

## Bill of materials

Table 1. STEVAL-CTM011V1 bill of materials

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
1	8	D1, D6, D7-12	BAT46ZFILM, SOD-123	100 V, 150 mA SMD general- purpose signal Schottky diode	ST	BAT46ZFILM
2	1	C17	0805, 1.2 nF, 50 V, ±10%	Capacitor	Kyocera AVX	08055C122K4T2A
3	12	C7, C9, C11, C13, C16, C20, C22-25, C32, C39	0805, 50 V, ±10%	Capacitors	Würth Elektronik	885012207098
4	3	C8, C36-37	150 pF, 0805, 50 V, ±10%, C0G/NP0	Ceramic capacitors	Würth Elektronik	885012007058
5	2	C18, C21	0805, 10 nF, 50 V, ±10%	Capacitors	Würth Elektronik	885012207092
6	1	C12	1500 pF, 0805, 50 V, C0G/NP0	Ceramic capacitor	Würth Elektronik	885012007064
7	1	C68	0805, 2.2 nF, 50 V, ±10%	Capacitor	Würth Elektronik	885012007065
8	2	C27, C29	0805, 20 pF, 50 V, ±5%	Capacitors	KEMET	C0805X200J5GACTU
9	2	C26, C28	0805, 33 pF, 50 V, ±5%	Capacitors	Kyocera AVX	08055C330JAT2A
10	1	C14	0805, 470 nF, 50 V, ±10%	Capacitor	Taiyo Yuden	UMK212C7474KGHTE
11	3	C2-C3, C5	10 µF, 0805, 25 V	Ceramic capacitors	Taiyo Yuden	TMK212BBJ106KG-T
12	1	C59	CBB61, 0.1 µF, 630 V, through-hole, P = 15 mm 630 V, ±10%	Capacitor	Panasonic	ECQ-E6104KFA
13	2	C109-110	CC, Y1, 471, 250 V, through-hole, P = 7.5 mm, 250 V <sub>AC</sub> , ±10%	Capacitors	Panasonic	ECW-F2474JAB
14	1	C10	10 µF, Ø5*L11, 50 V, ± 20%	Capacitor	Würth Elektronik	860130673001
15	1	C15	EC, 330 µF, 35 V Ø10*L12.5	Capacitor	Würth Elektronik	860020575013
16	1	C6	EC, 330 µF, 450 V Ø30*L51	Capacitor	Würth Elektronik	861021485026
17	1	C19	470 µF, Ø8*L122, 35 V, ±20%	Aluminum capacitor	Panasonic	EEU-FR1V471L
18	2	C1, C4	0.33 µF, 275 V <sub>AC</sub> , pitch 15 mm	Film capacitors	Würth Elektronik	890324025034CS
19	1	AC_IN	CON_2PINA, P = 7.92 mm	Connector header	Molex	0359790210

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
20	1	JP3	CON_2PIN_B2B, Through hole,P=2.5mm	Connector header	Samtec	TSW-101-07-F-D
21	2	SWD UART	CON_4PIN, through hole,P=2.54mm	Header spacer connector	Amphenol	75970-3BB-04LF
22	1	TEST	CON_8PIN, through hole,P=2.54mm	Connector header	Amphenol	78511-408HLF
23	1	MOTOR	CON_UVW, through hole	Connector header	Molex	0010634037
24	1	D4	DIOZ_1N4745A, 16V, 1W, LL-41	Zener diode	Vishay Semiconductor Diodes Division	ZM4745A-GS08
25	1	BD1	DIO_DB_KBJ608, KBJ	Bridge rectifier	Diodes Incorporated	KBJ608G
26	1	D3	DIO_LED, 0805	Red LED	Visual Communications Company - VCC	CMD17-21VRD/TR8
27	1	F1	FUSE_T3.15A-250VA C through hole,P=5.08mm 250V	Fuse	Bel Fuse Inc.	RST 3.15-BULK
28	1	L1	1 mH 800 mA 1.15 ohm, pitch 5 mm	Fixed inductor	Würth Elektronik	7447480102
29	1	L2	CMC 3.9 mH 1 A 2LN TH	Common mode choke	Würth Elektronik	7448640412
30	1	U6	L78L33ACUTR	Positive voltage regulator	ST	<a href="#">L78L33ACUTR</a>
31	1	RV1	MOV_681	High surge varistor	Würth Elektronik	820415511B
32	1	R1	NTC_5D15, through-hole, P = 7.5 mm, 5 Ω ±20%	Thermistor	EPCOS - TDK Electronics	B57234S0509M051
33	1	ISO1	PC817, DIP-4	Optoisolator transistor	Taiwan Semiconductor Corporation	TPC817C C9G
34	6	R31-32, R37, R39, R41-42	RES_0805_10R, 0805, 10.0 Ω ±1%	Resistors	Rohm	SFR10EZPF10R0
35	4	R12, R17, R57-58	RES_0805_220R, 0805, 220.0 Ω ±1%	Resistors	Rohm	KTR10EZPF2200
36	6	R20-21, R23, R26-27, R29	RES_0805_510R, 0805, 510 Ω ±1%	Resistors	Rohm	KTR10EZPF5100
37	8	R5, R14, R28, R30, R33-36	RES_0805_10K, 0805, 10 kΩ ±1%	Resistors	Rohm	SFR10EZPF1002
38	2	R46, R50	RES_0805_12K, 0805, 12 kΩ ±1%	Resistors	Rohm	KTR10EZPF1202
39	1	R10	RES_0805_17.4K, 0805, 17.4 kΩ ±1%	Resistor	Rohm	KTR10EZPF1742
40	9	R6, R15-16, R25, R45, R48-49, R52, R60	RES_0805_1K, 0805, 1 kΩ ±1%	Resistors	Rohm	KTR10EZPF1001
41	1	R38	RES_0805_2.2K, 0805, 2.2 kΩ ±1%	Resistor	Rohm	SFR10EZPF2201

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
42	1	R8	RES_0805_33K, 0805, 33 k $\Omega$ $\pm$ 1%	Resistor	Rohm	KTR10EZPF3302
43	2	R47, R51	RES_0805_5.1K, 0805, 5.1 k $\Omega$ $\pm$ 1%	Resistors	Rohm	SFR10EZPF5101
44	1	R9	RES_0805_9.1K, 0805, 9.1 k $\Omega$ $\pm$ 1%	Resistor	Rohm	SFR10EZPF9101
45	2	R65-66	RES_1206_1M, 1206, 1 m $\Omega$ $\pm$ 1%	Resistors	Rohm	KTR18EZPF1004
46	2	SR3	RES_2010_0.1 ohm 2010 0.1 $\Omega$ $\pm$ 1%	Resistor	Vishay	WFMB2010R1000FEA
46	1	SR1-SR2	RES_2010_0OHM, 2010, 0 $\Omega$	Resistors	Vishay	CRCW20100000Z0EFHP
47	6	Q1-6	STGD5H60DF, DPAK	600 V, 5 A high-speed trench gate field-stop IGBT, H series	ST	STGD5H60DF
48	1	U2	STSPIN32F0601Q, TQFP 10x10 64PIN/ QFN10x10 72PIN	600 V three-phase controller with MCU	ST	STSPIN32F0601Q
49	2	D2 D5	STTH1L06A, SOD-123F	600 V, 1 A low drop ultrafast diode	ST	STTH1L06A
50	1	U3	TSV912ID, SO8	Wide bandwidth (8MHz) rail-to-rail input/output 5 V CMOS op-amp	ST	TSV912ID
51	1	U4	VIPER122, SSOP10	High-voltage converter	ST	VIPER122
52	1	PCB	113x76x1.6mm	FR4 TG 140, CU thickness 35 microns	Any	Any

## Evaluation board license agreement

**Important:** All information on this document is subject to this Evaluation Board License Agreement.

By using this evaluation board or kit (together with all related software, firmware, components, and documentation provided by ST, "Evaluation Board"), You ("You") are agreeing to be bound by the terms and conditions of this Evaluation Board License Agreement ("Agreement"). Do not use the Evaluation Board until You have read and agreed to this Agreement. Your use of the Evaluation Board constitutes Your acceptance of this Agreement.

### LICENSE

STMicroelectronics ("ST") grants You the right to use the enclosed Evaluation Board offering limited features only to evaluate and test ST products solely for Your evaluation and testing purposes in a research and development setting. The Evaluation Board shall not be, in any case, directly or indirectly assembled as a part in any production of Yours as it is solely developed to serve evaluation purposes and has no direct function and is not a finished product. If software and/or firmware is accompanied by a separate end user license agreement ("EULA"), then such software and/or firmware shall be governed by such EULA.

### EVALUATION BOARD STATUS

The Evaluation Board offers limited features allowing You only to evaluate and test the ST products. The Evaluation Board is not intended for consumer or household use. You are not authorized to use the Evaluation Board in any production system, and it may not be offered for sale or lease, or sold, leased or otherwise distributed for commercial purposes. If the Evaluation Board is incorporated in an evaluation system, the evaluation system may be used by You solely for Your evaluation and testing purposes. Such evaluation system may not be offered for sale or lease or sold, leased or otherwise distributed for commercial purposes and must be accompanied by a conspicuous notice as follows: "This device is not, and may not be, offered for sale or lease, or sold or leased or otherwise distributed for commercial purposes".

### OWNERSHIP AND COPYRIGHT

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### RESTRICTIONS AND WARNINGS

Before You handle or use the Evaluation Board, You must carefully review any related documentation provided by ST. Such documentation may contain important warnings. You shall comply with all such warnings and other instructions and employ reasonable safety precautions in using the Evaluation Board. Failure to do so may result in death, personal injury, or property damage. If You have any questions regarding the safe usage of the Evaluation Board, You should contact ST for guidance.

You may not sell, assign, sublicense, lease, rent or otherwise distribute the Evaluation Board for commercial purposes, in whole or in part, or use Evaluation Board in a production system, with the exception that if You are an authorized ST distributor, You may resell the Evaluation Board in compliance with the applicable terms and conditions. Except as provided in this Agreement or as explicitly permitted in the documentation of the Evaluation Board, You may not reproduce the Evaluation Board or modify,

reverse engineer, de-compile or disassemble its software and/or firmware, in whole or in part.

You shall not use the Evaluation Board in any safety critical or functional safety testing, including but not limited to testing of life supporting, military or nuclear applications. ST expressly disclaims any responsibility for such usage which shall be made at Your sole risk, even if ST has been informed in writing of such usage. Unless expressly designated in writing by ST as suitable for use in testing automotive or aerospace applications, You shall not use the Evaluation Board in such testing.

### Notice applicable to Evaluation Boards according to European Regulation

For the European Regulation of the Evaluation Board, the applicable EU directives are considered, with a particular attention to the Low Voltage Directive (LVD) 2014/35/EU, the Electromagnetic Compatibility (EMC) Directive 2014/30/EU, and the Radio Equipment Directive (RED) 2014/53/EU. If the Evaluation Board is outside the scope of the foregoing Directives, then the General Product Safety Directive (GPSD) 2001/95/EC and Council Directive 93/68/EEC, amending Directive 73/23/EEC on electrical equipment designed for use within certain voltage limits, are applicable.

The Evaluation Board meets the requirements of the Restriction of Hazardous Substances (RoHS 2 or RoHS recast) Directive 2011/65/EU, Annex II, as amended by Directive 2015/863/EU.

### Notice applicable to Evaluation Boards not FCC-Approved

This kit is designed to allow:

1. Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and
2. Software developers to write software applications for use with the end product.

This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of 47 CFR, Chapter I ("FCC Rules"), the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

### For Evaluation Boards annotated as FEDERAL COMMUNICATIONS COMMISSION (FCC) Part 15 Compliant

- **FCC Interference Statement for Class A Evaluation Boards:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- **FCC Interference Statement for Class B Evaluation Boards:** 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 by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment to 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.
- 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### WARRANTY

ST WARRANTS THAT IT HAS THE RIGHT TO PROVIDE THE EVALUATION BOARD TO YOU. THIS WARRANTY IS PROVIDED BY ST IN LIEU OF ALL OTHER WARRANTIES, WRITTEN OR ORAL, STATUTORY, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY AS TO MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR UNINTERRUPTED OR ERROR-FREE OPERATION, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. THE EVALUATION BOARD IS PROVIDED "AS IS".

YOU WARRANT TO ST THAT YOU WILL ENSURE THE EVALUATION BOARD IS USED ONLY BY ELECTRONICS EXPERTS WHO UNDERSTAND THE DANGERS OF HANDLING AND USING SUCH ITEMS, YOU ASSUME ALL RESPONSIBILITY AND LIABILITY FOR ANY IMPROPER OR UNSAFE HANDLING OR USE OF THE EVALUATION BOARD BY YOU, YOUR EMPLOYEES, AFFILIATES, CONTRACTORS, AND DESIGNEES.

#### **LIMITATION OF LIABILITIES**

IN NO EVENT SHALL ST BE LIABLE TO YOU, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR ANY OTHER LEGAL THEORY, FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, OR EXEMPLARY DAMAGES WITH RESPECT TO ANY MATTERS RELATING TO THIS AGREEMENT, REGARDLESS OF WHETHER ST HAS BEEN ADVISED OF THE POSSIBILITY OF THE SAME. IN NO EVENT SHALL ST'S LIABILITY ARISING OUT OF THIS AGREEMENT IN THE AGGREGATE EXCEED THE AMOUNT PAID BY YOU UNDER THIS AGREEMENT FOR THE PURCHASE OF THE EVALUATION BOARD, OR TEN UNITED STATES DOLLARS (\$10.00) IF NO PURCHASE PRICE WAS PAID.

#### **INDEMNIFICATION**

You shall, at Your expense, defend ST and its Affiliates against a claim or action brought by a third party for infringement or misappropriation of any patent, copyright, trade secret or other intellectual property right of a third party to the extent resulting from (1) Your combination of the Evaluation Board with any other component, system, software, or firmware, (2) Your modification of the Evaluation Board, or (3) Your use of the Evaluation Board in a manner not permitted under this Agreement.

You shall indemnify ST and its Affiliates against and pay any resulting costs and damages finally awarded against ST or its Affiliates or agreed to in any settlement, provided that You have sole control of the defense and settlement of the claim or action, and ST cooperates in the defense and furnishes all related evidence under its control at Your expense. ST will be entitled to participate in the defense of such claim or action and to employ counsel at its own expense.

"Affiliates" means any corporation or other entity directly or indirectly controlled by, controlling or under common control with the entity in question, for so long as such ownership exists. "Control" means the direct or indirect beneficial ownership of more than fifty (50%) percent of the stock or other equity interests entitled to vote for the election of directors or an equivalent governing body. Any such corporation or other legal entity shall be deemed to be an Affiliate of such Party only as long as such Control exists.

#### **TERMINATION**

ST may terminate this Agreement without notice if You breach this Agreement. Upon termination, You shall immediately destroy or return all copies of the software, firmware, and documentation of the Evaluation Board to ST and certify in writing to ST that You have done so.

#### **APPLICABLE LAW AND JURISDICTION**

This Agreement shall be governed, construed and enforced in accordance with the laws of Switzerland, without regard to its conflict of laws rules. The UN Convention on Contracts for the International Sale of Goods shall not apply to this Agreement. In case of dispute and in the absence of an amicable settlement, the only competent jurisdiction shall be the Courts of Geneva, Switzerland. Any breach of this Agreement by You may result in irreparable damage to ST for which ST will not have an adequate remedy at law. Accordingly, in addition to any other remedies and damages available, You acknowledge and agree that ST may immediately seek enforcement of this Agreement in any jurisdiction by means of specific performance or injunction, without any requirement to post a bond or other security.

#### **SEVERABILITY**

If any provision of this agreement is or becomes, at any time or for any reason, unenforceable or invalid, no other provision of this agreement shall be affected thereby, and the remaining provisions of this agreement shall continue with the same force and effect as if such unenforceable or invalid provisions had not been inserted in this Agreement. In addition, any unenforceable or invalid provision shall be deemed replaced by a provision that is valid and enforceable and that comes closest to expressing the intention of the unenforceable or invalid provision.

**WAIVER**

The waiver by either party of any breach of any provision of this Agreement shall not operate or be construed as a waiver of any other or a subsequent breach of the same or a different provision.

**RELATIONSHIP OF THE PARTIES**

Nothing in this Agreement shall create, or be deemed to create, any joint venture, partnership, principal-agent, employer-employee or other relationship between the Parties, except that of independent contractors. Neither Party has the authority or power to bind, to contract in the name of, or to create a liability for the other in any way or for any purpose.

**SURVIVAL**

Any provision of this Agreement which imposes an obligation after termination of this Agreement shall survive the termination of this Agreement.

**SECTION HEADINGS**

Section headings are inserted for convenience only and shall not be used to interpret this Agreement.

**WASTE AND RECYCLING**

**The Evaluation Board is not to be disposed of as urban waste. At the end of its life cycle, differentiated waste collection must be followed.** Consult the local authorities for more information on the proper disposal channels. It is mandatory to separately collect the Evaluation Board and make sure it is delivered it to the appropriate waste management and recycling centers.

As of 15 August 2018, in all the countries belonging to the European Union, the Evaluation Board is subject to the WEEE Directive 2012/19/EU requirement; therefore, it is forbidden to dispose of the Evaluation Board as undifferentiated waste or with other domestic wastes. Consult the local authorities for more information on the proper recycling centers.

Disposing of the Evaluation Board incorrectly may cause damage to the environment and may be subject to fines based on specific countries' rules.

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