

Table 1: STDES-EVT001V1 bill of materials

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
1	3	C1, C38, C61	22 μ F, 63V, \pm 20%	Electrolytic capacitor, 5mm dia, 2mm pitch, Through Hole	Panasonic Electronics	ECA-1JM220
2	1	C2	1 μ F, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R8BB105
3	1	C3	100 μ F, 100V, \pm 20%	Electrolytic capacitor, 10mm dia, 5mm pitch Through Hole	Nichicon	UVR2A101MPD
4	1	C4	220nF, 50V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R9BB224
5	1	C5	(not mounted)	SMD0805	-	-
6	1	C6	470 μ F, 25V, \pm 20%	Electrolytic capacitor, 10mm dia, 5mm pitch Through hole	Panasonic Electronics	ECA-1EM471
7	1	C7	1nF, 50V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R9BB102
8	1	C8	100nF, 100V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R0BB104
9	1	C9	10 μ F, 16v, \pm 20%	Electrolytic capacitor, 8mm dia, 3.5mm pitch, Through Hole	Nichicon	USH1C100MPD
10	3	C11, C49, C71	100nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB104
11	4	C12, C53, C55, C57	10nF, 50V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R9BB103
12	3	C13, C62, C73	100nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB104
13	11	C14, C15, C16, C44, C46, C59, C66, C67, C94, C95, C96	1nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB102
14	12	C17, C18, C19, C20, C21, C22, C23, C24, C26, C28, C31, C32	470 μ F, 100V, \pm 20%	Electrolytic capacitor, 16mm dia, 7.5mm pitch, Through hole	Panasonic Electronics	ECA-2AHG471
15	3	C25, C27, C30	2.2nF, 760VAC, 500VAC, \pm 20%	Safety Ceramic Disc Capacitors, Through Hole	Vishay	VY1222M37Y5VQ63V0
16	3	C34, C40, C47	220nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB224
17	2	C37, C72	10nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB103
18	2	C39, C43	20pF, 25V, \pm 5%	Ceramic Capacitor, SMD0805	AVX	08053A200JAT2A
19	6	C41, C50, C51, C60, C70, C98	100nF, 25V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB104
20	7	C42, C56, C58, C63, C64, C69, C99	100nF, 50V, \pm 10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R9BB104

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
21	1	C45	680nF, 25V, ±10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R8BB684
22	1	C48	1µF, 25V, ±10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KKX7R8BB105
23	3	C52, C100, C101	1µF, 50V, ±20%	Electrolytic capacitor, 5mm dia, 2mm pitch, Through hole	Würth Electronics	860010672005
24	1	C54	100nF, 25V, ±10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB104
25	1	C65	10nF, 25V, ±10%	Ceramic Capacitor, SMD0805	Yageo	AC0805KRX7R8BB103
26	1	C68	10nF, 50V, ±10%	Ceramic Capacitor, SMD1206	Würth Electronics	885012208081
27	2	C90, C93	100nf, 25V, ±10%	Ceramic Capacitor, SMD0805	Würth Electronics	885012207072
28	9	D1, D3, D4, D8, D10, D11, D13, D15, D16	1.0 Amp, 60 V	Schottky Diodes & Rectifiers , SMA	ST	STPS1L60A
29	6	D2, D5, D9, D12, D14, D17	18V, 18V/500MW, ±5%	Zener Diode, SOD-123	ON Semiconducto	MMSZ5248BT1G
30	1	D6	1000V 1A	Rectifier , Through hole	ON Semiconducto	1N4007RLG
31	2	D18, D19	200V 1A	Ultrafast Recovery Diode, SMA	ST	STTH102A
32	1	D20	100 V, 150 mA	General Purpose Signal Schottky Diode, SOD-123	ST	BAT46ZFILM
33	1	D21	18V	TVS Diodes, SMA	ST	SMAJ18A-TR
34	3	D22, D23, D24	200V 1A	Ultrafast Diode, SMA	ST	STTH102AY
35	1	D30	30V, 300mA	General Purpose Schottky Diodes, SOD-523	ST	BAT30KFILM
36	3	J1, J2, J10	CON2, connector	Header and Wires, 2 Pins Through hole	Molex	22-28-4033
37	7	J3, J13, J14, J15, J16, J17, J18	15V_+VE	Header and Wires, 1 Pin each Through hole	Molex	22-28-4033
38	1	J4	CON3	Header and Wires, 3 Pins Through hole	Molex	22-28-4033
39	1	J5	BAT+VE	VBUS (marked on Board)	-	-
40	1	J7	BAT-VE	GND (marked on board)	-	-
41	3	J9, J11, J12	CON5, connector	Header and Wires, 5 Pins Through hole	Molex	22-28-4033
42	4	LD1, LD2, LD3, LD4	LED_RED, 1.7V	LED Indicator, SMD0805	Stanley Electric	BR1112H-TR
43	1	L1	BEAD, 150MA 360 MΩ, ±10%	Fixed inductor 10µh, SMD0805	Taiyo Yuden	LBR2012T100K

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
44	1	L2	1.2mH, 750mA, ±10%	Fixed inductor 1.2mh, 5 mm pitch Through hole	Wurth Electronics	7447480122
45	24	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25	STP100N8F6, 80 V, 100 A	N-channel Power MOSFET, TO-220 Through hole	ST	STP100N8F6
46	1	RT1	10kΩ NTC	NTC Thermistor	EPOCS/TDK	B57703M103G40
47	6	R1, R47, R21, R25, R28, R78	10K, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT10K0
48	6	R2, R3, R31, R32, R56, R57	100E, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT100R
49	6	R4, R17, R30, R48, R55, R76	3R3, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT3R30
50	6	R5, R16, R33, R46, R58, R73	2R2, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT2R20
51	2	R6, R53	100k, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT100K
52	27	R7, R8, R9, R10, R11, R12, R13, R14, R15, R35, R36, R37, R38, R40, R41, R42, R43, R44, R61, R62, R63, R64, R66, R68, R69, R70, R71	4R7, 250mW, ±1%	Thick Film, SMD0805	Stackpole Electronics	RNCP0805FTD4R70
53	3	R24, R80, R110	0R, 125mW	Thick Film, SMD0805	TE Connectivity	CRG0805ZR
54	24	R18, R20, R79, R88, R95, R100, R102, R108, R109, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128	4K7, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT4K70
55	1	R19	2k7, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT2K70
56	4	R22, R23, R105, R106	0.015/SHUNT, 3W, ±1%	Metal Element Current Sensing Resistors, Through hole	TT Electronics	OAR3R015FLF
57	1	R27	1K8, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT1K80
58	4	R29, R72, R107, R113	5K1, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT5K10
59	9	R26, R34, R50, R59, R74, R75, R81, R82, R83	1K, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT1K00

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
60	4	R39, R60, R65, R67	680, 250mW, ±0.5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-PB6D6800V
61	1	R45	27K, 250mW, ±5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-T06J273V
62	1	R49	330K, 250mW, ±5%	Thick Film, SMD0805	Stackpole Electronics	RPC0805JT330K
63	1	R51	120E, 250mW, ±5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-T06J121V
64	1	R52	82E, 250mW, ±5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-T06J820V
65	1	R77	0E, 250mW	Thick Film, SMD1206	Yageo	RC1206FR-070RL
66	1	R54	6K8, 250mW, ±0.5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-PB6D6801V
67	6	R84, R91, R92, R93, R129, R130	4.7K, 250mW, ±0.5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-PB6D4701V
68	2	R111, R112	1.5K, 250mW, ±5%	Thick Film, SMD0805	Panasonic Electronics	ERJ-T06J152V
69	6	TP1, TP2, TP4, TP5, TP12, TP13	TEST POINT	-	-	-
70	1	U1	VIPER115LS, 30V, 1.25mA	AC/DC Converters, SSOP 10	ST	VIPER115LS
71	3	U2, U4, U6	4A	Half-Bridge Gate Driver, SO-14	ST	L6491D
72	1	U3	STM8S105C6T6, 2.95-5.5V	8-bit MCU, LQFP 48 7x7x1.4	ST	STM8S105C6T6
73	1	U5	TSV631, 60 µA at 5 V	Operational Amplifiers - Op Amps 60uA , SOT23-5L	ST	TSV631ILT
74	1	U12	74HC4050D/ SO16, 15V	Buffers & Line Drivers, SO16	Nexperia	74HC4050D
75	1	U17	L7805/TO220, 1.5A	Linear Voltage Regulators, TO-220	ST	L7805
76	1	Y1	XTAL_16MHz	Crystal Oscillator, HC-49/S Through Hole	TXC Corporation	AS-16.000MAHK-B

**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 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.