

Designator(Main Board)	Quantity	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer Part Number	Substitution Allowed	Lead Free
C1	1	ALU electrolyte low impedance 10µF 35V 2.6Ohm 20% Würth Elektronik	10 µF			Würth Elektronik	865080540004	Yes	Yes
C2	1	MLC capacitor 100nF 25V X7R 10% Würth Electronics	100 nF			Würth Elektronik	885012206071	Yes	Yes
C3, C5	2	MLC capacitor 100nF 50V X7R 10% Würth Electronics	100 nF			Würth Elektronik	885012206095	Yes	Yes
C4, C16	2	Film X2 capacitor 1µF 310V PP ± 10 % Würth Electronics	1 µF			Würth Elektronik	890334026027CS	Yes	Yes
C6	1	Polymer ALU elco 100µF 35V 30mOhm 20% Würth Elektronik	100 µF			Würth Elektronik	875115652007	Yes	Yes
C7	1	MLC capacitor 330nF 16V X7R 5% Murata	330 nF			Murata	GRM188R71C334JA0 1D	Yes	Yes
C8, C9	2	MLC capacitor 1nF 25V NP0 5% Würth Electronics	1 nF			Würth Elektronik	885012006044	Yes	Yes
C10, C52, C54, C55, C57, C62, C64	7	MLC capacitor 10nF 50V X7R 10% Würth Electronics	10 nF			Würth Elektronik	885012206089	Yes	Yes
C11	1	MLC capacitor 2µ2 10V X7R 10% Würth Electronics	2µ2			Würth Elektronik	885012206027	Yes	Yes
C12	1	MLC capacitor 220nF 50V X7R 10% Murata	220 nF			Murata	GRM188R71H224KA C4D	Yes	Yes
C13	1	MLC capacitor 68pF 50V C0G 5% Murata	68 pF			Murata	GRM1885C1H680JA0 1D	Yes	Yes
C14	1	MLC capacitor 470nF 50V X5R 10% Murata	470 nF			Murata	GRM188R61H474KA1 2D	Yes	Yes
C15	1	MLC capacitor 1nF 50V NP0 5% Würth Electronics	1 nF			Würth Elektronik	885012006063	Yes	Yes
C17, C51	2	Film X2 capacitor 680nF 310V PP ± 10 % Würth Electronics	680 nF			Würth Elektronik	890334026020CS	Yes	Yes
C18	1	Ceralink SMD capacitor 250nF 900V TDK	250 nF			TDK	B5803119254M062	Yes	Yes
C19, C26, C27, C28, C29, C30, C31, C50, C53, C56	10	MLC capacitor 100pF 50V NP0 5% Würth Electronics	100 pF			Würth Elektronik	885012006057	Yes	Yes
C20	1	MLC capacitor 100nF 25V X7R 10% Würth Electronics	100 nF			Würth Elektronik	885012207072	Yes	Yes
C21	1	Polymer ALU elco 330µF 35V 20mOhm 20% Würth Elektronik	330 µF			Würth Elektronik	875075661010	Yes	Yes
C22, C24, C32	3	MLC capacitor 100nF 25V X5R 20% Würth Electronics	100 nF			Würth Elektronik	885012105018	Yes	Yes
C23, C25, C33	3	MLCC capacitor 22µF 25V X7R ± 20% TDK	22 µF			TDK	C4532X7R1E226M250 KC	Yes	Yes
C34, C43, C47	3	MLC capacitor 1nF 50V X7R 10% Würth Electronics	1 nF			Würth Elektronik	885012206083	Yes	Yes
C35	1	Film X2 capacitor 100nF 310V PP ± 10 % Würth Electronics	100 nF			Würth Elektronik	890334025017CS	Yes	Yes
C36	1	ALU electrolytic capacitor 10µF 450V ± 20% Rubycon	10 µF			Rubycon	450BXF10M10X16	Yes	Yes
C37	1	MLC capacitor 330nF 50V X7R 1% Würth Electronics	330 nF			Würth Elektronik	885012207101	Yes	Yes

C38	1	MLC capacitor 47nF 50V X7R 10% Würth Electronics	47 nF			Würth Elektronik	885012206093	Yes	Yes
C39, C40	2	ALU electrolyte capacitor 220µF 25V 20% Würth Elektronik	220 µF			Würth Elektronik	860040474004	Yes	Yes
C41	1	MLC capacitor 150nF 50V X7R 10% Murata	150 nF			Murata	GRM188R71H154KA C4D	Yes	Yes
C42	1	ALU electrolyte capacitor 470µF 450V 20% Würth Elektronik	470 µF			Würth Elektronik	861141486024	Yes	Yes
C44, C45, C46	3	SMD Multilayer Ceramic Capacitor, 470 pF, 50 V, 0603 [1608 Metric], ± 5%, COG / NP0, WCAP-CSGP Series, Würth Electronics	470pF			Würth Elektronik	885012006061	Yes	Yes
C48, C49, C59, C63	4	MLC capacitor 0.1µF 16V X7R 10% Würth Electronics	100 nF			Würth Elektronik	885012206046	Yes	Yes
C58	1	SMD Multilayer Ceramic Capacitor, 15000 pF, 50 V, 0603 [1608 Metric], ± 10%, X7R, WCAP-CSGP Series, Würth Electronics	15 nF			Würth Elektronik	885012206090	Yes	Yes
C60	1	MLC capacitor 330nF 50V X7R 1% Würth Electronics	10 nF			Würth Elektronik	885012206065	Yes	Yes
C61	1	MLC capacitor 47µF 6.3V X5R 20% Murata	47 µF			Murata	GRM188R60J476ME1 5D	Yes	Yes
CON1	1	AC Power Entry Modules 15A IEC PCB MOUNT MALE FLANGE MNT	Black			TE Connectivity	6ESRM-P	Yes	Yes
CON2	1	Pluggable Terminal Blocks WR-TBL Model3137 5mm 3Pin Cls Hzt1 PCBHdr	Green			Würth Elektronik	691313710003	Yes	Yes
CON3	1	2.54mm Dual SMT Socket Header WR-PHD 2x18 WE	610 036 218 21			Würth Elektronik	61003621821	Yes	Yes
CON4, CON6, CON7	3	Header 1x8 pins SMD 100 mil pin #1 left Würth Elektronik	610 008 13 321			Würth Elektronik	61000813321	Yes	Yes
CON5	1	PCB right angle connector 2 pins 5.08 mm pitch Würth Elektronik	691 313 510 002			Würth Elektronik	691313510002	Yes	Yes
CY1, CY3, CY4	3	Ceramic capacitor 4700p 250V E ± 20 % Murata	4700 pF			Murata	DE1E3KX472MA4BN 01F	Yes	Yes
D1	1	Standard recovery rectifier 600V 3A ON Semiconductor	1N5406RLG			onsemi	1N5406RLG	Yes	Yes
D2, D5	2	SiC Schottky diode 650V 10A ON Semiconductor	FFSPF1065A			onsemi	FFSPF1065A	Yes	Yes
D3, D7, D9, D15	4	Switching diode 100V 200mA SOD323 ON Semiconductor	MMSD4148T1 G			onsemi	MMSD4148T1G	Yes	Yes
D4	1	Bridge Rectifier Diode, Single, 800 V, 6 A, SIP, 1 V, 4 Pins ON Semiconductor	GBU6K			onsemi	GBU6K	Yes	Yes
D6, D10, D11, D12, D13	5	TVS 15V 200W SOD123FL unidirectional Littelfuse	SMF15AT1G			onsemi	SMF15AT1G	Yes	Yes
D8	1	Schottky diode 100 V 3 A SMB ON Semiconductor	NTSS3100			onsemi	NTSS3100T3G	Yes	Yes
D14	1	Standard recovery power rectifier 1000V 1A SMA ON Semiconductor	MRA4007T3G			onsemi	MRA4007T3G	Yes	Yes
D16, D17	2	Ultra Fast diode 600 V 2 A SMA ON Semiconductor	MURA160T3G			onsemi	MURA160T3G	Yes	Yes
F1	1	Fuseholder, Open Design, 500V, 10A, 5 x 20mm, Through Hole, Black	10 A			Schurter	0031.8201	Yes	Yes
F2	1	Fuse, Cartridge, Time Delay, 4 A, 250 V, 5mm x 20mm, 0.2" x 0.79", FST Series	4 A			Schurter	0034.3123	Yes	Yes
FC1	1	Fuse Accessory, Cover, Transparent				Schurter	0853.0551	Yes	Yes
HSA, HSB	2	eloxed	black anodized					Yes	Yes
HSC	1	eloxed	natural					Yes	Yes
HSD	1	eloxed	mm black					Yes	Yes
IC1	1	Offline DC-DC converter, peak current 780 mA 60 kHz ON Semiconductor	NCP1063AP60			onsemi	NCP1063AP60G	Yes	Yes
J AC OUT	1	Cable connector series 351 3pins 5.08 mm Würth Elektronik	691 351 500 003			Würth Elektronik	691351500003	Yes	Yes

J DC390V	1	Cable connector series 351 2pins 5.08 mm Würth Elektronik	691 351 500 002		Würth Elektronik	691351500002	Yes	Yes
L1	1	Fixed Inductors WE-TIS Lead Rad 8075 1000uH .35A 1.850hm	1 mH		Würth Elektronik	744731102	Yes	Yes
L2	1	Fixed Inductors WE-TIS Lead Rad 8075 470uH .6A .80hm	470 µH		Würth Elektronik	744731471	Yes	Yes
L3	1	WE-STAR-RING Snap Ferrite with safety key technology			Würth Elektronik	7427154	Yes	Yes
L4	1	Toroidal Inductor, Leaded, WE-FI Series, 150 µH, 5 A, 0.045 ohm, ± 20%	150 µH		Würth Elektronik	7447076	Yes	Yes
L5	1	Common Mode Chokes / Filters WE-CMB Choke Type L 2.2mH 6A 20mOhm	2 x 2.2 mH		Würth Elektronik	744824622	Yes	Yes
NAC1, NAC2	2	nut M3 hex 5.5 ISO4032	nut M3 ISO4032				Yes	Yes
Q1, Q3	2	NMOS 650V 24A 125mOhm ON Semiconductor	FCPF125N65S3		onsemi	FCPF125N65S3	Yes	Yes
Q2, Q4	2	High Current surface mount PNP silicon switching transistor	MMBT589LT1G		onsemi	MMBT589LT1G	Yes	Yes
Q5	1	Low voltage high speed complementary push-pull output comparator	NCS2250SN2T3G		onsemi	NCS2250SN2T3G	Yes	Yes
R1	1	Thermistor, ICL NTC, 2.2 ohm, -20% to +20%, Radial Leaded, B57237S0 Series TDK	2R2		TDK	B57237S0229M000	Yes	Yes
R2, R4, R5	3	SMD Chip Resistor, 680 kohm, CRCW Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Vishay	680k		Vishay	CRCW1206680KFKE A	Yes	Yes
R3, R47	2	TVS Varistor, 320 V, 420 V, Standard Series, 840 V, Disc 14mm, Metal Oxide Varistor (MOV) TDK	320 V		TDK	B72214S0321K101	Yes	Yes
R6, R12, R17, R21	4	SMD Chip Resistor, 3.9 Mohm, CRCW Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Vishay	3M9		Vishay	CRCW12063M90FKE A	Yes	Yes
R7, R25	2	SMD thick film resistor 10R 0805 1% 125 mW Panasonic	10R		Panasonic	ERJ6ENF10R0V	Yes	Yes
R8, R9, R15, R16	4	SMD Chip Resistor, 1.8 Mohm, CRCW Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Vishay	1M8		Vishay	CRCW12061M80FKE A	Yes	Yes
R10, R11, R32, R36	4	SMD thick film resistor 22k 0603 1% 100 mW Panasonic	22k		Panasonic	ERJ3EKF2202V	Yes	Yes
R13, R28	2	SMD thick film resistor 10k 0805 1% 125 mW Panasonic	10k		Panasonic	ERJ6ENF1002V	Yes	Yes
R14, R29	2	SMD thick film resistor 0R 0805 2A Panasonic	0R		Panasonic	ERJ6GEY0R00V	Yes	Yes
R18	1	SMD thick film resistor 11k5 0603 1% 100 mW Panasonic	11k5		Panasonic	ERJ3EKF1152V	Yes	Yes
R19	1	SMD Chip Resistor, 820 kohm, ERJU08 Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Panasonic	820k		Panasonic	ERJU08F8203V	Yes	Yes
R20	1	SMD Chip Resistor, 560 kohm, ERJU08 Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Panasonic	560k		Panasonic	ERJU08F5603V	Yes	Yes
R22	1	SMD thick film resistor 120k 0603 1% 100 mW Panasonic	120k		Panasonic	ERJ3EKF1203V	Yes	Yes
R23, R24	2	SMD thick film resistor 27k 0603 1% 100 mW Panasonic	27k		Panasonic	ERJ3EKF2702V	Yes	Yes
R26	1	SMD thick film resistor 1k8 0603 1% 100 mW Panasonic	1k8		Panasonic	ERJ3EKF1801V	Yes	Yes
R27, R63, R64, R65, R71, R79	6	SMD thick film resistor 1k 0603 1% 100 mW Panasonic	1k		Panasonic	ERJ3EKF1001V	Yes	Yes
R30, R31	2	SMD Current Sense Resistor, 0.075 ohm, CRA Series, 2512 [6432 Metric], 3 W, ± 1%, Thick Film, Bourns	0R075		Bourns	CRA2512-FZ-R075SELF	Yes	Yes
R33	1	SMD thick film resistor 270k 0603 1% 100 mW Panasonic	270k		Panasonic	ERJ3EKF2703V	Yes	Yes
R34, R56, R57	3	SMD thick film resistor 5k1 0603 1% 100 mW Panasonic	5k1		Panasonic	ERJ3EKF5101V	Yes	Yes
R35, R49, R50, R51	4	SMD thick film resistor 15k 0603 1% 100 mW Panasonic	15k		Panasonic	ERJ3EKF1502V	Yes	Yes
R37	1	SMD thick film resistor 143k 0603 1% 100 mW Panasonic	143k		Panasonic	ERJ3EKF1433V	Yes	Yes
R38, R39, R40, R41, R42, R43, R54, R58, R78, R81, R84	11	SMD thick film resistor 100R 0603 1% 100 mW Panasonic	100R		Panasonic	ERJ3EKF1000V	Yes	Yes
R44	1	SMD Chip Resistor, 2 Mohm, CRCW Series, 75 V, Thick Film, 0603 [1608 Metric], 100 mW Vishay	2M		Vishay	CRCW06032M00FKE A	Yes	Yes
R45	1	SMD thick film resistor 39k 0603 1% 100 mW Panasonic	39k		Panasonic	ERJ3EKF3902V	Yes	Yes
R46, R52, R53	3	SMD Chip Resistor, 330 kohm, CRCW Series, 200 V, Thick Film, 1206 [3216 Metric], 250 mW Vishay	330k		Vishay	CRCW1206330KFKE A	Yes	Yes

R48	1	SMD thick film resistor 56k 0603 1% 100 mW Panasonic	56k			Panasonic	ERJ3EKF5602V	Yes	Yes
R55	1	SMD thick film resistor 6k8 1206 1% 660 mW Panasonic	6k8			Panasonic	ERJP08F6801V	Yes	Yes
R59, R60, R61	3	Current Sense Resistors - SMD 2W 39 mOhm 1% 50ppm, KOA SPEER ELECTRONICS	0R039			KOA SPEER ELECTRONICS	TLRH3AWTTE39L0F	Yes	Yes
R62	1	SMD thick film resistor 10k 0603 1% 100 mW Panasonic	10k			Panasonic	ERJ3EKF1002V	Yes	Yes
R66, R67, R69, R70, R72, R73, R75	7	SMD Chip Resistor, 1 kohm, ERJ3R Series, 50 V, Thick Film, 0603 [1608 Metric], 100 mW Panasonic	1k			Panasonic	ERJ3RBD1001V	Yes	Yes
R68	1	SMD thick film resistor 21k5 0603 1% 100 mW Panasonic	21k5			Panasonic	ERJ3EKF2152V	Yes	Yes
R74, R80, R83, R85, R86, R87	6	SMD Chip Resistor, 4.99 kohm, PCF Series, 75 V, Thin Film, 0603 [1608 Metric], 63 mW	4k99			TT Electronics	PCF0603R-4K99BT1	Yes	Yes
R76	1	SMD thick film resistor 215k 0603 1% 100 mW Panasonic	215k			Panasonic	ERJ3EKF2153V	Yes	Yes
R77	1	SMD thick film resistor 680R 0603 1% 100 mW Panasonic	680R			Panasonic	ERJ3EKF6800V	Yes	Yes
R82	1	SMD thick film resistor 3k 0603 1% 100 mW Panasonic	3k			Panasonic	ERJ3EKF3001V	Yes	Yes
SAC1, SAC2, SHA1, SHA2, SHB1, SHB2, SHD1	7	Pan head cross screw M3x8 DIN7985	M3x8 DIN7985					Yes	Yes
SB1, SB2, SB3, SB4, SB5, SB6	6	Steel spacer internal/internal M3x6 thread 50mm Würth Elektronik	Spacer M3 F/F 50 HEX7					Yes	Yes
SDA, SDB, SDD, SHC1, SHC2, SQA, SQB	7	Pan head cross screw M3x16 DIN7985	M3x16 DIN7985					Yes	Yes
SHSA1, SHSA2, SHSB1, SHSB2	4	steel brass spacer for M3	spacer for M3			Würth Elektronik	963030042	Yes	Yes
ST1, ST2, ST3, ST4, ST5, ST6	6	Steel spacer external/internal M3x6 thread 40mm Würth Elektronik	Spacer M3 M/F 6/40 HEX7			Würth Elektronik	971400321	Yes	Yes
TP1, TP2	2	PTH testpoint eyelet 3.2mm red Keystone Electronics	RED			Keystone Electronics	5005	Yes	Yes
TP3, TP17, TP24	3	PTH testpoint eyelet 3.2mm orange Keystone Electronics	ORANGE			Keystone Electronics	5008	Yes	Yes
TP4, TP18, TP21	3	PTH testpoint eyelet 3.2mm white Keystone Electronics	WHITE			Keystone Electronics	5007	Yes	Yes
TP5, TP9, TP13, TP22	4	PTH testpoint eyelet 3.2mm brown Keystone Electronics	BROWN			Keystone Electronics	5120	Yes	Yes
TP6, TP7, TP8, TP10, TP11, TP12, TP14, TP25, TP26	9	PTH testpoint eyelet 3.2mm yellow Keystone Electronics	YELLOW			Keystone Electronics	5009	Yes	Yes
TP15, TP16	2	PTH testpoint eyelet 3.2mm blue Keystone Electronics	BLUE			Keystone Electronics	5122	Yes	Yes
TP20, TP23, TP28	3	PTH testpoint eyelet 3.2mm purple Keystone Electronics	PURPLE			Keystone Electronics	5124	Yes	Yes
TP27	1	PTH testpoint eyelet 3.2mm black Keystone Electronics	BLACK			Keystone Electronics	5006	Yes	Yes
TR1, TR2	2	Custom transformer for PFC	750314724			Würth Elektronik	750314724	Yes	Yes
U1	1	2 Phase PFC Controller, 10V to 20V Supply, 50 µA Startup, 3.5mA Operating, 30kHz, SOIC-16	NCP1632			onsemi	NCP1632DR2G	Yes	Yes
U2	1	Inverter Intelligent Power Module (IPM), 600 V, 10 A	NFAQ1060L36T			onsemi	NFAQ1060L36T	Yes	Yes
U3, U4, U5	3	Low voltage rail to rail op amp, ON Semiconductor	NCS2003SN2T1G			onsemi	NCS2003SN2T1G	Yes	Yes
U6	1	MDK to Arduino Due Adapter	MDK to Arduino Due Adapter					Yes	Yes
U7	1	Low Voltage Precision Adjustable Shunt Regulator 1.24 -16 V output, 20mA ±0.2%	TLV431			onsemi	TLV431CSN1T1G	Yes	Yes
U8	1	Universal Controller Board with Zynq 7000 SoC FPGA and ARM-based processor	Universal Controller Board SECO-TE0716-GEVB					Yes	Yes
WAC1, WAC2, WHSA1, WHSA2, WHSB1, WHSB2, WPDA, WPDB, WPDD, WPQA, WPQB, WSHC1, WSHC2, WSHD1	14	Plain washer for M3 screw according DIN125A	plain washer M3 DIN125A					Yes	Yes
WHAD, WHAQ, WHBD, WHBQ	4	Ceramic insulation washer with hole for TO220 1.5mm Fischer Elektronik	AOS 220 18x12x1.5 D3.1					Yes	Yes
WSDA, WSDDB, WSDDD, WSQA, WSQB	5	Spring lock washer for M3 screw according DIN7980	spring washer M3 DIN7980					Yes	Yes

