EVAL6480H-DISC

cSPIN™ Discovery: development tool to explore cSPIN (L6480) motor controller

Data brief

Description

The cSPIN™ Discovery is a low cost development tool to explore the cSPIN™ (L6480) motor controller.

The EVAL6480H-DISC is an ideal starter kit for both beginners and experienced users, it is autonomous and can be used with a software interface, or it can be used with custom firmware thanks to the embedded microcontroller.

Through the available GUI a user can easily set the full configuration of application parameters. The "Plug and Play" tool offers high motor control flexibility thanks to the wide operating voltage range from 10.5 V to 85 V and the current capability up to 7.8 $A_{r.m.s}$. It is equipped with LED indicators for a specific ready, busy, and error warning.

Features

- Voltage range from 10.5 V to 85 V
- Phase current up to 7.8 A $_{r.m.s}$
- Footprint 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
- Sensorless stall detection
- Compatible with SPIN family evaluation tool
- Autonomous board due to an embedded firmware
- Up to 1/128 microstepping
- Programmable non dissipative overcurrent
- Overtemperature protection

Board description

Table 1. Electrical specifications

| Parameter	Value
Supply voltage (V_S)	10.5 to 85 V
Maximum output current (each phase)	7.8 $A_{r.m.s}$
Internal voltage regulator (V_{SREG})	10.5 to 85 V
Gate driver supply voltage (V_{CC})	7.5 or 15 V
Logic and supply interface voltage (V_{DD} - V_{REG})	3.3 V
Low level logic inputs voltage	0 V
High level logic input voltage	V_{DD}
Stepping	Up to 1/128 microstepping
Operating temperature	0 to 85 °C

Figure 1. Jumpers and connectors location
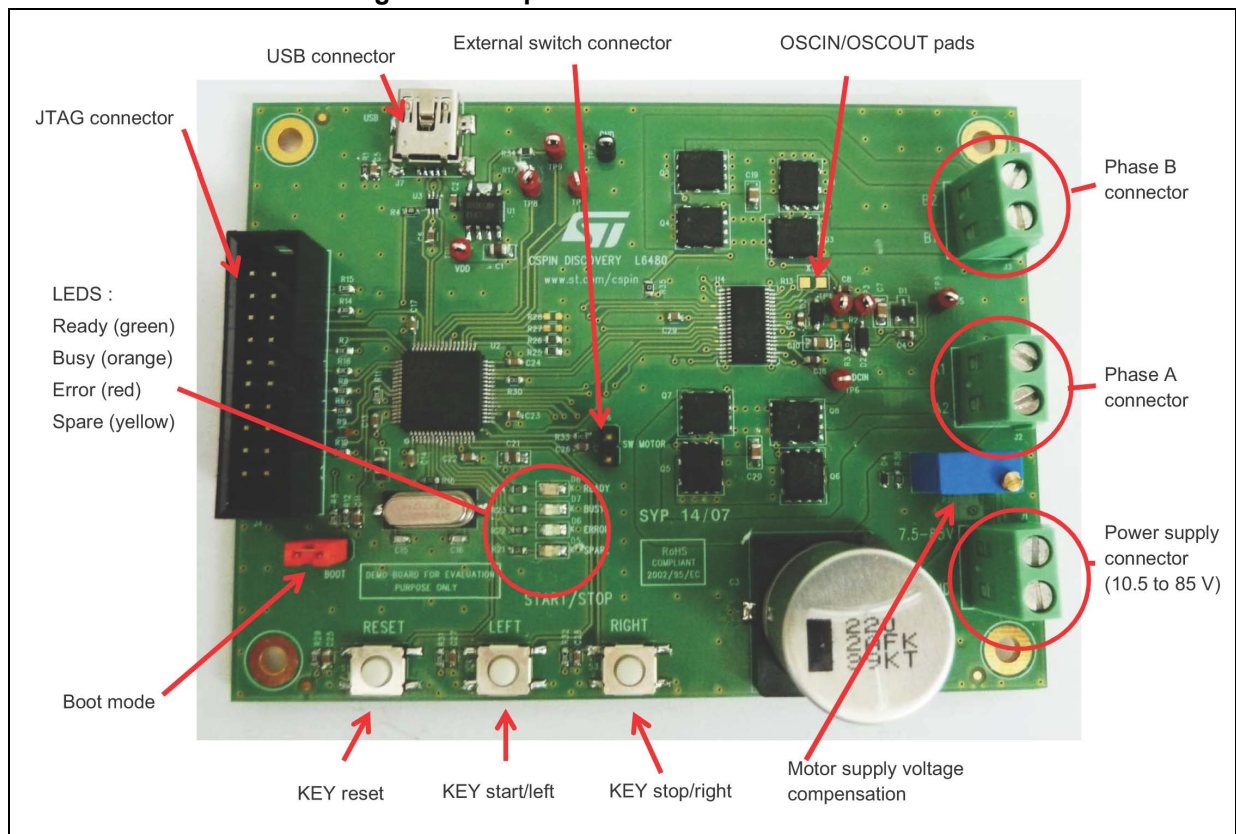
Table 2. Jumpers and connectors

Name	Function
J1	Motor supply voltage
J2	Bridge A output
J3	Bridge B output
J4	Debug JTAG function
J5	Boot mode
J6	External switch input
J7	USB function
R13	OSCIN and OUSCOUT pins
TP1	V_{DD} - logic supply voltage
TP2	GND - ground test point
TP3	V_{SREG} driver supply
TP4	V_{CC} driver supply
TP5	V_S - motor supply voltage
TP6	Motor supply voltage compensation
TP7	UART CK - debug test point
TP8	UART RX - debug test point
TP9	UART TX - debug 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

Figure 2. Schematic (microcontroller control part)
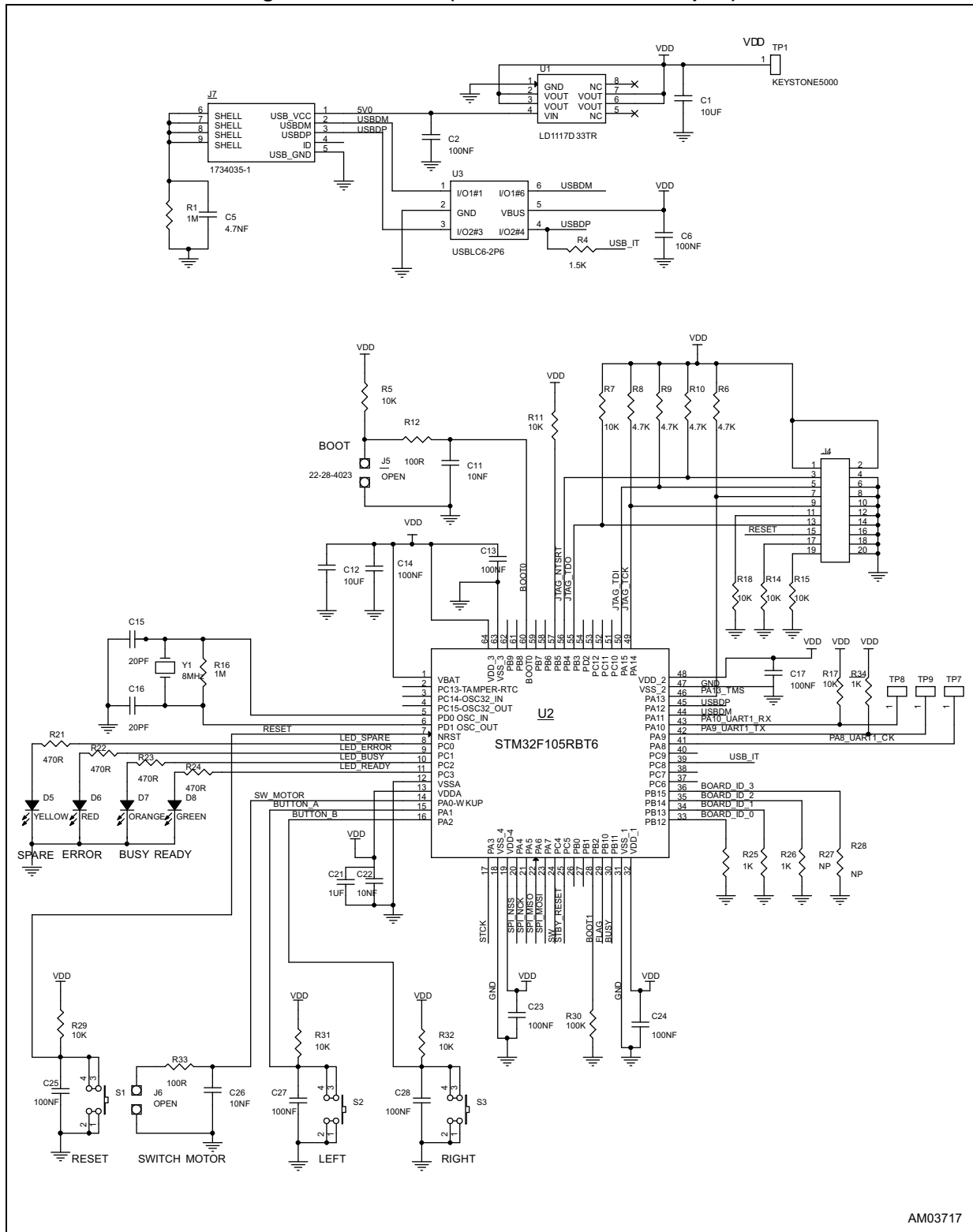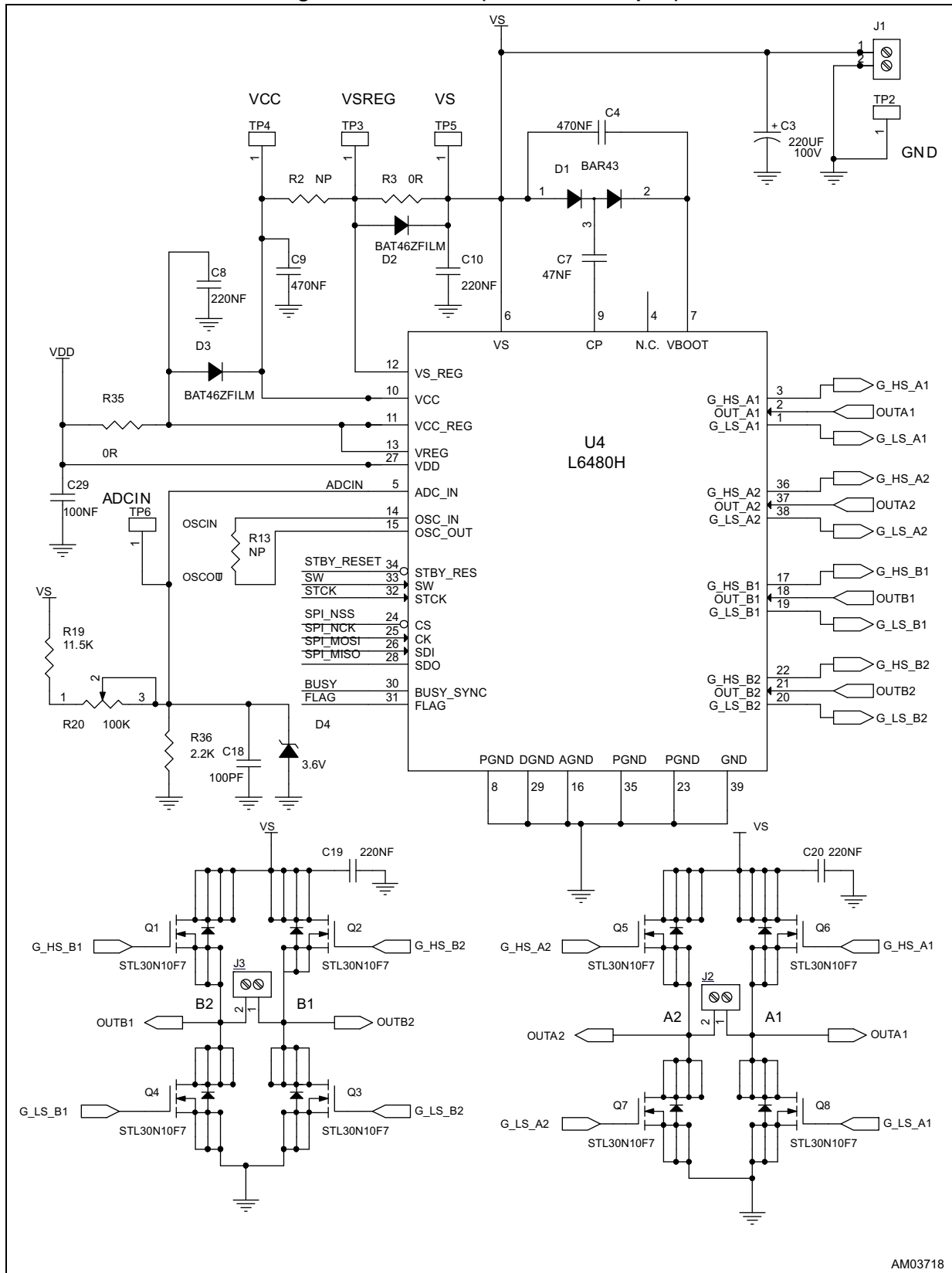
Figure 3. Schematic (motion control part)

AM03718

Table 4. Bill of material

Item	Qty.	Reference	Value	Package
C1, C12	2	CAP. CER. 10 µF 10 V X7R 0805	10 µF	0805
C2, C6, C13, C14, C17, C23-C25, C27-C29	11	CAP. CER. 100 nF 50 V X7R 0603	100 nF	0603
C3	1	CAP. ELEC. 220 µF 100 V	220 µF	CAPES-R18H17
C4, C9	2	CAP. CER. 470 nF 25 V X7R 0603	470 nF	0603
C5	1	CAP. CER. 4.7nF 50 V X7R 0603	4.7 nF	0603
C7	1	CAP. CER. 47 nF 100 V X7R/X7S 0805	47 nF	0805
C8	1	CAP. CER. 220 nF 35 V X7R 0603	220 nF	0603
C10, C19, C20	3	CAP. CER. 220 nF 100 V X7R 0805	220 nF	0805
C11, C22, C26	3	CAP. CER. 10 nF 50 V X7R 0603	10 nF	0603
C15, C16	2	CAP. CER. 20 pF 50 V COG 0603	20 pF	0603
C18	1	CAP. CER. 100 pF 50 V COG 0603	100 pF	0603
C21	1	CAP. CER. 1 µF 10 V X7R 0805	1 µF	0805
D1	1	Double diode - high speed switching diode	BAR43	SOT23
D2, D3	2	Diode Schottky 150 MA	BAT46ZFILM	SOD 123
D4	1	Zener regulator	3.6 V	SOD 523
D5	1	LED yellow - 0805 -6 mcd - 588 nm	Yellow	0805
D6	1	LED red - 0805 -2 mcd - 621 nm	Red	0805
D7	1	LED orange - 0805 -2 mcd - 602 nm	Orange	0805
D8	1	LED green - 0805 -6 mcd - 569 nm	Green	0805
FIX1 - FIX4	4	Hole		Diam. 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. - straight- 10 x 2 - 180 M	CON. - STRAIGHT - 10 x 2 - 180 M	CON. - FLAT - 10 x 2 - 180 M
J5 J6	2	JUMP254P-M-2	OPEN	2.54 mn
J7	1	USB_B_MINI_AMP_1734035-1	CN-USB	CMS mini USB
MIRE1 - MIRE3	3	OPTICAL_TARGET	OPTICAL_TARGET	Diam. 1 mn
Q1 - Q8	8	N-channel 100 V, 27 mΩ, 8 A STripFET™ VII DeepGATE™ Power MOSFET in PowerFLAT™ 5 x 6 package	STL30N10F7	PowerFLAT 5 x 6
R1, R16	2	Res. 1 MΩ M 1/10 W 5% 0603 SMD	1 MΩ	0603
R2, R27, R28	3	Res. NP 0603	NP	0603
R3, R35	2	Res. 0.0 Ω 5% 1/1 0W 0603	0 Ω	0603

Table 4. Bill of material (continued)

| Item	Qty.	Reference	Value	Package
R4	1	Res. 1.5 KΩ 1/10 W 5% 0603 SMD	1.5 KΩ	0603
R5, R7, R11, R14, R15, R17, R18, R29, R31, R32	10	Res. 10 KΩ 5% 1/10 W 0603 SMD	10 KΩ	0603
R6, R8 - R10	4	Res. 4.7 KΩ 5% 1/10 W 0603 SMD	4.7 KΩ	0603
R12, R33	2	Res. 100 Ω 5% 1/10 W	100 Ω	0603
R13	1	Res. NP 0805	NP	0805
R19	1	Res. 11.5 KΩ 1% 1/10 W 0603	11.5 KΩ	0603
R20	1	Trimmer 100 KΩ 100 x 50 x 110 64 W	100 KΩ	Trimm. 100 x 50 x 110
R21 - R24	4	Res. 470 Ω 5% 1/10 W 0603	470 Ω	0603
R25, R26, R34	3	Res. 1 KΩ 5% 1/10 W 0603 SMD	1 KΩ	0603
R30	1	Res. 100 KΩ 5% 1/10 W 0603 SMD	100 KΩ	0603
R36	1	Res. 2.2 KΩ 1/10 W 5% 0603 SMD	2.2 KΩ	0603
S1 - S3	3	Switch button SMD	EVQQ2D03W	CMS 6.5 x 6 x 3.1
TP1, TP3 - TP9	8	Test point red	KEYSTONE-5000	TH
TP2	1	Test point black	KEYSTONE-5001	TH
U1	1	IC reg. 1300MA LN 3.3 V	LD1117D33TR	SO8
U2	1	IC, MCU, RISC, 72 MHz, 3.6 V, 32-bit, 64-pin, LQFP	STM32F105RBT6	LQFP64 10 x 10
U3	1	USBLC6-2P6 - TVS USB2	USBLC6-2P6	SOT 666
U4	1	cSPIN™ microstepping motor driven	L6480H	HTSSOP38
Y1	1	XTAL 8 MHz-30 PPM-20 pF	8 MHz	HC49/US-SM

Figure 4. Layout (silk screen)
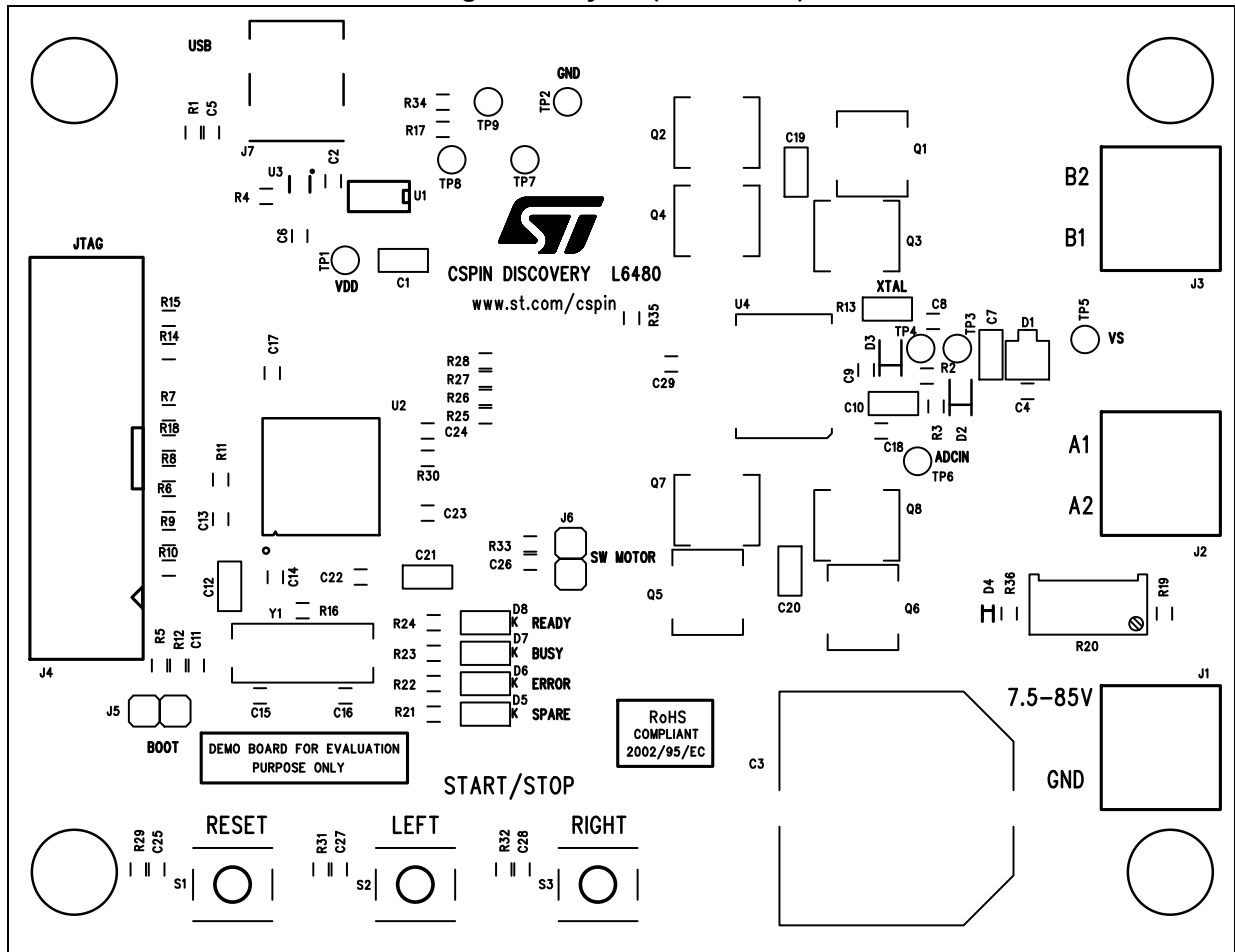
Figure 5. Layout (top layer)
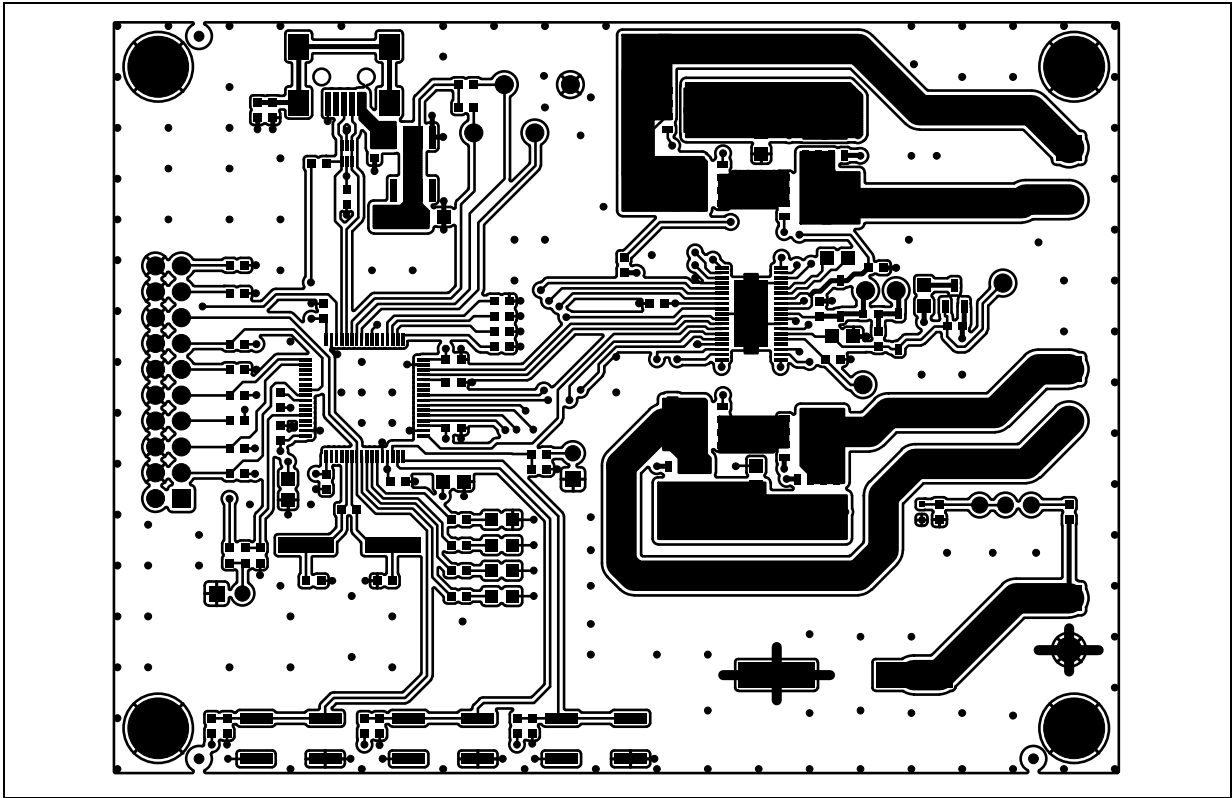
Figure 6. Layout (bottom layer)
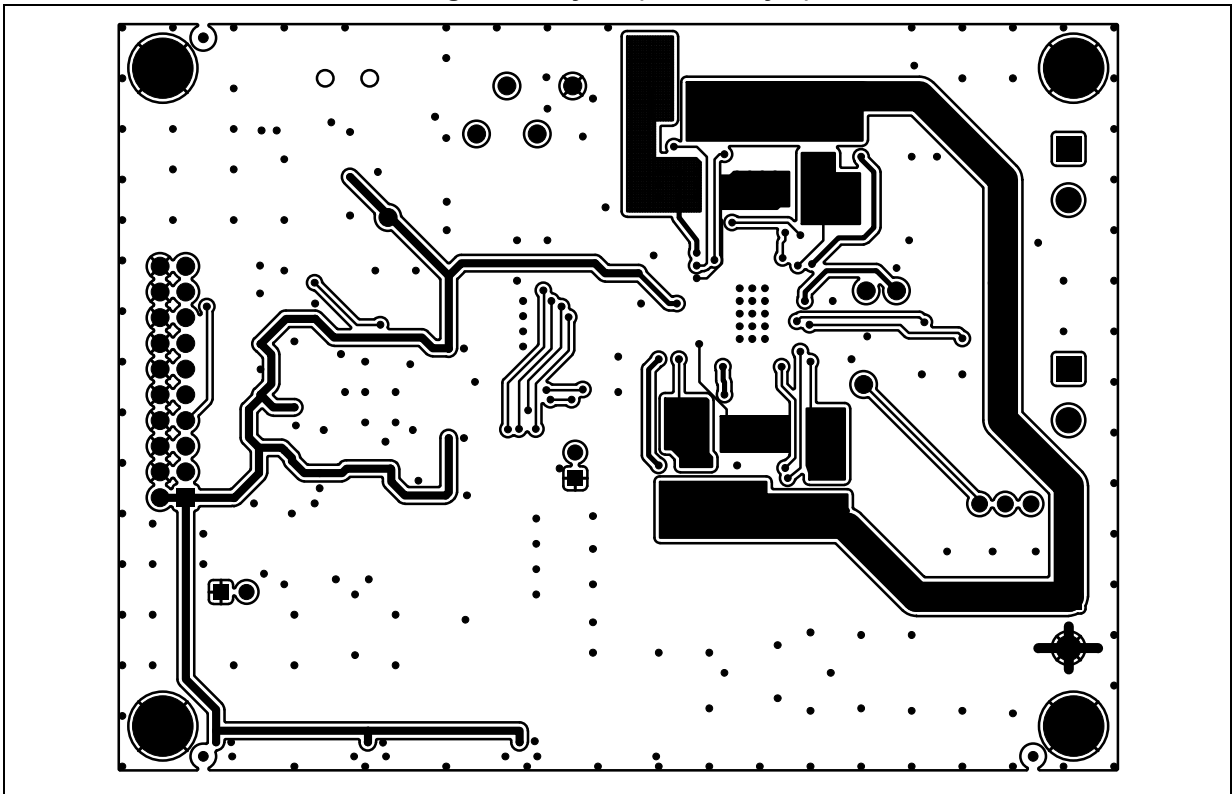
Revision history

Table 5. Document revision history

Date	Revision	Changes
23-Apr-2014	1	Initial release.

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