

Bill of materials

Table 1. STDES-PFCBIDIR bill of materials

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
1	1	Table 2. STDES-PFCBIDIR control board	-	Control board	ST	Not available for separate sale
2	1	Table 3. STDES-PFCBIDIR power board	-	Power board	ST	Not available for separate sale

Table 2. STDES-PFCBIDIR control board

Item	Q.ty	Ref.	Value	Description	Manufacturer	Order code
1	1	CN56	Jtag_SWD_Adapter,	10-way, 2-row, vertical pin header	Würth	62201021121
2	20	C3,C6, C7,C28, C34,C36,C37,C45,C48, C49,C51,C52,C53,C55, C59,C61,C62,C65,C66, C134	100 nF, 603, 16 V, ±10 %,	Multilayer ceramic capacitors	Würth	885012206046
3	7	C2,C27, C35,C47,C50,C58,C64	1 µF, 603, 25 V	Multilayer ceramic capacitors	Würth	885012206076
4	17	C11,C12,C13,C14,C20, C21,C22,C24,C30,C31, C32,C33,C38,C40,C42, C43,C140	100 pF, 603, 50 V	Multilayer ceramic capacitors	Würth	885012006057
5	1	C135	220nF, 603, 50 V	Multilayer ceramic capacitor	ANY	ANY
6	1	C18	470 nF, 805, 50 V	Multilayer ceramic capacitor	Würth	885012207102
7	3	C15,C23,C29	2.2 nF, 603, 50 V, ±5 %	Multilayer ceramic capacitors	KEMET	C0603C222J5GACTU
8	1	C133	10 µF, 805, 25 V	Multilayer ceramic capacitor	ANY	ANY
9	7	D2,D4, D5,D9, D12,D13,D15	GREEN, SMD 0805, 2.8 V	Green LED	Würth	150080GS75000
10	2	D3,D10	SMAJ5.0A-TR, SMA, 400 W	Uni-directional TVS Diode,	ST	SMAJ5.0A-TR

Item	Q.ty	Ref.	Value	Description	Manufacturer	Order code
11	1	D7	RED, SMD 0805, 2.4 V	Red LED	Würth	150080RS75000
12	5	F1,F2,F3,F4,F5	22 Ohm@100 MHz, 6 A	Ferrite beads	Würth	742792021
13	2	JP1,JP7 N.A.	3JP_pcb	Solder jumper selectors (not assembled)	ANY	ANY
14	1	JP2 N.A.	STRIP_2X3	Solder jumper selector (not assembled)	ANY	ANY
15	1	J1	i2C, strip4_100m_v	4-way, 1-row, straight pin header	Würth	61300411121
16	2	J2,J3	CON4, strip4_100m_v,	4-way, 1 row, straight pin header	Würth	61300411121
17	1	LED1	SMTL4-SBC, 2 V, SMD	LED	BIVAR	SMTL4-SBC
18	1	L1	WE-CBF, 603, 500 m A, $\pm 25\%$	Ferrite bead	Würth	74279262
19	1	P1	CON 64 male	Multipole plug	ERNI	533406
20	13	R2,R4, R5,R8, R10,R1 3,R16,R 19,R44, R125,R 128,R1 29,R13 0	10 k, 603, 0.1 W, $\pm 1\%$	Thick film SMD resistors	ANY	ANY
21	36	R6,R7, R9,R12, R14,R1 5,R20,R 21,R22, R24,R2 5,R26,R 27,R28, R29,R3 1,R33,R 34,R36, R38,R4 0,R41,R 42,R43, R47,R4 8,R49,R 52,R54, R55,R5 7,R58,R 59,R60, R61,R6 2 N.A.	N.M., 603	Resistors (not mounted)	ANY	ANY
22	10	R17,R3 9,R45,R 46,R50, R51,R5 3,R56,R 131,R1 33	1 k, 603, 0.1 W, $\pm 1\%$	Thick film SMD resistors	ANY	ANY
23	7	R23,R3 0,R35,R 126,R1	0, 603, 0.1 W, $\pm 1\%$	Thick film SMD resistors	ANY	ANY

Item	Q.ty	Ref.	Value	Description	Manufacturer	Order code
		27,R13 4,R135				
24	2	S1,S2	te_fsm4jsma, None	Button tactile switch, single pole single throw (SPST)	TE Connectivity	FSM4JSMATR
25	26	TP1,TP 2,TP3,T P4,TP5, TP6,TP 7,TP8,T P9,TP1 0,TP11, TP12,T P13,TP 14,TP1 5,TP16, TP17,T P18,TP 19,TP2 0,TP21, TP22,T P24,TP 25,TP2 6,TP27	TestPoint	Test terminals	ANY	ANY
26	1	USB2	microUSB	Micro USB connector receptacle	MOLEX	47346-0001
27	5	U2,U5, U6,U9, U10	TSV912IDT, SO-8	Wide-bandwidth (8 MHz) rail-to-rail input/output 5 V CMOS op-amp	ST	TSV912IDT
28	1	U3	LD29080, 3.3 V, 800 mA	800 mA fixed and adjustable output very low drop voltage regulator	ST	LD29080
29	1	U23	STM32G474RET3, LQFP 64	Mainstream Arm Cortex-M4 MCU	ST	STM32G474RET3
30	1	U22	ESDAL, 300 W, SOT23-3L	Dual-Element Uni- Directional TVS Diode	ST	ESDA6V1L
31	1	PCB	FR4 4 LAYER, 98x48x1.6mm	PCB FR4- 4 Layer size 98x48x1.6mm	-	-

Table 3. STDES-PFCBIDIR power board

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
1	33	C1, C3, C7, C9, C13, C14, C83, C85, C91, C95, C99, C104, C108, C113, C117, C120, C124, C130, C140, C181, C186, C197, C202, C241, c245, C251, C265, C303, C310, C314, C321, C325, C332	1μF, 25V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
2	55	C2, C4, C6, C8, C10, C12, C15, C16, C18, C84, C86, C88, C90, C92, C94, C96, C97, C100, C102, C103, C105, C109, C111, C112, C114, C122, C125, C131, C141, C182, C187, C198, C203, C242, c246, C255, C266, C302, C304, C306, C307, C308, C309, C313, C315, C317, C318, C319, C320, C324, C326, C328, C329, C330, C331	100nF, 16V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
3	28	C5, C11, C17, C87, C89, C98, C106, C107, C115, C116, C163, C166, C178, C180, C211, C213, C238, C240, C271, c279, C291, C300, C301, C311, C312, C322, C323, C333 N.M (NOT Assembly)	N.M.	(not mounted), 0603	ANY	ANY
4	21	C19, C23, C25, C27, C28, C29, C30, C33, C37, C39, C41, C42, C43, C44, C47, C51, C53, C55, C56, C57, C58	100nF, 16V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
5	11	C20, C24, C31, C34, C38, C45, C48, C52, C59, C61, C64	1µF, 25V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
6	9	C21, C22, C32, C35, C36, C46, C49, C50, C60 N.M (NOT Assembly)	N.M.	(not mounted), 0603	ANY	ANY
7	3	C26, C40, C54	4.7µF, 25V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
8	2	C62, C63	100nF, 16V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
9	3	C65, C66, C67	100nF, 16V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
10	6	C68, C71, C72, C75, C78, C79	100nF, 630V, ±10%	Multilayer ceramic capacitor SMD, 1812	Murata	GRM43DR72J104KW01L
11	4	C69, C70, C76, C77	470µF, 500V	Electrolytic Capacitor Through Hole	Vishay BC Components	MAL215759471E3
12	1	C73	100nF, 3kV, ±5%	Polypropylene Capacitor	KEMET	R474N310050A1K
13	1	C74	1nF, 3kV, ±5%	Polypropylene Capacitor	KEMET	PHE450XB4100JB04R17
14	3	C80, C81, C82	10µF, 305V, ±20%	Polypropylene Capacitor through hole	EPCOS	B32926C3106M000
15	6	C93, C101, C110, C305, C316, C327	4.7µF, 25V, ±10%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
16	2	C118, C119	100nF, 16V, ±10%	Multilayer ceramic capacitor SMD, 0604	ANY	ANY
17	1	C121	1µF, 25V, ±10%	Multilayer ceramic capacitor SMD, 0605	ANY	ANY
18	12	C123, C126, C129, C142, C183, C185, C193, C204, C243, C247, C256, C267	1nF, 25V, ±10%	Ceramic Capacitor X7R	Samsung Electro-Mechanics	CL10B102KA8NNNC
19	60	C127, C128, C133, C135, C136, c143, C145, c146, C153, C155, C156, C159, C161, C164, c167, C170, C171, c174, C176, c179, C184, C188, C189, C194, C196, C201, C205, C210, C216, C217, C221, C222, C225, C227, C228, C230, C231, C234, C235, C239, C244, C248, C253, C254, C259, C261, C264, C268, C274, C275, C278, C281, C283, C286, C287, C289, C292, C294, C295, C298	2.2µF, 50V, ±10%	Multilayer ceramic capacitor SMD, 1206	ANY	ANY
20	24	C132, C138, C144, c148, C154, C157, c168, C172, C190, C199, C206, C208, C214, C219, C223, C232,	1nF, 50V, ±10%	Multilayer ceramic capacitor SMD, 1206	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		C249, C258, C262, C269, C272, C280, C284, C296				
21	24	C134, C137, C139, c147, C158, C160, c169, c173, C191, C195, C207, C209, C218, C220, C224, C233, C250, C257, C260, C270, C276, C285, C288, C297	100nF, 25V, ±5%	Multilayer ceramic capacitor SMD, 1206	ANY	ANY
22	12	C149, C150, C151, C152, C192, C200, C212, C215, C252, c263, C273, C282	220pF, 50V, ±5%	Multilayer ceramic capacitor SMD, 0603	ANY	ANY
23	18	C162, C165, c175, C177, C226, C229, C236, C237, C277, C290, C293, C299, C334, C336, C339, C341, C342, C344	470nF, 50V, ±10%	Multilayer ceramic capacitor SMD, 0805	Murata	ANY
24	6	C335, C337, C338, C340, C343, C345	10µF, 50V, ±10%	Multilayer ceramic capacitor SMD, 0805	Murata	ANY
25	1	C346	3,3nF, 200V, ±10%	Multilayer ceramic capacitor SMD	ANY	ANY
26	1	C347	15µF, 450V	Electrolytic Capacitor Through Hole	Panasonic Electronic Components	EEU-EE2W150
27	1	C348	10µF, 50V, ±10%	Multilayer ceramic capacitor SMD, 0805	Murata	ANY
28	1	C349	560µF, 16V	Polypropylene Capacitor through hole	Panasonic Electronic Components	16SEPF560M
29	2	C350, C356 N.M.	N.M.	(not mounted)	-	-
30	2	C351, C352 N.M.	N.M.	(not mounted)	-	-
31	1	C353	N.M.	(not mounted)	-	-
32	1	C354	100nF, 50V, ±10%	Multilayer ceramic capacitor SMD, 0805	ANY	ANY
33	1	C355	680µF, 10V	Polypropylene Capacitor through hole	ANY	ANY
34	1	C357	220pF, 100V, ±5%	Multilayer ceramic capacitor SMD, 0805	ANY	ANY
35	12	DC1, DC2, DC3, DC4, DC5, DC6, DC7, DC8, DC9,	Vin 10.8 - 13.2V dc, Vout -5V dc, 20, 2W	Isolated DC-DC Converter Through Hole, R24P22005D	Recom Power	R12P22005D

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		DC10, DC11, DC12				
36	1	D1	RED, 2.4V, 20mA	LED SMD, 3216 (1206)	Lumex Opto/ Components Inc.	SML-LX1206SIC-TR
37	7	D2, D3, D4, D5, D98, D99, D100	30V, 1A	Schottky Diode, 2-Pin, DO-214AC, SMA	ST	STPS1L30A
38	51	D6, D7, D8, D9, D25, D26, D28, D29, D30, D31, D32, D33, D48, D50, D51, D53, D54, D55, D56, D58, D70, D74, D75, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88, D89, D90, D95, D96, D97, D101, D102, D103, D104, D105, D106, D107, D108, D109, D110, D111	RED, 20mA	LED SMD, 3216 (1206)	Lumex Opto/ Components Inc.	SML-LX1206SIC-TR
39	24	D10, D11, D12, D13, D15, D17, D18, D19, D34, D35, D36, D37, D38, D39, D45, D47, D57, D59, D60, D61, D64, D65, D67, D73	20V, 500mW	Zener Diode SMT 2-Pin MiniMELF	Vishay Semiconductor Diodes Division	TZMB20-GS08
40	24	D14, D16, D20, D21, D22, D23, D24, D27, D40, D41, D42, D43, D44, D46, D49, D52, D62, D63, D66, D68, D69, D71, D72, D76	3.3V, 500mW	Zener Diode SMT 2-Pin MiniMELF	Vishay Semiconductor Diodes Division	TZMB3V3-GS08
41	1	D91	600V, 1A	Silicon Junction Diode, 2-Pin DO-214AC	ST	STTH1L06A
42	1	D92	150V, 1A	Silicon Junction Diode, 2-Pin DO-214AC	ST	STPS1150A
43	1	D93	100V, 2A	Silicon Junction Diode, 2-Pin DO-214AC	ST	STPS2H100A
44	1	D94	60V, 2A	Silicon Junction Diode, 2-Pin DO-214AC	ST	STPS2L60A
45	70	F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36,	30Ω@100MHz, 6A	Ferrite Beads 10mΩ Ferrite Chip, 0805	TDK Corporation	MPZ2012S300AT000

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73				
46	3	F21, F22, F23	Fuse10X38	Fuse Clips TRON FUSE CLIP	Eaton	BK/1A3400-09-R
47	1	JP1 N.M (NOT Assembly)	Jp_pcb	Solder jumper (not mounted)	-	-
48	16	JP2, JP3, JP4, JP6, JP18, JP20, JP21, JP24, JP43, JP44, JP51, JP52, JP72, JP75, JP76, JP82 N.M (NOT Assembly)	3JP_pcb	Solder jumper selector (not mounted)	-	-
49	1	JP5	Con2	Fixed Terminal Blocks GMKDS 3/2-7.62	Phoenix Contact	1731721
50	77	JP7, JP9, JP10, JP11, JP12, JP13, JP14, JP15, JP16, JP17, JP19, JP22, JP23, JP25, JP26, JP27, JP28, JP29, JP30, JP31, JP32, JP33, JP34, JP35, JP36, JP37, JP38, JP39, JP40, JP41, JP42, JP45, JP46, JP47, JP48, JP49, JP50, JP53, JP54, JP55, JP56, JP57, JP58, JP59, JP60, JP61, JP62, JP63, JP64, JP65, JP66, JP67, JP68, JP69, JP70, JP71, JP73, JP74, JP77, JP78, JP79, JP80, JP81, JP83, JP84, JP85, JP86, JP87, JP88, JP89, JP90, JP91, JP92, JP93, JP94, JP100, JP101 N.M (NOT Assembly)	Jp_pcb	Solder jumper (not mounted)	-	-
51	1	JP8	Jp_pcb	Solder jumper	-	-
52	3	JP95, JP96, JP98	Con2	Fixed Terminal Blocks 2P 5.08mm 90DEG	Phoenix Contact	1729128
53	2	JP97, JP99	3JP_pcb	Solder jumper selector	-	-
54	1	J1	Con2	Fixed Terminal Blocks 2P 5.08mm 90DEG	Phoenix Contact	1729128

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
55	1	J2	Digital Power Connector	DIN 41612 Connectors 64P 2.54MM VERT FML TYPE B 4MM SLDR	ERNI	284166 32X2
56	2	J3, J4	Con3_32A	Phoenix Contact MKDS 5/3-9.5, 3 Way PCB Terminal Strip	Phoenix Contact	1714984
57	20	J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J19, J20, J21, J22, J23, J24, J25, J26	Con3	HARWIN M20, 3 Way, 1 Row, Straight Pin Header	Harwin Inc.	M20-9990345
58	2	J17, J18	Dev3, 500mA (DC)	Through Hole Slide Switch Single Pole Double Throw (SPDT) Latching 100 mA@ 42V dc Slide	Würth Electronics Inc.	450301014042
59	4	K1, K2, K3, K4	1-1393210-4	General Purpose Relay SPST-NO (1 Form A) 15VDC Coil Through Hole	TE Connectivity Potter & Brumfield Relays	T9AS1D12-15
60	4	LEM1, LEM2, LEM3, LEM4	LTSR 15-NP, 0 - ±48A nom	LEM LTSR Series Closed Loop Current Sensor, LTSR 25-NP	LEM USA Inc.	LTSR 15-NP
61	3	L1, L3, L6	514µH	Boost Inductor	Würth Electronics Inc.	750344313
62	3	L2, L4, L5	3.22µH, 20.5 A	Fixed Inductors Inductors, Coils, Chokes Fixed - INDUCTOR POWER TOROID TH	Pulse Electronics	PA0431LNL
63	12	L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18	22µH, 4810mΩ, 130Ma, ±20%	Fixed Inductors, 0805 (2012 Metric)	Taiyo Yuden	LBC2012T220M
64	1	L19	N.M.	(not mounted), SMD 4.5x4mm	-	-
65	12	PROBE1, PROBE2, PROBE3, PROBE4, PROBE5, PROBE6, PROBE7, PROBE8, PROBE9, PROBE10, PROBE11, PROBE12 N.M (NOT Assembly)	Current_ProbE	Solder Current Probe	-	-
66	1	Q1	20V, 6A	MOSFET N-CH 8SOIC	ST	STS6NF20V
67	6	Q5, Q6, Q7, Q8, Q9, Q10, N.M (NOT Assembly)	650V, 45A	Silicon Carbide HIP247 (not mounted)	ST	SCTW35N65G2V
68	12	Q14, Q15, Q16, Q17, Q18, Q19,	60V, 3A	NPN Transistor, 3-Pin SOT-89	ST	2STF1360

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		Q20, Q21, Q22, Q23, Q24, Q25				
69	7	Q26, Q27, Q28, Q29, Q30, Q31, Q32	20V, 6A	N-Channel MOSFET, 8-Pin SOIC, SO8	ST	STS6NF20V
70	3	RL1, RL2, RL3	250Vac-16A, 12V dc coil, 16A	Phoenix Contact REL- MR- 12DC/21HC SPDT Non-Latching Relay PCB Mount, TRH	Phoenix Contact	2961309
71	3	RT1, RT2, RT3	5Ω, 32mm, 20A	Inrush Current Limiters KINK INRSH CURR LIMITER	Ametherm	SL32 5R020-B
72	3	RT4, RT5, RT6	150Ω, 6W, ±0.1%	Thin Film SMD Resistor, 2512 (6432M)	Vishay	PCAN2512E1500BST3
73	60	Rled1, Rled2, Rled3, Rled4, Rled5, Rled6, Rled7, Rled8, Rled9, Rled10, Rled11, R150, R151, R152, R153, R154, R155, R156, R157, R194, R195, R196, R197, R198, R199, R200, R201, R202, R206, R207, R211, R242, R243, R244, R245, R246, R247, R248, R249, R251, R254, R259, R262, R287, R291, R292, R293, R354, R355, R356, R360, R361, R365, R366, R367, R369, R374, R376, R378, R380	1k, 0.1W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
74	40	R1, R9, R17, R106, R170, R171, R172, R173, R182, R183, R184, R185, R186, R187, R190, R191, R214, R215, R218, R219, R220, R221, R232, R235, R236, R237, R238, R240, R255, R256, R266, R270, R271, R275, R276,	N.M.	(not mounted), 0603	-	-

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		R278, R281, R286, R288, R289 N.M (NOT Assembly)				
75	22	R2, R5, R6, R7, R10, R13, R14, R15, R18, R21, R22, R23, R107, R112, R118, R122, R301, R308, R318, R325, R335, R342	10k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	-
76	3	R3, R11, R19	4.12k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	-
77	16	R4, R12, R20, R109, R115, R121, R131, R132, R144, R145, R296, R305, R313, R322, R330, R339	0 Ω , 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	-
78	3	R8, R16, R24	1.65k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	-
79	3	R25, R47, R69	27k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
80	15	R26, R27, R28, R32, R41, R48, R49, R50, R54, R63, R70, R71, R72, R76, R85	0 Ω , 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
81	3	R29, R51, R73	36k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
82	9	R30, R34, R35, R52, R56, R57, R74, R78, R79	1M, 0.25W, $\pm 0.1\%$	Thin Film SMD Resistor, 1206	ANY	ANY
83	3	R31, R53, R75	69.8k, 0.063W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
84	3	R33, R55, R77	13.3k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
85	6	R36, R38, R58, R60, R80, R82	2k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
86	6	R37, R44, R59, R66, R81, R88	10k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
87	6	R39, R43, R61, R65, R83, R87	0, 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
88	3	R40, R62, R84	12.4k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
89	3	R42, R64, R86	0 Ω , 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
90	1	R45	N.M.	(not mounted), 0603	ANY	ANY
91	3	R46, R68, R90	8.06k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
92	2	R67, R89	N.M.	(not mounted), 0603	ANY	ANY
93	1	R91	470 Ω , 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
94	1	R92	5.6k, 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
95	1	R93	5.1k, 0.25W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
96	1	R94	22 Ω , 0.25W, $\pm 1\%$	Thick Film SMD Resistor, 1206	ANY	ANY
97	1	R95	10k, 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
98	1	R96	33k, 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0604	ANY	ANY
99	6	R97, R98, R99, R100, R101, R102	240k, 0.25W, $\pm 1\%$	Thick Film SMD Resistor, 1206	ANY	ANY
100	3	R103, R104, R105	220m Ω , 7W, $\pm 5\%$	Wire Wound Resistor	ANY	ANY
101	1	R108	3.4k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
102	1	R110	18k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
103	1	R111	12k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
104	1	R113	16.5k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
105	1	R114	27k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
106	1	R116	13.3k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
107	8	R117, R119, R300, R302, R317, R319, R334, R336	2k, 0.1W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
108	4	R120, R304, R321, R338	12.4k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
109	1	R123	8.06k, 0.1W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
110	15	R124, R125, R126, R137, R138, R139, R295, R298, R299, R312, R315, R316, R329, R332, R333	1M, 0.25W, $\pm 0.1\%$	Thin Film SMD Resistor, 1206	ANY	ANY
111	4	R127, R136, R140, R149	16.9k, 0.063W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
112	4	R128, R133, R142, R146	0, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY
113	4	R129, R134, R143, R147	10.5k, 0.063W, $\pm 0.1\%$	Thin Film SMD Resistor, 0603	ANY	ANY
114	4	R130, R135, R141, R148	1.6k, 0.063W, $\pm 0.1\%$	Metal Film SMD Resistor, 0603	ANY	ANY
115	12	R158, R160, R163, R181, R203, R208, R223, R227,	100 Ω , 0.1W, $\pm 1\%$	Thick Film SMD Resistor, 0603	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		R250, R261, R263, R282				
116	12	R159, R162, R166, R179, R205, R210, R224, R229, R253, R265, R272, R280	12Ω, 0.5W, ±1%	Thick Film SMD Resistor	ANY	ANY
117	24	R161, R164, R165, R167, R169, R174, R176, R178, R204, R209, R212, R216, R225, R228, R230, R233, R252, R257, R264, R268, R269, R273, R279, R284	0Ω, 0.5W, ±0%	Thick Film SMD Resistor	ANY	ANY
118	12	R168, R175, R177, R180, R213, R217, R231, R234, R258, R260, R274, R285	22Ω, 0.5W, ±1%	Thick Film SMD Resistor	ANY	ANY
119	12	R188, R189, R192, R193, R222, R226, R239, R241, R267, R277, R283, R290	47k, 0.25W, ±1%	Thick Film SMD Resistor, 1206	ANY	ANY
120	3	R294, R311, R328	27k, 0.1W, ±0.1%	Metal Film SMD Resistor, 0603	ANY	ANY
121	3	R297, R314, R331	13.3k, 0.063W, ±0.1%	Metal Film SMD Resistor, 0603	ANY	ANY
122	6	R303, R307, R320, R324, R337, R341	0Ω, 0.1W, ±0.1%	Thin Film SMD Resistor, 0603	ANY	ANY
123	1	R306	0Ω, 0.1W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
124	3	R309, R326, R343	N.M.	(not mounted), 0603	ANY	ANY
125	3	R310, R327, R344	8.06k, 0.1W, ±0.1%	Thin Film SMD Resistor, 0603	ANY	ANY
126	2	R323, R340	11.3k, 0.1W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
127	2	R345, R346	750Ω, 0.25W, ±1%	Thick Film SMD Resistor, 1206	ANY	ANY
128	2	R347, R348	51k, 0.25W, ±0.1%	Thin Film SMD Resistor, 1206	ANY	ANY
129	1	R349	10Ω, 0.1W, ±0.1%	Thin Film SMD Resistor, 0603	-	-
130	2	R350, R353	27k, 0.1W, ±0.1%	Thin Film SMD Resistor, 0603	ANY	ANY
131	1	R351	10.2k, 0.1W, ±0.1%	Metal Film SMD Resistor, 0603	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
132	1	R352	110k, 0.1W, ±0.1%	Thin Film SMD Resistor, 0603	ANY	ANY
133	3	R357, R358, R359	22Ω, 0.25W, ±1%	Thick Film SMD Resistor, 1206	ANY	ANY
134	7	R362, R363, R364, R375, R377, R379, R381	33k, 0.1W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
135	1	R368	1k, 0.1W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
136	4	R370, R371, R372, R373	22Ω, 0.25W, ±1%	Thick Film SMD Resistor, 0603	ANY	ANY
137	2	SHUNT1, SHUNT2	25m, 1W, ±1%	Metal Strip SMD Resistor, 2512	Vishay	WSL2512R0250FEA
138	164	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36, TP41, TP42, TP43, TP44, TP45, TP46, TP47, TP48, TP49, TP50, TP51, TP52, TP53, TP54, TP55, TP56, TP57, TP58, TP59, TP60, TP61, TP62, TP63, TP64, TP65, TP66, TP67, TP68, TP69, TP70, TP71, TP72, TP73, TP74, TP75, TP76, TP77, TP78, TP79, TP80, TP81, TP82, TP83, TP84, TP85, TP86, TP87, TP88, TP89, TP90, TP91, TP92, TP93, TP94, TP95, TP96, TP97, TP98, TP99, TP100, TP101, TP102, TP103, TP104, TP105, TP106, TP107,	TestPoint_Ring	RS PRO 1mm Black Test Terminal	ANY	ANY

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
		TP108, TP109, TP110, TP111, TP112, TP113, TP114, TP115, TP116, TP117, TP118, TP119, TP120, TP121, TP122, TP123, TP124, TP125, TP126, TP127, TP128, TP129, TP130, TP131, TP132, TP133, TP134, TP135, TP136, TP137, TP138, TP139, TP140, TP141, TP142, TP143, TP144, TP145, TP146, TP147, TP148, TP149, TP150, TP151, TP152, TP153, TP154, TP155, TP156, TP157, TP158, TP159, TP160, TP161, TP162, TP163, TP164, TP165, TP166, TP167, TP168				
139	4	TP37, TP38, TP39, TP40	TestPoint_Ring	RS PRO 1mm Black Test Terminal	ANY	ANY
140	15	TW1, TW2, TW3, TW4, TW5, TW6, TW7, TW8, TW9, TW10, TW11, TW12, TW13, TW14, TW15	CON1	3mm HOLE (not mounted)	-	-
141	1	T1	-	TRANSFORMER_ViPER_WURTH 750317707 (not mounted)	-	-
142	10	U1, U2, U3, U15, U19, U21, U4, U10, U7, U16	8MHz, 2.3 - 5.5V	High Speed, Op Amp, RRIO, 8-Pin SOIC	ST	TSV912IDT
143	6	U5, U8, U11, U35, U37, U39,	8MHz, 3V, 5V	High Speed, Op Amp, RRIO, 14-Pin SOIC	ST	TSV914IDT
144	9	U6, U9, U12, U17, U18, U20, U36, U38, U40	-	IC OPAMP ISOLATION 1 CIRC 8SOIC, SOIC-8	Texas Instruments	AMC1301DWVR
145	2	U13, U22	-	1-Channel DC-DC Power Supply Module 4-Pin, SIP Module, DCH010505SN7	Texas Instruments	DCH010505SN7
146	1	U14	-55 - +130 °C ±1.5°C	Temperature Sensor Analogue, 5-Pin SOT-323, SOT323-5L	ST	STLM20W87F
147	12	U23, U24, U25, U26, U27, U28, U29, U30, U31, U32, U33, U34	4A	DGTL ISO single Gate Drive	ST	STGAP2SM

Item	Q.ty	Ref.	Part / Value	Description	Manufacturer	Order code
148	2	U41, U43	800mA	LDO Voltage Regulators Fixed Adjust output very Lo drop	ST	LD29080DT50R
149	2	U42, U44	0.4 400mV 3.3V, 800mA	LDO Voltage Regulators 800mA VLD Fixed Adj 25c	ST	LD29080S33R
150	1	U45	-	AC-DC Converter 16-Pin, SOIC	ST	VIPER26HD
151	6	Q2, Q3, Q4, Q11, Q12, Q13	1200V	Silicon Carbide 1200V HIP247	ST	SCTW40N120G2VAG

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

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.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

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