

Table 1: Bill of materials

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
1	1	C1	1nF, 1000V, ±10%	X7R, TH-Radial	Murata	RDER73A102K2K1H03B
2	2	C2, C3	100nF, 305V, ±20%	X2, TH-Radial	EPCOS(TDK)	B32921C3104M
3	1	C4	470nF, 300V, ±20%	X2, TH-Radial	EPCOS(TDK)	B32922C3474M
4	2	C21, C28	470nF, 25V, ±10%	X7R, SMD0805	Samsung	CL21B474KAFNNWG
5	4	C5, C6, C14, C15	470µF, 160V, ±20%	Aluminium 12000hrs, TH-Radial	United Chemi-Con	EKXJ161ELL471MMN3S
6	1	C49	470µF, 16V, ±10%	Aluminium 12000hrs, TH-Radial	Nichicon	UVK1C471MPD1TD
7	12	C8, C16, C19, C37, C38, C40, C42, C43, C44, C47, C50, C52	100nF, 50V, ±10%	X7R, SMD 0805	Yageo	CC0805KRX7R9BB104
8	1	C9	4700pF, 300V	Radial, Disc	Murata	DE2E3KY472MB3BU02F
9	1	C10	10nF, 25V, ±10%	X7R, SMD 0805	Kemet	C0805C103J3RACTU
10	1	C11 N.M.	DNM	SMD 0805 (not mounted)	-	DNM
11	1	C12	220nF, 25V, ±10%	X7R, SMD 0805	TDK Corporation	CGA4J2X7R1E224K125AA
12	2	C13, C46	100pF, 16V, ±10%	X7R, SMD 0805	Würth	885012207027
13	4	C25, C45, C53, C54	10µF, 16V, ±10%	X7R, SMD 0805	Samsung	CL21B106KOQNNNG
14	1	C27	4.7µF, 25V, ±10%	X7R, SMD 0805	Samsung	CL21B475KAFNNNE
15	2	C29, C33	1µF, 400	TH-Radial	Nichicon	UVR2G010MPD1TD
16	4	C34, C32, C30, C31	2.2µF, 25V, ±10%	X7R, SMD1206	Samsung	CL31B225KAHNNNE
17	2	C35, C48	2.2nF, 1kV, ±10%	X7R, TH	Murata	RDER73A222K2M1H03A
18	1	C36	33nF, 50V, ±10%	X7R, SMD 0805	Samsung	CL21B333KBANNNC
19	2	C39, C41	2.2pF, 50V, ±10%	X7R, SMD 0805	Samsung	CL21C2R2BBANNNC
20	1	C51	100µF, 16V	TH-Radial	Nichicon	UVR1C101MDD1TA
21	1	C55	1nF, 16V, ±10%	X7R, SMD0805	Kemet	C0805C102K4RACTU
22	1	D1	600V, 3A	SMB	ST	STTH3L06U
23	3	D2, D5, D13	600V, 1A	SMB	ST	STTH3L06U
24	3	D4, D7, D26	75V	DO-213AA	Microsemi	1N4148UR-1
25	1	D6	400V, 3A	DO-201AD	Diodes Incorporated	1N5404-T
26	1	D8	-	Transil , TH	ST	P6KE400ARL
27	1	D10	600V, 4A	Bridge, 4-SIP	Micro-commercial	GBU4J-BP

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
28	4	D14, D17, D18, D23	33V, 0.5W	Zener, TH	Fairchild	BZX79C33_T50A
29	1	D19	12V, 0.25W	Zener, TH	Fairchild	1N5242BTR
30	1	D20	3.3V, 0.5W	Zener, SOD123	On-Semiconductor	MMSZ5226BT1G
31	1	D21	15V, 0.25W	Zener, TH	Fairchild	1N5245BTR
32	2	D24, D25	2.5mm, 2.1V, 20mA	LED, TH	cree Inc.	C503B-AAN-CA0C0252-015
33	1	D27	100V, 1A	SMA	ST	STPS1H100
34	2	D28, D30	1000V, 1A	SMA	On-Semiconductor	MRA4007T3G
35	1	D29	388V, 6A	SMA	ST	SMAJ188A-TR
36	1	F1	300V, 2A	Fuse, TH	Littelfuse Inc.	36912000000
37	1	J1	90-300V, 1A	Connector, TH	Phoenix Contact	1935174
38	1	J2	2PIN, 300V, 18A	Connector, TH	Phoenix Contact	1935161
39	1	J4	1.27mm pitch, Male 5x2 P	Header 5X2, TH	CNC Tech	3220-10-0100-00
40	1	L1	47mH, 1A	Line Filter, TH	Schaffner EMC Inc.	RN143-1-02-47M
41	2	L2, L3	200mA, 3.8 Ω , $\pm 5\%$	Inductor, Axial	Epcos	B82144A2105J
42	1	Q1	900V, 18A	TO220	ST	STP21N90K5
43	1	Q4	200V, 0.5A	SOT 23-3	Fairchild	KST43MTF
44	1	Q5	60V, 0.135A	SOT 23-3	On-Semiconductor	2N7002LT1G
45	2	Q6, Q7	80V, 0.5A	SOT 23-3	On-Semiconductor	MMBTA06LT3G
46	3	RV1, RV2, RV3	470V, 1.2KA, DISC 7MM	VARISTOR, TH	Burns Inc.	MOV-07D471K
47	1	R1	10R, 0.5W	NTC, TH	Vishay	NTCLE100E3109JB0
48	1	RT1	10K, $\pm 2\%$	NTC, TH	Ametherm	PANR103395-408
49	1	R2	100K, 2W, $\pm 5\%$	TH	Yageo	FMP200JR-52-100K
50	3	R5, R21, R44	100K, 1/8W, $\pm 5\%$	SMD0805	Panasonic Electronic Components	ERJ-6GEYJ104V
51	1	R3	220K, 1/4W, $\pm 5\%$	SMD0805	Yageo	RC0805JR-07220KL
52	2	R20, R40	4.7K, 1/8W, $\pm 1\%$	SMD0805	Yageo	RC0805FR-074K7L
53	2	R6, R34	120K, 1/8W, $\pm 1\%$	SMD0805	Yageo	RC0805FR-07120KL
54	1	R7	33K, 1/8W, $\pm 1\%$	SMD0805	Yageo	RC0805FR-0733KL
55	1	R8 N.M.	DNM	SMD0805 (not mounted)	-	DNM
56	1	R9	56K, 1/8W, $\pm 1\%$	SMD0805	Yageo	RC0805FR-0756KL
57	1	R10	3 K, 1/8W, $\pm 1\%$	SMD0805	Yageo	RC0805FR-073KL

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
58	2	R11, R67	100R, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-07100RL
59	1	R12	220R, 1/4W, ±1%	SMD1206	Yageo	RC1206FR-07220RL
60	1	R13	2K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-071K6L
61	1	R14	0.22R, 2W, ±1%	SMD2512	TE Connectivity	RLP73K3AR22FTDF
62	1	R18	0.27R, 2W, ±1%	SMD2512	TE Connectivity	RLP73K3AR27FTDF
63	7	R15, R38, R42, R43, R53, R57, R58	1K, 1/4W, ±1%	SMD0805	Stackpole Electronics Inc	RNCP0805FTD1K00
64	2	R16, R59	0R, 1/8W	SMD0805	Yageo	RC0805JR-070RL
65	1	R32	1.5K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-071K5L
66	4	R33, R52, R54, R63	10K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-0710KL
67	2	R35, R73	390K, 1/8W	SMD0805	Yageo	RC0805FR-07390KL
68	2	R36, R37	0.82R, 2W, ±1%	SMD2512	Bourns Inc.	CRM2512-FX-R820ELF
69	1	R39	2.7K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-072K7L
70	1	R17	330R, 1/8W, ±1%	SMD 0805	Yageo	RC0805FR-07330RL
71	3	R45, R46, R69	5.1K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-075K1L
72	1	R50	4.7K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-074K7L
73	2	R68, R70	910K, 1/8W, ±1%	SMD0805	Yageo	RC0805FR-07910KL
74	1	R71	750K, 1/8W, ±5%	SMD0805	Yageo	RC0805FR-07750KL
75	1	R72	150K, 1/8W, ±5%	SMD0805	Stackpole Electronics Inc	RMCF0805JT150K
76	1	R74	22R, 0.5W, ±5%	Fuse, TH	Stackpole Electronics Inc	CF12JT22R0
77	1	R41	470K, 1/8W, ±1%	SMD0805	Yageo	RT0805BRD07470KL
78	1	SW1	0.02A, 15V	SWITCH TACTILE SPST-NO, SMD	Panasonic	EVP-AA402W
79	1	T1	Lp=350µH Turns P:59 S:65 A1:13T A2:13T	Transformer, ETD 34/17/11, TH	Wurtz	750343544,Rev01
80	1	T2	Lp =2mH Np =130 SWG (36), Ns =18 (SWG 32), Na =27 (SWG 36)	Transformer, E20/10/6 (10PIN), TH	Wurtz	750344118,rev01
81	1	U2	-	10-SSOP	ST	HVLED001A
82	1	U3	-	SO8	ST	TSM101AIDT
83	2	U4, U5	-	Optocoupler, TH	Vishay	VO617A-2
84	1	U6	-	SSOP10	ST	VIPER012LS(TR)
85	1	U8	-	UFQFPN32	ST	STM32L071KZU6-TR

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
86	1	U9	-	DPAK	ST	LDF33DT-TR
87	1	U10	-	SMD	ST	SPSGRFC-868
88	1	Y1	32.768kHz ±20ppm 12.5pF 30 kΩ -10°C ~ 60°C	Crystal Through Hole Cylindrical Can, Radial, TH	Abracon LLC	AB38T-32.768KHZ
89	1	-	-	Heat Sink	Assmann WSW Components	V7235-T
90	1	-	-	MOUNTING KIT TO-220	Aavid Thermalloy	4880G
91	1	-	750MHz ~ 950MHz 1.6dBi Cable (216mm) - u.FL Panel Mount	868MHz ISM, LoRa, Sensor Networks, SigFox Whip, Straight RF Antenna	Linx Technologies Inc.	ANT-868-PW-QW-UFL

**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.