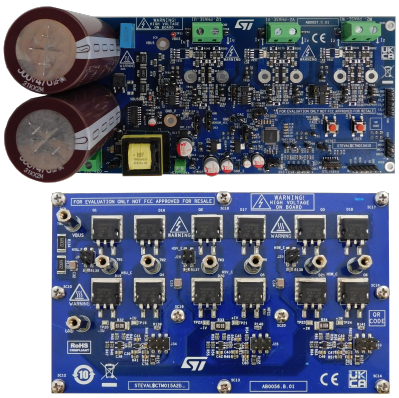
STEVAL-CTM015V1

Data brief

1 kW, 400 V_{DC} three-phase switched reluctance motor drive



Product summary	
1 kW, 400 Vdc three-phase switched reluctance motor drive	STEVAL-CTM015V1
Trench gate field-stop 600 V, 30 A high speed HB series IGBT	STGB30H60DFB
600 V, 15 A turbo 2 soft ultrafast recovery diode	STTH15RQ06
Single-chip 600 V high and low-side driver for N-channel power MOSFETs or IGBTs	L6395D
Power supply for auxiliary voltage generation DC-link voltage to 15 V, 5 V, 3.3 V	VIPER26L LD1117S50 LD1117S33C
Applications	Motor Control

Features

- Driver board (STEVAL-CTM015A1)
  - Based on three L6395D high voltage single-chip high and low-side gate drivers, with independent control of high and low-side
  - STM32F303CBT6 microcontroller
  - Support for quadrature incremental encoder and Hall effect rotor position sensor
  - DC-DC power supply based on VIPER26LD, LD1117S50TR, and LD1117S33CTR
  - Support to host three Insulated Current Sensors (ICS) for phase current reading
- Power board (STEVAL-CTM015A2)
  - Insulated metal substrate (IMS)
  - Hosts six STGB30H60DFB IGBTs and six STTH15RQ06 diodes in a D2PAK-2 package
  - Decoupling gate resistors
  - NTC sensing network for overheat protection
  - LMV331ICT comparators for overcurrent protection
  - Three-shunt resistors sensing network and TSV991IL OpAmps for three-phase current reading
- Heat sink for heat dissipation featuring a thermal resistance of 1 K/W

Description

The STEVAL-CTM015V1 evaluation kit provides a complete solution for a three-phase switched reluctance motor (SRM) drive based on asymmetric half bridge flexible converter topology.

The kit consists of the STEVAL-CTM015A1 driver board, the STEVAL-CTM015A2 power board and a 1 K/W heat sink already assembled.

The driver board features a DC-DC power supply based on VIPER26L, LD1117S50, LD1117S33C, STM32F303CBT6 as MCU, and L6395D high voltage, single-chip high and low-side gate drivers for N-channel power MOSFETs or IGBTs.

The power board features an insulated metal substrate (IMS), NTCs for thermal protection, decoupling gate resistors for each IGBT, LMV331I comparators for overcurrent protection, STGB30H60DFB trench gate field-stop, and STTH15RQ06 Turbo 2 soft ultrafast recovery diode.

By default, the STEVAL-CTM015V1 features the three-shunts resistors current sensing network based on TSV991IL, but it can also host three Insulated Current Sensors (ICSs).

Soft-chopping speed control firmware, based on STM32F303CBT6 microcontroller, is available.

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1 Schematic diagrams

Figure 1. **STEVAL-CTM015A1 circuit schematic (1 of 12)**

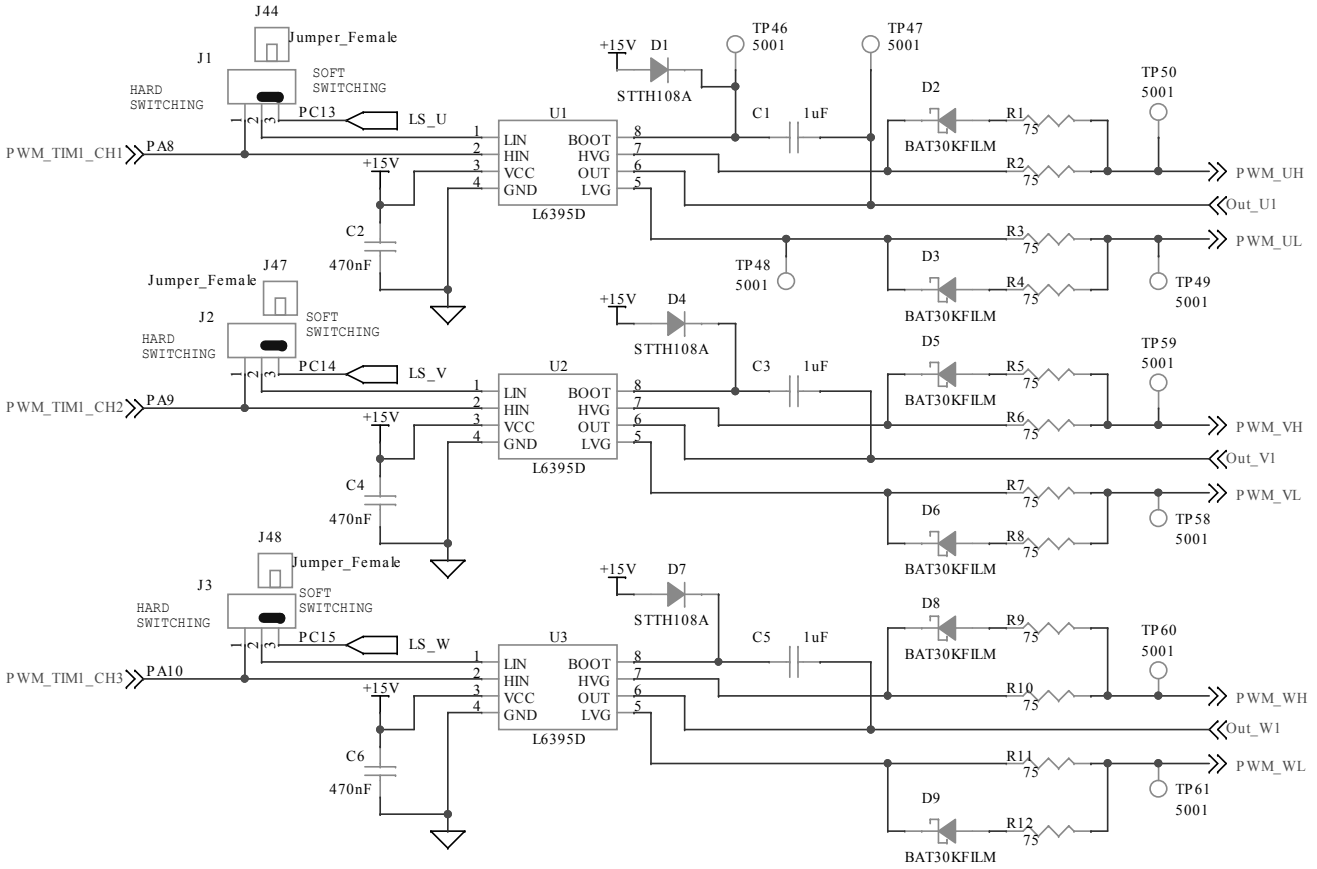

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Figure 2. **STEVAL-CTM015A1 circuit schematic (2 of 12)**

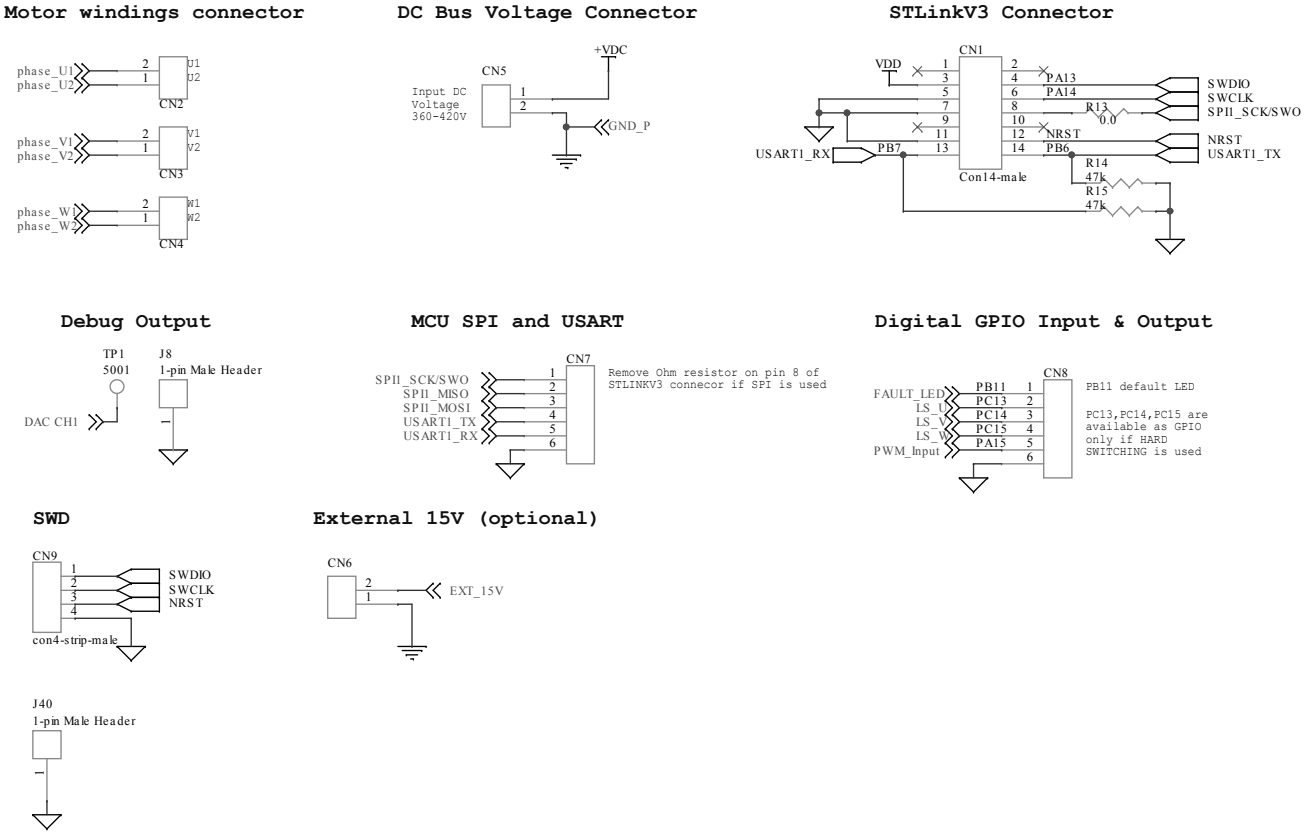

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Figure 3. **STEVAL-CTM015A1 circuit schematic (3 of 12)**

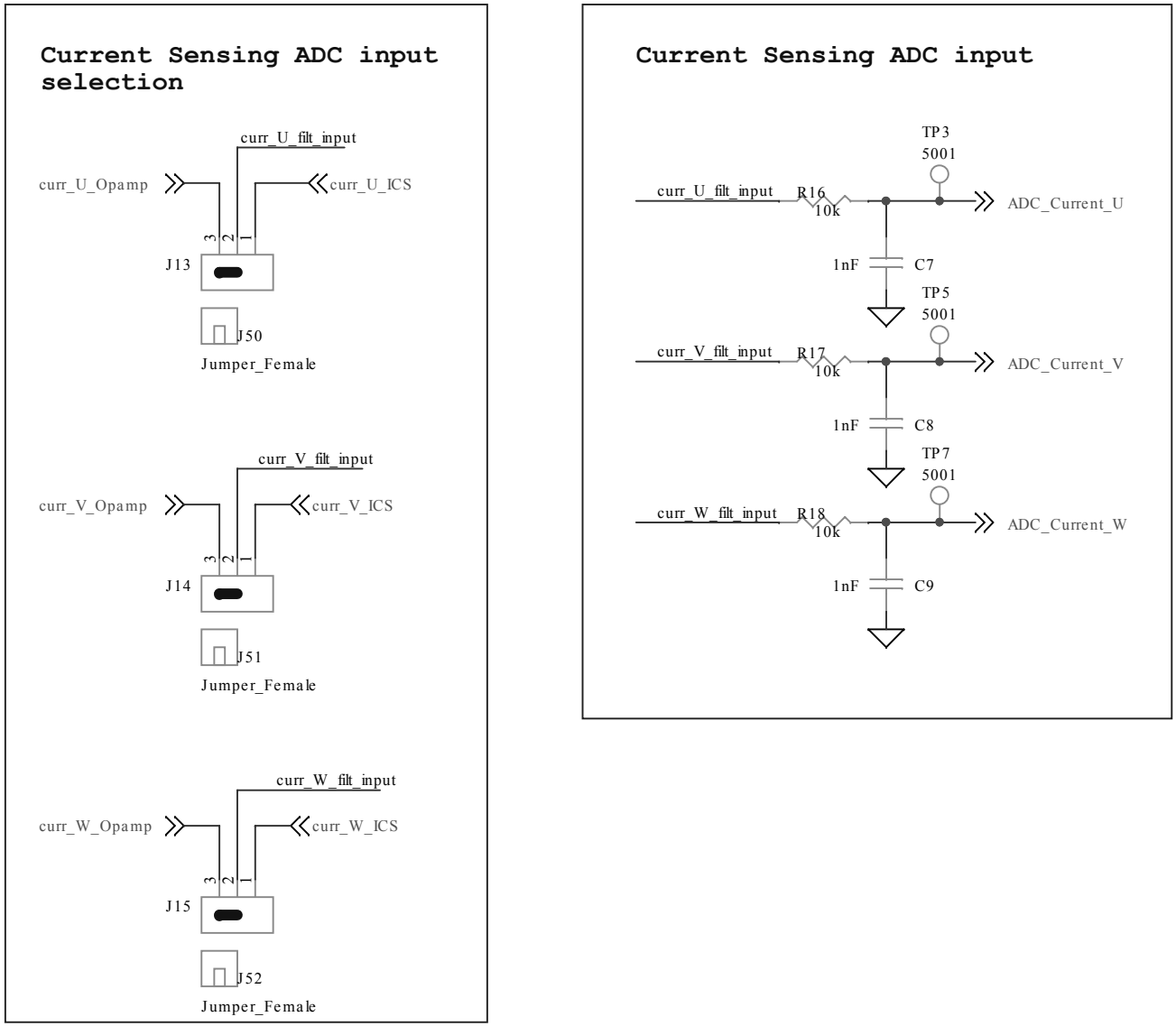

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Figure 4. STEVAL-CTM015A1 circuit schematic (4 of 12)

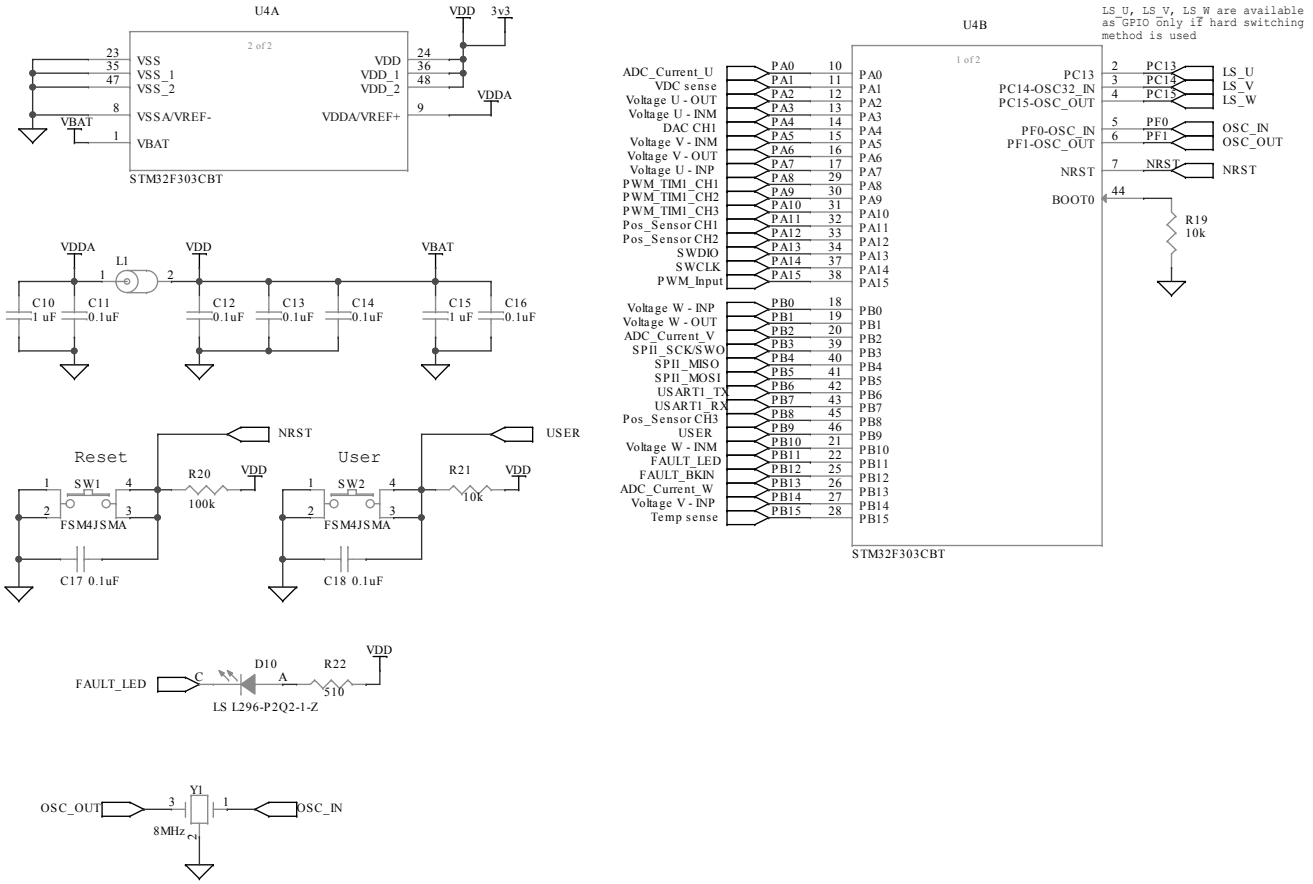

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Figure 5. STEVAL-CTM015A1 circuit schematic (5 of 12)

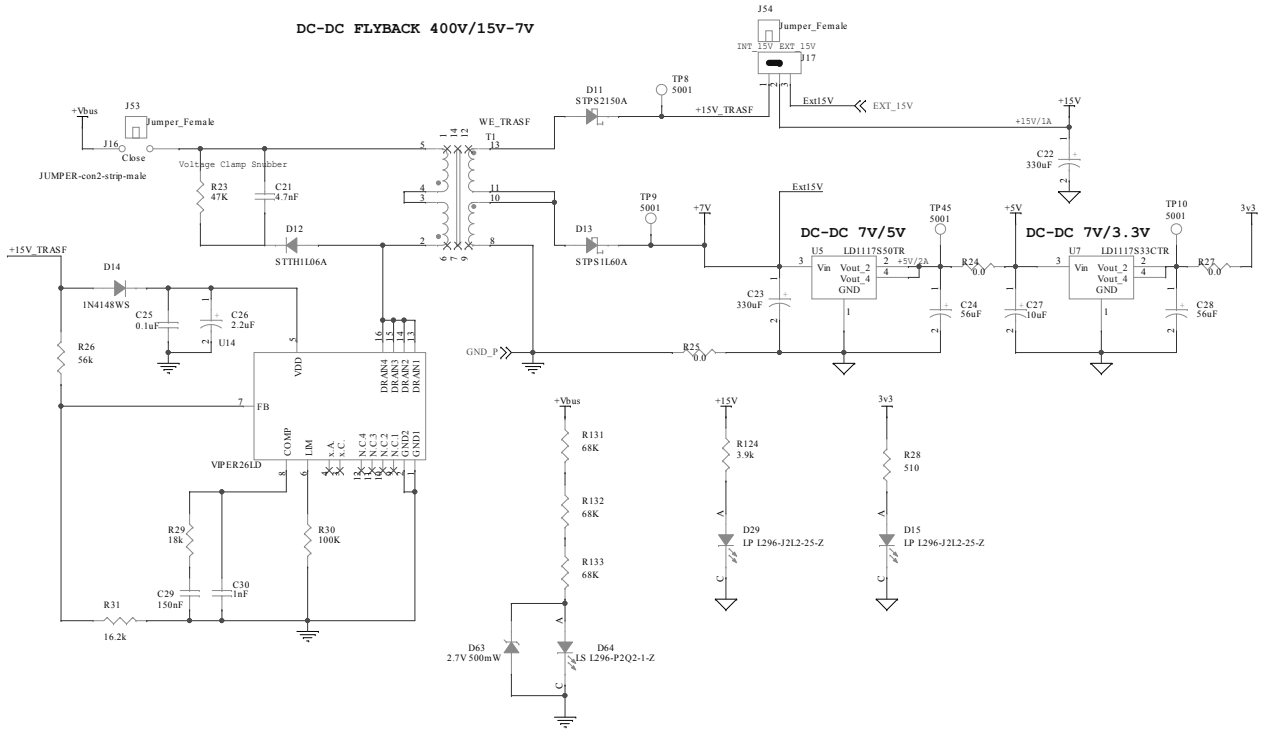

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Figure 6. STEVAL-CTM015A1 circuit schematic (6 of 12)

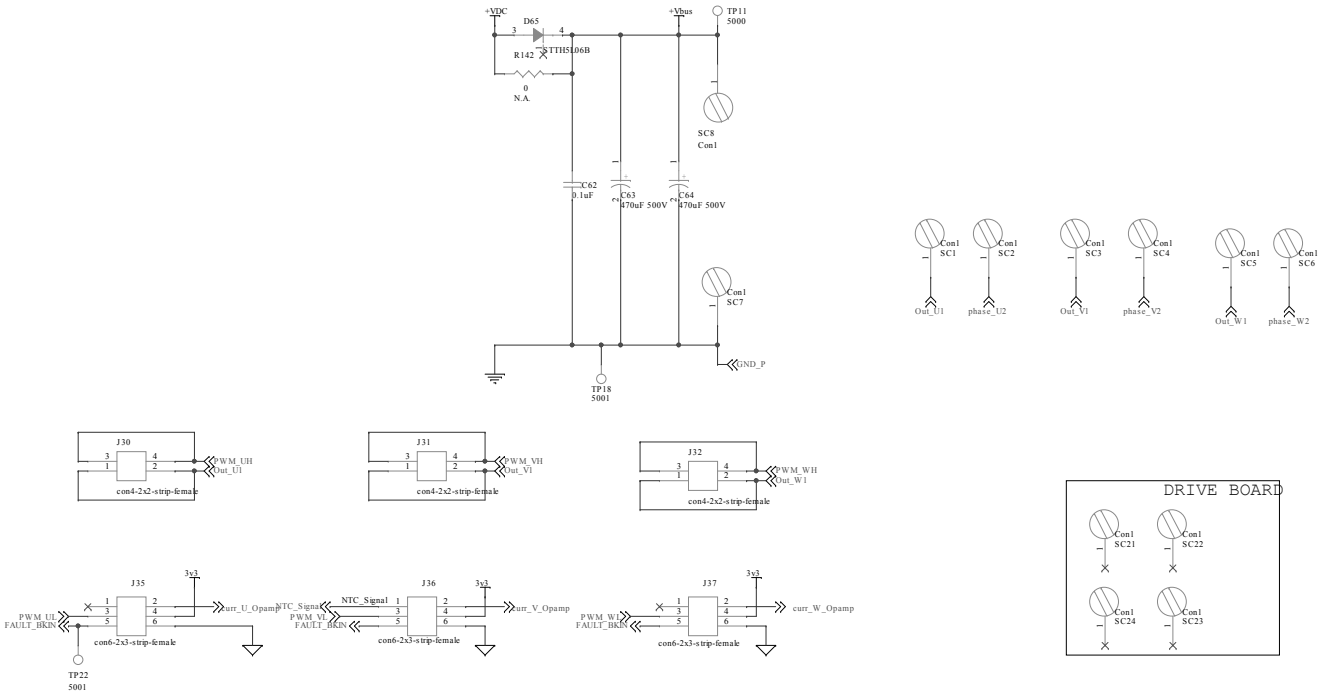

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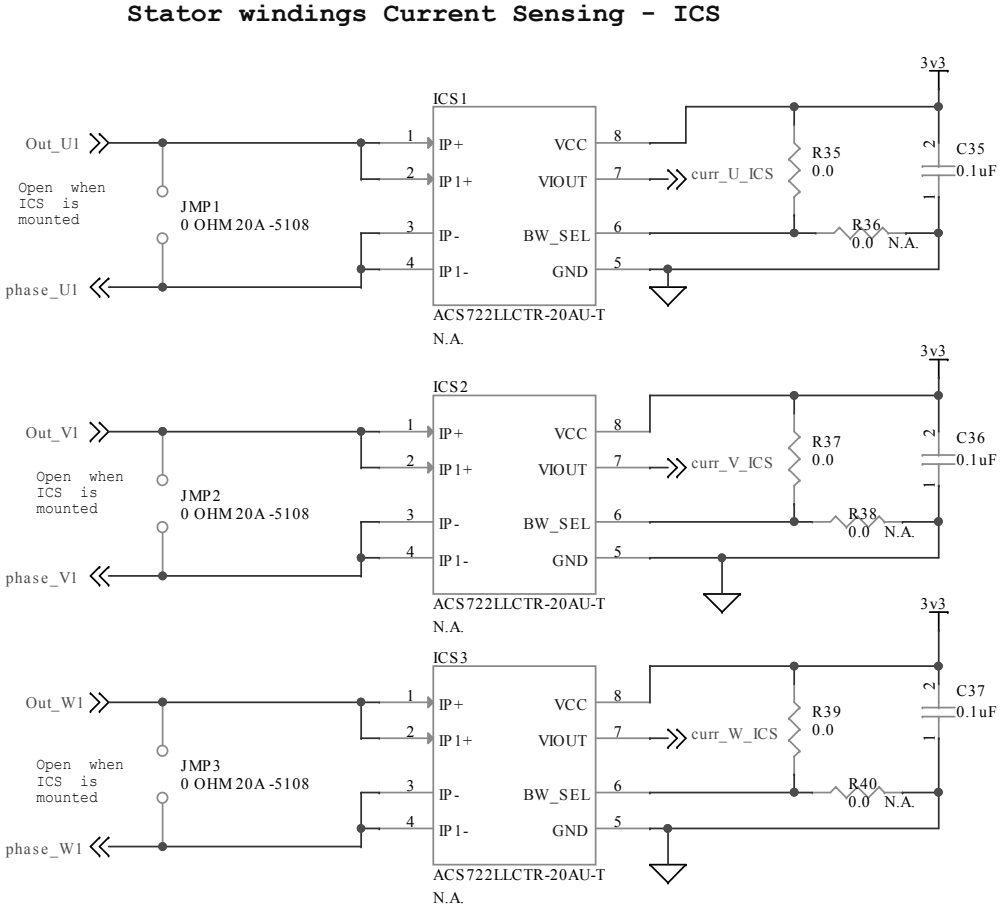
Figure 7. **STEVAL-CTM015A1 circuit schematic (7 of 12)**



ICS Internal badwidth (BW) Selection Table

	BW	
	20kHz	80kHz
BW_SEL	Vcc	GND

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Figure 8. STEVAL-CTM015A1 circuit schematic (8 of 12)

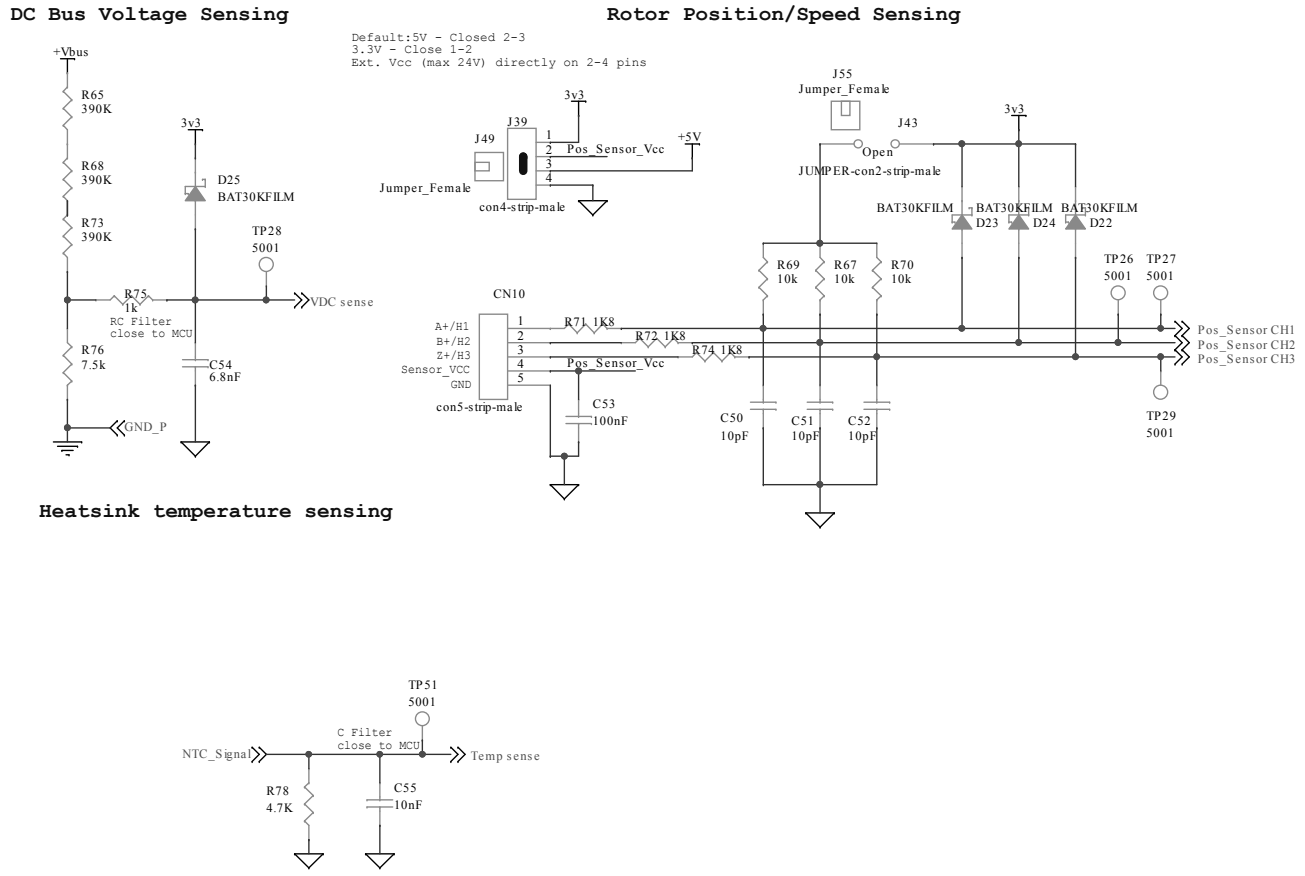

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Figure 9. **STEVAL-CTM015A1 circuit schematic (9 of 12)**

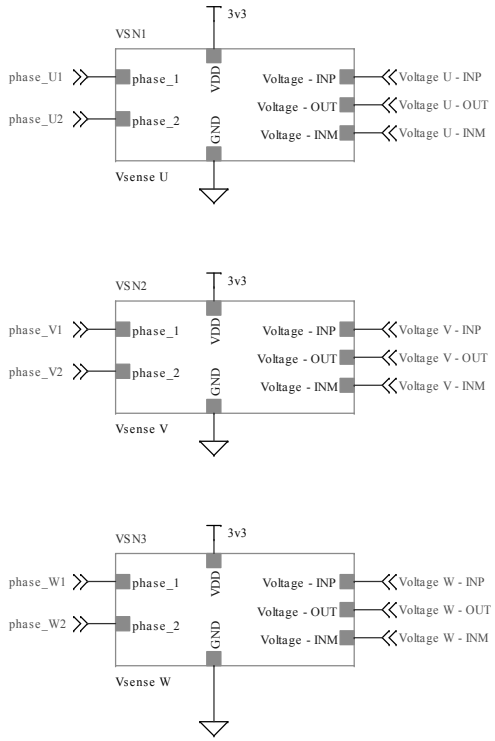

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Figure 10. STEVAL-CTM015A1 circuit schematic (10 of 12)

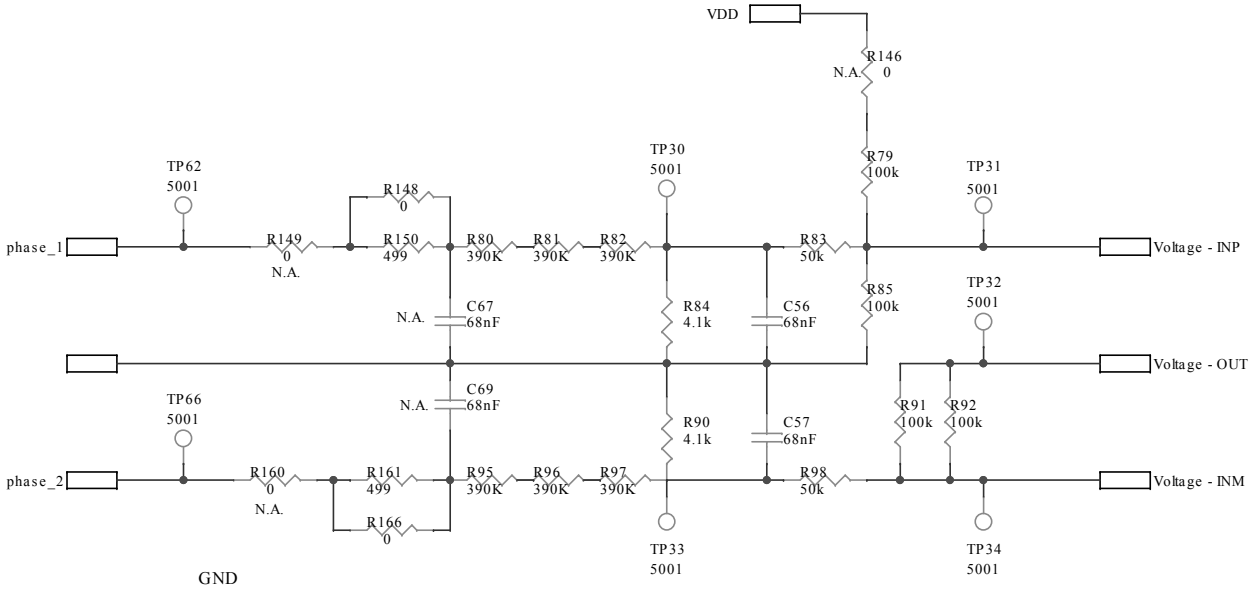

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Figure 11. **STEVAL-CTM015A1 circuit schematic (11 of 12)**

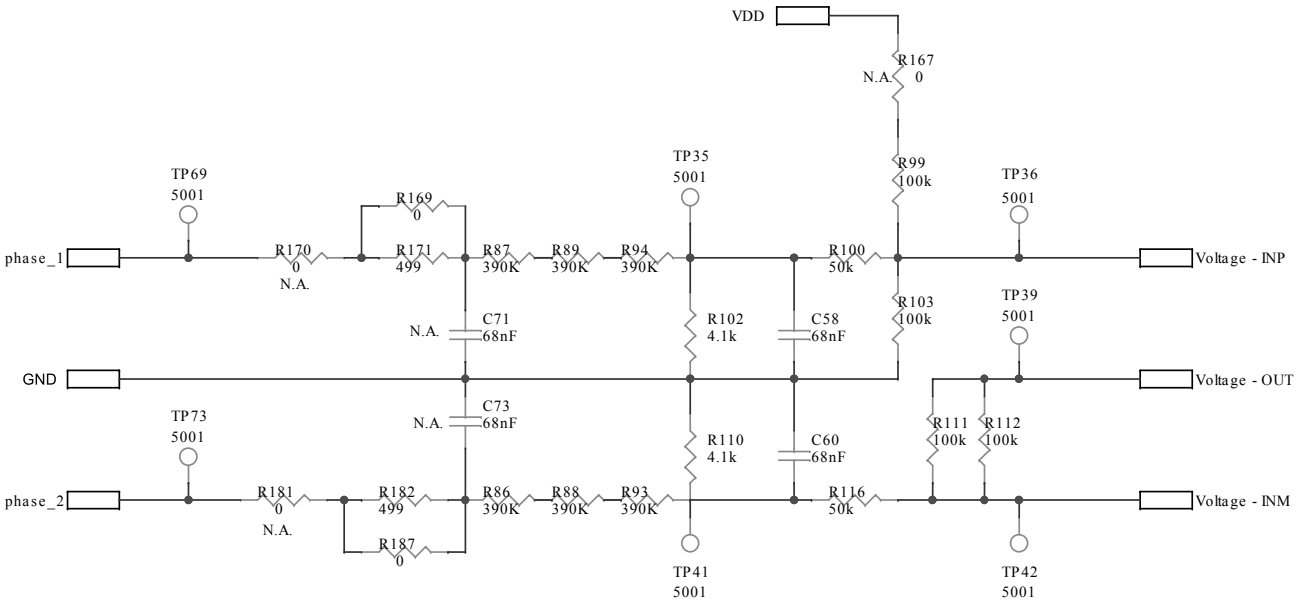

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Figure 12. **STEVAL-CTM015A1 circuit schematic (12 of 12)**

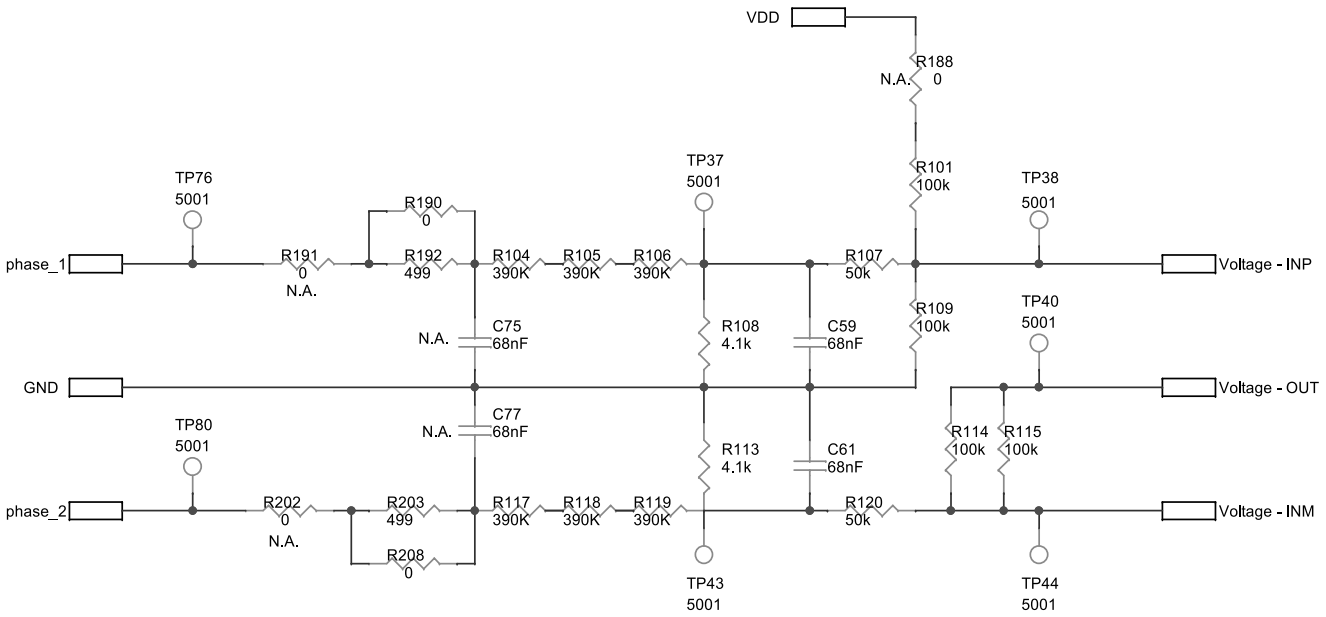

Figure 13. **STEVAL-CTM015A2 circuit schematic (1 of 3)**

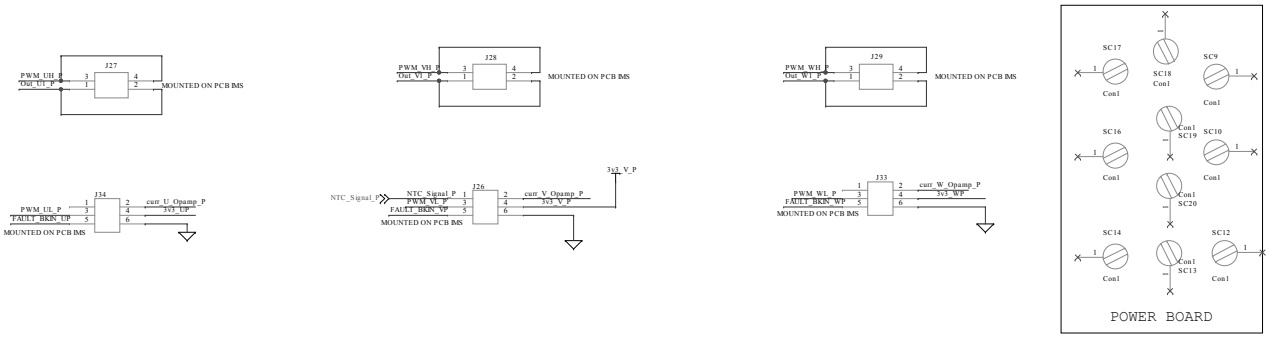

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Figure 14. **STEVAL-CTM015A2 circuit schematic (2 of 3)**

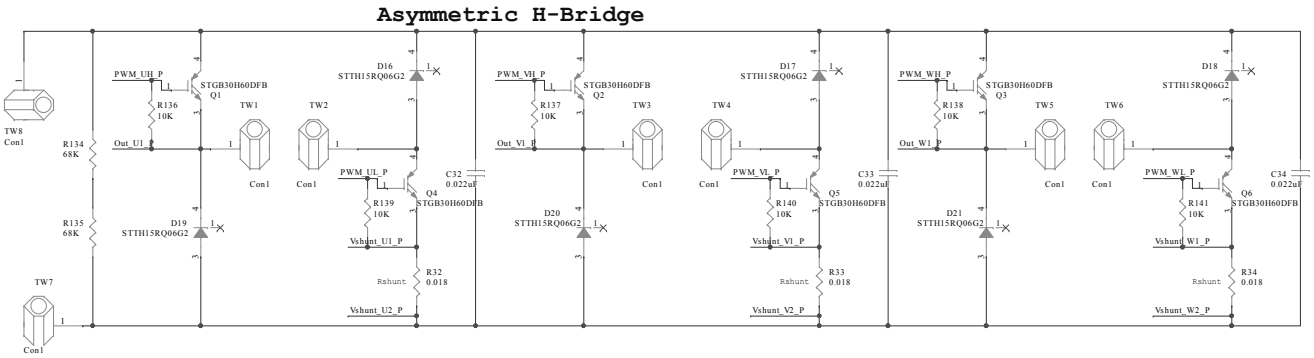
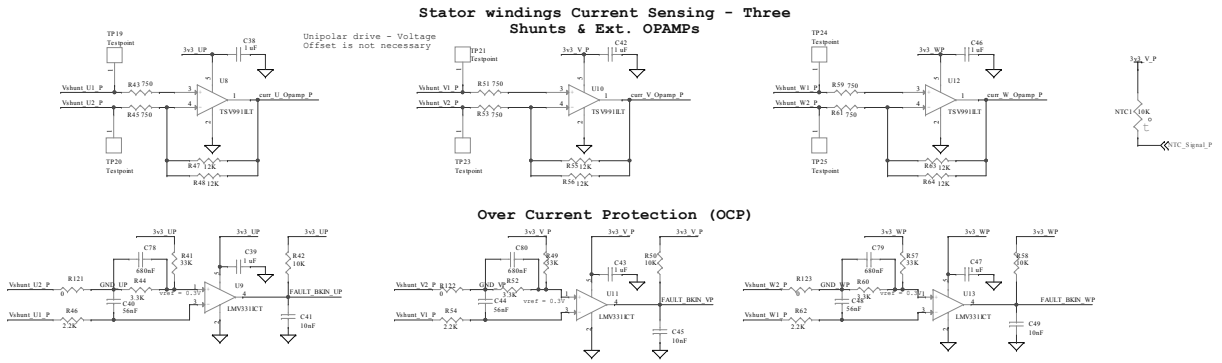


Figure 15. **STEVAL-CTM015A2 circuit schematic (3 of 3)**



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2 Kit versions

Table 1. STEVAL-CTM015V1 versions

Finished good	Boards finished good	Schematic diagrams	Bill of materials
STEVAL$CTM015V1A	STEVAL$CTM015A1A	-	-
	STEVAL$CTM015A2A		
STEVAL$CTM015V1B(1)	STEVAL$CTM015A1B	STEVAL$CTM015V1B schematic diagrams	STEVAL$CTM015V1B bill of materials
	STEVAL$CTM015A2B		

1. *This code identifies the STEVAL-CTM015V1 evaluation kit second version. The kit consists of the STEVAL-CTM015A1 driver board, whose version is identified by the code STEVAL$CTM015A1B, the STEVAL-CTM015A2 power board, whose version is identified by the code STEVAL$CTM015A2B, and a 1K/W heat sink already assembled. The STEVAL$CTM015A2B board is mounted in the middle position between the STEVAL$CTM015A1B and the heatsink. Additional information about the heatsink is available in the BOM list.*

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Revision history

Table 2. **Document revision history**

Date	Revision	Changes
25-Oct-2021	1	Initial release.
09-Jun-2023	2	Updated features, description and product summary in cover page. Updated Section 1 Schematic diagrams and Section 2 Kit versions.

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