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D1V2 + Zen I/V Manual

PCM63 x 4, SM5842, WM8804, Zen I/V (Nelson Pass)

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Classic B2B DAC full balance design
Digital to Analogue Converter

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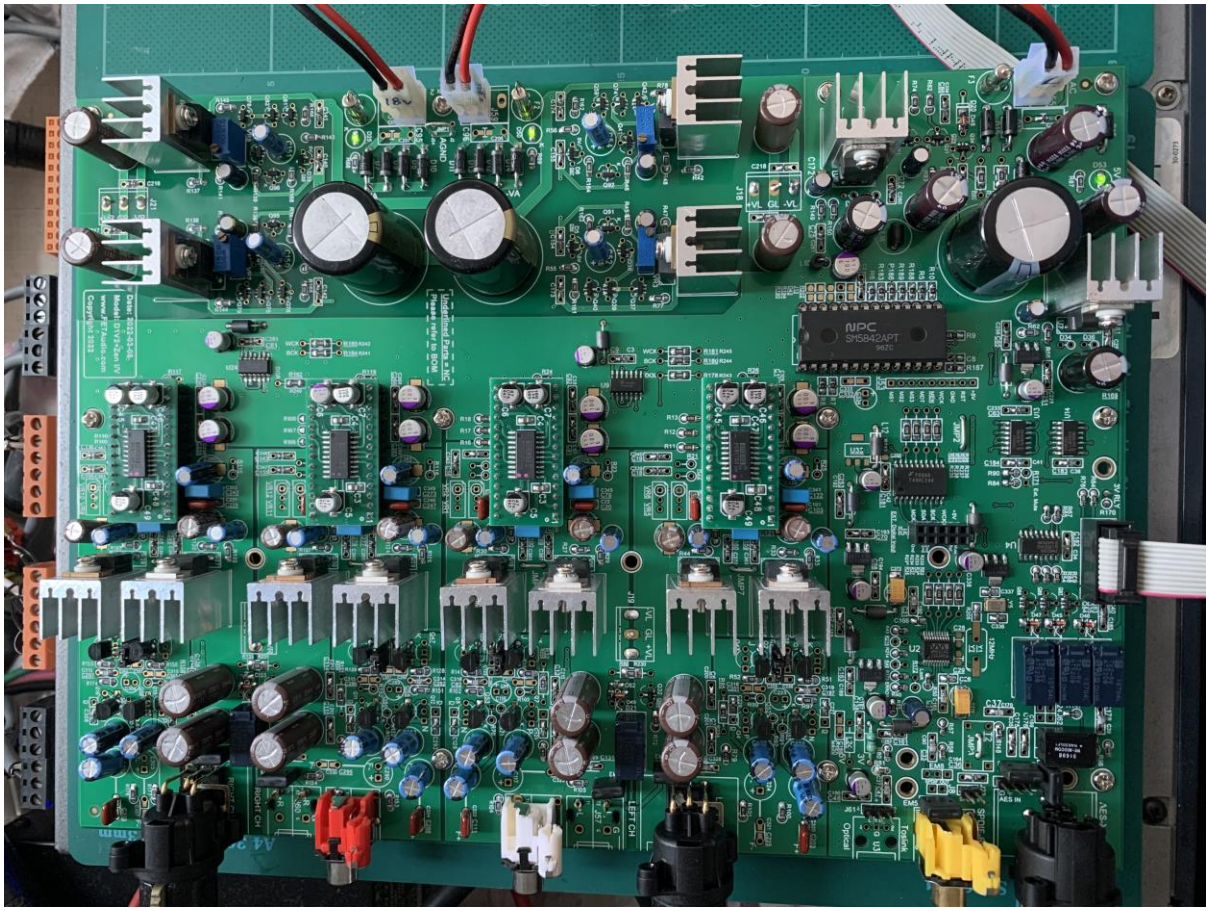


A. Introduction:

Nelson Pass has designed a "Classic D1 DAC" using 4 pcs PCM63 R2R DAC chips with full balance back in 1997. I have done a so call D1 clone circuit board back in 2012. Nelson had also issued a Zen I/V article since 2010 but I did not take a serious look due to my day-time work commitment. Some people have been posted many derivates of the Zen I/V since then in http://www.diyaudio.com forum. Mr. Pass had laid down the foundation of Zen I/V with many hinds for Diyer to explorer further. Of course, there are still many people interest to build old R2R DACs as the sound is typical analogy style!

Finally in 2022, I decided to make a new PCB of D1 clone (name it D1V2 Zen I/V). My purpose is to see how good the Zen I/V is compared to the past design of my jfets I/V which has quite a high distortion level of about 0.3% per channel! I started with a daughter board Zen I/V and mounted on my old D1V3.3 version board for experiment. The result is promising with distortion at about 0.005% levels. As far as I know the D1V3.3 still has many weaknesses and thus I am going to address them one by one whatever I can in the new PCB.

Here are the key features of the D1V2 Zen I/V PCB:

1. WM8804 receiver chip is used (one of the lowest jitter receiver chip available) with relay switching for 3 digital inputs (AES/ SPDIF/ Optical). The selection still uses the FDA-1B front panel to control the selection of input digital source. WM8804 clock - XTI input is also provided with an option of XO or TCXO (5x3.2 or 3.2x2.5mm size) besides standard 12MHz Crystal. User can search the more accurate frequency and lower jitter XO/TCXO to experiment.
2. Keep the form factor of the FDA-1B circuit board with all the M3 mounting holes, input, and output sockets for easy fitting into existing casing. I can cut short much time to design the digital part and power supply sections. In fact the time is spend on fine tune the layout of the digital section.
3. Digital Bus signal buffer chip 74VHC244 can select to use either 5V or 3.3V supply. If use 5V, it is acting like a level shifting buffer from 3V3 to 5V CMOS levels. At 3V3 supply, it is used for digital filter DF1706 to match the input levels.
4. Digital filter is designed for SM5842 by default, but SM5813/DF1700, PMD100, SM5843, DF1704 and DF1706 can also be used. The last two DF chips need a SSOP28 to DIP28 converter board for mounting. All the hardware mode selections are done using 0805 size SMD resistors on top or bottom side of the board. A "**Digital Filter Assignment Table**" (section E, item 8-9) is provided for setting but it is not a quick switching using jumpers or dip switches due to possibility of damaging the chip if connected wrongly on the power supply.
5. Since DF1706 use 3.3V supply, a regulator is added on the bottom of board.
6. J53 connector pins (2.54mm pitch) are added next to the DF chip. It is used for future daughter board when SM5803 is used (some code loading is needed during power up to set the attenuation of the chip to Zero and I know many diyers are better than me on software coding).
7. After the DF, phase convertor chip 74HC86 DIP is changed to 74VHC86 SOIC. Reason is availability issue and faster speed for better jitter performance.

8. PCM63 design is keeping the distortion tuning option by trimming pots. With the lower distortion of Zen I/V, I expect the turning is workable with proper setup and very low distortion measurement equipment.
9. Other DAC chips PCM1702U / PCM1702 DIP / PCM1704U can be used as new converter boards for each of them is available. Of course, the I/V resistor should be adjusted for higher output levels. Due to supply rails limitation, the output levels will be a bit lower, but distortion is also lower at full digital scale.
10. The power supply of Zen I/V is adopted from FDA-1B analogy low noise regulators. Each PCM63 +/-5V power supply is regulated by two IC (LM317/LM337) and the input voltage is from the +/-20V low noise regulator. Digital supply of PCM63 is derived from the analogy +/-5V supply with RC filtering. The digital and analogy ground is connected at the middle of the DAC chip by the ground plane. In fact, the Yamaha DA8X PCB layout for the power supply and grounding is used as the DA8X supply and layout is well designed to ensure low noise and low distortion performance.
11. Resistors are 100% Through Hole design except at digital filter mode setting resistors are 100% 0805 style. In fact, the TH resistors pitch is either 2.5mm or 3m5mm and thus SMD 0805 or 1206 sizes resistors are okay to use. For small value capacitors, both through hole 5mm pitch and 0805 pads are provided for flexibility of component choice. BOM default is SMD types and note the size required.
12. Zen I/V is adapted Mr. Nelson Pass's design with an added transistor emitter follower by default. The input can use a complementary K170/J74 pair or two K369 jfets. I duplicate the input FET pads so that people can put max two K170/J74 pairs or 4 pcs K369 jfets as input section. For output buffer, it can use one pair of NPN/PNP transistor as emitter follower or K170/J74 as source follower (I added one "**D**" hole so that jfets can be mounted easily as source follower). I also added two more DGS pads for K170/K170, K363/K363 or K369/K369 buffer when use it in single end buffer when input is using only K/K jfets. Thus, there are many combinations diyer can explorer. Finally, if there is new better IV design, a daughter board can also be mounted on top like what I did on the D1V3.3 board.
13. Zen I/V is using 100uF output capacitor for coupling and the board has added F+/F+ & F-/F- points for connecting film capacitors. Drill size and solder pad is enlarged and the pitch is 650mil.
14. Added EMI filters (LCL) pads at all AES/SPDIF/Analogy outputs as some user may have EMI issue complaints. If not use, just short the pad with a wire!
15. I like single board DAC design because the supply is there, layout is there and all the wirings issues has been addressed in the PCB design stages to get better performance. This is the main reason I make a full DAC PCB design as I want diyers to have consistent result when building a DAC with some good topology.
16. With limited time, my main purpose is to share the DAC PCB. Not to sell kit but I still can provide some of the components if I have extra in my stock. Note that most of the part can be found in distributors like RS components, Element14, Mouser and Digikey etc…

B. Specifications:

1. Power supply: 18V x 2 and 9V x 1 transformer of total about 60VA of equal share.
2. Digital Input: RCA/SPDIF, XLR female/AES and Toslink/Optical input. Control by front panel using tact switch or push button. Selection by two pins with 00/01/10/11.
3. Analogy Output: Two male XLR on board sockets for balance output, two single RCA and two dual RCA pads is also provided for single end output.
4. Zen I/V rail: use +/-20V with default I/V resistors values. User can adjust the rails and I/V resistors as they like.
5. Output levels: With PCM63 DAC, it is about 1.03Vrms in SE mode or 2.06Vrms for balance mode.
6. Output distortion is around 0.006~8% for using PCM63 in single end mode with Jfets NP pair input and transistors NP pair buffer. That is one pair of K170/J74 (8~9mA Idss) and one pair of transistors KSC1845/KSA992 for each I/V.
7. Output capacitors from emitter follower is using two Electrolytic capacitors. Big film capacitors space is not provided but they can be connected on top or bottom of the PCB.
8. Digital Receiver chip: WM8804. 4 Digital output formats are able to be set on board by 4 resistors (only solder two at one time).
9. Digital Filter: SM5842, SM5843, SM5813, DF1700, PMD100, DF1704 & DF1706. Last two DF chips need a SSOP28 to DIP28 converter board. SMD bypass film capacitor should be added on the convert boards for the power supply and ground pins of the DF chip.
10. SM5803AP may be able to use as a connector "**J53**" is reserved for putting a daughter board to transfer preset codes into the internal registers during power up or reset cycles.
11. Buffer and Inverter: 74VHC244 and 74VHC86 high speed CMOS logic IC.
12. DAC: PCM63 DIP28, PCM1702 (DIP and SOIC), & PCM1704 SOIC. Note that converter board is needed for PCM1702 / PCM1704 DAC chips.
13. Zen I/V: Use Nelson Pass basic design with some modifications of added output buffer and different I/V resistor values and rail voltages. Distortion level as measured is very close or equal to Nelson Pass's figures.

C. Assembly Procedures:

**** For manual soldering, the rule is to solder part from small to big size and from short to tall parts ****

1. Refer to the BOM, solder all the SMD small part first – IC, resistors and capacitors.
2. Solder all the SOICs – U2 (**WM8804 FIRST**), U4, U9, U12, U13, U14, U24, & Y5 (XO). **Note the pin 1 of all ICs and alignment of IC text direction**. Solder all the 3V3 SMD SOT-223 regulators. For WM8804, use a multimeter to check if there is any short solder between adjacent pins and the connectivity to the pad and trace.
3. Solder all the Diodes (**Marking "Circle" is Cathode or "K"**), Beads, and small horizontal through hole components including all the **JUMPER number 2~7**.
4. Solder all small pins, jumpers and DIP28 IC sockets. That is the SMALL J parts.
5. Solder the through hole resistors vertically placed including the VRs and relays.
6. Solder all Through Hole transistors and Jfets. **Note the J/K/N/P markings on board and marking orientation**. Also the layout for IV for +ve and -ve is an MIRROR image!
7. Solder all the heatsink together with the IRFs and LM317/LM337 parts. Make sure there is a mounting kit for all these parts with a mica or thermal pad between the TO-220 body and the heatsink surface. Verify the isolation of the part body to the heatsink ground by a multimeter after soldering.
8. Solder the rest of through hole capacitors. For electrolytic capacitor, note the "+".
9. Solder all the power connector and input and output sockets – BIG J parts.
10. Check if any missing components and solder them all to complete the assembly process.

Use of DF filter chips other than SM5842:

1. Follow the "**Digital Filter Pin Cross Reference**" table to determine what component is needed if another digital filter chip is used other than SM5842. All the part designations are layout either on top or bottom nearby the U1 - DF location. For SM5842 (default DF), all the parts required are placed on the Top of the PCB. Any part with "Underlined Designation like C334" is not required on top side. For other digital filter chips, follow the cross-reference table to put in the components on either top or bottom of the PCB **carefully**.
2. For PMD100, there is two power supply pins and thus additional supply through two resistors R195 and R196 to pin 7 is needed, they are all 0R jumper resistors on the bottom side of PCB. C334 and C332/C333 are providing additional filter and bypass for pin 7. R194, D42 are for HDCD LED on board. If off board is needed for the LED, do not solder D42 and use J12 to connect the LED off the board.
3. For DF1704 and DF1706, they are required to be mounted on a SSOP28 to DIP28 converter board first. Addition SMD 0.1u MLCC capacitors is needed to solder on the converter boards to improve power supply bypass.
4. For DF1706, it is a 3.3V parts thus two 3.3V regulators are needed to ensure it is working properly. One is for the supply of DF1706 at the bottom U31. Other components needed is R203, and C335. **Make sure L10 is remove for the 5V supply to pin 22!** Besides, U33 is also needed for 74VHC244's power supply at 3V3 due to DF1706 input levels at 3V3 range. Other parts for the U33 regulator are R212, and C355. **When using U33, make sure L12 is disconnected also!**

D. Adjustment and Testing Procedures:

DO NOT PLUG IN ANY DIGITAL FILTER CHIPS AND DAC CHIPS FOR BELOW ADJUSTMENT AND TESTING!

1. **Digital power supply**:
    a. Connect an AC voltage about 7-9V to J55, check the DC voltage at the D19 anode for about 9 to 12V dc. Note down the DC voltage as standard.
    b. Check the regulator U6 and U7 for a 5V regulated voltages at their TO-220 heatsink body (not the big heatsink which is grounded).
    c. Then verify all the 3V3 regulators output is correct by touching the pin 4 (heatsink) of each unit to ground – within 3.3V +/- 0.02V. That is U8, U10 and U17. If other SOT223 regulator is used, check them also for U32, U33 and U31 – bottom at U1 pin 22 (for using DF1706 only).
    d. By default, if SM5842 is used, pin 22 of U1 is at 5Vdc.
    e. If PMD100 is used, pin 7 of U1 should also be at 5V. that is R195 and R196 is shorted. **DO NOT SHORT THESE TWO RESISTORS FOR OTHER DIGITAL FILTER CHIPS OR ELSE DAMAGE MAY HAPPEN!**
    f. Once all the regulators voltage is correct, most likely the digital section is working! Remove the AC at J55 and continue the testing below.
2. **Analogy power supply**:
    a. Connect AC 18V x 2 to J58 and J59. Verify the output near D7 (+VA) marking for about +24V dc. Also check at D14 (-VA) marking for about -24V dc.
    b. Then connect the meter to two -VR (one by one) and ground and adjust VR4 and VR8 (two regulators) for an output voltage of -20Vdc.
    c. Also connect the meter to two +VR (one by one) and ground and adjust VR3 and VR7 (two regulators) for an output voltage of +20Vdc.
    d. The voltages should be very easy to adjust to be within +/-0.05V as the VR is a 10 turns type.
    e. Note that the AC noise at the 20V regulator output should be about 100uVrms. Measure with a bench top Keithley 2000 meter at AC mode.
    f. Then connect 6 wires from J18 to J19 and J20 to J21. Make sure the +VL, GL & -VL AND +VR, GR & -VR are connected together respectively. *Shielded twisted pair wire is welcome here to avoid additional noise from regulator to analogy sections.*
    g. Power on the 18V x 2 again and then check the +/-20V supply voltages at the I/V side of the socket. Trouble shoot if the supply drop by more than 0.5V.
    h. Verify the regulators voltage for EACH PCM63 location as below:
        i. Pin 2 and Pin13 should be about +5V +/- 0.05V
        ii. Pin 28 and Pin 11 should be about -5V +/- 0.05V
    i. Repeat the checking for other regulators for PCM63: That is for U11, U15, U25 and U26. Total 4 x 4 points.
    j. In case the voltage is wrong, verify the two resistors value at the LM317/337.
    k. Next verify the I/V resistors (R51 & R52 for the first I/V) voltage at the drain of input Jfets Q1 and Q2. They should be about + 6.5V +/-0.5V and – 6.5V +/-0.5V respectively. If the Idss of the jfet is higher than 8-9 mA, a lower value

will be measured and vice versa. Below 5V is not recommended and max is half of the rail voltage, that is about 10V.

l. Check the input dc offset voltage at pin 6 of PCM63 to be below 3mV dc. A good match jfet pair will give even lower dc offset readings about 1mV or below.
m. Check the emitter resistor at the emitter of each transistor Q3 & Q4 and they should be about 0.5V below the voltages at the drain of each jfets Q1 & Q2. That is about +6V +/-0.5V and -6V +/- 0.5V readings.
n. Repeat step j to l for the other 3 Zen I/V.
o. If all the voltages in the analogy section is correct, then power it off again.
p. Plug in the digital filter chips and the DAC chips.

3. **Functional test section**:
   a. Feed a digital signal with 1kHz data at the RCA/SPDIF input (default) without front panel control board connection.
   b. Power on the digital and analogy supply together (J55, J58 and J59).
   c. You should hear the output mute relay to click after 5-10 seconds. That means the output is un-muted.
   d. Then measure the AC analogy output signal at C10 with the PCM63 DAC chips. The reading should be about 1.03Vrms at 1kHz if the digital signal is a 100% full scale signal and digital signal is locked.
   e. If no digital signal is available, music CD player with SPDIF RCA output can be used.
   f. Repeat to plug in other PCM63 after power off one by one until all the 4 channels are working with almost same output analogy AC signal levels at C10, C131, C295 & C310. The variations of output levels should not be more than 0.5dB.
   g. After that can verify all the regulators voltage again to be at either 5V or 3v3 again carefully and not to short the probe to any traces other than measurement points. For +5V, LM317 heatsink can be used as the output voltage. For LM337, the pins at the 1uf capacitor pad at C107, C106, C103 and C102 should be measured.
   h. For regulator noise after the LM317 and LM337, a typical value is about 200 to 250uVrms using a bench top AC meter when the circuits is under load testing with 1kHz digital signal input.
   i. If the voltages are still okay, then proceed to do output level, distortion test and frequency response tests!
   j. Finally Listen test can be started!

E. Board Interface Specifications:

1. Power Supply Connectors:

Location	Description	Format
J58	18V to 20V AC, 0.8A, 14VA	3.96mm pitch (5mm also provided)
J59	18V to 20V AC, 0.8A, 14VA	3.96mm pitch (5mm also provided)
J55	8 to 9V AC, 1.2A, 12VA	3.96mm pitch (5mm also provided)
J2/J54/JMP1	Chassis Ground	Connect AGND to star ground point

2. External digital Connector J5: (5 x 2 female Pin Header; pitch 2.54mm, CMOS 5V logic; 3V3 when used U33/R212/C355 and remove L12 to power up U12 VHC244)

Pin	Description	Marking on PCB
1	Digital Ground	GND
2	System clock 256fs	MCLK
3	USB2 LED drive (with current limit R120)	GND
4	Serial Digital Data	SDA
5	USB LED drive (with current limit R121)	GND
6	Bit clock 64fs	BCK
7	Power up reset (Low = Reset)	RST
8	Work clock fs	LRK
9	Output Mute (Hi = Mute)	Mute
10	+5V DC Supply for plugin	+5V

3. Digital Input / Output Socket:

Location	Description	Spec	Format
J4 / J23	SPDIF input	75 ohm 24bit/192k	RCA (Single deck)
J3 / J22	AES input	110 ohm 24bit/192k	XLR female
U3 / J61	Optical input	Optical 24bit/192k	Toslink - TORX147
J5	See item 2 above	5V (default) or 3.3V CMOS levels	5x2 pin header
J8	Digital SPDIF output	75 ohm 24bit/ 192k	2.54mm Pin header

Note: For 192k operation, an ASRC daughter must be used at U18 location.

4. Analogy Output Socket:

Location	Description	Format
J14	Left Ch balance output	XLR male
J15	Right Ch balance output	XLR male
J7	Left Single Ended Output	RCA (white)
J57	Left channel +V and -V output	RCA (vertical double deck) not provided
J6	Right Single Ended Output	RCA (red)

5. J1 – Front Panel connector (for hardware mode only):

Pin	Description	Marking on PCB
1	Digital input Select Binary bit 0 (0, A)	Default A = 1
2	Digital input Select Binary bit 1 (B, 0)	Default B = 1
3	GND	GND
4	USB2 LED drive from pin 1 of J62 (no current limit) AND pin 3 of J5 (with resistor R120=680R current limit).	USB2
5	DGND	GND
6	USB LED drive from pin 1 of J24 (no current limit) AND pin 5 of J5 (with resistor R121=680R current limit).	USB
7	+3V3 Supply from U8	+3v3
8	Lock LED drive (with resistor 680R current limit)	High = Lock
9	+3V3 Supply from U8	+3v3
10	Mute LED drive (with resistor 680R current limit)	High = Mute

6. Digital Input Select (Pin 1 and 2 of J1):

No	Description	Marking on PCB
1	Pin 2, Pin 1 = 0, 0	J5 ext digital input
2	Pin 2, Pin 1 = 0, 1	Toslink
3	Pin 2, Pin 1 = 1, 0	AES
4	Pin 2, Pin 1 = 1, 1	RCA - default

7. JUMPERS, RESISTOR AND PIN HEADER DESCRIPTION:

Location	Description
R90	Short one of these resistors; R90 = External Digital Mute at J5 pin 9 is active High. Default is R90 short (active high).
R171	If shorted, then the I2S Mute pin 9 is shorted to ground, thus the Mute conditions will depend on the setting of R53 and R88. Default is R171 open.
L1/L24	L1 and L24 are for 3V3 and 5V optical receiver at U3 respectively. Only one of the inductors should be connected per the spec of the Toslink.
R39	Should be shorted for SPDIF/RCA IN to work without T2.
JMP1	If connected, the M3 hole near to it will be connected to analogy ground
C95/C96/C97	Can be used to connect a MOV for surge suppression, not provided
R169/R170	R169 is 0R and R170 is open for 5V relays - K3, K4 & K5. For 3V3 relays, short R170 and open R169.
VR1, VR2, VR5, VR6, VR9, VR10, VR11, VR12	All 100k 10 turns pots to adjust distortion of PCM63 when needed. Use together with Resistors R19 to 22 and R112 to R115. This must refer to PCM63 data sheet for the adjustment method.
WM8804 **R43/R214** R43/R49 R215/R49 R215/R214	Digital output format setting: (Connect only two 10k resistors) 16-bit Right Justified (**Default** for PCM63/PCM1702/PCM1704 DAC) 24-bit I2S 16-bit I2S 24-bit Left justified

8. Digital Filter Pin tables:

Pin #	SM5842	SM5813 / DF1700	DF1704E	DF1706-3.3V	PMD100	SM5803	SM5843
1	DI / INF2N	DIN	DIN	DIN	DIN	DIN	DI / INF2N
2	BCKI	BCKI	BCKIN	BCKIN	BCKI	BCKI	BCKI
3	CKSLN	CKSL_	I2S	I2S	XTIM	CKSL_	CKSLN
3							
4	INF1N	CKDV_	IW0	IW0	DITH	CKDV_	INF1N
4							
5	IW1N / DIL	NC	IW1	IW1	GAIN	8X_	IW1N / DIL
5							
6	XTI	XTI	XTI	XTI	XTI	XTI	XTI
7	XTO	XTO	XTO	XTO	VDD1	XTO	XTO
7							
8	VSS	VSS1	VSS	VSS	VSS1	VSS1	VSS
9	CKO	CKO	CLKO	CLKO	PROG	CKO	CKO
10	IW2N / DIR	SYN_	MODE	MODE	OSIZ0	MS1	IW2N / DIR
10							
11	OW1N	NC	MD / CKO	MD /CKO	OSIZ1	MS2	MDT
11							
12	OW2N	NC	MC / LRIP	MC /LRIP	COB_	MS3	MDK
12							
13	SYNCN	NC	ML /RESV	ML /RSV	JUST	MDT	MLEN
13							
14	RSTN	RST_	RST	RST_	BCPL	MEN_	RSTN
14							
15	DEMPR	COB_	MUTE	MUTE_	SMUTE	MUTE	MUTE
15							
15							
15							
16	DEMPL	OW20_	DEM	DEM	DEEMPH	DIEM	DEMP
16							
17	FSEL1	OW18_	SF0	SF0	HMUTE	FSEL1	FSEL1
17							
18	FSEL2	NC	SF1	SF1	FSEL	FSEL2	FSEL2
18							
19	MUTER	NC	OW0	OW0	SCAL	DGR	OW20N
19							
19							
20	MUTEL	DG	OW1	OW1	DG	DGL	SYNCN
20							
20							
21	DITHN	VSS2	NC	X4	VSS2	VSS2	TMOD1
22	VDD	VDD	VDD	VDD	VDD2	VDD	VDD
23	DOR	DOR	DOR	DOR	DOR	DOR	DOR
24	DOL	DOL	DOL	DOL	DOL	DOL	DOL
25	WCKO	WCKO	WCKO	WCKO	WCKO	WCKO	WCKO
26	BCKO	BCKO	BCKO	BCKO	BCKO	BCKO	BCKO
27	DG	FSCO	SRO	SRO	HDCD	FSCO	TMOD2
27							
27							
28	LRCI	LRCI	LRCIN	LRCIN	LRCI	LRCI	LRCI

9. Digital Filter assignment tables:

NOTE: NC = NO CONNECTION

Pin #	RESISTOR	SM5842	SM5813 / DF1700	DF1704E	DF1706-3.3V	PMD100	SM5803	SM5843	Value
1									
2									
3	R8	0R	0R	0R	0R	0R	0R	0R	0R
3	R206	NC	NC	NC	NC	NC	NC	NC	10K
4	R7	0R	NC	0R	0R	NC	NC	0R	0R
4	R204	NC	NC	NC	NC	10K	NC	NC	10K
5	R2	NC	NC	0R	0R	NC	0R	NC	0R
5	R207	NC	NC	NC	NC	NC	NC	NC	10K
6									
7	R195	NC	NC	NC	NC	0R	NC	NC	0R
7	R196	NC	NC	NC	NC	0R	NC	NC	0R
8									
9	R193	NC	NC	NC	NC	0R	NC	NC	0R
10	R3	NC	NC	0R	0R	0R	J53-1	NC	0R
10	R208	NC	NC	NC	NC	NC	MS1	NC	10K
11	R9	0R	NC	NC	NC	NC	J53-2	NC	0R
11	R199	NC	NC	NC	NC	10K	MS2	NC	10K
12	R1	NC	NC	0R	0R	NC	J53-3	NC	0R
12	R198	NC	NC	NC	NC	10K	MS3	NC	10K
13	R4	NC	NC	NC	NC	NC	J53-4	NC	0R
13	R197	NC	NC	NC	NC	10K	MDT	NC	10K
14	C8	330pF	100pF	330pF	330pF	0R	J53-5	330pF	SEE left
14	R187	0R	0R	0R	0R	NC	MEN_	0R	0R
15	R10	0R	NC	NC	NC	NC	NC	NC	0R
15	R179	NC	NC	NC	NC	0R	0R	0R	0R
15	R213	NC	NC	0R	0R	NC	NC	NC	0R
15	R75	NC	NC	NC	NC	NC	NC	NC	10K
16	R5	0R	0R	0R	0R	0R	0R	0R	0R
16	R211	NC	NC	NC	NC	NC	NC	NC	10K
17	R188	0R	NC	0R	0R	0R	0R	0R	0R
17	R210	NC	NC	NC	NC	NC	NC	NC	10K
18	R189	0R	NC	0R	0R	0R	0R	0R	0R
18	R209	NC	NC	NC	NC	NC	NC	NC	10K
19	R191	NC	NC	0R	0R	0R	NC	0R	0R
19	R186	0R	NC	NC	NC	NC	NC	NC	0R
19	R201	NC	NC	NC	NC	NC	NC	NC	10K
20	R192	NC	NC	NC	NC	NC	NC	NC	0R
20	R183	0R	NC	NC	NC	NC	NC	NC	0R
20	R200	NC	NC	10K	10K	NC	NC	NC	10K
21	R6	0R	0R	NC	0R	0R	0R	0R	0R
22									
23									
24									
25									
26									
27	R190	NC	NC	NC	NC	NC	NC	NC	0R
27	R194	NC	NC	NC	NC	680R	NC	NC	680R
27	R202	NC	NC	NC	10K	NC	NC	NC	10k
28									
PMD100	C332/C333	NC	NC	NC	NC	**0.1uF**	NC	NC	0.1u
	C334	NC	NC	NC	NC	**10uF 25V**	NC	NC	10u
	R194	NC	NC	NC	680R	**680R**	NC	NC	680R
	D42 (LED)	NC	NC	NC	NC	**0805 LED**	NC	NC	0805 LED
	J12 (LED Con)	NC	NC	NC	NC	**2.54mm pin**	NC	NC	2.54mm PIN
DF1706	C335	NC	NC	NC	**0.1u 0805**	NC	NC	NC	0.1u 0805
	R203	NC	NC	NC	**0R**	NC	NC	NC	0R
	L10	Bead	Bead	Bead	**NC**	Bead	Bead	Bead	Bead
	U31	NC	NC	NC	**AMS1117-3.3V**	NC	NC	NC	SOT223 3,3V
	L12	Bead	Bead	Bead	**NC**	Bead	Bead	Bead	Bead
	R212	NC	NC	NC	**0R**	NC	NC	NC	0R
	C355	NC	NC	NC	**0.1u 0805**	NC	NC	NC	0.1u 0805
	U33	NC	NC	NC	**AMS1117-3.3V**	NC	NC	NC	SOT223 3,3V
	On Bottom side								
	On TOP side								

Note: For SM5803 digital filter, a small program board is required to write the codes into it during power up or reset mode for setting the internal attenuator to 0 dB via J53 on next page.

10. Digital Filter connector J53:

This connector is reserved for future control of SM5803 software mode digital filters. A counter and ROM with preset data is required to send the code to the DF chip during power up. The work clock can be used to clock the codes into the DF chips. Pin assignment is in below table:

No	DF chip Pin	Description:
1	10	See table 8 for SM5803 – MS1
2	11	See table 8 for SM5803 – MS2
3	12	See table 8 for SM5803 – MS3
4	13	See table 8 for SM5803 – MDT
5	14	See table 8 for SM5803 – MEN_
6	LRCLK	Work clock of the digital signal. Can be used for clocking of code into the DF chip.
7	GND	
8	Reset	Reset signal from the DAC
9	+5V	

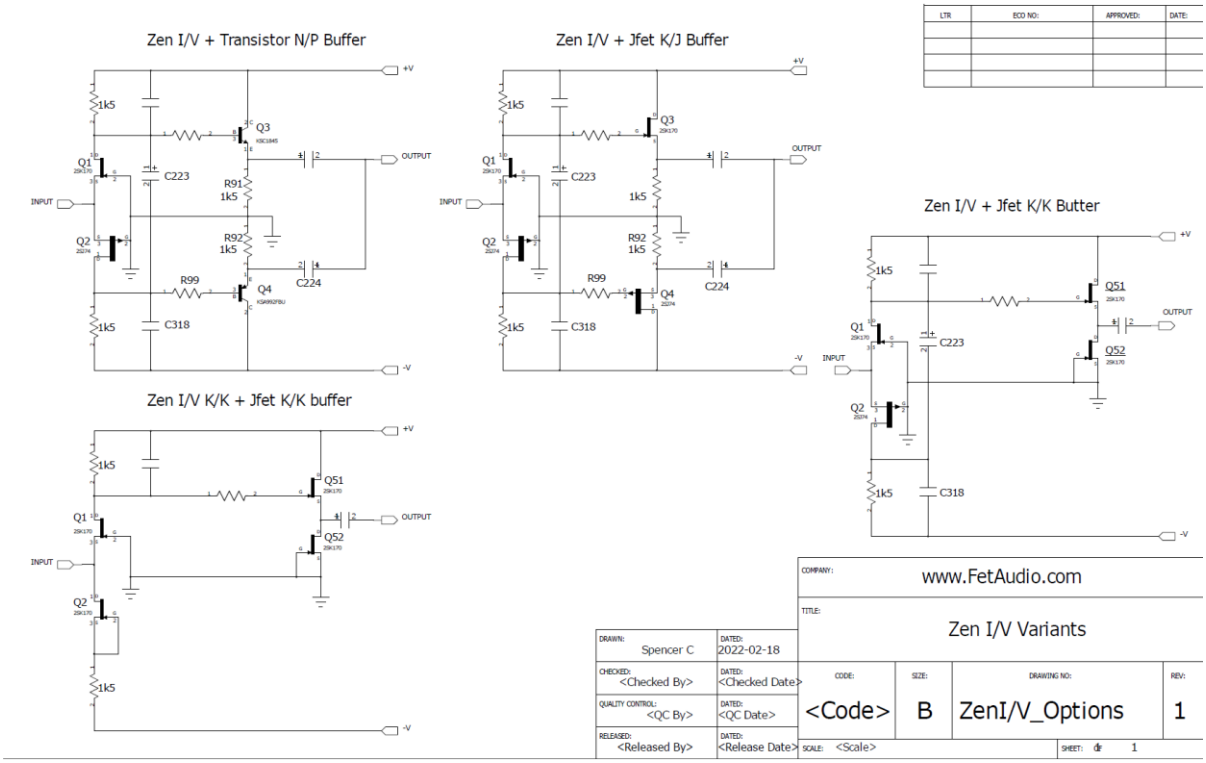
11. Jumpers and others on board:

No	Jumper	Description:
1	JMP1	Connect analogy supplier AGND to chassis, screw hole (near marking 18Vx2
2	JMP2	JMP2 is for the "Reset" pin 14 of DF at 3v3 level. In case the Reset level for Digital Filter is not working, then can use J53 pin 8 & 9 for 47k resistors and pin 5 & 7 for a 10uF capacitor as reset ramp up signal to pin 14 of some DF chips.
3	JMP3	On T2 location with 5mm pitch, shorted if use R39. No need if use T2 pulse transformer. It is for putting some bigger size film capacitor for the SPDIF input like WIMA FKP2 0.033uf 63V. Note that Locations C36 and C37 is in series and may need to shorted by jumper.
4	JMP 4 to 7	These are supply to the LM317/LM337 regulator. Make sure all are connected.
5	C158	Like JMP3 reserve for other film capacitor coupling for AES digital input to replace pulse transformer T1. If T1 is not use, C175 need to be shorted. C176 will be opened.

12. Zen I/V configurations table: (Use "Zen I/V Left -V" circuit as illustration example)

Jfet / Transistor Reference Designation	Part Name / Part number	Zen I/V + transistor NP buffer (Default)	Zen I/V + Jfet K/J buffer (full Jfets)	Zen I/V K/K + Jfet K/K buffer	Zen I/V + Jfet K/K buffer
Q1	K170 / K363 / K369	Y	Y	Y	Y
Q44	K170 / K363 / K369	For low Idss jfet put in parallel to get 8~9 mA			
Q2	J74	Y	Y	Y -K170 REVERSE	Y
Q43	J74	For low Idss jfet put in parallel to get 8~9 mA			
Q3	KSC1845	Y	Y – K170 USE PAD D		
Q4	KSA992	Y	Y – J74 USE PAD D		
Q51	K170 / K363 / K369			Y	Y
Q52	K170 / K363 / K369			Y	Y
C318	2n2 to 4n7 filter	Y	Y		Y
R99	100R	Y	Y		
R92	1k5	Y	Y		
C224	100u	Y	Y		
C223	33u	Y	Y		Y
J13 jumper	Short 1-2 or 2-3	1-2	1-2	2-3	1-2

Note: Diyers can also think of other options to try out in the layout. For fast conversion without de-soldering and soldering again, IC pin sockets can be soldered on the pads so that transistors can be unplugged for replacement!

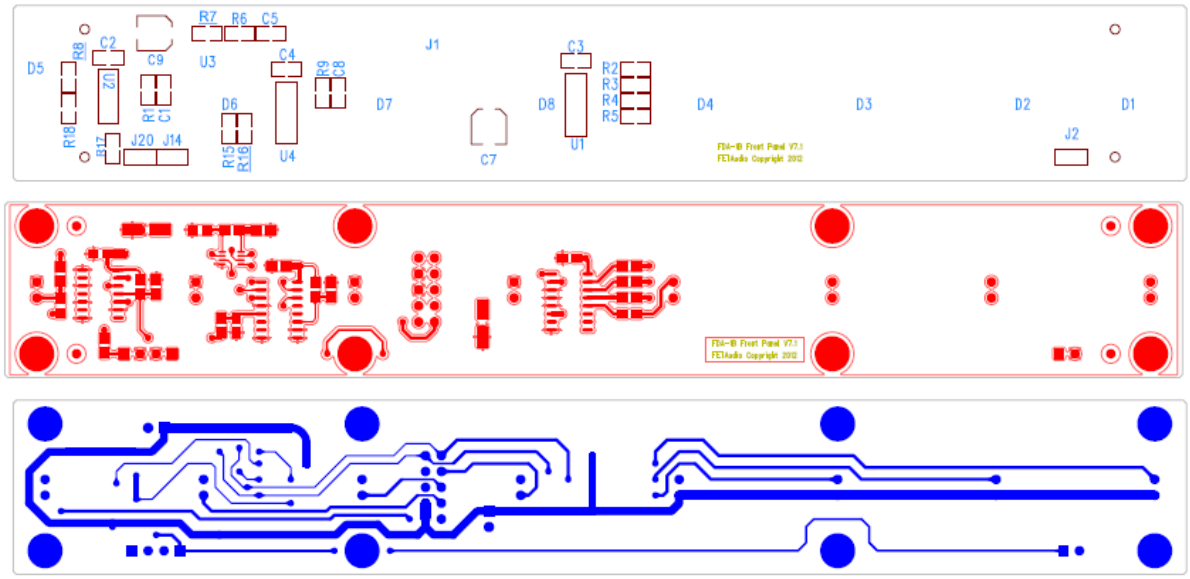


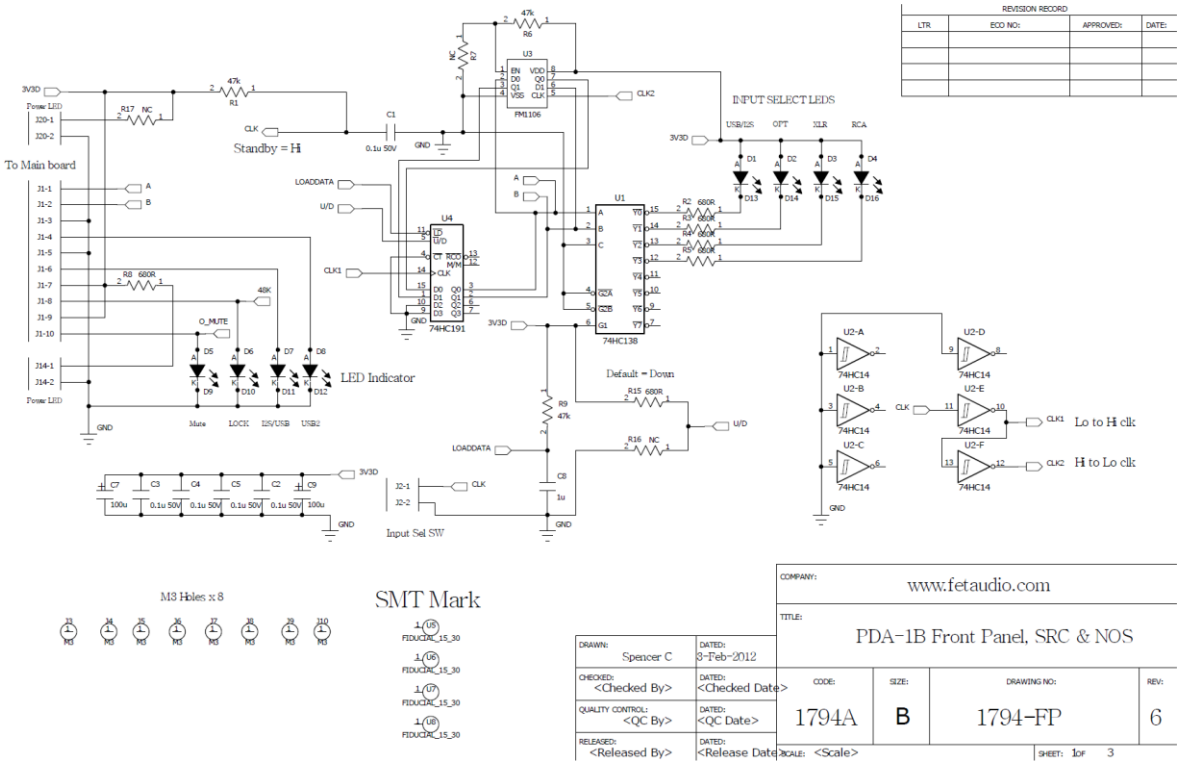
F. Front Panel Control Board (V7.1):

The front panel control board Version 7.1 (from FDA-1B) will control the counting of two digits (J1 pin 1 and Pin 2), there are 4 select inputs. In D1V2 board, it has (0, 0) for external digital input via J5, (0, 1) for Toslink - optical, ((1, 0) for AES – XLR female and (1, 1) for SPDIF – RCA inputs. Note that the front panel control will remember the last selection after power off as there is a static memory chips FM1106 on board. If FM1106 is not available, the front panel board still can be used but each time when power on, the default input will be (0, 0) external digital input.

1. J1: Connect back to DAC main board via 10-pin flex cable.
2. J2 and J14 are the same toggle switch to select the digital input – SPDIF, AES, Toslink, and External digital input (J5 – not use as this moment).
3. J20 can be connected to an external Power LED. Brightness can be adjusted by changing the value of R17.
4. R18: D5 will indicate Mute if connected. R8 should not be connected in this mode.
5. R8: D5 will be power LED indicator if connected. R18 should not be connected in this mode.
6. The front panel can be mounted to the front plate when the LEDs are populated at the bottom of the PCB.
7. Please refer to the circuit diagram and BOM and silk screen for components details.

Note: The front panel board is very basic logic and more advance control board with display and remote can be used if the diyer has the skill to make one!





G. Attachments:

1. Circuit Diagram – 11 pages
2. BOM (Bill of Material) – 4 pages
3. PCBs silk screen, dimension & mounting – 4 pages
4. Photos – refer to website pages - http://www.fetaudio.com/archives/3058

*** E N D ***

Analysis of ouput Voltage for different IV resistors and Rails to find the optimise design conditions:

A. Use: J/K jfets, Rail = 20V and Idss = 9mA

Jfet = K170 / J74, Yfs = 20mS, i/p about 15 ohm; ? mV

				DAC Iout (mA)		Ratio		Idss	Output	Distortion		Input DC offset	Input volt at
IV resistor	Equivalent		Cut off freq	2	1.2	1.67	Rail (v)	9	stage	PCM63	PCM1702	mV	DAC Iout
J/K	R-IV	IV Cap (pf)	Fc=1/2PiRC	Vout (Vrms)	Vout (Vrms)		20	Riv drop	Vdc out				mVrms
1000	500	4,700	67,726	707	424	1.67	20	9.00	11.00				
1200	600	3,917	67,726	849	509	1.67	20	10.80	9.20				
1500	750	3,133	67,726	1,061	636	1.67	20	13.50	6.50	0.008	0.007	0.5 to 3.5mV	
1800	900	2,611	67,726	1,273	764	1.67	20	16.20	3.80	**20V rail with 1k5 IV resistor is not giving good output levels ==> must increase Rail voltage!**			
2000	1000	2,350	67,726	1,414	849	1.67	20	18.00	2.00				
2200	1100	2,136	67,726	1,556	934	1.67	20	19.80	0.20				
2500	1250	1,880	67,726	1,768	1,061	1.67	20	22.50	-2.50				
	<-- Pass Default values			Vout > 1Vrms					>=6.5V				

B. Use: J/K jfets, Rail = 30V and Idss = 10mA

Jfet = K170 / J74, Yfs = 20mS, i/p about 15 ohm; ? mV

				DAC Iout (mA)		Ratio		Idss		Distortion		Input DC offset	Input volt at
	Equivalent		Cut off freq	2	1.2	1.67	Rail (v)	10		PCM63	PCM1702	mV	DAC Iout
J/K	R-IV	IV Cap (pf)	Fc=1/2PiRC	Vout (Vrms)	Vout (Vrms)		30	Riv drop	Vdc out				mVrms
1000	500	4,700	67,726	707	424	1.67	30	10.00	20.00				
1200	600	3,917	67,726	849	509	1.67	30	12.00	18.00				
1500	750	3,133	67,726	1,061	636	1.67	30	15.00	15.00				
1800	900	2,611	67,726	1,273	764	1.67	30	18.00	12.00	**Rail is high but output voltage is too low ! Not very practical for low Iout DAC chips.**			
2000	1000	2,350	67,726	1,414	849	1.67	30	20.00	10.00				
2200	1100	2,136	67,726	1,556	934	1.67	30	22.00	8.00				
2500	1250	1,880	67,726	1,768	1,061	1.67	30	25.00	5.00				
	<-- Pass Default values			Vout > 1Vrms					>=6.5V				

C. Use: K/K jfets, Idss = 10mA

Jfet = K369 and K363, Yfs = 40mS, input ?mV

				DAC Iout (mA)		Ratio		Idss		Distortion		Input DC offset	Input volt at
	Equivalent		Cut off freq	2	1.2	1.67	Rail (v)	10		PCM63	PCM1702	mV	DAC Iout
J/K	R-IV	IV Cap (pf)	Fc=1/2PiRC	Vout (Vrms)	Vout (Vrms)		20	Riv drop	Vdc out	2	1.2		mVrms
1000	1000	4,700	33,863	1,414	849	1.67	20	10.00	10.00				
1200	1200	3,917	33,863	1,697	1,018	1.67	20	12.00	8.00				
1500	1500	3,133	33,863	2,122	1,273	1.67	22	15.00	7.00				
1800	1800	2,611	33,863	2,546	1,528	1.67	25	18.00	7.00	**Output voltage is high enough for IV resistor of 1k5! Thus no need very high Rail voltage!**			
2000	2000	2,350	33,863	2,829	1,697	1.67	27	20.00	7.00				
2200	2200	2,136	33,863	3,112	1,867	1.67	29	22.00	7.00				
2500	2500	1,880	33,863	3,536	2,122	1.67	30	25.00	5.00				
	15	10,000	1,061,033	Vout > 1Vrms					>=6.5V				

Observations:

1. K/K input mode has double IV resistance value, but requires the Jfet to have higher Yfs to get same input impedance. Thus K369 and K363 is excellent choice for this.
2. K/K input mode can use rail 20V to 22V to get the almost balance output DC offset (half rail) with jets from 8mA to 10mA. At this level, the output AC level is >1Vrms.
3. From the table C, it seems that IV resistor of 1k5 is best choice with Rail of 22V. It will be good for DAC with Iout from 1mA to 2mA. Output level will be >1Vrms
4. For balance output levels, it will be doubled and thus there is no issue to drive a power amplifier directly in most situations.
5. Parallel of PCM1702/PCM1704/AD1862 DAC is recommended to get higher ouput levels of Iout to be close to PCM63 output levels.

Actual Measurement Results:

1) IV resistors: 1k5 // 3000p with 1kHz signal **2)Transformer 18V x 2, 9V x 1 30VA** **3) IV Rail: +/-20V**

DAC	IV type	SE o/p Vrms	Distortion	I/P imp	i/P offset	I/P Vrms	Noise (uV)	Set	Idss
PCM1702	J/K IV	0.623	0.003~0.004%	14.7	Max 2.9mV	0.0125	5uV	1	9.3mA
PCM1702	K/K IV	1.24	0.01~0.013%	20.4	max 1.3mV	0.0173	10uV	2	9.1mA
PCM63	J/K IV	1.03	0.009~0.012%	14.7	Max 3.5mV	0.0208	5uV	1	9.3mA
PCM63	K/K IV	2.06	0.018~0.021%	20.2	<1mV	0.0286	11uV	2	9.1mA

2) IV resistors: 1k5 // 3000p with 1kHz signal **2)Transformer 18V x 2, 9V x 1 30VA** **3) IV Rail: +/-20.5V**

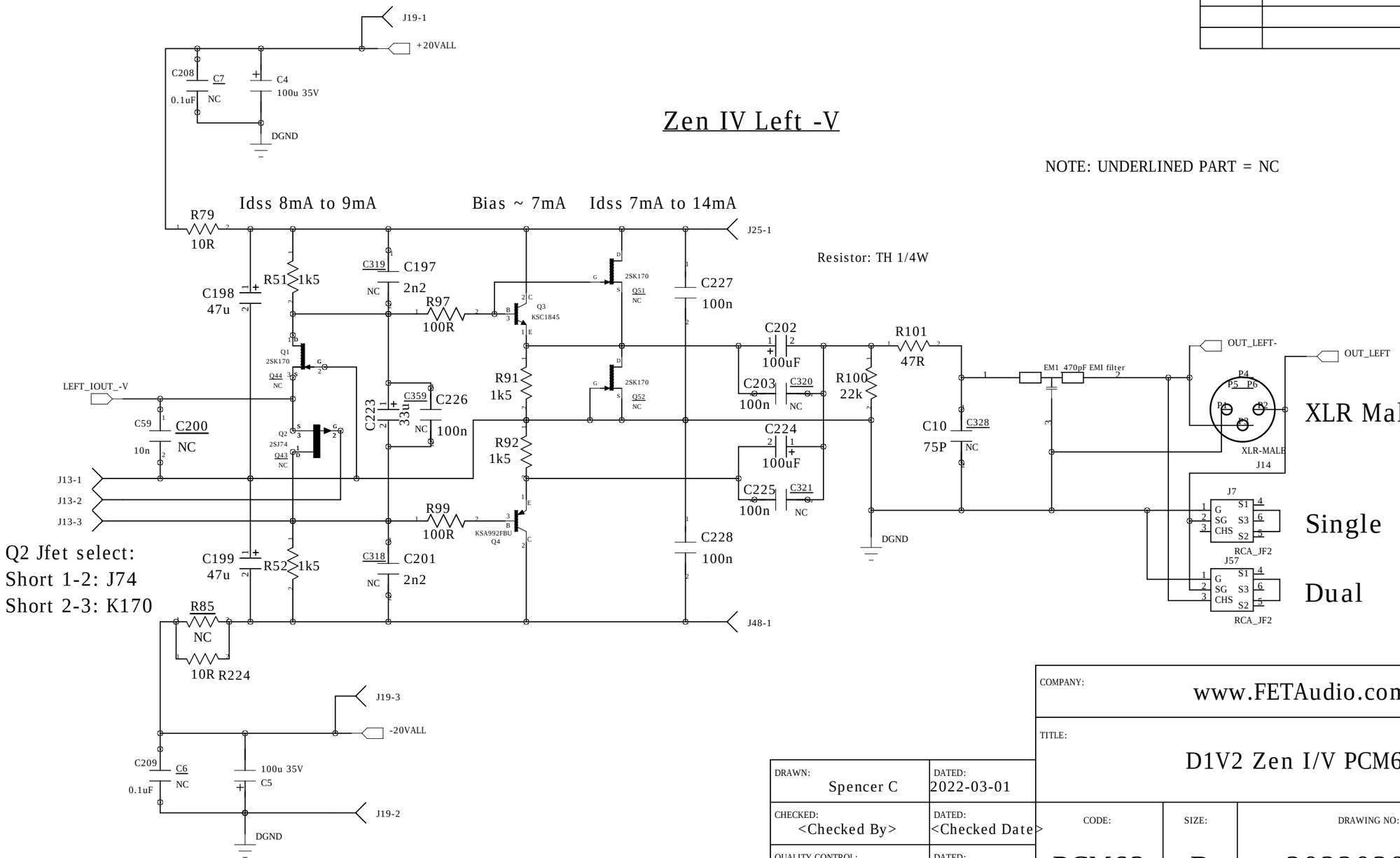
DAC	IV type	SE o/p Vrms	Distortion	I/P imp	i/P offset	I/P Vrms	Noise (uV)	Set	Idss
PCM1702	K/K IV	1.24	0.01~0.011%	12.7	Max 1.3mV	0.018	8~9uV	3	8.4mA
PCM63	K/K IV	2.05	0.015~0.02%	20.9	max 1.0mV	0.0295	9~10uV	3	8.4mA

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

Zen IV Left -V

NOTE: UNDERLINED PART = NC

Resistor: TH 1/4W



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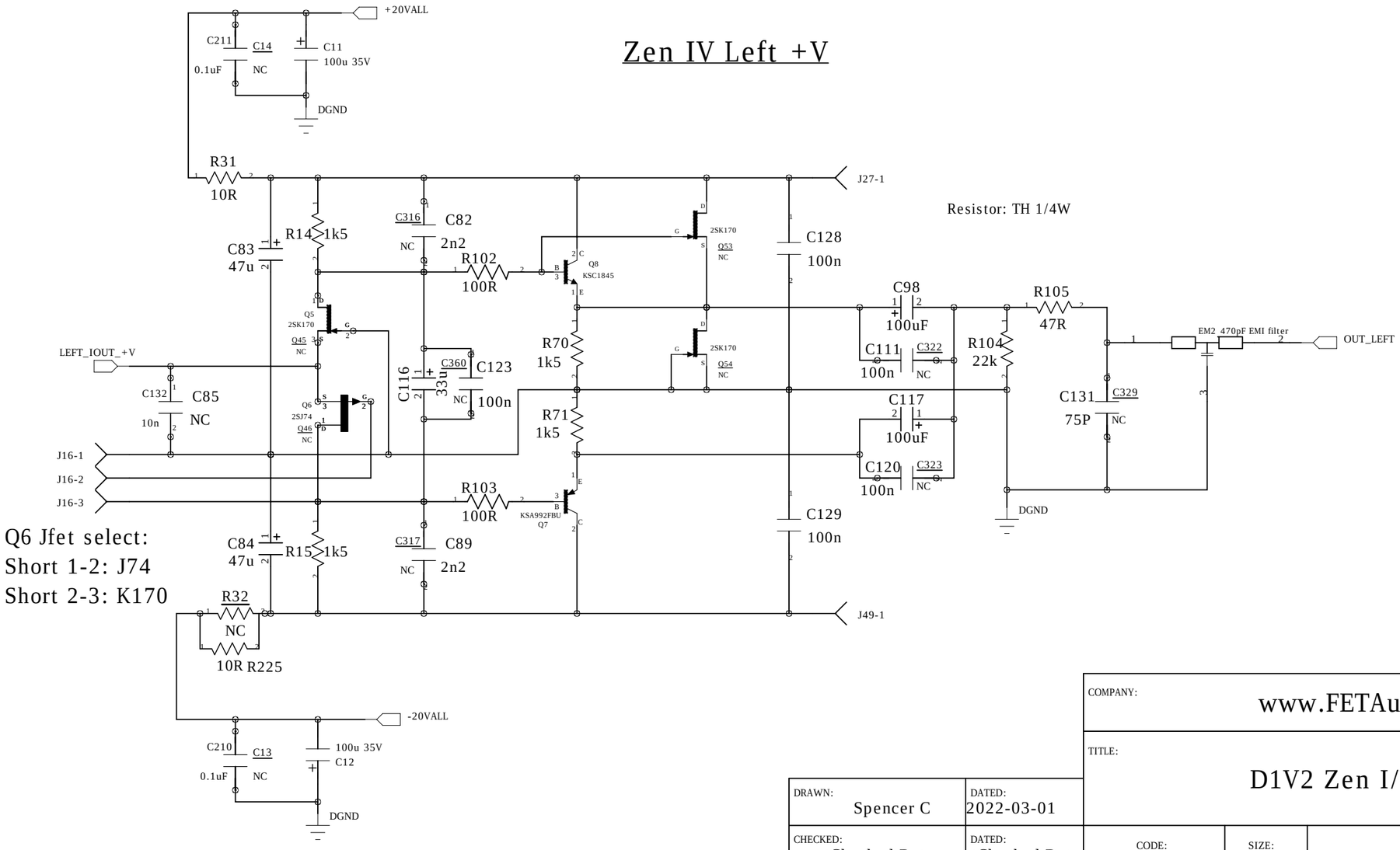
RELEASED: Spencer Cheung	DATED: 2020 Mar	SCALE: 1:1		SHEET: 1 OF 11	

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

Zen IV Left +V



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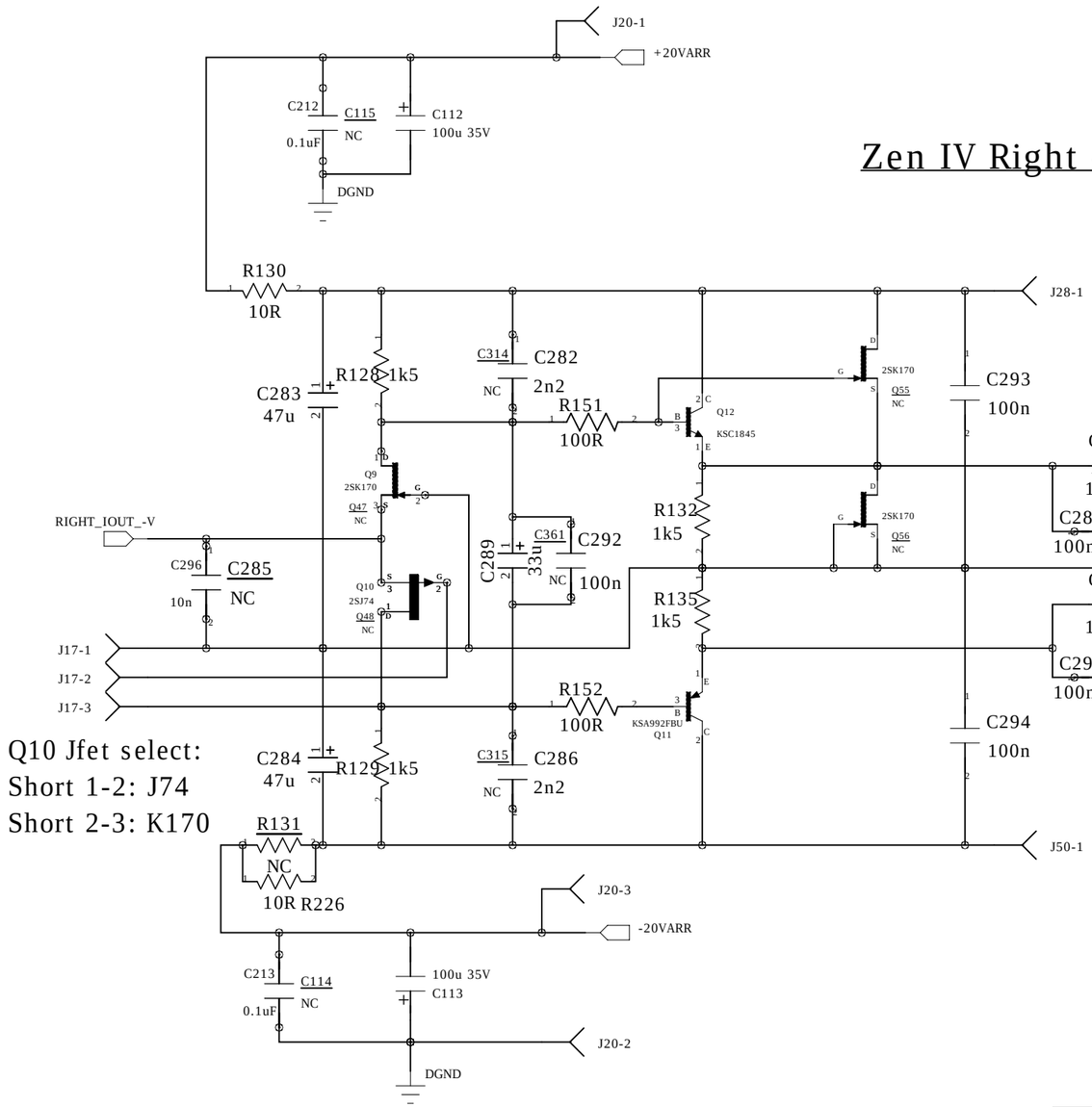
Zen IV Right -V



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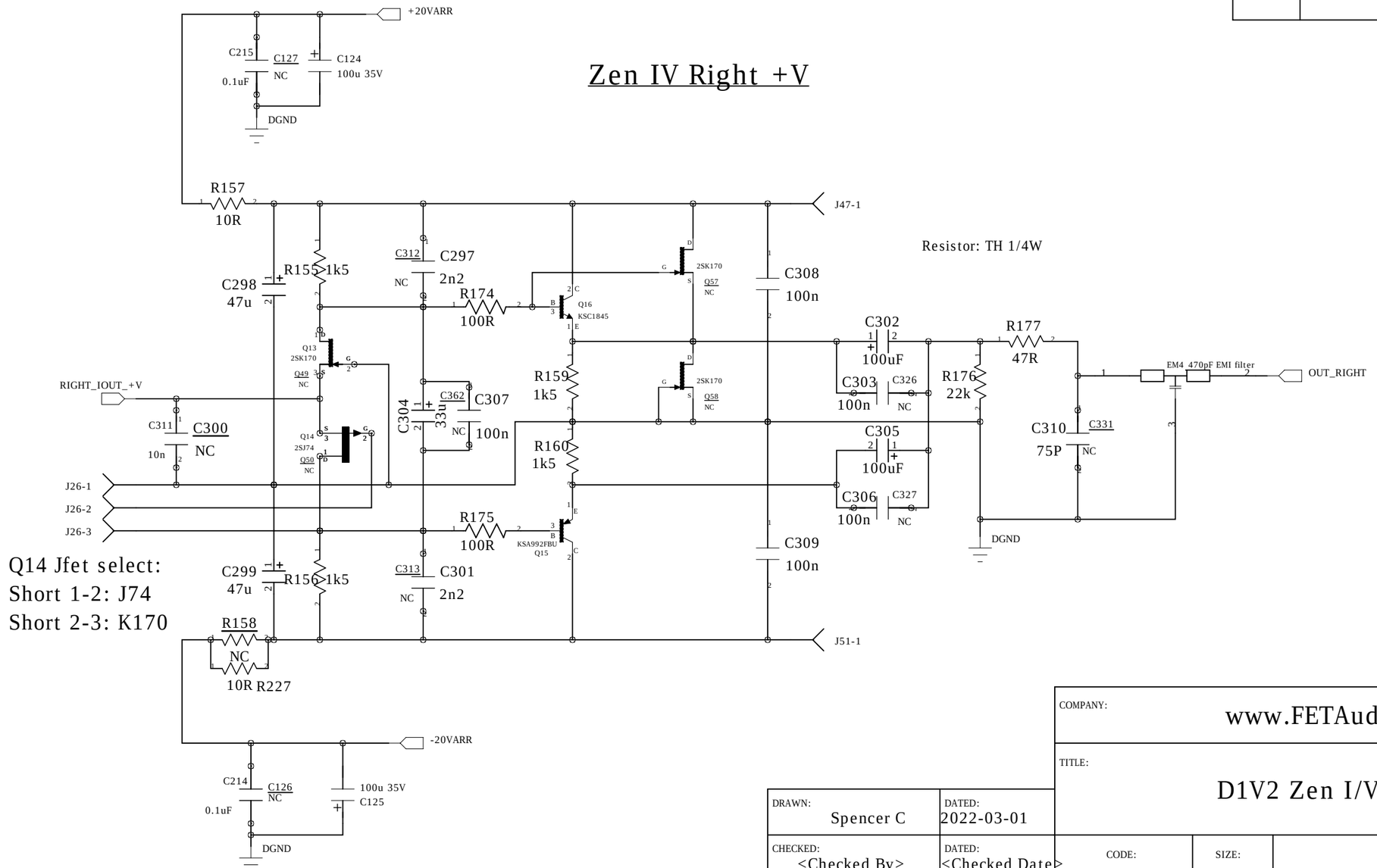
Zen IV Right +V



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RELEASED: Spencer Cheung	DATED: 2020 Mar	DRAWING NO: 20220301	REV: 1
		SCALE: 1:1	SHEET: 4 OF 11

Refer to table for DF select

Default: SM5842AP

SM5813/DF1700/SM5843

PMD100

DF1704E

DF1706 - 3.3v

SM5803 TBD

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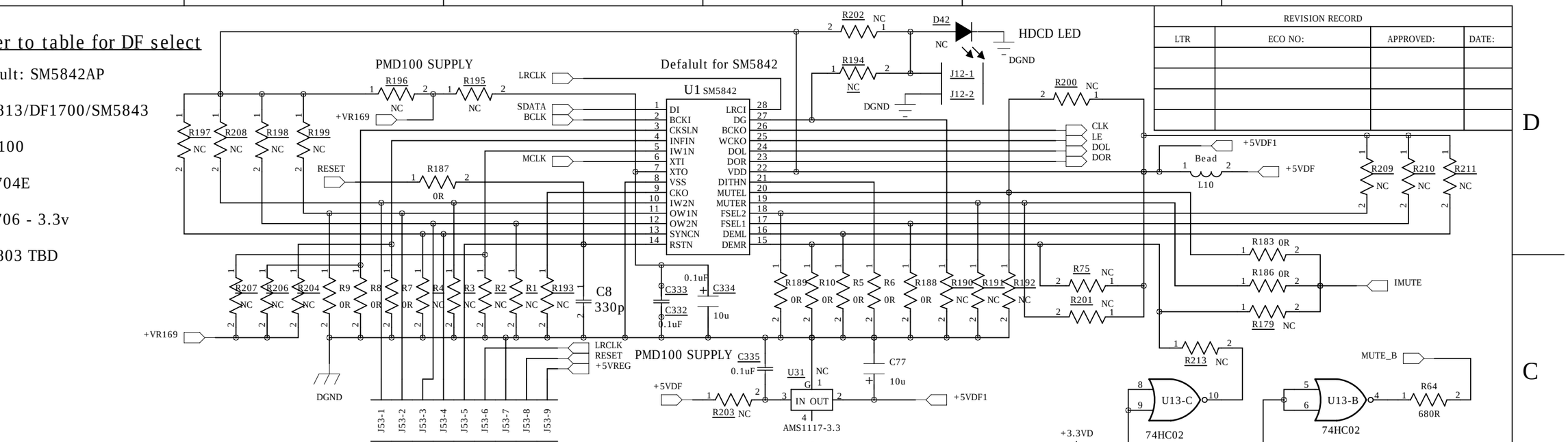

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PCM63 CKT LEFT

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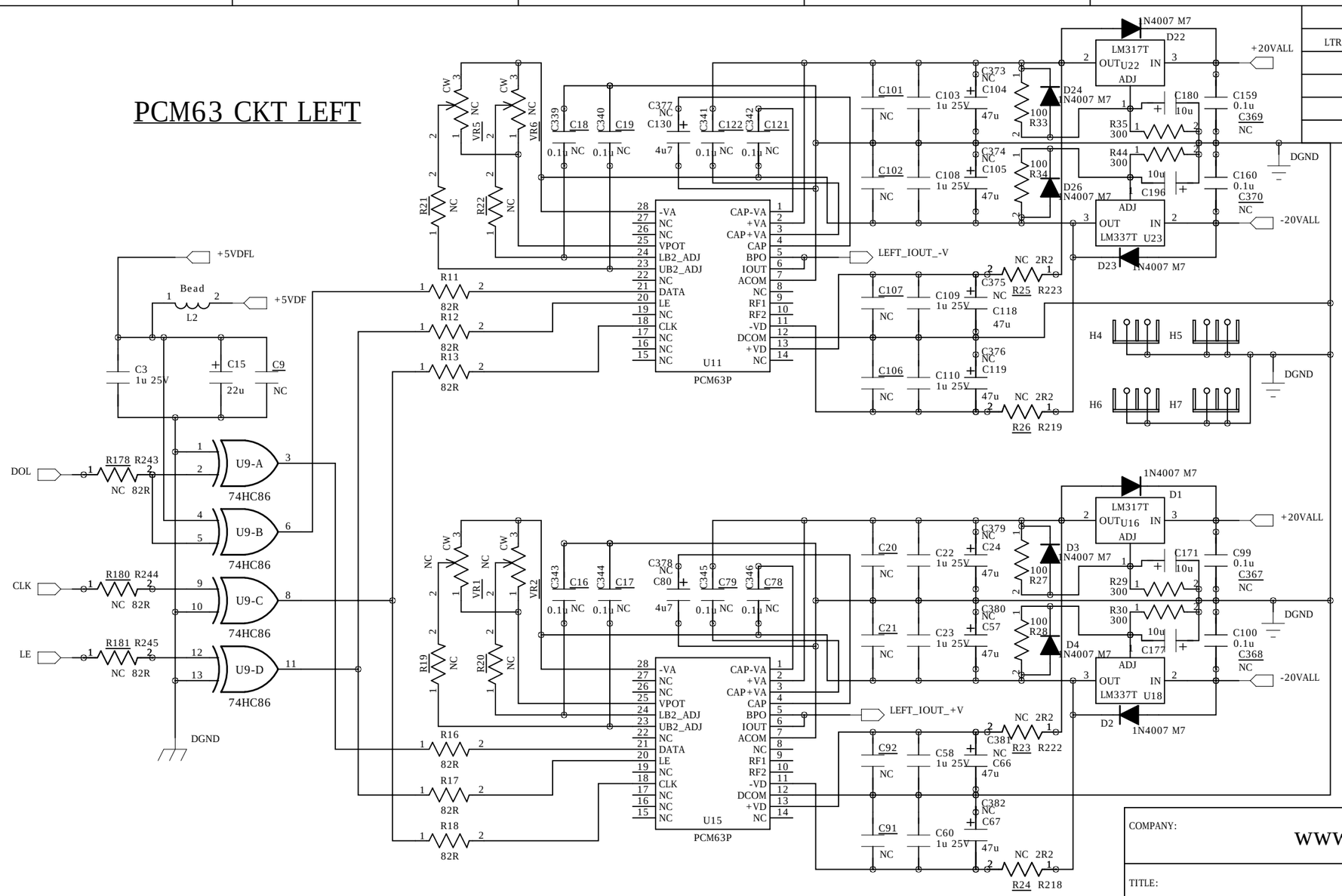

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PCM63 CKT RIGHT

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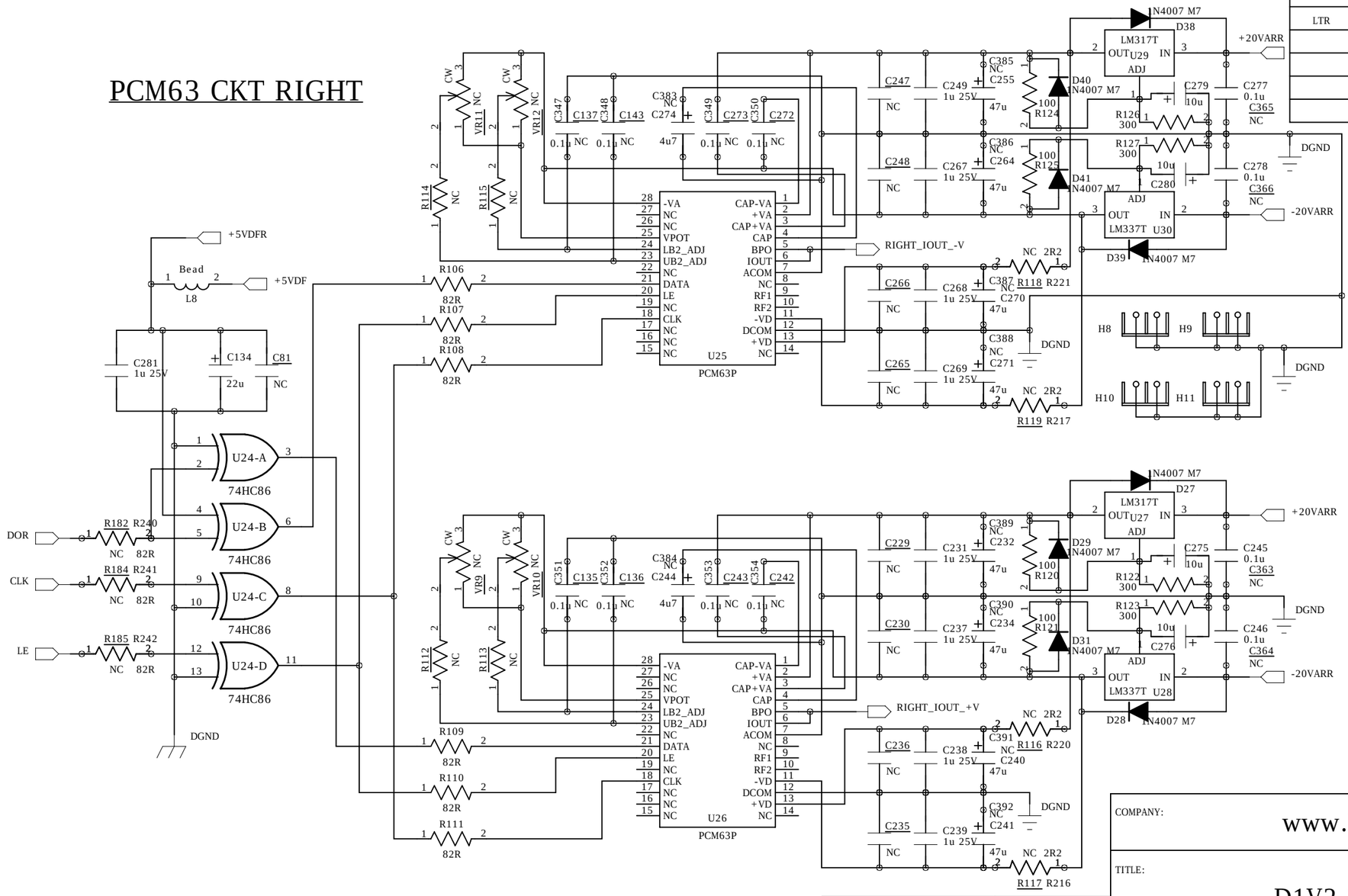

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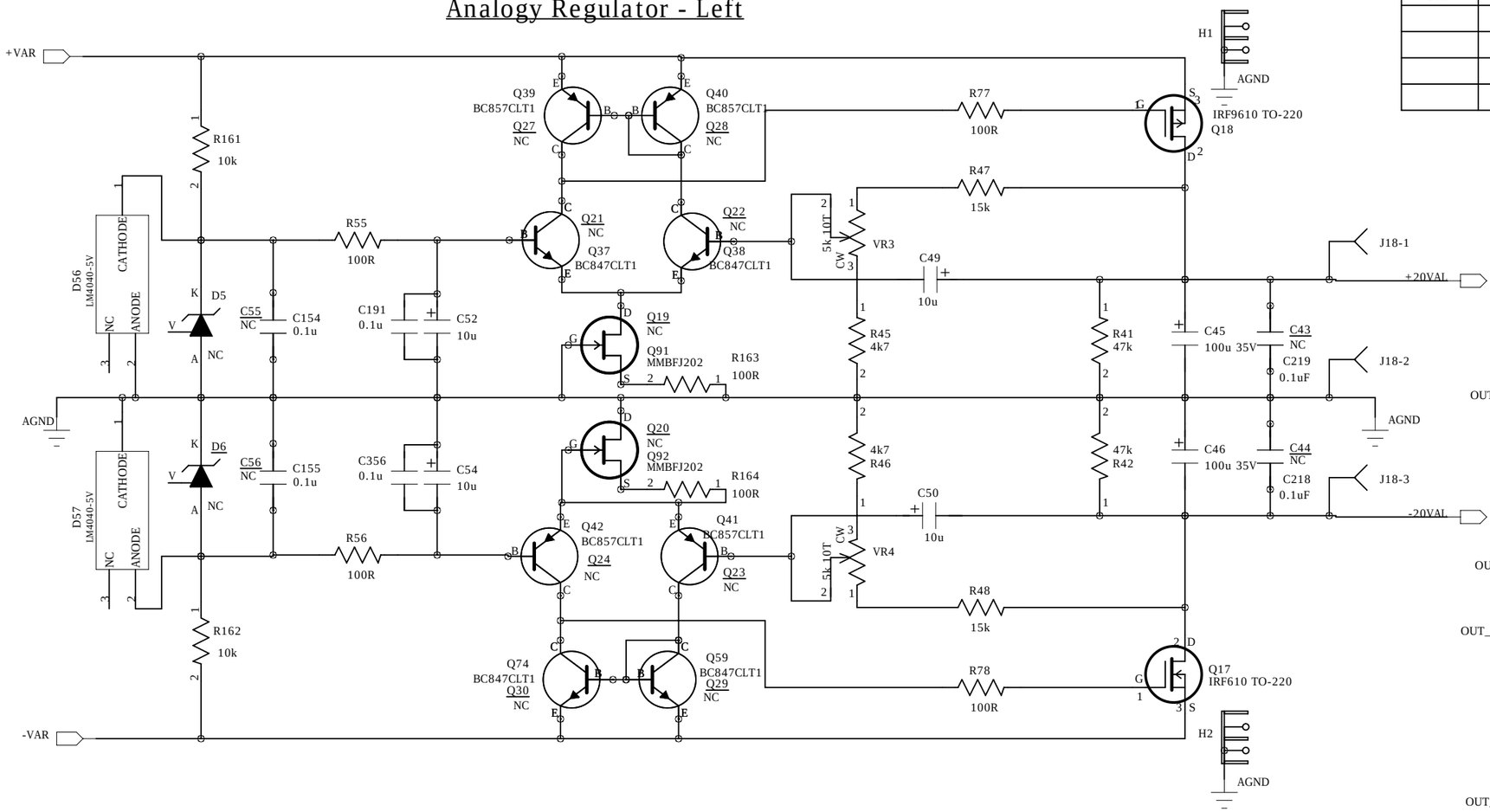
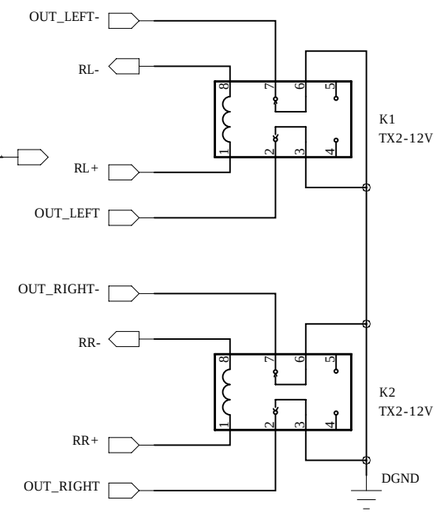
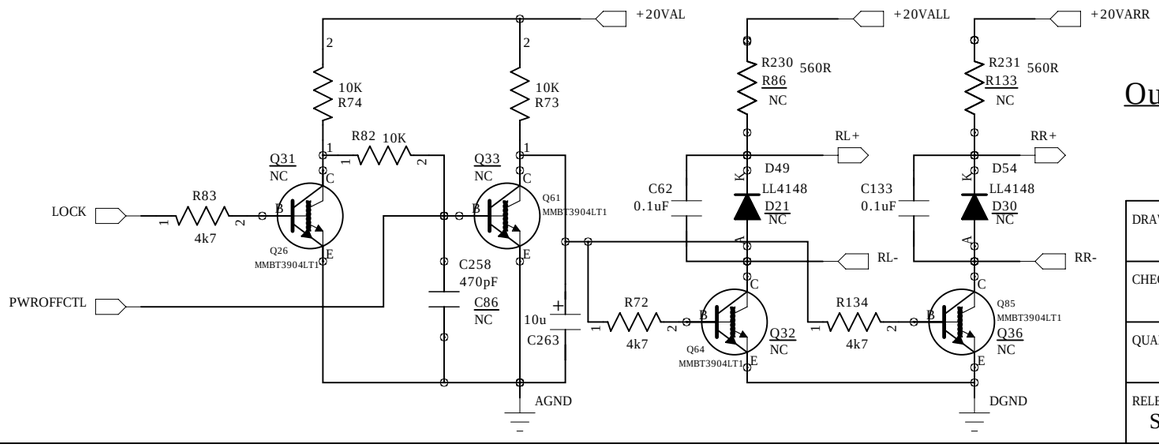
Analogy Regulator - Left



Mute Relays



Output Muting Ckt



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REVISION RECORD			
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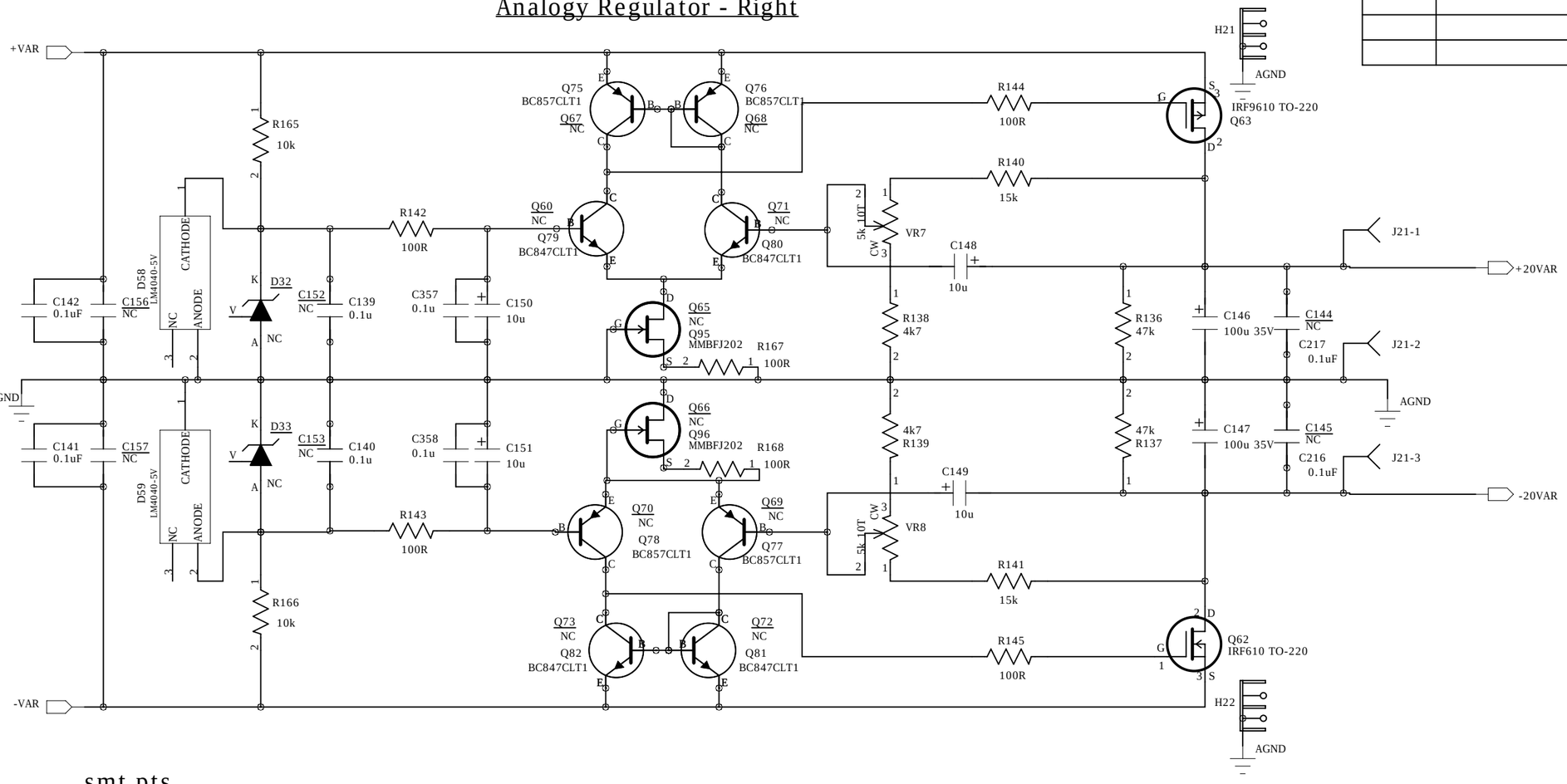
Analogy Regulator - Right



smt pts

U5 FIDUCIAL_15_30

U19 FIDUCIAL_15_30

U20 FIDUCIAL_15_30

U21 FIDUCIAL_15_30

M3 Screw Holes

J29 J30 J31 J32 J33 J34 J35 J36 J37 J38 — M3

AGND

J39 J40 J41 J42 J43 J44 J45 J63 J64 — M3

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RELEASED: Spencer Cheung	DATED: 2020 Mar	DRAWING NO: 20220301	REV: 1
		SCALE: 1:1	SHEET: 9 OF 11

AES XLR (1,0)

EM7 470pF EMI filter
EM6 470pF EMI filter
C35 0.1u C175 NC
T1 51698-LF3
J3-C2
J3-C1
J3-C3
J3-C4
NC C158
R146 10R
R147 10R
R98 90.9R
C169 0.1u C176 NC
J22-1
J22-2
J22-3
DGND
C39 0.01u C178 NC XLRIN
J61-1
J61-2
J61-3

TOSLINK INPUT (0,1)

U3 TORX147
OUTPUT
GND
VCC
C27 0.01u NC
C47
R81 10R
TOSIN
C186 0.1u
C48 NC
R80 47k
C87 10u
C187 0.1u
C138 NC
P2
DGND
+VRELAY
C185 0.1u
C40 NC
DGND
DVDD
L1 47uH

RCA
R54 680R
Q35 NC MMBT3904LT1
D51 NC
D45 LL4148
K3 TX2-5V
RCAIN

XLR
R88 680R
Q83 NC MMBT3904LT1
D52 NC
D46 LL4148
K4 TX2-5V
XLRIN

TOS
R89 680R
Q84 NC MMBT3904LT1
D55 NC
D47 LL4148
K5 TX2-5V
TOSIN

LL4148 D43
LL4148 D44
PVDD
DGND

SPDIF RCA (1,1)

Jump3
J4 RCA_JF2
C36 NC
C164 0.1u
T2 NC
C37 NC
C170 0.01u
RCAIN
R148 75R
J23-1
J23-2
EM5 470pF EMI filter

Mute Select

I_MUTE
R173 0R
R172 NC
Err
Lock

R50 10k
R214 10k
R49 NC
R43 10k
R215 NC
R40 10k

U2 WM8804
SCLK
GPO0/SWIFMODE
SDIN/HWMODE
SDOUT/GPO2
CBS/GPO1
RESETB
PVDD
PGND
CLKOUT
XOP
RX0
DVDD
DGND
TXO
MCLK
LRCLK
BCLK
DIN
DOUT
XIN

RESET
PVDD
PVDL
R53 47k
RESET
C30 10u
Y1 NC
Y2 NC
C29 NC
C28 NC
DGND

Output Mode:

R43/R214: 16 bit R Justified
R43/R49: 24bit I2S
R215/R49: 16bit I2S
R215/R214: 24bit Left J.

Set dafault to RCA (1,1)

U4 74HC238
A0
A1
A2
E1
E2
E3
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
I2S1
TOS
XLR
RCA
+3.3VD
R65 47k
R67 47k

To FP

J1-1
J1-2
J1-3
J1-4
J1-5
J1-6
J1-7
J1-8
J1-9
J1-10
E_SEL0
E_SEL1
USB2
USB
LOCKO
MUTE_B

Logic power decouple

+5VREG
Bead L12
+3.3VD
+VU12
C184 NC
C182 NC
C183 NC
C181 NC
C254 47u
C41 0.1u
C34 0.1u
C38 0.1u
C42 0.1u
For Digital Filter IC
DGND

J24-1
J24-2
USB
J62-1
J62-2
USB2

Relay Select

+5VREG
5V RLY
R169 NC
+VRELAY
+3.3VD
3V RLY
R170 0R

8804 Supply

+5VREG
Bead L5
U17 LT1117 IN OUT G1
PVDL
Bead L4
C189 0.1u
C163 NC
C162 100u
C262 0.1u
C161 NC
DGND

DVDD
C372 NC
C32 47u
C166 0.1u
C31 NC
C190 0.01u
PVDD
C179 NC
C371 NC
C25 47u
C165 0.1u
C26 1u 6.3V

SPDIF Out

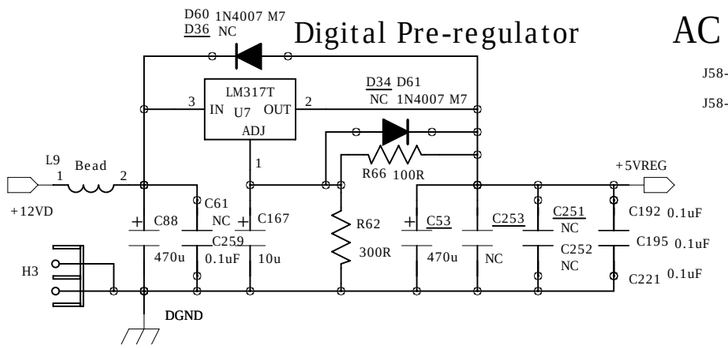
TXO
R38 R235 NC 82R
I_MCLK
R37 R234 NC 82R
I_LRCLK
R36 R233 NC 82R
I_BCLK
R63 R232 NC 82R
I_SDATA
R57 210R
C33 NC
C90 0.1uF
R58 110R
NC
EM8
DGND
J8-2
J8-1
12MHz XO or TCXO
OUTPUT
VDD
GND
TRI-STATE
Y5
Y6 NC
+VXO
C337 0.1u
C336 0.1u
R205 56R

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

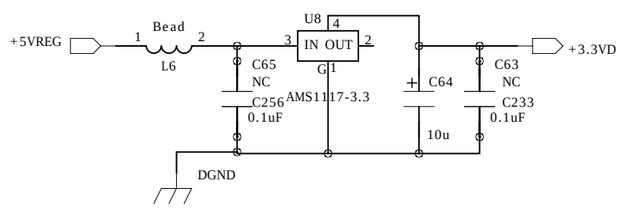
DRAWN: Spencer C	DATED: 2022-03-01	COMPANY: www.FETAudio.com	
CHECKED: <Checked By>	DATED: <Checked Date>	TITLE: D1V2 Zen I/V PCM63 x 4	
QUALITY CONTROL: <QC By>	DATED: <QC Date>	CODE: PCM63	SIZE: B
RELEASED: Spencer Cheung	DATED: 2020 Mar	DRAWING NO: 20220301	REV: 1
		SCALE: 1:1	SHEET: 10 OF 11

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

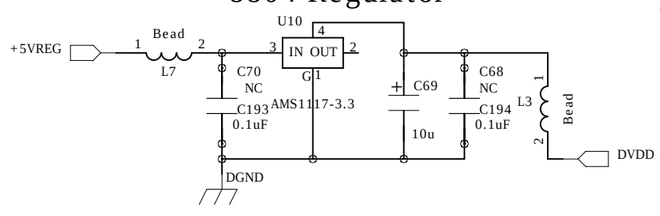
Digital Pre-regulator



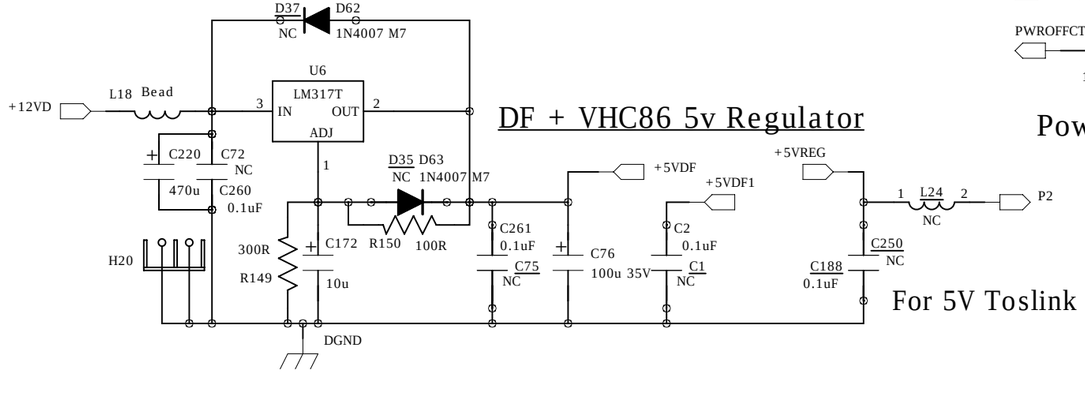
Logic Regulator



8804 Regulator



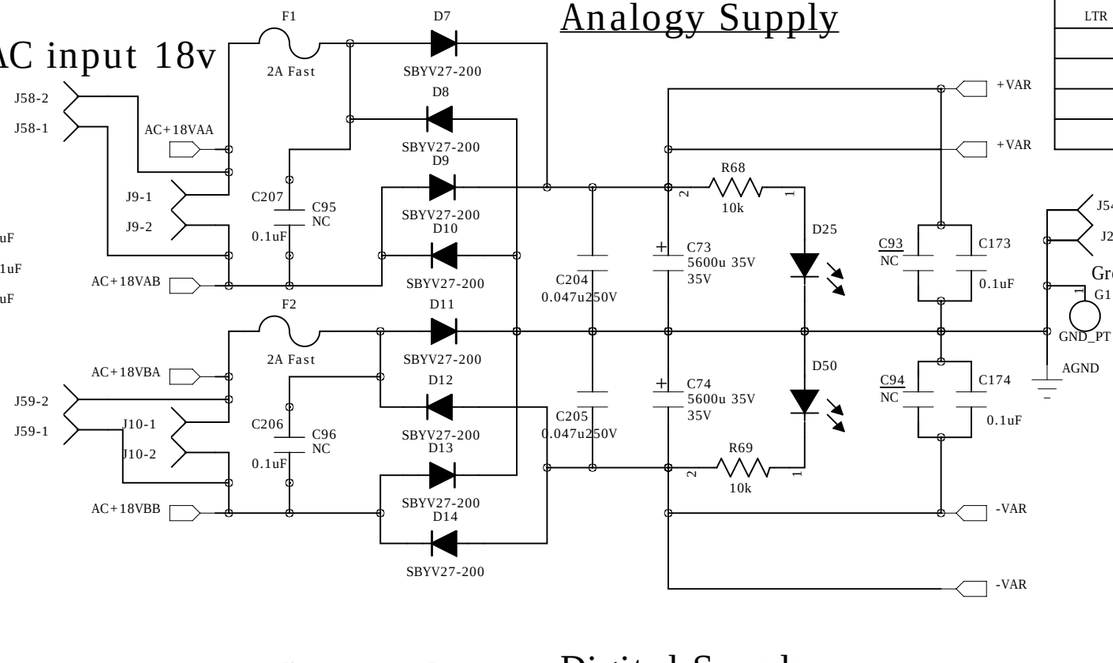
DF + VHC86 5v Regulator



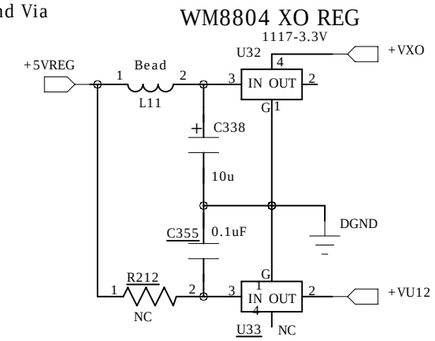
For 5V Toslink

Analogy Supply

AC input 18v



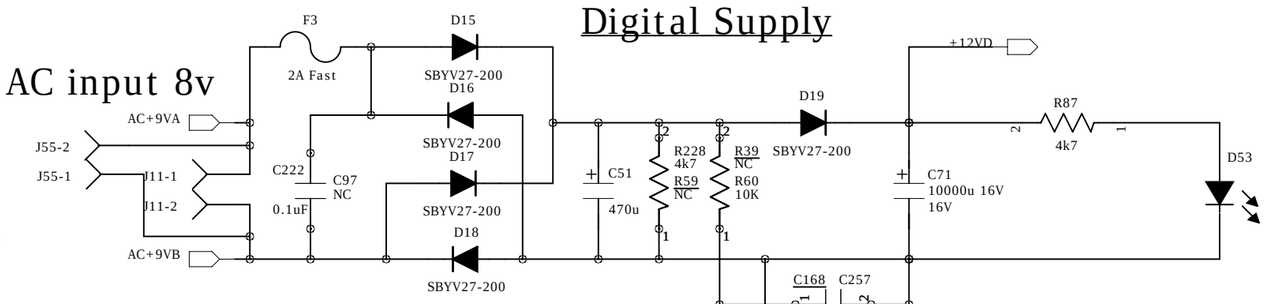
WM8804 XO REG



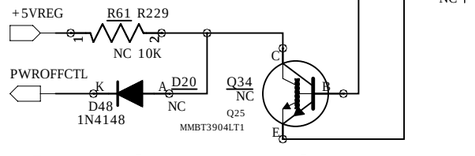
Regulator for VHC244 - for DF1706

Digital Supply

AC input 8v



Power down control



DRAWN: Spencer C	DATED: 2022-03-01	COMPANY: www.FETAudio.com	
CHECKED: <Checked By>	DATED: <Checked Date>	TITLE: D1V2 Zen I/V PCM63 x 4	
QUALITY CONTROL: <QC By>	DATED: <QC Date>	CODE: PCM63	SIZE: B
RELEASED: Spencer Cheung	DATED: 2020 Mar	DRAWING NO: 20220301	REV: 1
		SCALE: 1:1	SHEET: 11 OF 11

Item	Use Qty	Reference	Part Name	Manufacturer	Description	Part Number	Value / Alternative Part	Package Type	Source	Part NO.
2	8	Q31-36 Q83-84	2SC1815,C1815	TOSHIBA or Fairchild	NPN TRANSISTOR	2SC1815 or KSC1815	MMBT3904LT1	SOT-23	Mouser	863-MMBT3904LT1G
4	4	Q2 Q6 Q10 Q14	~~2SJ74~~	~~TOSHIBA~~	**JFET_PN-Channel_45V Idss 8-10mA**	~~2SJ74BL~~	2SK369BL or 2SK363BL	TO-92	**Solder in reversed position** - SGD; for K/K IV	
6	4	Q1 Q5 Q9 Q13	2SK170,2SK369BL 2SK363BL	TOSHIBA	**JFET_N-Channel_45V Idss 8-10mA**	~~2SK170 DGS~~	**2SK369BL or 2SK363BL**	TO-92		For Zen K/K IV
7	8	~~Q44-45 Q47 Q49~~ Q51-58	2SK170,NC	TOSHIBA	**JFET_N-Channel_45V Idss 8-10mA**	~~2SK170 DGS~~	**2SK369BL or 2SK363BL**	TO-92		For Zen K/K IV
9	1	T1	51698-LF3,51698-LF3	MIDCOM Pulse	Transformer PULSE TRANSFORMER 1:1	51698-LF3	51698-LF3 PE-65612NL	5x10mm	Mouser	673-PE-65612NL
11	1	U14	74HC00,74HC00D SOIC	NXP or TI	IC QUAD 2-INPUT POS-NAND GATE	74HC00D	74HC00D SOIC	SO14	Mouser	595-SN74HC00D
12	1	U13	74HC02,74HC02D SOIC	NXP or TI	IC QUAD 2-INPUT POS-NOR GATE	74HC02D	74HC02D SOIC	SO14	Mouser	595-SN74HC02DE4
13	2	U9 U24	74HC86,74VHC86M SOIC	On Semi	QUADRUPLE 2-INPUT EXCLUSIVE-OR GATE	74VHC86M	74VHC86M SOIC	SO14NB	Mouser	512-74VHC86MX
14	1	U4	74HC238,74HC238D	NXP or Ti	3-LINE TO 8-LINE DECODER\DEMULTIPLEXER	74HC238M	74HC238D	SO16NB	Mouser	757-74HC238DBJ
15	1	U12	74HC244,74VHC244M WB	Fairchild or ST	IC OCTAL BUFFER/LINE DRIVER 3 STATE OUTPUTS	74VHC244M	74VHC244M WB	SO20WB	Mouser	512-74VHC244M
16	8	Q37-38 Q59 Q74 Q79-82	BC847BLT1,KSC1845F	NXP, Fairchild, On Semi	GENERAL PURPOSE NPN SILICON TRANSISTOR	KSC1845F	2SC2240 BC847BLT1 BC47CLT1	TO92 SOT23	Mouser	771-BC847C235
17	8	Q39-42 Q75-78	BC857BLT1,KSA992F	NXP, Fairchild, On Semi	GENERAL PURPOSE PNP SILICON TRANSISTOR	KSA992F	2SA970 BC857BLT1 BC857CLT1	TO92 SOT23	Mouser	771-BC857C-T/R
18	13	D7-19	BYV27-150,BYV27-150	Vishay/Phillips	Diode DO-5 fast recovery	SBYV27-200	BYV27-150	DO35	Mouser	78-BYV27-200-TAP
19	5	C27 C39 C165 C170 C190	CAP0805,0.01u	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.01U COG 0805	0.01u	0805		**Digital section**
20	12	C34-35 C38 C41-42 C164 C169 C185-187 C189 C262	CAP0805,0.1u	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u, 50V X7R	0.1u	0805		
21	24	C100 C159-160 C245-246 C99 C277-278 C339-354	CAP0805,0.1u	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u 0805 X7R	0.1u	0805		
22	8	C139-140 C191 C154-155 C356-358	CAP0805,0.1u	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u 25V X7R	0.1u	0805		
23	2	C337 C336	CAP0805,0.1u	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u 0805 X7R	0.1u	0805		
24	14	C2 C62 C133 C192-195 C221 C233 C256 C259-261 C333	CAP0805,0.1uF	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u, 50V X7R	0.1uF	0805		
25	19	C207-219 C174 C222 C141-142 C173 C206	CAP0805,0.1uF	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u, 50V X7R	0.1uF	0805		
26	1	C90	CAP0805,0.1uF	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.01U COG 0805	0.01u	0805		**Digital section**
27	1	C335	CAP0805,0.1uF	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u, 50V X7R	0.1uF	0805		
28	1	C332	CAP0805,0.1uF	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1u, 50V X7R	0.1uF	0805		
29	3	C111 ~~C120~~ C203 ~~C225~~ C303 ~~C306~~	CAP0805,100n	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.01U COG 0805	0.01u	0805	**O/P couple**	For Zen K/K IV
30	8	C128 C227-228 C293-294 C129 C308-309	CAP0805,100n	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.1U 50V	100n	0805		
31	1	C288 ~~C291~~ **(C295 on pcb)**	CAP0805,100n	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.01U COG 0805	0.01u	0805	**O/P couple**	
32	0	~~C123 C307 C292 C226~~	~~CAP0805,100n~~	~~Walsin or Samsung~~	~~SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES~~	~~0.1U 50V~~	~~100n~~	~~0805~~		For Zen K/K IV
33	4	C59 C132 C296 C311	CAP0805,10n	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	0.01U COG 0805	0.01u	0805	**I/V input**	
34	18	C3 C22-23 C58 C60 C101 C108-110 C230-C231 C238-239 C249 C267-269 C281	CAP0805,1u 25V	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	1u 0805 X7R	1u 25V	0805		
35	2	C26 C166	CAP0805,1u 6.3V	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	1u 6.3V X7R	1u 6.3V	0805		
36	4	C82 ~~C89~~ C197 ~~C201~~ C282 ~~C286~~ C297 ~~C301~~	CAP0805,2n2	Murata or TDK	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	~~2n2 COG for J/K IV~~	1500p x 2 K/K IV	0805	**IV section**	For Zen K/K IV
37	1	C8	CAP0805,330p	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	330pF	330p or 470p	0805	**DF filter**	
38	2	C257-258	CAP0805,470pF,20%	Walsin or Samsung	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	470p 25V X7R	470pF	0805	**Digital Supply**	
39	4	C10 C131 **C295 (C291 on pcb)** C310	CAP0805,75P	SE	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	Mica 5mm pitch	75P or 100p	5mm pitch	**I/V Output**	
49	2	C204-205	CAP1206,0.047u250V	Murata	SURFACE MOUNT CAPACITOR 0.062 X 0.126 INCHES	GRM31CR72E473KW03L	0.047u250V	1206	**Supply Bottom**	

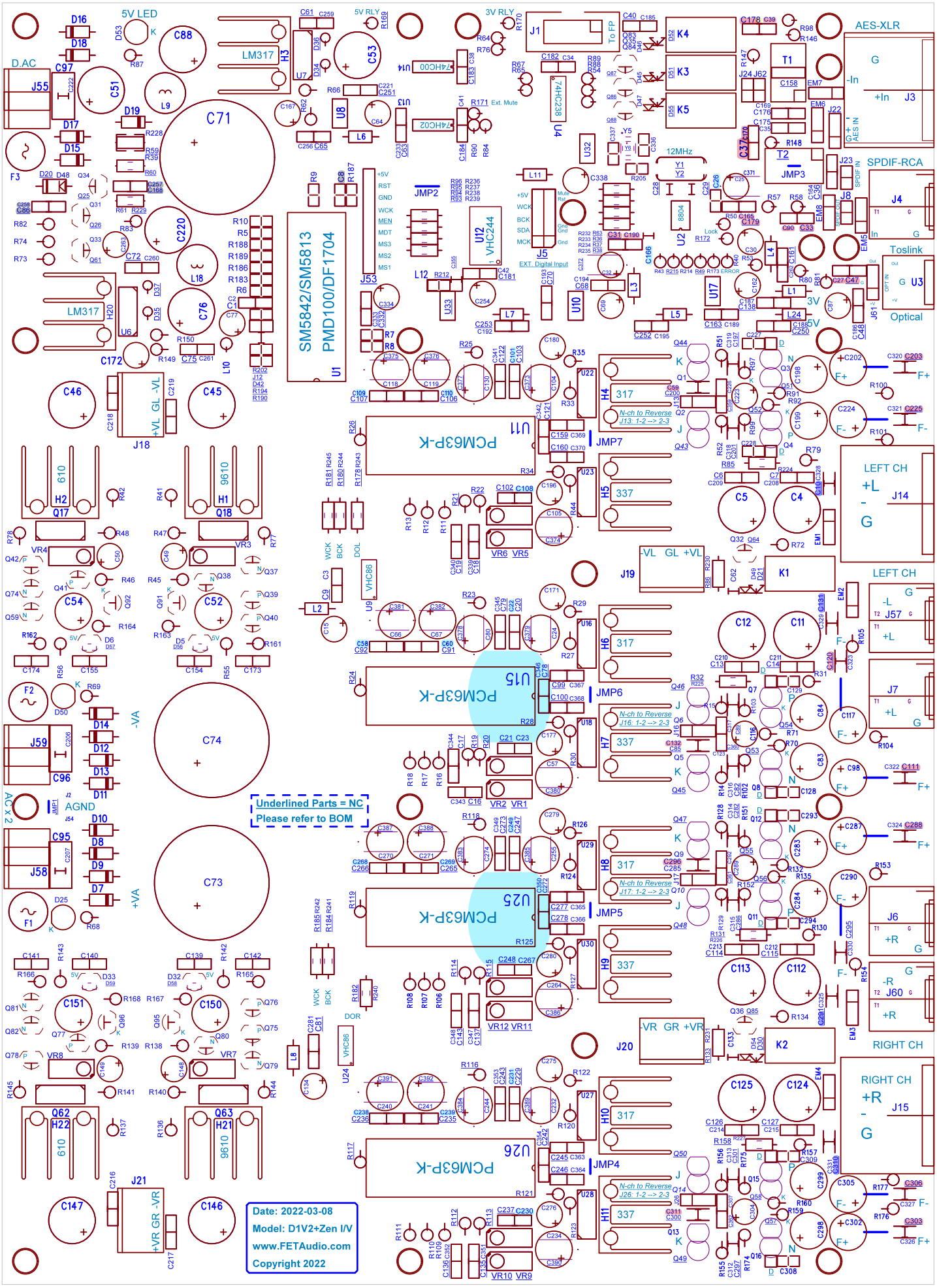
Item	Use Qty	Reference	Part Name	Manufacturer	Description	Part Number	Value / Alternative Part	Package Type	Source	Part NO.
50	1	C71	CAP-AE5,10000u 16V,20%	NCC KMH or Panasonic SU 22-25mm	ALUMINUM ELECTROLYTIC CAP.	10000u 16V 22mm	10000u 16V	D25xP10		
51	1	C30	CAP-AE5,100u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	~~100u 10V~~	10u 35V (max 47uF ok)	D8xP3	Reset	
52	12	C4-5 C11-12 C45-46 C112-113 C124-125 C146-147	CAP-AE5,100u 35V,20%	Elna Silmic-II or Nichicon UKA/UKT	ALUMINUM ELECTROLYTIC CAP.	100u 35V (220u 35V ok)	100u 35V	D5xP2		
54	8	C171 C177 C180 C196 C275-276 C279-280	CAP-AE5,10u	Panasonic FC	ALUMINUM ELECTROLYTIC CAP.	10u ~22u 35V	10u ~ 47u 35V	D10xP5		
55	16	C25 C32 C49-50 C64 C69 C77 C87 C148-149 C162 C167 C172 C263 C254 C338	CAP-AE5,10u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	10u 35V	10u ~ 47u 35V	D5xP2		
56	4	C150-151 C52 C54	CAP-AE5,10u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	100u 35V	10u ~ 47u 35V	D5xP2		
57	2	C64 C69	CAP-AE5,10u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	10u 6.3V	10u ~ 47u 35V	D5xP2		
58	1	C338	CAP-AE5,10u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	10u 35v	10u ~ 47u 35V	D5xP2		
59	2	C15 C134	CAP-AE5,22u	Panasonic FC	ALUMINUM ELECTROLYTIC CAP.	22u 35v	10u ~ 47u 35V	D5xP2		
60	5	C51 C53 C76 C88 C220	CAP-AE5,470u,20%	Panasonic FC, FM, or FA; Sanyo OS-Con	ALUMINUM ELECTROLYTIC CAP.	470u 25V (use 1000uf 25V) min 16V	470u ~ 1000u 16V	D10xP5	Digital Supply	
61	16	C24 C57 C66-67 C104-105 C118-119 C232 C234 C240-241 C255 C264 C270-271	CAP-AE5,47u	Nichicon UKA/UKT Audio cap	ALUMINUM ELECTROLYTIC CAP.	47u 35v	47u	D5xP2		
62	0	~~C25 C32 C254~~	~~CAP-AE5,47u,20%~~	~~Panasonic FC, FM, or FA; Sanyo OS-Con~~	~~ALUMINUM ELECTROLYTIC CAP.~~	~~47u 6.3V~~	~~47u~~	~~D5xP2~~		
63	4	C80 C130 C244 C274	CAP-AE5,4u7	Nichicon UKA/UKT Audio cap	ALUMINUM ELECTROLYTIC CAP.	4u7 35V (use 33uF 35V)	4u7	D5xP2		
64	2	C73-74	CAP-AE5,5600u 35V,20%	Panasonic Audio / SU 22-25mm	ALUMINUM ELECTROLYTIC CAP.	5600u 35V 22mm	5600u 35V	D25xP10		
73	2	J2 J54	CON1,Connect Case			AGND	Connect Case			
74	1	J1	CON-RIB10V,2x5 Male HD	China	RIBBON CABLE 10-PIN VERTICLE MALE NO LATCHES	2x5 2.5mm Male Header	2x5 Male HD	P2.5mm		
76	1	J12	CON-SIP-2P,2x1 female HD	China	GENERIC 2 PIN SIP HEADER .100 CENTERS	2x1 2.5mm pin Header	2x1 female HD	P2.5mm		
81	4	J13 J16-17 J26	CON-SIP-3P		GENERIC 3 PIN SIP HEADER .100 CENTERS			P2.5mm		
82	4	J18-21	CON-SIP-3P,3x5mm Con Wire	China	GENERIC 3 PIN SIP HEADER .100 CENTERS	3x5mm Con	3x5mm Con Wire	P5mm		
85	20	D1-4 D22-24 D26-29 D31 D38-41 D60-63	DIODE,1N4007 TH	Toshiba M7	Diode 1000V 1A diode	1N4007 TH	1N4007 (M7) SMD	M-FLAT		Solder at bottom of pcb last
86	8	D43-47 D49 D54	DIODE,LL4148	Semtech	Diode 100V 0.5A diode	LL4148	LL4148	M-FLAT		
90	4	C98 ~~C117~~ C202 ~~C224~~ C287 ~~C290~~ C302 ~~C305~~	ECAP_5X11,100uF,20%	Nichicon UKA/UKT	Leaded E capacitors Through Hole	8mm ecap 100U 25V	100uF	Dia 8mm	IV section	For Zen K/K IV
91	0	~~C116 C223 C289 C304~~	~~ECAP_5X11,33u,20%~~	~~Nichicon UKA/UKT~~	~~Leaded E capacitors Through Hole~~	~~5mm ecap 22-33u 35V~~	~~33u~~	~~Dia 5mm~~	IV section	For Zen K/K IV
92	8	C83-84 C198-199 C283-284 C298-299	ECAP_5X11,47u,20%	Nichicon UKA/UKT	Leaded E capacitors Through Hole	8mm ecap 47U 35V	47u ~ 100uf	Dia 8mm	IV section	
94	1	Y5	ECSTXO5032120TR,12MHz XO or TCXO	TXC	miniatue_SMD_HCMOS_TCXO_Oscillator.	7C-12.000MBA-T	12MHz XO or TCXO	5 x 3.5mm	Element14	7C-12.000MBA-T
96	3	F1-3	FUSE,2A Fast	Bell Fuse	Fuse	2A Fast	2A Fast	Leaded TH		
99	14	H1-11 H20-22	HEATSINK_SMALL,16x16x25mm	China white	Heatsink	630 x 600 x 1000 mil	16x16x25mm	HEATSINK_630X630X1000MIL	Mouser	567-634-10ABPE
100	1	L1	IND-MOLDED,47uH	Hualida	Radial inductors 47uH 200mA	47uH 200mA	47uH	Leaded TH	Element14	77F470J-TR-RC
101	12	L2-9 L10-12 L18	IND-MOLDED,Bead	Hualida	Radial inductors 100mA Bead	Bead	Bead	Leaded TH	Mouser	434-BEAD/4-900R-02
103	7	EM1-7	IND_C_IND,470pF EMI filter	Murata	Pitch 2.54mm x 3 LCL filter DSS1NB32A471Q91A	EM filter 470pF DSS1NB32A471Q91A	470pF EMI filter DSS1NB32A471Q91A	P2.5x3mm	Mouser	81-DSS1NB32A471Q91A
105	2	Q17 Q62	IRF610,IRF610	IR or Vishay	MOSFET N CHANN 200V 1.8A	IRF610 TO-220	IRF610	TO-220	Mouser	844-IRF610PBF
106	2	Q18 Q63	IRF9610,IRF9610	IR or Vishay	MOSFET P CHAN 200V 1.8A	IRF9610 TO-220	IRF9610	TO-220	Mouser	844-IRF9610PBF
107	4	Q91-92 Q95-96	J202,NC	MOTOROLA	N-CHANNEL,DEPLETION MODE, LOW FREQ./LOW NOISE JFET	MMBFJ202	MMBFJ202	SOT23	Mouser	512-MMBFJ202
108	0	~~Q4 Q7 Q11 Q15~~	~~KSA992FBU,2SA1145 BC560C~~	For Zen K/K IV	~~KSA992_Series_120_V_50_mA_Through_Hole_PNP_Epitaxial_Silicon_Transistor_-TO-92-3~~	~~KSA992FBU~~	~~2SA1145 BC560C~~	~~TO-92~~	~~Mouser~~	~~512-KSA992FBU~~

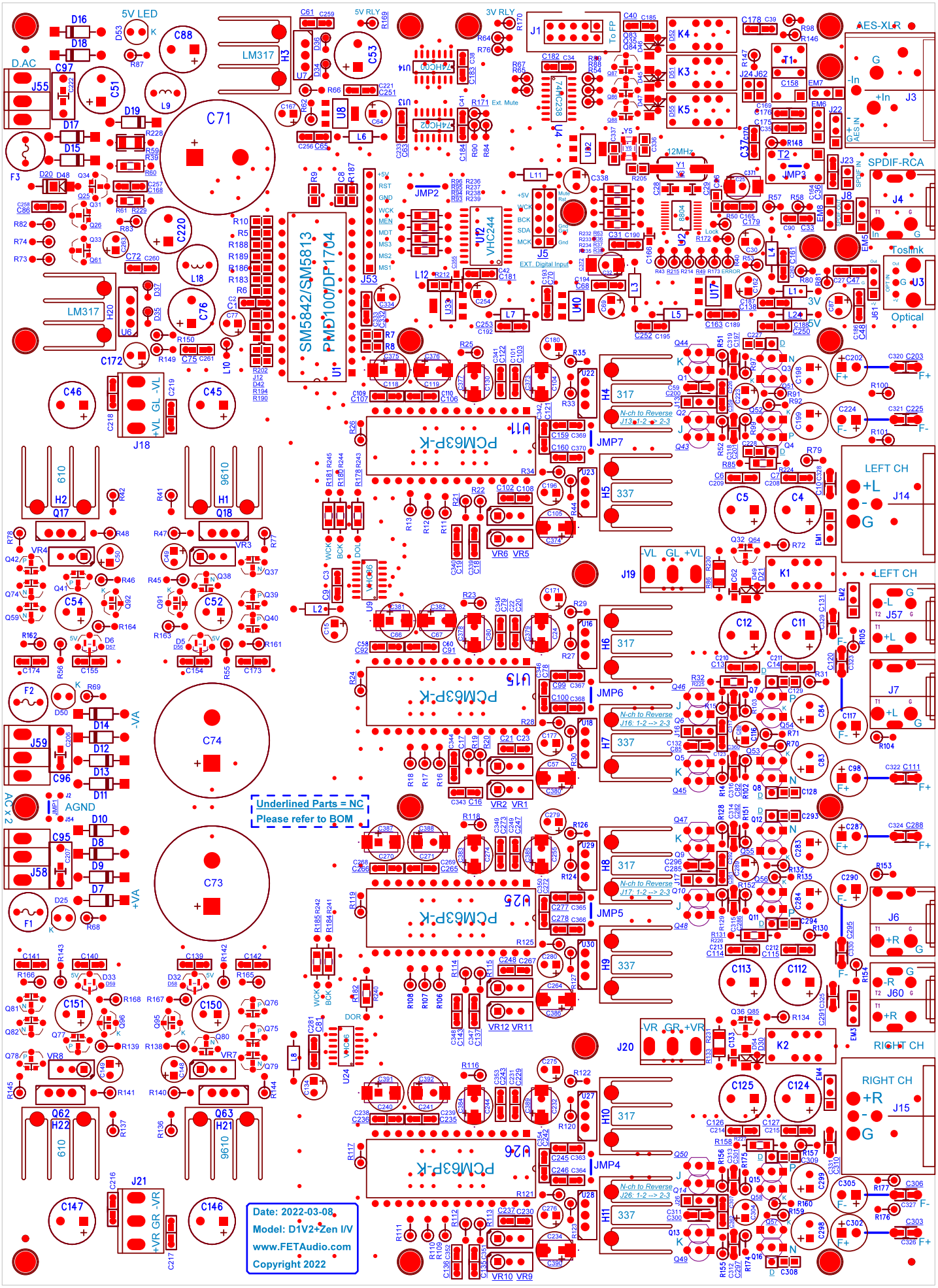
Item	Use Qty	Reference	Part Name	Manufacturer	Description	Part Number	Value / Alternative Part	Package Type	Source	Part NO.
109	0	~~Q3 Q8 Q12 Q16~~	~~KSC1845,2SC2705 BC550C~~	For Zen K/K IV	~~TO-92 Leaded Transistor~~	~~KSC1845~~	~~2SC2705 BC550C~~	~~TO-92~~	~~Mouser~~	~~512-KSC1845FTA~~
110	3	D25 D50 D53	LED,LED TH	China	Diode LIGHT EMITTING DIODE	Green LED 2.54mm TH	LED TH	0805		
113	6	U6-7 U16 U22 U27 U29	LM317T,LM317T	ST, Motorola, LT	POSITIVE VOLTAGE REGULATOR; ADJUSTABLE	LM317T	LT317	TO-220	Mouser	863-LM317TG
114	4	U18 U23 U28 U30	LM337T	ST, MOTOROLA	NEGATIVE VOLTAGE REGULATOR;ADJUSTABLE	LM337T	LT337	TO-220	Mouser	863-LM337TG
115	4	D56-59	LM4040EIM3X-2P5/NOPB	Ti	Voltage reference 5V	LM4040-5V	LM4040-5V	SOT-23	Mouser	926-LM4040CIM3X-50
116	4	U8 U10 U17 U32	LT1117,1117-3.3V	AMS, Linear Technology	IC 3.3V Regulator	AMS1117-3.3	LT1117-3.3V	SOT-223	Mouser	926-LM1117MPX3.3NOPB
119	0	~~Q25-26 Q61 Q64 Q85-88~~	~~MMBT3904LT1,NC~~	~~MOTOROLA~~	~~GENERAL PURPOSE NPN SILICON TRANSISTOR~~	~~MMBT3904LT1~~	~~MMBT3904LT1~~	~~SOT-23~~	~~Mouser~~	~~863-MMBT3904LT1G~~
120	4	U11 U15 U25-26	PCM63P,PCM63P-K	Burr Brown	20bit Digital to Analogy Converter	PCM63P-K	PCM63P-K	DIP28		
122	3	J4 J6-7	RCA_JF2,RCA H	JF	RCA H PCB with Screw	AV-8.4-8D	RCA H	RCA		
123	13	R5-10 R183 R186-189 R170 R173	RES0805,0R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	0R	0R	0805		
124	8	R27-28 R33-34 R120-121 R124-125	RES1206,100,1%	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	100R 1%	100R	1206		
125	4	R55-56 R142-143	RES0805,100R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	680R 1%	100R	1206		
126	4	R78 R77 R144-145	RES0805,100R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	100R 1%	100R	1206		
127	4	~~R103~~ ~~R97~~ ~~R99~~ R102 R151 ~~152~~ R174 ~~175~~	RES0805,100R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	100R 1%	100R	1206		For Zen K/K IV
128	4	R163-164 R167-168	RES0805,100R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	100R 1%	100R	1206		
129	2	R66 R150	RES0805,100R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	100R 1%	100R	1206		
130	2	R60 R229 **(or R39 R61)**	RES0805,10K	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k 1%	10K	1206		
131	3	R73-74 R82	RES0805,10K	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k 1%	10K	1206		
132	3	R81 R146-147	RES0805,10R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10R 1%	10R	0805		
133	4	R40 R43 R50 R214	RES0805,10k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k	10k	0805		
134	2	R69 R68	RES0805,10k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k	10k	1206		
135	3	R165 R161-162	RES0805,10k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k 1%	10k	1206		
136	1	R166	RES0805,10k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	10k1%	10k	1206		
137	1	R58	RES0805,110R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	110R 1%	110R **(100R ok)**	0805		
138	4	R47-48 R140-141	RES0805,15k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	15K 1%	15k **(use 22k)**	1206		
139	1	R57	RES0805,210R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	210R 1%	210R **(220R ok)**	0805		
140	8	R216-223	RES0805,2R2,1%	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	1R2 1%	1R2	1206		
141	8	R29-30 R35 R44 R122-123 R126-127	RES0805,300,1%	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	300R 1%	300R	1206		
142	2	R62 R149	RES0805,300R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	300R 1%	300R	1206		
143	4	R41-42 R136-137	RES0805,47k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	47K 1%	47k	1206		
144	6	R67 R80 R84 R90 R53 R65	RES0805,47k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	47K 1%	47k	0805		
145	5	R45-46 R87 R138-139	RES0805,4k7	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	4K7 1%	4k7	1206		
146	2	R134 R72	RES0805,4k7	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	4K7 1% 0805	4k7	1206		
147	1	R83	RES0805,4k7	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	4K7 0805	4k7	1206		
148	1	R228	RES0805,4k7	ASJ, Walsin, or Royalohm	TH 1/2W	4K7 1%	4k7	1210 **(or 1206)**		
149	1	R205	RES0805,56R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	56R 1%	56R	0805		

Item	Use Qty	Reference	Part Name	Manufacturer	Description	Part Number	Value / Alternative Part	Package Type	Source	Part NO.
151	5	R54 R64 R76 R88-89	RES0805,680R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	680R 1%	680R	0805		
152	1	R148	RES0805,75R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	75R 1%	75R	0805		
153	12	R11-13 R16-18 R106-111	RES0805,82R,1%	ASJ, Walsin, or Royalohm	THROUGH HOLE RESISTOR 1/4W	82R	82R	1206		
154	4	R236-239	RES0805,82R,1%	ASJ, Walsin, or Royalohm	THROUGH HOLE RESISTOR 1/4W	82R	82R	1206		
155	1	R98	RES0805,90.9R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	90.9R 1%	90.9R	0805		
168	4	R31 R79 R130 R157	RES1210,10R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.098 X 0.126 INCHES, 1/4W	10R	10R **(use 4R7)**	1206		
169	4	R224-227	RES1210,10R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.098 X 0.126 INCHES, 1/4W	10R	10R **(use 4R7)**	1206		
170	8	R14-15 R51-52 ~~R70-71~~ ~~R91-92~~ R128-129 ~~R132 R135~~ R155-156 ~~R159-160~~	RES1210,1k5	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.098 X 0.126 INCHES, 1/4W	1k5	1k5	1206		For Zen K/K IV
171	4	R100 R104 R153 R176	RES1210,22k	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.098 X 0.126 INCHES, 1/4W	22k	22k	1206		
172	4	R101 R105 R154 R177	RES1210,47R	ASJ, Walsin, or Royalohm	SURFACE MOUNT RESISTOR 0.098 X 0.126 INCHES, 1/4W	47R	47R	1206		
174	2	R230-231	RES-1/4W,560R,1%	Vishay BC Components MRS25	Leaded Resistor 1/2W	MRS25 1% 560R	560R **(use 750R)**	1210		
176	10	R232-235 R240-245	RES_LEAD_1/4W,82R,1%	ASJ, Walsin, or Royalohm	SMD 1/4W	82R TH 1%	82R	1206		
178	2	K1-2	RLY-NEC-EC2,TX2-12V	Axiom FX2 Panasonic TX2	Relay 2P2T	TX2-12V	TX2-12V		Mouser	769-TX2-12V
179	3	K3-5	RLY-NEC-EC2,TX2-5V	Axion FX2 Panasonic TX2	Relay 2P2T	TX2-5V	TX2-5V		Mouser	769-TX2-5V-1
180	1	U1	SM5842,SM5813 / PMD100 / DF1704 / DF1706	NPC	High Performance Digital Filter	SM5842AP/APT	SM5813 / PMD100 / DF1704 / DF1706	DIP28		
181	1	U3	TORX147,TORX147L	TOSHIBA	IC OPTICAL RECEIVER 3.3V	TORX147L	TORX147L			
182	4	VR3-4 VR7-8	VRES-TOP-ADJ,5k 10T	Bourns 3296	VARIABLE RESISTOR (TOP ADJUST TYPE)	3296W-1-502LF 5K	5k 10T	3296W	Mouser	652-3296W-1-502LF
184	1	U2	WM8804,WM8804	Wolfson	1:1 Digital Receiver	WM8804	WM8804		Mouser	238-WM8804GEDS/RV
185	2	J14-15	XLR-MALE,NC3MAA-H1	Neutrik	XLR Male Socket PCB Horizontal	NC3MAA-H1	NC3MAA-H1		Mouser	568-NC3MAAH-1
186	1	J3	XLR_FEMALE_2,NC3FAA-H2	Neutrik	XLR Female Socket PCB Horizontal	NC3FAA-H2	NC3FAA-H2		Mouser	568-NC3FAAH-2

Tested : PCM1702U, Rail at 20.5V, KK I/V with idss 9.3mA 2SK363BL - distortion 0.014 to 0.016% SE, Balance 0.008%. Vout = 1.24Vrms with IV resistor 1k5 and IV cap 3000 pf

Black - 470pf; Pink - 0.01uf; Light Blue - 1uF; Deep Blue - 75pF mica




5V LED
3V RLY
5V RLY
AES-XLR
D.AC
SPDIF-RCA
Toslink
Optical
LM317
SM5842/SM5813
PMD100/DF1704
VHC244
74HC02
74HC238
12MHz
LEFT CH
RIGHT CH
PCM63P-K
317
337
610
9610
Underlined Parts = NC
Please refer to BOM
Date: 2022-03-08
Model: D1V2+Zen I/V
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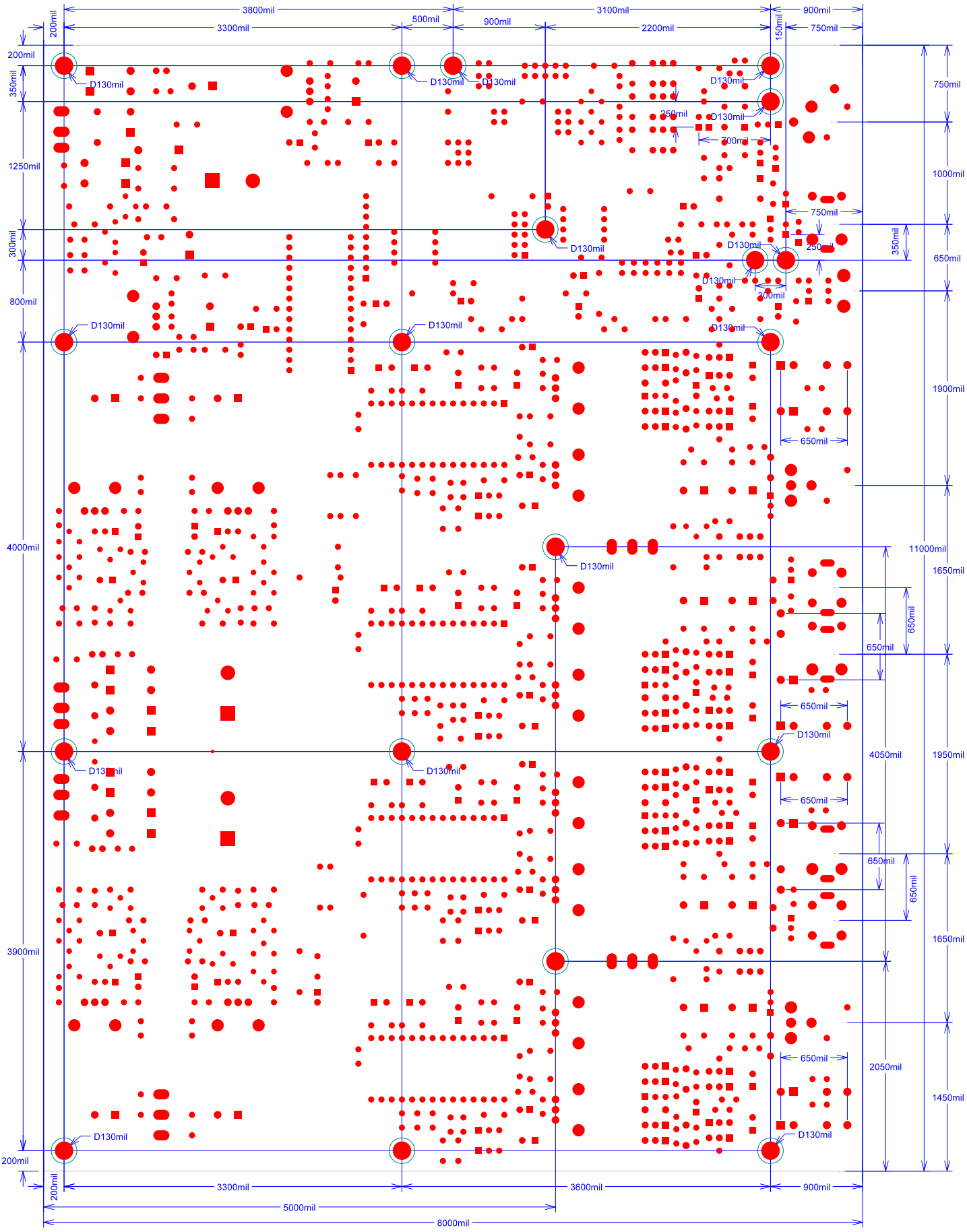
3800mil
3100mil
900mil
200mil
3300mil
500mil
900mil
2200mil
150mil
750mil
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D130mil
750mil
1250mil
1000mil
300mil
650mil
800mil
1900mil
650mil
4000mil
11000mil
1650mil
650mil
650mil
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4050mil
1950mil
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5000mil
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