

Table 1: EVALSTWBC-EP bill of materials

Item	Quantity	Reference	Part / Value	Voltage / Watt / Ampere	Type / TECHNOLOGY information	Tolerance	Package	Manufacturer	Manufacturer's ordering code / Orderable Part Number
1	4	C100,C114,C206,C217	NP		CER		402	any	C_NP_0402
2	7	C101,C105,C113,C500,C502,C504,C511 100NF				0.15	402		100NF_25V_X5R_0402
3	4	C102,C103,C512,C515	100NF	50V	CER	15%	402	any	100NF_50V_X5R_0402
4	3	C104,C200,C201	22UF	25V	CER	20%	1210	WURTH ELECTRONIK	885012109014
5	4	C106,C115,C218,C509	10NF	50V	CER	10%	402	any	10NF_50V_X7R_0402
6	2	C107,C109	NP		CER		603	any	C_NP_0603
7	2	C108,C111	10UF	25V	CER	20%	1206	WURTH ELECTRONIK	885012108021
8	1	C110	NP		CER		1210	any	C_NP_1210
9	1	C112	10UF	10V	CER	10%	805	MURATA	GRM21BR71A106KE51L
10	2	C202,C203	10UF	50V	CER	10%	1206	any	10UF_50V_X5R_1206
11	2	C204,C403	100PF	50V	CER	5%	402	any	100PF_50V_COG_0402
12	1	C205	100NF	50V	CER	5%	1206	MURATA	GRM31C5C1H104JA01L
13	2	C207,C301	100NF	50V	CER	15%	603	any	100NF_50V_X7R_0603
14	1	C208	5.6NF	50V	CER	15%	402	any	5.6NF_50V_X7R_0402
15	6	C209,C210,C211,C212,C213,C214	22UF	35V	CER	20%	1210	Taiyo Yuden	GMK325BJ226MM-P
16	1	C215	NP	35V	TANT	20%	TANT_E	KEMET	T495X476M035ATE185
17	1	C216	100PF	50V	CER	15%	402	any	100PF_50V_X5R_0402
18	2	C219,C220	220NF	35V	CER	15%	603	any	220NF_35V_X7R_0603
19	1	C300	10UF	25V	CER	10%	603	any	10UF_25V_X7R_0603
20	3	C302,C304,C305	100NF	100V	CER	5%	1812	TDK	C4532COG2A104J320KA
21	1	C306	1NF	50V	CER	15%	603	any	1NF_50V_X5R_0603
22	1	C307	NP		CER		1812	any	C_NP_1812
23	2	C308,C507	22NF	50V	CER	15%	402	any	22NF_50V_X7R_0402
24	2	C309,C508	470PF	50V	CER	15%	402	any	470PF_50V_X7R_0402
25	2	C310,C405	4.7NF	50V	CER	15%	402	any	4.7NF_50V_X7R_0402
26	2	C311,C312	1NF	50V	CER	5%	402	MURATA	GRM1555C1H102JA01D
27	1	C400	4.7NF	100V	CER	10%	603	TDK	CGA3E2X7R2A472K080AA
28	1	C401	10NF	100V	CER	15%	603	any	10NF_100V_X7R_0603
29	1	C402	22NF	100V	CER	15%	603	any	22NF_100V_X7R_0603
30	2	C404,C514	22PF	50V	CER	5%	402	any	22PF_50V_COG_0402
31	1	C406	220NF	50V	CER	10%	402	any	220NF_50V_X7R_0402

Item	Quantity	Reference	Part / Value	Voltage / Watt / Ampere	Type / TECHNOLOGY information	Tolerance	Package	Manufacturer	Manufacturer's ordering code / Orderable Part Number
32	1	C501	1NF	50V	CER	10%	402	any	1NF_50V_X7R_0402
33	1	C503	2.2NF	50V	CER	15%	402	any	2.2NF_50V_X7R_0402
34	1	C505	1UF	16V	CER	10%	402	any	1UF_16V_X5R_0402
35	1	C506	1NF	100V	CER	15%	402	any	1NF_100V_X7R_0402
36	1	C510	2.2UF	25V	CER	10%	402	any	2.2UF_25V_X5R_0402
37	1	C513	220PF	50V	CER	15%	402	any	220PF_50V_X7R_0402
38	1	D100	ESDA25P35-1U1M		TVS/ESD/EMI		QFN1610	STMICROELECTRONICS	ESDA25P35-1U1M
39	1	D200	PMEG045V100E PD		SCHOTTKY		SOT1289	NXP	PMEG045V100EPD
40	1	D201	4.3V		ZENER		SOD323	NXP	BZX384-C4V3-AK
41	1	D400	MMBD1503A		DIODE		SOT23	FAIRCHILD	MMBD1503A
42	1	D500	RB520S		SCHOTTKY		SOD523	ROHM	RB520S
43	2	D501,D502	BAS521-7		DIODE		DIOD_SOD523	any	BAS521-7
44	2	D503,D506	BAV99W		DIODE		SOT323	NXP	BAV99W
45	1	D504	GREEN		LED		L3.2_W2.5_H1	WURTH ELEKTRONIK	155124VS73200
46	1	D505	RED		LED		L3.2_W2.5_H1	WURTH ELEKTRONIK	155124RS73200
47	2	J100,J500	629105150521		USB		MICRO USB TYPE B SMD	WURTH ELEKTRONIK	629105150521
48	1	J501	61300411121		HEADER		TH_HEADER_1x4_P2.54	WURTH ELEKTRONIK	61300411121
49	1	L100	2.2uH	3.8A	INDUCTOR	20%	L5_W5_H4	WURTH ELEKTRONIK	74404054022
50	1	L200	2*4.7uH	8A	CM_CHOKE			WURTH ELEKTRONIK	744871004
51	2	L500,L501	1K	0.2A	FERRITE	25%	402	MURATA	BLM15AG102SN1D
52	1	M300	8uH	8A	INDUCTOR			WURTH ELEKTRONIK	760 308 103 146
53	4	M600,M601,M602,M603	M320 KRSTMCZ100-		SCREW			DURATOOL	M320 KRSTMCZ100-
54	4	M604,M605,M606,M607	D01475		SPACER			DURATOOL	D01475
55	4	M608,M609,M610,M611	HTSB-M3-15-5-1		SPACER			RICHCO	HTSB-M3-15-5-1
56	1	M620	SPACER_3MM_MP_A8_TOP_single		SPACER			any	SPACER_3MM_MP_A8_Single_coil
57	1	M628	19MMX2,3MMX1 1000MM		SPACER			3M	4991F 19MMX50M
58	3	Q100,Q303,Q400	NPN-NPN		CMS		SOT363	ON SEMICONDUCTOR	BC847CDW1T1G

Item	Quantity	Reference	Part / Value	Voltage / Watt / Ampere	Type / TECHNOLOGY information	Tolerance	Package	Manufacturer	Manufacturer's ordering code / Orderable Part Number
59	2	Q200,Q202	NPN-PNP		CMS		SOT363	ON SEMICONDUCTOR	MMDT4413
60	1	Q201	N-MOS		CMS		POWERFLAT-5x6	STMICROELECTRONICS	STL8DN6LF3
61	1	Q300	NP		CMS		SOT23	STMICROELECTRONICS	2N7002
62	2	Q301,Q302	N-MOS		CMS		POWERFLAT-3x3	STMICROELECTRONICS	STL10N3LLH5
63	1	Q500	NPN-PNP		CMS		SOT363	ON SEMICONDUCTOR	BC847BPDW1T1G
64	2	R100,R207	220K	1/16W	RES	1%	402	any	220K_1%_0402
65	1	R101	330K	1/16W	RES	1%	402	any	330K_1%_0402
66	1	R102	12K	1/16W	RES	5%	402	any	12K_5%_0402
67	1	R103	120K	1/16W	RES	5%	402	any	120K_5%_0402
68	8	R104,R108,R205,R510,R511,R516,R518,R524	100K	1/16W	RES	5%	402	any	100K_5%_0402
69	1	R105	39K	1/16W	RES	1%	402	any	39K_1%_0402
70	7	R106,R110,R200,R202,R309,R526,R527	10R	1/16W	RES	5%	402	VISHAY	10R_5%_0402
71	3	R107,R515,R520	33K	1/16W	RES	1%	402	any	33K_1%_0402
72	2	R109,R201	NP		RES		402	any	R_NP_0402
73	1	R111	39K	1/16W	RES	5%	402	any	39K_5%_0402
74	2	R203,R507	1K	1/16W	RES	1%	402	any	1K_1%_0402
75	2	R204,R400	470R	1/16W	RES	1%	402	any	470R_1%_0402
76	1	R206	0.033R	1/2W	RES	1%	1206	any	0R033_1%_1206_0.5W
77	1	R208	47R	1/16W	RES	5%	402	any	47R_5%_0402
78	1	R209	75K	1/16W	RES	1%	402	any	75K_1%_0402
79	2	R210,R213	3.3K	1/16W	RES	1%	402	any	3.3K_1%_0402
80	3	R211,R212,R311	10K	1/16W	RES	1%	402	any	10K_1%_0402
81	1	R214	4.7K	1/16W	RES	1%	402	any	4.7K_1%_0402
82	2	R301,R302	22R	1/16W	RES	5%	402	any	22R_5%_0402
83	3	R303,R408,R500	1M	1/16W	RES	1%	402	any	1M_1%_0402
84	5	R304,R409,R410,R506,R522	100K	1/16W	RES	1%	402	any	100K_1%_0402
85	5	R305,R306,R307,R404,R405	470K	1/16W	RES	1%	402	any	470K_1%_0402
86	1	R308	0.022R	1W	RES	1%	1206	any	0.022R_1%_1206
87	1	R310	NP	1/10W	RES	5%	603	any	22R_5%_0603
88	2	R312,R313	4.7R	1/16W	RES	1%	402	any	4.7R_1%_0402

Item	Quantity	Reference	Part / Value	Voltage / Watt / Ampere	Type / TECHNOLOGY information	Tolerance	Package	Manufacturer	Manufacturer's ordering code / Orderable Part Number
89	2	R401,R402	82K	1/16W	RES	1%	402	any	82K_1%_0402
90	1	R403	150K	1/16W	RES	1%	402	any	150K_1%_0402
91	2	R406,R523	22K	1/16W	RES	1%	402	any	22K_1%_0402
92	2	R407,R503	47K	1/16W	RES	1%	402	any	47K_1%_0402
93	1	R411	2.2K	1/16W	RES	5%	402	any	2.2K_5%_0402
94	5	R501,R502,R505,R512,R514	10K	1/16W	RES	5%	402	any	10K_5%_0402
95	1	R504	1K	1/16W	RES	5%	402	any	1K_5%_0402
96	1	R508	2.7K	1/16W	RES	1%	402	any	2.7K_1%_0402
97	1	R509	180K	1/16W	RES	1%	402	any	180K_1%_0402
98	1	R513	47K		THERMISTANCE	1%	402	MURATA	NCP15WB473F03RC
99	2	R517,R519	470R	1/16W	RES	5%	402	any	470R_5%_0402
100	1	R521	1M	1/16W	RES	5%	402	any	1M_5%_0402
101	1	R525	330R	1/16W	RES	5%	402	any	330R_5%_0402
102	4	TP100,TP103,TP300,TP301	WIRE_SOLDER		TEST POINT			any	WIRE_SOLDER
103	6	TP101,TP102,TP303,TP304,TP502,TP503	TPSMD-1MM		TEST POINT		Test Point	any	TPSMD-1MM
104	8	TP200,TP302,TP400,TP500,TP501,TP506,TP507,TP508	5001		TEST POINT			KEYSTONE	5001
105	1	U100	ST715PUR		CONVERTER		DFN8_L3_W3	STMICROELECTRONICS	ST715PUR
106	1	U300	DGD0590		DRIVER		V-QFN3030-8	DIODES INC	DGD0590
107	1	U500	STWBC_EP		CONTROLLER		QFN32	STMICROELECTRONICS	STWBC_EP
108	1	U501	TSV521ICT		AMPLIFIER		SOT353	STMICROELECTRONICS	TSV521ICT



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.