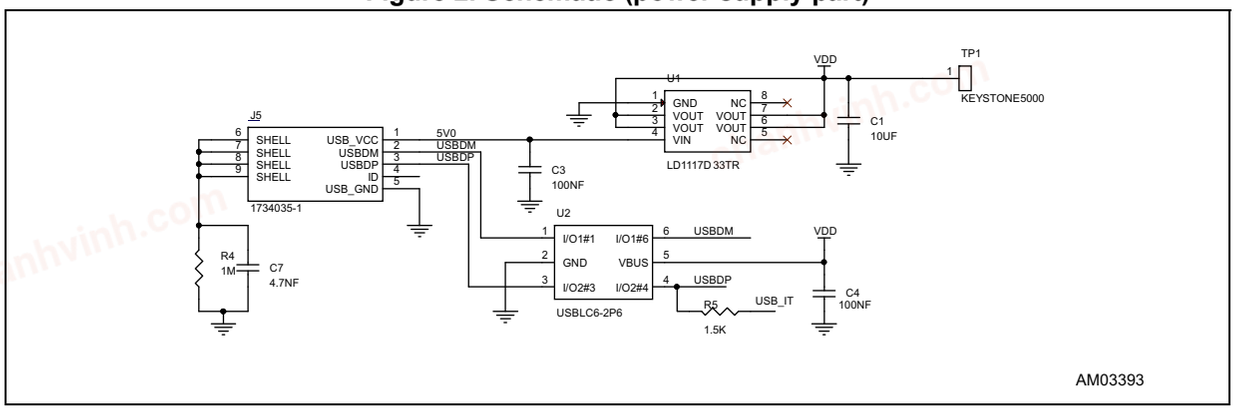
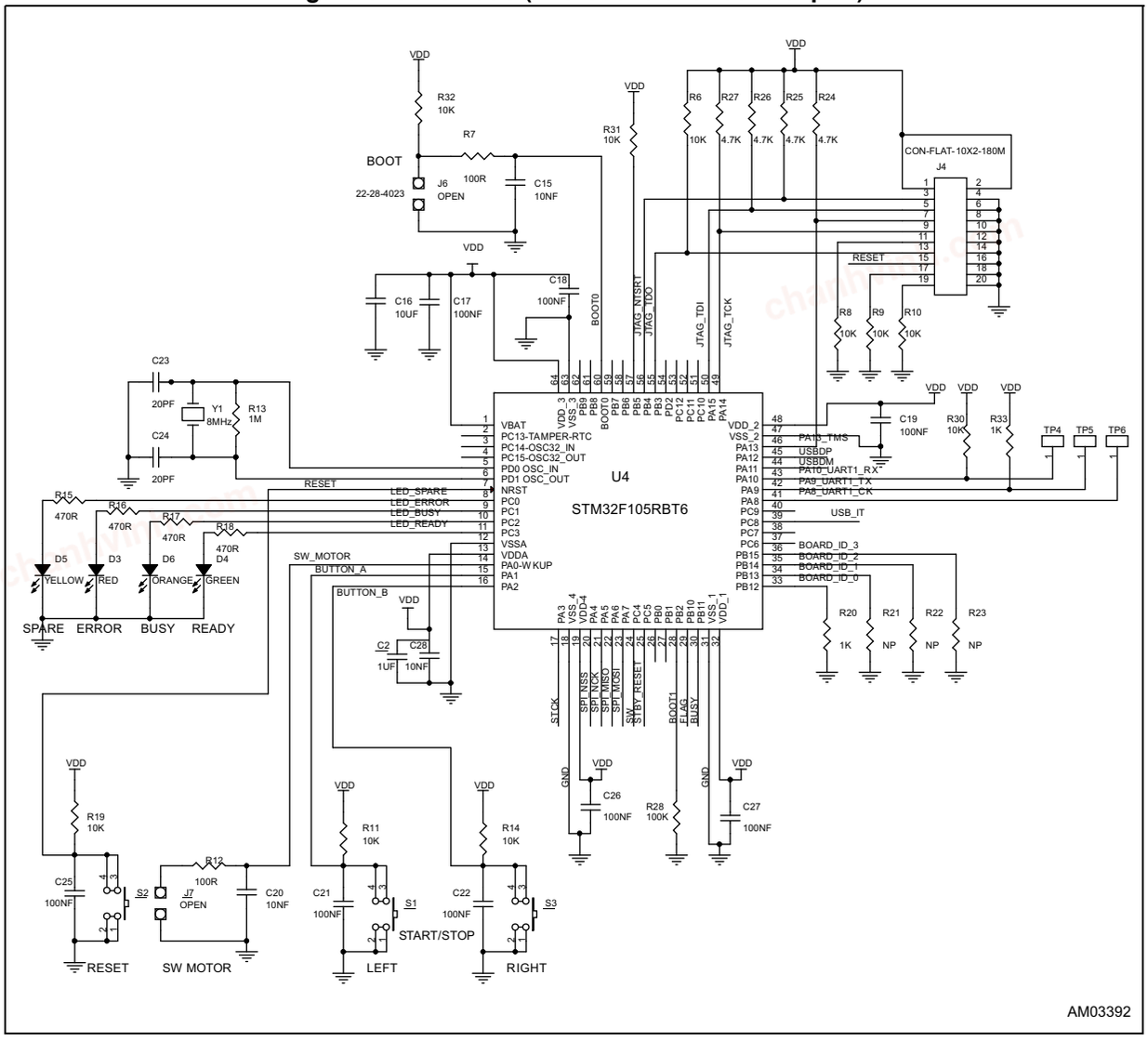


Figure 3. Schematic (microcontroller control part)



chanhvinh.com

Figure 4. Schematic (motion control part)

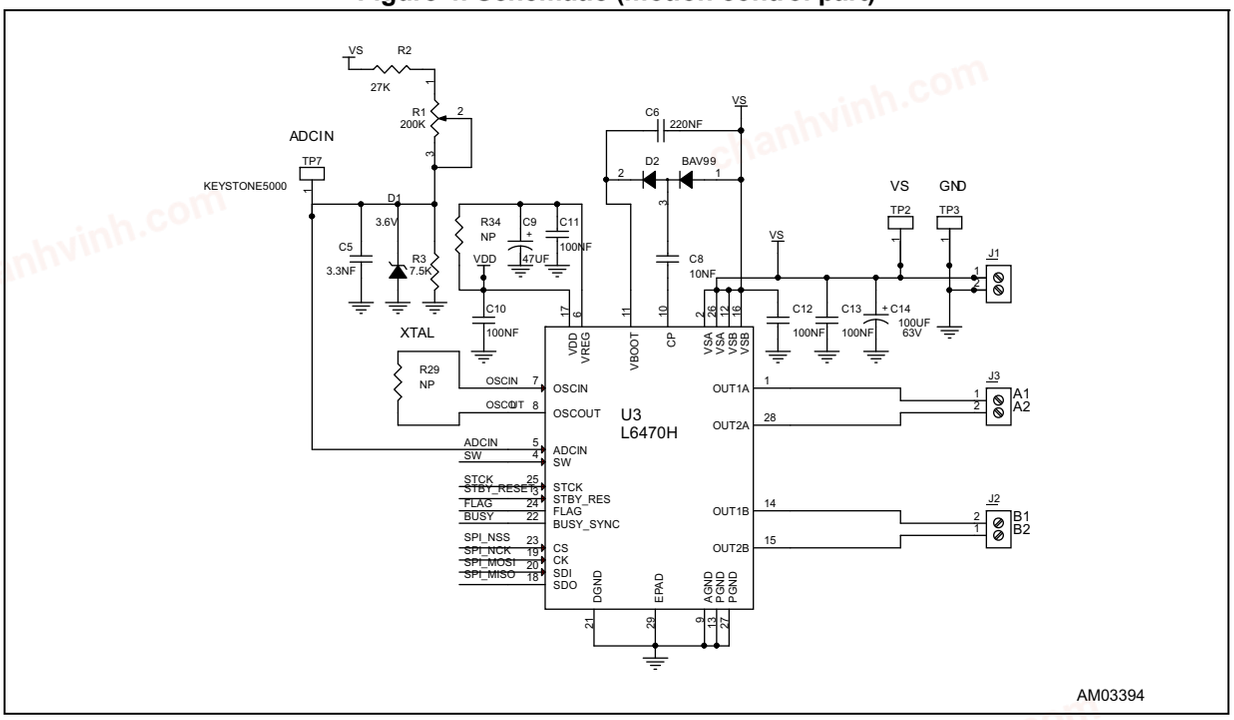


Table 4. Bill of material

Item	Quantity	Reference	Value	Package
C1, C16	2	Cap. cer. 10 µF 10 V X7R 0805	10 µF	0805
C2	1	Cap. cer. 1 µF 10 V X7R 0805	1 µF	0805
C3, C4, C10 -C13, C17 - C19, C21, C22, C25 -C27	14	Cap. cer. 100 nF 50 V X7R 0603	100 nF	0603
C5	1	Cap. cer. 3.3 nF 50 V X7R 0603	3.3 nF	0603
C6	1	Cap. cer. 220 NF 35 V X7R 0603	220 nF	0603
C7	1	Cap. cer. 4.7 nF 50 V X7R 0603	4.7 nF	0603
C8, C15, C20, C28	4	Cap. cer. 10 nF 50 V X7R 0603	10 nF	0603
C9	1	Cap. tant. 47 µF 6.3 V 10% PACK-A	47 µF	3216
C14	1	Cap. elect. 100 µF 63 V	100 µF	CAPES-R10HXX
C23, C24	2	Cap. cer. 20 pF 50 V COG 0603	20 pF	0603
D1	1	Zener regulator	3.6 V	SOD 523
D2	1	Double diode high speed switching diode	BAV99	SOT 23
D3	1	LED red - 0805 - 2 mcd - 621 nm	Red	0805
D4	1	LED green - 0805 - 6 mcd - 569 nm	Green	0805
D5	1	LED yellow - 0805 - 6 mcd - 588 nm	Yellow	0805
D6	1	LED orange - 0805 - 2 mcd - 602 nm	Orange	0805

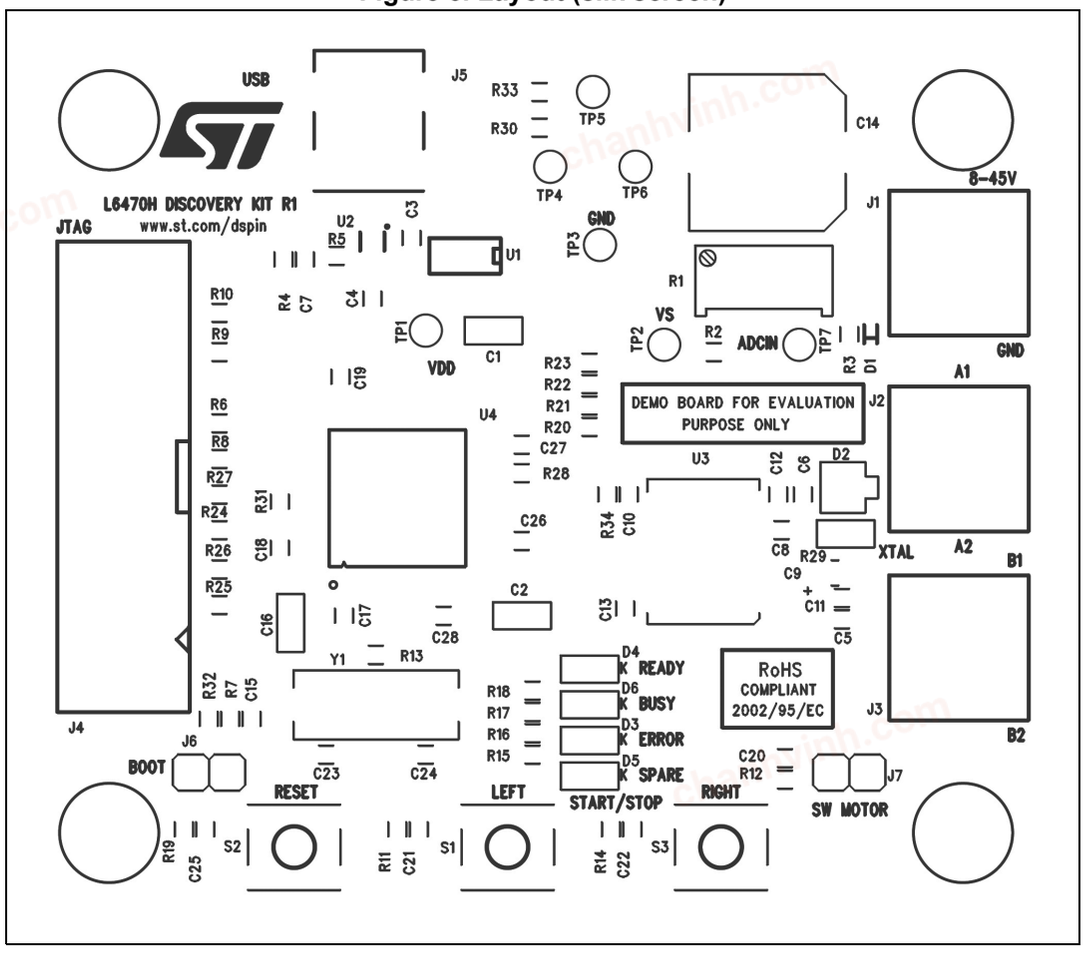
chanhvinh.com

Table 4. Bill of material (continued)

Item	Quantity	Reference	Value	Package
FIX1 - FIX4	4	Hole	3 mn	-
J1 - J3	3	Screw connector 2 poles MKDSN 1.5 / 2 - 5.08	MKDSN1.5 / 2 - 5.08	MKDSN1.5 / 2 - 5.08
J4	1	JTAG CON-FLAT-10 x 2 - 180 M	CON-FLAT - 10 x 2 - 180 M	CON-FLAT - 10 x 2 - 180 M
J5	1	USB_B_MINI_AMP_1734035-1	CN-USB	CMS mini-USB
J6, J7	2	JUMP254P-M-2	OPEN	Strip 2 x 2.54
MIRE1 - MIRE3	3	OPTICAL_TARGET	OPTICAL_TARGET	Diam. 1 mn
R1	1	Trimmer 200 KΩ	200 KΩ	Trimm. 100 x 50 x 110
R2	1	27 KΩ 5% 1/10 W	27 KΩ	0603
R3	1	Res. 7.5 KΩ 5% 1/10 W 0603 SMD	7.5 KΩ	0603
R4, R13	2	Res. 1 MΩ 1/10 W 5% 0603 SMD	1 MΩ	0603
R5	1	Res. 1.5 KΩ 1/10 W 5% 0603 SMD	1.5 KΩ	0603
R6, R8 - R11, R14, R19, R30 - R32	10	Res. 10 KΩ 5% 1/10 W 0603 SMD	10 KΩ	0603
R7, R12	2	Res. 100 Ω 5% 1/10 W	100 Ω	0603
R15 - R18	4	Res. 470 Ω 5% 1/10 W 0603	470 Ω	0603
R20, R33	2	Res. 1 KΩ 5% 1/10 W 0603 SMD	1 KΩ	0603
R21 - R23, R34	4	Res. NP 0603	NP	0603
R24 - R27	4	Res. 4.7 KΩ 5% 1/10 W 0603 SMD	4.7 KΩ	0603
R28	1	Res. 100 KΩ 5% 1/10 W 0603 SMD	100 KΩ	0603
R29	1	Res. NP 0805	NP	0805
S1 - S3	3	Switch button SMD	EVQQ2D03W	CMS 6.5 x 6 x 3.1
TP1, TP2, TP4 - TP7	6	Test point red	Keystone-5000	TH
TP3	1	Test point black	Keystone-5001	TH
U1	1	IC REG 1300 MA LN 3.3 V	LD1117D33TR	SO8
U2	1	UBSLC6-2P6 - ESD protection low capacitance	USBLC6-2P6	SOT 666
U3	1	dSPIN microstepping motor driven	L6470H	HTSSOP28
U4	1	IC, MCU, RISC, 72 MHz, 3.6 V, 32-bit, 64-pin, LQFP	STM32F105RBT6	LQFP64 10 x 10
Y1	1	Xtal 8 MHz - 30 PPM - 20 pF	8 MHz	HC49/US-SM

chanhvinh.com

Figure 5. Layout (silk screen)



chanhvinh.com

Figure 6. Layout (top layer)

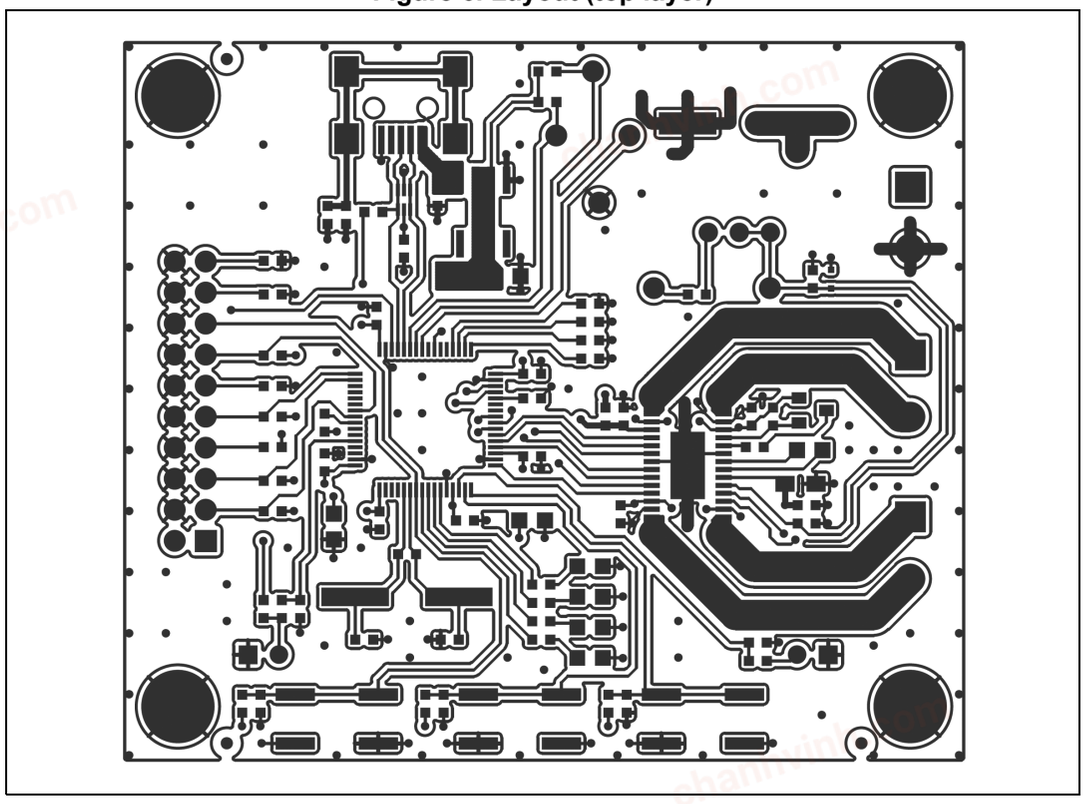
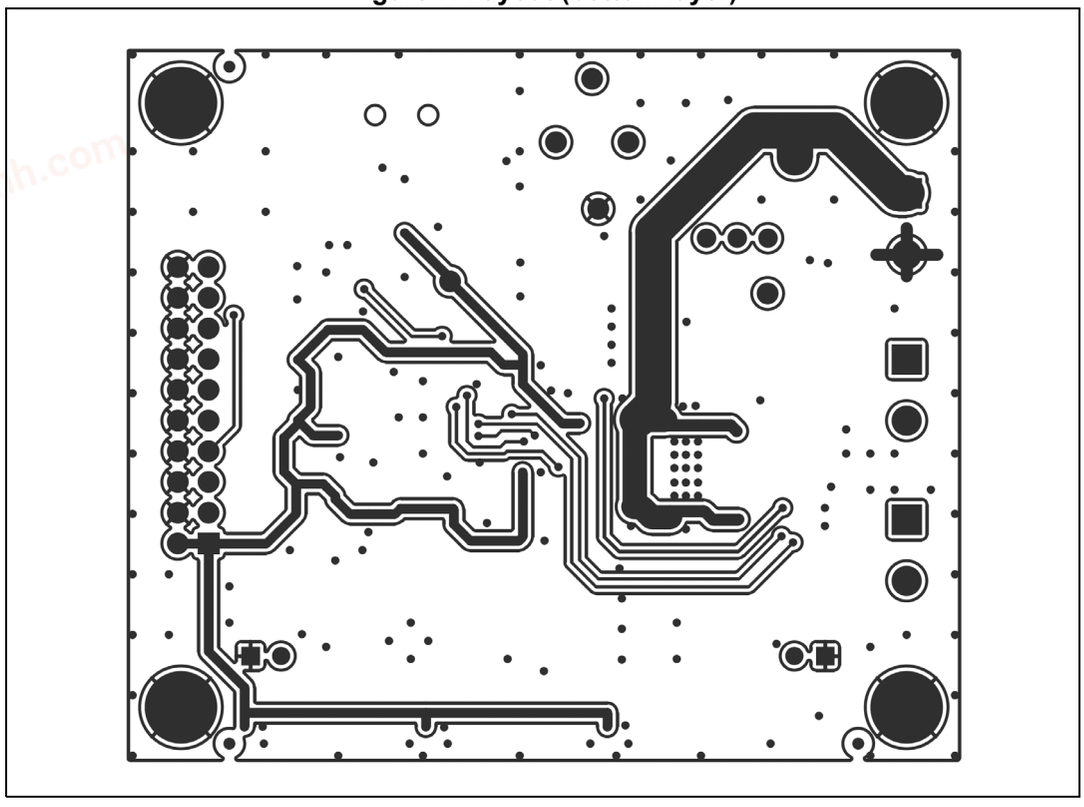


Figure 7. Layout (bottom layer)



chanhvinh.com

Revision history

Table 5. Document revision history

Date	Revision	Changes
30-Oct-2013	1	Initial release.
29-Nov-2013	2	Updated board photography on page 1. Updated *Figure 1 on page 2* (updated board photography). Minor modifications throughout document.
17-Jan2014	3	Updated main title on page 1 (replaced “dSPIN™ Discovery L6470” by “dSPIN™ Discovery: development tool to explore dSPIN™ (L6470) motor driver”). Updated *Section : Features on page 1* (replaced whole original *Section* by new *Features*). Updated *Section : Description on page 1* (replaced original *Section* by new *Description*). Minor modifications throughout document.

chanhvinh.com

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER’S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR “AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL” INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.
Information in this document supersedes and replaces all information previously supplied.
The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2014 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com