

# F1/F1J BOM

V3.6 PCB 11-9-2020, BOM Updated 2-7-2021

Item	Value	Part Number	Description	Manufacturer	Notes
R1	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	For F1J use 22R
R2	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	For F1J use 22R
R3	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	For F1J use 22R
R4	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	For F1J use 22R
R5	200K	RN60D2003FB14	Metal Film Resistors - Through Hole 1/4watt 200Kohms 1% 100ppm	Vishay	For F1J use 15K
R6	562K	RN60D5623FRE6	Metal Film Resistors - Through Hole 1/4watt 562Kohms 1% 100ppm	Vishay	For F1J use 27K
R7	392K	RN60D3923FRE6	Metal Film Resistors - Through Hole 1/4watt 392Kohms 1% 100ppm	Vishay	For F1J use 27K
R8	392K	RN60D3923FRE6	Metal Film Resistors - Through Hole 1/4watt 392Kohms 1% 100ppm	Vishay	For F1J use 27K
R9	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R10	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R11	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R12	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R13	1M	RN60D1004FB14	Metal Film Resistors - Through Hole 1/4watt 1Mohms 1% 100ppm	Vishay	
R14	1M	RN60D1004FB14	Metal Film Resistors - Through Hole 1/4watt 1Mohms 1% 100ppm	Vishay	
R15	475R	RN60D4750FRE6	Metal Film Resistors - Through Hole 1/4watt 475ohms 1% 100ppm	Vishay	
R16	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	
R17	47R 3W	CPF347R0000GKB14	Metal Film Resistors - Through Hole 3watts 47ohms 2%	Vishay	
R18	47R 3W	CPF347R0000GKB14	Metal Film Resistors - Through Hole 3watts 47ohms 2%	Vishay	
R19	1.5K	RN60D1501FRE6	Metal Film Resistors - Through Hole 1/4watt 1.5Kohms 1% 100ppm	Vishay	
R20	40K	N/A			LED dimming resistor - Not Used on this Build, LED on Power Supply
R21	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	
R22	221R	RN60D2210FB14	Metal Film Resistors - Through Hole 1/4watt 221ohms 1% 100ppm	Vishay	
R23	4.75K	RN60C4751FRE6	Metal Film Resistors - Through Hole 1/8watt 4.75Kohms 1% 50ppm	Vishay	See Note 1
R24	4.75K	RN60C4751FRE6	Metal Film Resistors - Through Hole 1/8watt 4.75Kohms 1% 50ppm	Vishay	See Note 1
R25	1.5K	RN60D1501FRE6	Metal Film Resistors - Through Hole 1/4watt 1.5Kohms 1% 100ppm	Vishay	
R26	1.5K	RN60D1501FRE6	Metal Film Resistors - Through Hole 1/4watt 1.5Kohms 1% 100ppm	Vishay	
R27	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R28	1R 3W	CPF31R0000FKE14	Metal Film Resistors - Through Hole 3watts 1ohms 1% 100ppm	Vishay	
R29	0R47 3W	CPF3R47000JNB14	Metal Film Resistors - Through Hole 3watts 0.47ohms 5%	Vishay	
R30	0R47 3W	CPF3R47000JNB14	Metal Film Resistors - Through Hole 3watts 0.47ohms 5%	Vishay	
R405					See Note 2
R406					See Note 2
R127					See Note 3
R128					See Note 3

Changed to provide correct resistance when in series with P2

Corrected P/N and Description (was 47ohms, should be 0.47 ohm)  
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Eliminated with the addition of P2  
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Item	Value	Part Number	Description	Manufacturer	Notes
Q1	IRFP240				See Note 4
Q2	IRFP240				See Note 4
Q3	IRFP9240				See Note 4
Q4	IRFP9240				See Note 4
Q5	ZTX550	ZTX550	Bipolar Transistors - BJT PNP Medium Power	Diodes Incorporated	
Q6	ZTX550	ZTX550	Bipolar Transistors - BJT PNP Medium Power	Diodes Incorporated	
Q7	IRFP240				See Note 5

C1	1uF	MKS2D041001K00KSSD	Film Capacitor, 1uF, 100VDC, 5mm Spacing	Wima	See Note 6
C2	1uF	MKS2D041001K00KSSD	Film Capacitor, 1uF, 100VDC, 5mm Spacing	Wima	See Note 6
C3	1000uF	UKZ1E102MHM	Aluminum Electrolytic Capacitors - Radial Leaded 25volts 1000uF 85c 16X35 7.5LS	Nichicon	See Note 7
C4	220uF	UKZ1E221MHM	Aluminum Electrolytic Capacitors - Radial Leaded 25volts 220uF 85c 12.5X20 5LS	Nichicon	See Note 7
C101	10uF	UES1H100MPM	Aluminum Electrolytic Capacitors - Radial Leaded 50volts 10uF 85c 8x11.5 3.5LS	Nichicon	This is only for F1J amps. Elna Silmic II can also be used P/N RFS-50V100MG3#5, See Note 13
C102	10uF	UES1H100MPM	Aluminum Electrolytic Capacitors - Radial Leaded 50volts 10uF 85c 8x11.5 3.5LS	Nichicon	This is only for F1J amps. Elna Silmic II can also be used P/N RFS-50V100MG3#5, See Note 13

Was 50V cap (50V still fits, but 25V is sufficient for a stock build)  
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Z1	20V	1N5357BRLG	Zener Diodes 20V 5W	ON Semiconductor	Omit this part for F1J Builds
Z2	20V	1N5357BRLG	Zener Diodes 20V 5W	ON Semiconductor	Omit this part for F1J Builds

P1	5K	3296Y-1-502LF	Trimmer Resistors - Through Hole 3/8" 5Kohms Sealed Vertical Adjust	Bourns	See Note 8
P2	500K	3296Y-1-504LF	Trimmer Resistors - Through Hole 3/8" 500Kohms Sealed Vertical Adjust		For F1J use 25K, Bourns P/N 3296Y-1-253LF, See Note 12

New item for revision 3.6 pcb

LED1	BLUE				Not used on this build, LED on Power Supply
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**F1/F1J BOM**  
V3.6 PCB 11-9-2020

**Misc**

Item	Qty	Part Number	Description	Manufacturer	Notes
Spade Connector 1/4"	8	62409-1	Terminals .250 PCB TAB	TE Connectivity	Omit if soldering wires directly into the board
1/4" Female Spade 14-16ga	8	D14-250-M	Terminals 16-14 .250 FML DISC	Panduit	See Note 9
Ring Terminal for M3 Screw	1	34120	Ring Terminal, 16-14 ga., for M3 Screw	TE Connectivity	Use to bring safety earth to mounting screw on power supply board.
SE Only Jumper Pins	2	61300211121	Headers & Wire Housings WR-PHD 2.54mm Jumper with Test Point	Würth Elektronik	See Note 10
SE Only Removable Jumper	2	61300311121	Headers & Wire Housings WR-PHD 2.54mm 3Pin THT Header	Würth Elektronik	See Note 10
Input Terminal	2	1725685	Fixed Terminal Blocks SP 2.54mm 90DEG	Phoenix Contact	
Screw Terminals for Off Board Caps	4	1985865	Fixed Terminal Blocks MKDSN 1.5/ 2-5.08 HT	Phoenix Contact	Use these if you want to have C1 and C2 off board.
Trim Resistor for R127/R128	1	CPF310R000FKEE6	Metal Film Resistors - Through Hole 3watts 10ohms 1%	Vishay/Dale	See note 14
Trim Resistor for R127/R128	1	CPF34R7000JKE14	Metal Film Resistors - Through Hole 3watts 4.7ohms 1%	Vishay/Dale	See note 14
Trim Resistor for R127/R128	1	CPF32R0000FKB14	Metal Film Resistors - Through Hole 3watts 2ohms 1%	Vishay/Dale	See note 14

Increased to a 3 pin header to provide a storage location for the jumper when not in use  
This worked well, but is kind of expensive so I left it out for my second build.

Added for convenience when adjusting DC offset - may not be needed

Added for convenience when adjusting DC offset - may not be needed

Added for convenience when adjusting DC offset - may not be needed

**Chassis Parts**

Item	Qty	Part Number	Description	Manufacturer	Notes
IEC Input Module	1	4304.6090	IEC Input Terminal, Fused, Switched	Schurter	Same switch used for by the diyAudio Deluxe chassis.
Fuses	2	5ST 4-R	Cartridge Fuse, 5mm x 20mm, 4 A	Bel	See Note 11
RCA Input - White	1	NYS367-9	Panel Mount RCA Jack, White/Gold	REAN/Neutrik	These are cheap and seem to be fine.
RCA Input - Red	1	NYS367-2	Panel Mount RCA Jack, Red/Gold	REAN/Neutrik	These are cheap and seem to be fine.
XLR Input Jack	2	NC3FD-L-B-1	Panel Mount XLR, Female, Gold Contacts	Neutrik	These require a 24mm hole in the panel.

## F1/F1J Power Supply BOM

V2.1 PCB 11-04-2020

Item	Value	Qty	Part Number	Description	Manufacturer	Notes
R1-R8	1 ohm	8	ERX-3SJ1R0	Metal Film Resistors - Through Hole 1 OHM 5% 300PPM 3W	Panasonic	
R9, R10	2.2K ohm	2	ERG-3SJ222	Metal Oxide Resistors 2.2K OHM 5% 300PPM 3W	Panasonic	
R101	10K ohm	1	RN60C1002FRE6	Metal Film Resistors - Through Hole 1/8watt 10Kohms 1% 50ppm	Vishay	LED Dimming Resistor, choose value to suit your taste and choice of LED
R102	10K ohm	1	RN60C1002FRE6	Metal Film Resistors - Through Hole 1/8watt 10Kohms 1% 50ppm	Vishay	LED Dimming Resistor, choose value to suit your taste and choice of LED

C1 - C8	> 15,000 uF	8	LLS1E183MELC	Aluminum Electrolytic Capacitors - Snap In 25volts 18000uF 85c 35x30x10L/S	Nichicon	Stock F1 value is 15,000 uF, anything with 10mm snap in connection and less than 35mm diameter will fit, the part number specified seemed like a good value
C9	3300pF	1	R413I13300000M	Safety Capacitors 1000volts 3300pF 20%	KEMET	

TH1	CL-60	1	CL-60	Inrush Current Limiters 5A 10ohm Straight leads	Amphenol	Ground Lift, a small bend in legs will allow it to mount straight
TH2	CL-60	1	CL-60	Inrush Current Limiters 5A 10ohm Straight leads	Amphenol	Ground Lift, a small bend in legs will allow it to mount straight
THx	CL-60	See Notes	CL-60	Inrush Current Limiters 5A 10ohm Straight leads	Amphenol	Use qty(1) for 240V and qty(2) for 120V wire per F1 schematic in F1 service manual, a small bend in the legs will allow it to mount straight

### Misc

Item	Qty	Part Number	Description	Manufacturer	Notes
Spade Connector 1/4"	12	62409-1	Terminals .250 PCB TAB	TE Connectivity	Omit if soldering wires directly into the board
1/4" Female Spade 14-16ga wire	20	D14-250-M	Terminals 16-14 .250 FML DISC	Panduit	See Note 9
Connector for LED wiring	2	10-11-2024	Headers & Wire Housings KK 100 Housing Crimp Pol Ramp 2 Ckt	Molex	connector for LED wiring
Crimps for LED wiring connector	4	08-50-0114	Headers & Wire Housings CRIMP TERM 22-30 TIN	Molex	crimps for use with LED wiring connector, I crimp to wire with a pliers and then solder
Header for LED wiring	2	22-23-2021	Headers & Wire Housings VERT PCB HDR 2P TIN FRICTION LOCK	Molex	on board connector for LED, omit if soldering wires directly
Diode Bridge Rectifier	2	KBPC5010-G	Diode Bridge Rectifier, 50A, 1000V	Comchip Technology	this does not mount to the board, there is probably something better than this, but it works, eliminate if using the Schottky Diode Bridge Rectifier Boards
Blue LED Power Indicator	2	TLHB44K2M1	Standard LEDs - Through Hole Blue 3mm 466nm 15mcd	Vishay	I really liked these, they are not too bright and have a diffuse lens to spread the beam. See Note 15

Not in first BOM

### Schottky Diode Bridge Rectifier Parts

Item	Qty	Part Number	Description	Manufacturer	Notes
Schottky Diodes	8	VS-15TQ060-M3	Schottky Diodes, TO-220, 60V, 15A	Vishay	
Heat Sinks	4	529902B02500G	Extruded Radial Fin Heatsink, for TO-220, 25.4 x 41.91 x 50.8	Aavid	
Thermal Transfer Pads	8	SP2000-0.015-00-58	Thermal Transfer Pad for TO-220, Sil-Pad TSP 3500 Series	Bergquist Company	
Insulating Washer	8	7721-7PPSG	Insulating Washer for TO-220	Aavid	I bought mine in a bag of 100 from Amazon for a much lower price

Not in first BOM

Heat Sinks	4	529802B02500G	Extruded Radial Fin Heatsink, for TO-220, 25.4 x 41.91 x 31.8	Aavid	Shorter previously specified Heatsinks - worked fine but taller would be better
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## F1/F1J BOM Notes

V3.6 Amp PCB and V2.1 Power Supply PCB

1) This is the same as the 1/4W RN60, just rated for lower power at a higher ambient temperature (1/4W @70°C vs. 1/8W @ 125°C)

2) ~~Used for adjusting DC offset on F1J, Nelson Pass F1 to F1J conversion instructions suggests values of 100K to 2M.~~

Eliminated with the addition of P2

3) Used for adjusting DC offset due to Q1-Q3 and Q2-Q4 mismatch, Firstwatt F1 service manual suggests that adding 10ohms here will produce a change in DC differential of 50mV. Target DC differential is 50mV or less.

4) Suggest Getting matched parts for Q1,Q2,Q3, Q4 by purchasing an F4 transistor kit from the diyAudio Store, I have been told getting good matches for the N channel parts can require a lot of parts. For F1J Q1 and Q2 need to be matched SemiSouth R100 JFETS.

5) You will have this left over from the F4 transistor kit, but any part could be used (ie. no matching required).

6) You have many choices here. If you are a believer in boutique caps, max length that fits on the board is 49mm, max diameter is 21.5mm if you want things nice and lined up with the footprints on the board, 28mm if you don't mind things being offset a bit, and 35mm if R1 & R2 are mounted below the board and input screw terminal jumper terminal pins are omitted. If your favorite flavor doesn't fit on the board, there are holes for a screw terminal to connect a larger cap off the board. Phoenix Contact P/N 1985865 fits (most other .20 inch/5.08mm pitch terminals should also fit).

Increased maximum diameter to 35mm with other component placement changes required

7) Larger 50V rated Nichicon Muse UKZ series capacitor from previous BOM will also fit the board and leaves some head room for experimenting with higher voltages

8) Suggest starting at 1.05 Kohm pin 3 to pin 2 (this setting gave me a 13.7 VDC offset at power up)

9) Omit if soldering wires directly into the board  
These Panduit brand connectors fit the male spade terminal well and are recommended over other brands.  
A 12ga. wire will fit if it is soldered in place not crimped.

10) This jumper is to allow easy switching from Single Ended to Balanced inputs. If you only have SE inputs now, I would put the jumper in so it will be easy to add Balanced later. Omit if you don't want a jumper for SE input on the board. If you forget to remove it and connect an XLR balanced input, the input will be shorted from pin 3 to pin 1.

11) 4A fuse called out in FirstWatt power supply schematic, I used 5A because I had them and used a larger capacitor bank and transformer.

12) Used for fine tuning of DC offset. For F1 set pin 3 to pin 2 resistance to 362K, for F1J set pin 3 to pin 2 resistance to 12K before soldering into board. Try to reduce DC offset by adding resistance at R127 or R128 prior to adjusting potentiometer.

New Note

13) C1 + C101 (or C2 + C102) combined capacitance should be 11uF to match FirstWatt specifications for F1J, based on listening tests I would not go lower than 6.8uF for full range use your taste may vary.

New Note

14) These are trim resistors to use in positions R127 or R128, they are not strictly needed, but are on the BOM so you have a few resistors on hand to help rough in the DC offset after power up. 2x 1/4W resistors in parallel can also be used if power rating for each resistor is not exceeded, but keep in mind they will heat up more and have larger resistance changes due to thermal effects than a larger resistor would.

New Note

15) If used with the LED mounting boards make sure your double sided tape is thick enough to keep the leads of the led from contacting the front panel.

New Note