



## Bill of Materials for the NCP1937BADAPGEVB Evaluation Board

Designator	Quantity	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer Part Number	Substitution Allowed	Lead Free
C1, C2	2	Capacitor, Metallized Polypropylene	0.22uF, 450 V	5%	Through hole, 10mm	Panasonic	ECW-F2W224JAQ	No	Yes
C3	1	Capacitor, Electrolytic	82uF, 450 V	20%	Through hole, 7.5mm, Vertical mount	Rubycon	450KXW82MEFC18X30	No	Yes
C4	1	Capacitor, Ceramic, X7R	10nF, 50 V	10%	SMD, 1206	Vishay	VJ1206Y103KXAAC	Yes	Yes
C5	1	Capacitor, Ceramic, X7R	6800 pF, 630 V	20%	SMD, 1206	TDK	C3216X7R2J682M	No	Yes
C6	1	Capacitor, Ceramic, X7R	100 pF, 1 kV	10%	SMD, 1206	Johanson's Dielectric	102R18W101KV4E	No	Yes
C7	0	DO NOT POPULATE	PLACEHOLDER		SMD, 0603	PLACEHOLDER	PLACEHOLDER	Yes	Yes
C8	1	Capacitor, Electrolytic	47uF, 35 V	20%	Through hole, 2.5mm	Kemet	ESH476M035AE3AA	No	Yes
C9	1	Capacitor, Ceramic, COG	15pF, 50 V	5%	SMD, 0603	TDK	C1608COG1H150J080AA	Yes	Yes
C10	1	Capacitor, Ceramic, X7R	1000pF, 25 V	10%	SMD, 0603	Vishay	VJ0603Y102KXCW1BC	Yes	Yes
C11, C12, C24	3	Capacitor, Ceramic, X7R	0.1uF, 50 V	10%	SMD, 0603	Yageo	CC0603KRX7R9BB104	Yes	Yes
C13	1	Capacitor, Ceramic, X7R	2.2uF, 10 V	10%	SMD, 0603	Taiyo Yuden	LMK107B7225KA-T	Yes	Yes
C14	1	Capacitor, Ceramic, X7R	330pF, 50 V	10%	SMD, 0603	Yageo	CC0603KRX7R9BB331	Yes	Yes
C15	1	Capacitor, Ceramic, X7R	150pF, 25 V	10%	SMD, 0603	AVX	06033C151KAT2A	Yes	Yes
C16, C23	2	Capacitor, Ceramic, X7R	0.47uF, 50 V	10%	SMD, 0603	Taiyo Yuden	UMK107B7474KA-TR	Yes	Yes
C17	1	Capacitor, Ceramic, X7R	100pF, 25 V	10%	SMD, 0603	Vishay	VJ0603Y101KXCW1BC	Yes	Yes
C18	1	Capacitor, Ceramic, COG	47pF, 50 V	10%	SMD, 0603	Vishay	VJ0603A470KXAAC	Yes	Yes
C19, C20	2	Capacitor, Electrolytic	1000uF, 35 V	20%	Through hole, 5mm	Panasonic	EEU-FM1V102	No	Yes
C21	1	Capacitor, Ceramic, X7R	47nF, 50 V	10%	SMD, 1206	Xicon	140-CC502B473K-RC	Yes	Yes
C22	1	Capacitor, Ceramic, X7R	0.22uF, 25 V	10%	SMD, 0805	Kemet	C0805C224K3RACTU	Yes	Yes
C25	1	Capacitor, Ceramic, X7R	2.2uF, 25 V	10%	SMD, 0805	TDK	TMK212B7225KG-TR	Yes	Yes
C26	1	Capacitor, Ceramic, X7R	22nF, 50 V	10%	SMD, 0603	TDK	C1608X7R1H223K	Yes	Yes
C27	1	Capacitor, Ceramic, X7R	10nF, 50 V	10%	SMD, 0603	Murata	GRM188R71H103KA01D	Yes	Yes
C28	1	Capacitor, Electrolytic	100uF, 35V	20%	Through hole, 2.5mm	Kemet	ESH107M035AE3AA	Yes	Yes
C29	0	DO NOT POPULATE	PLACEHOLDER		SMD, 0603	PLACEHOLDER	PLACEHOLDER	Yes	Yes
C30	1	Capacitor, Ceramic, X5R	10uF, 35V	10%	SMD, 1206	Taiyo Yuden	GMK316BJ106KL-T	Yes	Yes
C31	0	DO NOT POPULATE	PLACEHOLDER		SMD, 0603	PLACEHOLDER	PLACEHOLDER	Yes	Yes
C32	1	Capacitor, Ceramic, COG	33pF, 50 V	5%	SMD, 0603	Murata	GRM1885C1H330JA01D	Yes	Yes
CX1, CX2	2	Capacitor, Metallized Polypropylene, X2	100 nF, 275 VAC	10%	Through hole, 10mm	Kemet	PHE840MA6100KA04	Yes	Yes
CY1, CY2, CY3	3	Capacitor, Ceramic, X1Y2	1000pF, 250 VAC	20%	Through hole, 5mm	Murata	DE2E3KY102MA2BM01	Yes	Yes
D1, D2	2	Diode, Standard Recovery	1000 V, 1 A		SMD, SMA	ON Semiconductor	MRA4007T3G	Yes	Yes
D3	1	Diode, Standard Recovery, (Vertical mount, teflon tube required on exposed lead)	600 V, 3 A		Through hole, Axial, DO-201AA	ON Semiconductor	1N5406G	No	Yes
D4	1	Diode, Switchmode Rectifier, (Vertical mount, teflon tube required on exposed lead)	520 V, 5A		Through hole, Axial, DO-201AA	ON Semiconductor	MUR550APFG	No	Yes

D5, D6, D8, D9, D10, D11, D19	7	Diode, Switching	100 V, 200 mA		SMD, SOD-123	ON Semiconductor	MMSD4148T1G	Yes	Yes
D7	1	Diode, Standard Recovery	1000 V, 1.5 A		SMD, SMB	Vishay	S2M-E3/52T	No	Yes
D12, D13, D18	3	Diode, Switching	250 V, 100 mA		SMD, SOD-123	ON Semiconductor	MMSD103T1G	Yes	Yes
D14	1	Diode, Zener	27 V, 500 mW		Through hole, Axial, DO-35	Fairchild	1N5254B	Yes	Yes
D15	1	Diode, Schottky	100 V, 5 A		SMD, SO-8FL	ON Semiconductor	MBR5H100MFST1G	No	Yes
D16	1	Diode, Bridge Rectifier	600 V, 4 A		Through hole, GBU	Diodes Inc	GBU406	Yes	Yes
D17	1	Diode, Zener	7.5 V, 500 mW		SMD, SOD-123	ON Semiconductor	MMSZ5236BT1G	Yes	Yes
D20	1	Dual Diode, Switching	100 V, 215 mA		SMD, SC-70	ON Semiconductor	BAV99RWT1G	Yes	Yes
F1	1	Fuse, (Vertical mount, teflon tube required on exposed lead)	250 VAC, 3 A		Through hole	Littelfuse	0224003.HXP	No	Yes
J1	1	Terminal Block, 3 pos, in-line	250 V, 16 A		Through hole, 5mm	On Shore Technology	OSTTA030161	Yes	Yes
J2	1	Header, 2 pos, in-line, right angle	250 V, 12 A		Through hole, 5mm	Phoenix Contact	1757475	Yes	Yes
J2A	1	Terminal Block, 2 pos, plug, (Not Mounted on Board)	250 V, 12 A		N/A	Phoenix Contact	1754449	Yes	Yes
L1	1	Inductor, Common mode choke, (Need shielding)	4mH, 1.5 A		Through hole	Würth Electronics	744 821 240	No	Yes
L2	1	Inductor, Common mode choke	20mH, 0.5 A		Through hole	Würth Electronics	744 822 120	No	Yes
L3	1	Inductor, Differential choke	300uH, 2 A		Through hole	Würth Electronics	744 706 0	No	Yes
L4	1	Inductor, PFC boost, (Need shielding)	390uH, 3.5 A		Through hole, RM10, Custom	Würth Electronics	750313048 rev2	No	Yes
M1	1	MOSFET, PFC Switch	600 V, 12 A		TO-220FP	Toshiba	TK12A60U	No	Yes
M2	1	MOSFET, QR Switch	650 V, 10.6 A		TO-220FP	Infineon	IPA65R380C6	No	Yes
M3	1	MOSFET, Synchronous Rectifier	100 V, 100 A		TO-220	Infineon	IPP045N10N3	No	Yes
MOV1	1	MOV	300 VAC, 2.5 kA		Through hole, 10mm	Epcos	S10K300	Yes	Yes
Q1	1	MOSFET, Small signal	PMOS, 50V		SMD, SOT23-3	ON Semiconductor	BSS84LT1G	Yes	Yes
R1, R2	2	Resistor, 1/4 W	1 k $\Omega$	1%	SMD, 1206	Stackpole	RMCF1206FT1K00	Yes	Yes
R3, R3A, R3B, R3C	4	Resistor, 1/2 W	0.5 $\Omega$		SMD, 1206	Stackpole	CSR1206FKR500		Yes
R4, R12, R51	3	Resistor 1/10 W	10 k $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT10K0	Yes	Yes
R5	1	Resistor, 1/4 W	4.75 k $\Omega$	1%	SMD, 1206	Stackpole	RMCF1206FT4K75	Yes	Yes
R6	1	Resistor 1/10 W	4.75 k $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT4K75	Yes	Yes
R7	1	Resistor, 1/8 W	47.5 $\Omega$	1%	SMD, 0805	Stackpole	RMCF0805FT47R5	Yes	Yes
R8	1	Resistor, 1/8 W	4.75 $\Omega$	1%	SMD, 0805	Stackpole	RMCF0805FT4R75	Yes	Yes
R9	1	Resistor, 1/8 W	20 $\Omega$	1%	SMD, 0805	Stackpole	RMCF0805FT20R0	Yes	Yes
R10, R28, R49	3	Resistor, 1/4 W	20 $\Omega$	1%	SMD, 1206	Stackpole	RMCF1206FT20R0	Yes	Yes
R11	1	Resistor, 1/4 W	8.25 $\Omega$	1%	SMD, 1206	Yageo	RC1206FR-078R25L	Yes	Yes
R13, R13A	2	Resistor, 1 W	0.4 $\Omega$	1%	SMD, 2512	Yageo	PT2512FK-070R4L	No	Yes
R14	1	Resistor, 1/10 W	249 $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT249R	Yes	Yes
R15, R16	2	Resistor, 1/4 W	1.62 M $\Omega$	1%	SMD, 1206	Yageo	RC1206FR-071M62L	Yes	Yes
R17	1	Resistor, 1/8 W	118 k $\Omega$	1%	SMD, 0805	Stackpole	RMCF0805FT118K	Yes	Yes
R18	1	Resistor, 1/10 W	34 k $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT34K0	Yes	Yes
R19	1	Resistor, 1/10 W	20 k $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT20K0	Yes	Yes
R20	1	Resistor, 1/10 W	499 k $\Omega$	1%	SMD, 0603	Stackpole	RMCF0603FT499K	Yes	Yes
R21, R31	2	Resistor, 1/10 W	0 $\Omega$		SMD, 0603	Yageo	RC0603JR-070RL	Yes	Yes

R22	1	Resistor, 1/8 W	5.1 MΩ	5%	Through hole, Axial	Stackpole	CF18JT5M10	Yes	Yes
R23	1	Resistor, 1/10 W	750 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT750K	Yes	Yes
R24	1	Resistor, 1/10 W	80.6 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT80K6	Yes	Yes
R25, R27	2	Resistor, 1/8 W	2 kΩ	1%	SMD, 0805	Stackpole	RMCF0805FT2K00	Yes	Yes
R26	1	Resistor, 1/8 W	1 MΩ	1%	SMD, 0805	Stackpole	RMCF0805FT1M00	Yes	Yes
R29, R30	2	Resistor, 1/10 W	15 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT15K0	Yes	Yes
R32	1	Resistor, 1/10 W	267 Ω	1%	SMD, 0603	Yageo	RC0603FR-07267RL	Yes	Yes
R33	1	Resistor, 1/10 W	453 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT453K	Yes	Yes
R34	1	Resistor, 1/10 W	90.9 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT90K9	Yes	Yes
R35	1	Resistor, 1/10 W	200 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT200K	Yes	Yes
R36, R37	2	Resistor, 1/10 W	14.3 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT14K3	Yes	Yes
R38	1	Resistor, 1/10 W	2.32 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT2K32	Yes	Yes
R39	1	Resistor, 1/10 W	1 kΩ	1%	SMD, 0603	Yageo	RC0603FR-071KL	Yes	Yes
R40	1	Resistor, 1/4 W	0 Ω		SMD, 1206	Yageo	RC1206JR-070RL	Yes	Yes
R41	1	Resistor, 1/10 W	10 Ω	1%	SMD, 0603	Stackpole	RMCF0603FT10R0	Yes	Yes
R42, R43, R44, R45	4	Resistor, 1/4 W	100 kΩ	1%	SMD, 1206	Stackpole	RMCF1206FT100K	Yes	Yes
R46	1	Resistor, 1/2 W	1 kΩ	5%	Through hole, Axial	Yageo	CFR-50JB-52-1K	Yes	Yes
R50	1	Resistor, 1/8W	10 kΩ	5%	Through hole	Stackpole	CF18JT10K0	Yes	Yes
R52	0	DO NOT POPULATE	PLACEHOLDER		SMD, 0603	PLACEHOLDER	PLACEHOLDER	Yes	Yes
R53	1	Resistor 1/10 W	35.7 kΩ	1%	SMD, 0603	Stackpole	RMCF0603FT35K7	Yes	Yes
RT1	1	NTC Thermistor	220 K, 500 mW	5%	Through hole, 2.54mm	Vishay	NTCLE100E3224JB0	No	Yes
RT2	1	NTC Inrush Current Limiter	15 ohm		Through hole, 10mm	Epcos	B57153S0150M000	Yes	Yes
TX1	1	Flyback Transformer	500uH, 4 A		Through hole, PQ32, Custom	Würth Electronics	750313054 rev02 (Rev01 and Rev02 are interchangeable. No other substitution allowed)	See comment	Yes
U1	1	Controller, PFC - QR Combo			SMD, SOIC-20NB, 1mm	ON Semiconductor	NCP1937A	No	Yes
U2	1	Optocoupler	120 V, 60 mA		Through hole, PDIP4	NEC	PS2513-1-A	No	Yes
U3	1	Optocoupler	70 V, 30 mA		Through hole, PDIP4	NEC	PS2561A-1	Yes	Yes
U4	1	Controller, Sleep mode, Secondary side			SOIC-8	ON Semiconductor	NCP4355B	No	Yes
U5	1	Synchronous rectification driver			SOIC-8	ON Semiconductor	NCP4304A	No	Yes
HS1, HS2	2	Heatsink			Custom	Custom	Custom	No	Yes
	1	PCB				Custom	Custom	No	Yes
Hardware									
Thermal Pad for M3	1	THERMAL PAD TO-220 .007" SP400				Bergquist	BER207-ND	YES	Yes
SHLDR Washer for M3	1	WASHER SHOULDER #4 NYLON	#4			Keystone Electronics	3049	YES	Yes
Screw: M1, M2, M3, D16	4	SS Phillips Machine Screw 4-40 X 1/4 inch	4-40X1/4 inch			McMaster-Car	91772A106	YES	Yes
Nut: M1, M2, M3, D16	4	HEX NUT STN STEEL 4-40	4-40			B&F Fastener Supply	HNSS440	YES	Yes
Tubing: D3,D4	As Needed	TUBING PTFE 14AWG	14GA			Alpha Wire	TFT20015 NA005	Yes	Yes
Tubing: Fuse	As Needed	TUBING PTFE 18AWG	18GA			Alpha Wire	TFT20018 NA005	Yes	Yes

Jumper	As Needed	WIRE BUS BAR 22 AWG, Jumper	22GA			Alpha Wire	298 SV001	Yes	Yes
Thermal Grease: M1,M2,D16	As Needed	SILICONE THERMAL GREASE				T-Global Technology	S606-30	Yes	Yes
Tape	As Needed	57-YELLOW-1/4" wide, L3	1/4"			3M	57-YELLOW-1/4"X72YD	Yes	Yes
Tape	As Needed	TAPE Yellow 1/2" wide, L1,L4	1/2"			3M	35-YELLOW-1/2	Yes	Yes
Standoff	4	STANDOFF HEX 6-32THR ALUM 1"L, PCB Standoff	6-32 X 1"			Keystone Electronics	2212	Yes	Yes
Copper Foil	As Needed	1245-3/8"	3/8"			3M	1245-3/8"X18YD	Yes	Yes

Note 1: MOSFET M3 must have a nylon washer isolating it from the heatsink.

Note 2: If boards are to be washed, then inductors are to be wrapped AFTER the wash. Failure to do so can result in water being trapped under insulating tape with the inductors.