Bill Of Materials for Excessively Complex VCO

Design Title	Excessively Complex VCO
Author	Dustin Stroh J3RK
Document Number	
Revision	1.5
Design Created	Friday, March 31, 2023
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Total Parts In Design	254

0 Modules

Quantity	References	Value	PCB Package	Notes

Sub-totals:

30 Capacitors

Quantity	References	Value	PCB Package	Notes
6	C1-C3,C12-C14	10nF	CAP10	C0G/NP0 or Film
2	C4,C16	3.9nF	CAP20	Main VCO Rate Timing Capacitors. Use Polypropylene / Polystyrene
2	C5,C28	100nF	CAP20	LFO Rate Timing Capacitors. Use Polypropylene / Polystyrene / C0G Ceramic
6	C6-C8,C17-C19	22pF	CAP10	C0G/NP0 MLCC / Ceramic / Film
9	C9,C15,C20,C24-C27,C29-C30	47pF	CAP10	C0G/NP0 MLCC / Ceramic / Film
2	C10-C11	330nF	CAP10	C0G/NP0 MLCC / Ceramic / Film
1	C21	10pF	CAP10	C0G/NP0 MLCC / Ceramic / Film
1	C22	1.5nF	CAP10	C0G/NP0 MLCC / Ceramic / Film
1	C23	100pF	CAP10	C0G/NP0 MLCC / Ceramic / Film

Sub-totals:

121 Resistors

Quantity	References	Value	PCB Package	Notes
1	R1	340R	RES40	1% Resistor (50PPM Recommended)
16	R2,R12,R15,R18,R29,R40,R50,R53,R56,R67,R91,R93,R102,R117,R119-R120	10K	RES40	1% Resistor (50PPM Recommended)
4	R3-R4,R41-R42	499K	RES40	1% Resistor (50PPM Recommended)
2	R5,R43	53.6K	RES40	1% Resistor (50PPM Recommended)
2	R6,R44	267R	RES40	1% Resistor (50PPM Recommended)
2	R7,R45	4.32K	RES40	1% Resistor (50PPM Recommended)
2	R8,R46	267K	RES40	1% Resistor (50PPM Recommended)
2	R9,R47	27K	RES40	1% Resistor (50PPM Recommended)
16	R10,R34,R36-R38,R48,R74-R75,R77-R79,R84-R88	100K	RES40	1% Resistor (50PPM Recommended)
14	R11,R13-R14,R16-R17,R19,R49,R51-R52,R54-R55,R57,R95-R96	40.2K	RES40	1% Resistor (50PPM Recommended)
13	R20-R22,R33,R58-R60,R71,R73,R89,R97,R106,R108	100R	RES40	1% Resistor (50PPM Recommended)
2	R23,R61	3.0K	RES40	1% Resistor (50PPM Recommended)
2	R24,R62	330R	RES40	1% Resistor (50PPM Recommended)
3	R25,R63,R98	75K	RES40	1% Resistor (50PPM Recommended)
6	R26,R30,R64,R68,R99,R103	2.2K	RES40	1% Resistor (50PPM Recommended)

6	R27-R28,R65-R66,R100-R101	4.7K	RES40	1% Resistor (50PPM Recommended)
6	R31-R32,R69-R70,R104-R105	12K	RES40	1% Resistor (50PPM Recommended)
1	R35	51K	RES40	1% Resistor (50PPM Recommended)
4	R39,R72,R113,R115	1M	RES40	1% Resistor (50PPM Recommended)
3	R76,R83,R121	49.9K	RES40	1% Resistor (50PPM Recommended)
3	R80-R82	47K	RES40	1% Resistor (50PPM Recommended)
1	R90	14K	RES40	1% Resistor (50PPM Recommended)
1	R92	9.1K	RES40	1% Resistor (50PPM Recommended)
1	R94	150K	RES40	1% Resistor (50PPM Recommended)
1	R107	33K	RES40	1% Resistor (50PPM Recommended)
4	R109-R112	100k	RES40	1% Resistor (50PPM Recommended)
2	R114,R116	2.2M	RES40	1% Resistor (50PPM Recommended)
1	R118	20K	RES40	1% Resistor (50PPM Recommended)

Sub-totals:

22 Integrated Circuits

Quantity	References	Value	PCB Package	Notes
1	U1	LM4040-2.5	TO92	LM4040-2.5 (A, B, or C)
2	U2,U9	J2131	SO16	Sound Semiconductor SSI2131 VCO
2	U3,U10	TL074	SO14	These scale/buffer the waveform outputs, so something a little fancier than the TL074 may improve performance a touch. OP4180 perhaps.
3	U4,U11,U19	SSM2212	SO8	Matched NPN Pairs for Sine Shaping. LS318 / LS38 / SSM2212
4	U5,U12,U14,U20	TL071	SO8	Choose op amp for function and preference. U5 / U12 / U20 are for sine shaping. Choose something good. TLE071 / AD8033 for example. U14 choose DC accurate low drift. LF411 / OPA132 / etc.
1	U6	7805	TO220	TO220 LM7805 Regulator
1	U7	7905	P1	TO220 LM7905 Regulator
7	U8,U15-U18,U21-U22	TL072	SO8	Choose op amp for function and preference. Many of these are used in the phase shift circuit. Choose fast slew, low drift, DC accurate. LF412 / OPA2132 / etc.
1	U13	AD633	SO8	Analog Devices AD633 Four Quadrant Multiplier.

Sub-totals:

1 Transistors

Quantity	References	Value	PCB Package	Notes
1	Q1	2N3904	TO92	2N3904 or Equivalent NPN (EBC Pinout on PCB)

Sub-totals:

1 Diodes

Quantity	References	Value	PCB Package	Notes
1	D1	DIODE	DIODE30	Signal Diode / 1N4148 or Equivalent

Sub-totals:

79 Miscellaneous

Quantity	References	Value	PCB Package	Notes
19	4Q,HS,LF1-LF2,P1-P2,PS,PSM,PSW,PTRIANGLE,PULSE,SAW,SINE,SS,TRI,VO,WC,XI,YI	CONN-SIL1	CONN-SIL1	These are SIL Pads on the PCB. No component required.
32	BP1-BP32	100nF	0805	Decoupling / Bypass 0805 Capacitors C0G/NP0
8	CRS1-CRS2,LFM1-LFM2,PHASE1,PMLVL1,PWM1-PWM2	100K	CONN-SIL3	Panel Pots
2	FB1-FB2	0R	RES40	Ferrite Beads

5	FIN1-FIN2,WCVL1,X1,Y1	100k	CONN-SIL3	Panel Pots
1	J1	SIL-156-04	SIL-156-04	MTA-156 Friction Lock Power Header
2	LED1-LED2	LED-GREEN	CONN-SIL2	Two Lead BiColor LED (If Anit-Vandal Illuminated Pushbuttons are used, choose BiColor type, and that covers these LEDs.)
2	PF1-PF2	10uF	ELEC-RAD13	Electrolytic Power Filter Capacitors
2	RATE1-RATE2	SW-SPST	CONN-SIL2	SPST / SPDT Switch. Can be toggle. (NKK Recommended) Typically Anti-Vandal Illuminated Pushbuttons are used. (TE Connectivity AV2211EA12Q04 Pushbutton or E-Switch Equivalent.
4	SSNPH1,SSPH1,SW3-SW4	SW-SPDT	CONN-SIL3	SPDT Phase Modulated Waveform Select Switches. Recommend NKK SPDT Toggles.
2	SW1-SW2	SW-ROT-3	CONN-SIL4	SP3T Toggles Wired as 3-Way Selector Switch. Recommend NKK SP3T Toggles.

Sub-totals:

Totals:

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