

Table 1: STEVAL-TTM002V1 bill of materials

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
1	1	CON1	KK MTA-100	Male Molex KK	TE Connectivity	640456-5
2	1	CON2	Header2x7	Multipole female connector	Sullins Connector Solution	SFH11-PPTC-082LFBN-RC
3	1	CON3	KK MTA-100	Male Molex KK	TE Connectivity	640456-5
4	1	CON4	Header2x7 pitch 2.54 mm	Multipole female connector	Sullins Connector Solution	PPTC072LFBN-RC
5	1	CON5	Header2x17	Multipole female connector	Sullins Connector Solution	SFH11-PBPC-D17-ST-BK
6	1	CON6	KK MTA-100	Male Molex KK	TE Connectivity	640456-5
7	3	CON7, CON8, CON9	Double strip line male 2X4 pitch 2.54mm Header2x4	Connector	Any	Any
8	1	CON10	Male 2X5 pitch 2.54mm Header2x5	Connector	Amphenol ICC (FCI)	67997-410HLF
9	1	C1	100 nF SMD 0805 100 V $\pm 10\%$	Capacitor	Any	Any
10	31	C2, C3, C4, C6, C8, C15, C23, C24, C26, C48, C58, C59, C62, C63, C65, C69, C70, C71, C72, C85, C86, C87;C88, C89, C91, C93, C95, C97, C99, C100, C113	100 nF/50 V SMD 0.1 μ F 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any
11	16	C5, C7, C9, C13, C29, C30, C33, C35, C37, C38, C40, C41, C43, C44, C46, C47	47 pF SMD 0603 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any
12	9	C10, C11, C12, C14, C16, C19, C20, C21, C22	10 pF SMD 0603 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any
13	2	C17, C28	220 pF SMD 0603 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any
14	4	C18, C31, C36, C42	4.7 nF SMD 0603 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any
15	3	C25, C32, C61	1 nF SMD 0603 50 V $\pm 10\%$ X7R 0603	Ceramic capacitors	Any	Any

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
16	4	C27, C34, C39, C45	2.2 nF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitors	Any	Any
17	2	C49, C101	10 µF TantalioB 10 V ±10%	Ceramic capacitors	AVX	TAJB106K010RNJ
18	6	C50, C75, C77, C79, C81, C83,	470 nF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitors	Any	Any
19	9	C51, C52, C53, C54, C55, C57, C60, C66, C67	10 nF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitors	Any	Any
20	1	C56	1 µF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitor	Any	Any
21	1	C64	4.7 µF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitor	Murata	GRM188R61E475KE11D
22	1	C68	22 µF SMD 0805 10 V ±10% X7R 0603	Ceramic capacitor	TDK	C2012X5R1A286K125
23	2	C73, C74	27 pF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitors	Any	
24	10	C76, C78, C80, C82, C84, C90, C92, C94, C96, C98	470 pF SMD 0603 50 V ±10% X7R 0603	Ceramic capacitors	Any	
25	2	D1, D29	SMD 0603	Orange LED	OSRAM-Opto	LO-Q976
26	4	D2, D26, D27, D28	SMD 0603	Green LED	OSRAM-Opto	LT Q39G-Q100-25-1
27	16	D3, D4, D5, D6, D11, D12, D14, D15, D16, D18, D19, D20, D22, D23, D24, D25,	ESDLIN1524BJ SOD323	Transil™, transient voltage surge suppressor diode for ESD protection	ST	ESDLIN1524BJ
28	3	D7, D8, D9	BAT30KFILM SOD-523	30 V, 300 mA SMD general purpose signal Schottky diode	ST	BAT30KFILM
29	5	D10, D13, D17, D21, D32	MM3Z3V6C	Zener diodes	Fairchild/ OnSemiconductors	MM3Z3V6C
30	2	D30, D31	FAULT SMD 0603	Red LED	OSRAM-Opto	LSQ976

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
31	33	F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33	SMD 0603	Power line ferrite beads	TDK Corporation/ Würth	MPZ1608S121ATAH0
32	1	IC1	ST2378ETTR TSSOP20	8-bit level translator with 15 kV ESD protection	ST	ST2378ETTR
33	7	J1, J8, JP1, JP6, JP10, JP11, JP14	Strip Line male 2X1 pitch 2.54mm SIP2	Jumpers	Any	Any
34	7	JP2, JP3, JP4, JP5, JP7, JP8, JP9	Strip Line male 3X1 pitch 2.54mm SIP3	Jumpers	Any	Any
35	1	J2	5 V 2 A Mor2x254	Terminal block	Phoenix Contact	1725656
36	2	J3, J4	4X1 pitch 2.54mm	Strip line	Any	Any
37	1	J5	2x5 pitch 2.54mm	Double strip line	Any	Any
38	2	J6, J7	DB9	Connector	Amphenol	L717TSEH09POL2RM5
39	4	L1, L2, L3, L4		Ferrite beads	Murata	BLM18SG331TN1D
40	2	MT1, MT2	10 mm	Tower nylon plus 2 screws in nylon m3 hex standoff	Keystone Electronics/ Essentra	25502/50M030050P006
41	1	Q1	BCP68T1G SOT-223	Bipolar transistor	ONSemiconductors	BCP68T1G
42	6	REF1, REF4, R43, R51, R57, R63	1.8 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
43	7	REF2, REF5, R27, R36, R48, R60, R79	3.3 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
44	1	REF3	10 K TRIMS- BOURNS-4MM 1/16 w	Trimmer	Bourns	3314G-1-103E

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
45	18	RF1, RF3, R9, R10, R11, R12, R13, R19, R33, R41, R53, R65, R67, R81, R82, R85, R90, R94	10 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
46	2	RF2, RF4	27 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
47	3	RG1, RG2, R93	1 M SMD 0603 1/16 w ±5%	Resistors	Any	Any
48	1	R1, R71	1.33 K SMR 0603 1/16 w ±1%	Resistors	Any	Any
49	2	R2, R70	820 R SMR 0603 1/16 w ±1%	Resistors	Any	Any
50	14	R3, R4, R5, R6, R7, R8, R29, R30, R35, R39, R44, R50, R55, R62	100 R SMD 0603 1/16 w ±1%	Resistors	Any	Any
51	11	R14, R15, R16, R31, R34, R37, R42, R46, R54, R56, R66	4k7 SMD 0603 1/16 w ±1%	Resistors	Any	Any
52	8	R17, R18, R20, R83, R92, R95, R97	0 SMD 0603 1/16 w ±1%	Resistors	Any	Any
53	3	R21, R25, R26	100 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
54	3	R22, R23, R24,	1 k SMD 0805 1/8 w ±1%	Resistors	Any	Any
55	3	R68, R69, R84	1 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
56	4	R28, R38, R49, R61	18 k SMD 0603 1/16 w ±1%	Resistors		
57	4	R32, R40, R47, R58	1.5 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
58	4	R45, R52, R59, R64	3.6 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
60	1	R72	47R SMD 0603 1/16 w ±1%	Resistors	Any	Any
61	5	R73, R74, R75, R78, R86	510 SMD 0603 1/16 w ±1%	Resistors	Any	Any
62	2	R76, R77	33 k SMD 0603 1/16 w ±1%	Resistors	Any	Any
63	1	R80	5.6 K SMD 0603 1/16 w ±1%	Resistor	Any	Any

Item	Q.ty	Ref.	Part/Value	Description	Manufacturer	Order code
64	1	R87	2k2 SMD 0603 1/16 w ±1%	Resistor	Any	Any
		R88	0 SMD 0805 1/8 w ±1%	Resistor	Any	Any
65	1	R89	680 SMD 0603 1/16 w ±1%	Resistor	Any	Any
66	1	R91	20k SMD 0603 1/16 w ±1%	Resistor	Any	Any
67	1	R96	120 SMD 0603 1/16 w ±1%	Resistor	Any	Any
68	1	S1	SPST FSM5M	Push button	TE Connectivity	FSM5M
69	1	S2	SPST FSM5M	Push button	TE Connectivity	FSM5M
70	1	TP30	GND 0805D	GND	Any	Any
71	1	U1, U10	ESDA5V3LY	Automotive dual Transil™ array for ESD protection	ST	ESDA5V3LY
72	1	U2	ESDA6V1LY	Automotive dual Transil™ array for ESD protection	ST	ESDA6V1LY
73	1	U3	TS952IYDT	Real input and output rail to rail / low distortion	ST	TS952IYDT
74	1	U4	TS954IYPT TSSOP14	Real input and output rail to rail / low distortion	ST	TS954IYPT
75	1	U5	SPC560P50L3 quad50m100wg160	32-bit power architecture MCU for automotive chassis and safety applications	ST	SPC560P50L3
76	1	U6	STM6315RB SOT143-4	Open drain microprocessor reset	ST	STM6315RBW13F
77	1	U7	ST3232EBTR TSSOP-16	Low power, enhanced ESD protection communication interface	ST	ST3232EBTR
78	1	U8	L9616D SO-8	High speed CAN bus transceiver	ST	L9616
79	1	U9	LF33CDT-TRY SMD_DPACK	Very low drop voltage regulator with inhibit	ST	LF33CDT-TRY
80	1	X1	Male Header7x2 SMD	Connector	Assmann WSW Components	AWHW 14G-SMD
81	1	Y1	12MHz XTAL_SOCKET	Socket	Multicomp	HC49S-12-30-50-70-30-ATF

**STMicroelectronics****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

Title to the Evaluation Board remains with ST and/or its licensors. You may not remove any copyright or other proprietary rights notices without prior written authorization from ST. You may make one copy of the software and/or firmware of the Evaluation Board for back up or archival purposes provided that You reproduce and apply to such copy any copyright or other proprietary rights notices included on or embedded in the software and/or firmware. You agree to prevent any unauthorized copying in whole or in part of the Evaluation Board.

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 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.