

agdr Desktop Headphone Amplifier - 7/6/2013 - Bill Of Materials (BOM) - ODA 14 80x160 #23

part	function	part number	qty	mfr
JACKS, SWITCHES, HEADERS, AND WIRE JUMPERS				
3.5mm stereo jack, vertical, PC mount, with switch	Input signal jack	J2	1	Switchcraft
3.5mm stereo jack, vertical, PC mount, without switch	Output 3.5mm headphone jack	J4	1	Switchcraft
1/4" slim stereo jack, no switch	Output 1/4" headphone jack	J6	1	Neutrik
Dual RCA jack, vertical mount	Rear signal input jacks, pre-amp output jacks	J1, J5	2	Kobiconn
DC power jack, 2.1mm center pin 5.5mm outer, PCB mount	Power input jack	J3	1	Switchcraft
Optional upper PCB dual RCA jack, horizontal mount	Input or pre-amp output	optional	1	Kycon
Rotary switch, DP4T	Gain selector	S3	1	Alpha
DPDT toggle switch, verticle toggle	Power on/off	S1	1	Mountain Switch
DPDT pushbutton switch	Voltage selector, Input jack selector	S2, S4	2	C&K
Optional panel mount DP6T rotary for damping factor switch, 0.5inch	Output damping selector	optional	1	C&K
1 pin test point	pre-regulator voltage test & gain stage output test [poms	JP8, JP9, JP10, JP11	4	
2 pin header - optional	Rear input signal, signal select switch, bass boost switch	JP1, JP2, JP3, JP5, JP6, JP7	6	
3 pin header - optional	Pre-amp feed, Output	JP14, JP15, JP16	1	
4 pin square header - optional	Power rails and ground test pt	JP4, JP12, JP13	3	
4mm jumper wire - use 22 gauge insulated wire		JPR2, JPR4	2	
5mm jumper wire - use 22 gauge insulated wire		JPR1	2	
7mm jumper wire - use 22 gauge insulated wire		JPR3	2	
10mm jumper wire - use 22 gauge insulated wire		JPR5	1	
12mm jumper wire - use 22 gauge insulated wire		JPR6	1	
If damping resistors not being used, use 22 gauge uninsulated wire		R70, R71	2	

Subtotal for this section

IC, TRANSISTOR

Op amp, single, ultra low-noise ultra low-distortion, SOIC-8	Gain stage	IC1, IC2	2	Texas Instruments
Op amp, dual low noise low distortion audio, SOIC-8	Pre-amp out buffer/amp	IC8	1	Texas Instruments
Op amp, dual high current, SIP-8	Output current buffer	IC9- IC12, IC14, IC15	6	New Japan Radio
Op amp, quad FET input, SOIC-14	Clipping comparator	IC5	1	Texas Instruments
Positive low-noise LDO voltage regulator	Positive volt reg LDO	IC6	1	Linear Technology
Positive voltage regulator, TO-220, 1.5A	Positive volt pre-reg	IC3	1	ON Semiconductor
Negative low-noise LDO voltage regulator	Negative volt reg LDO	IC7	1	Linear Technology
Negative voltage regulator, TO-220, 1.5A	Negative volt pre-reg	IC4	1	ON Semiconductor
Positive fixed 24V 100mA voltage regulator	Relay power volt regulator	IC13	1	ON Semiconductor
NPN transistor, Vceo=40V, Ic=200mA, hfe=100	Clipping indicator	Q1	1	Fairchild
n-ch enhancement mosfet, 60V, 200mA, 5 ohm, +/-20Vgs or greater	Relay control	Q2, Q3	2	Fairchild

Subtotal for this section

DIODE, LED

1A rectifier diode, std recovery, 200V, DO-41 case, Vf=1.1V, Ir=5uA	vreg protect, relay coil suppression	D3, D4, D5, D6, D13	5	Vishay
2A rectifier diode, std recovery, 600V, DO-15 case, Vf-1V, Ir-5uA	Power rectifiers	D1, D2	2	Taiwan Semi
Zener diode, 33Vdc, 5%, 1.3W, DO-41, Izt = 27mA	Relay coil suppression	D14	1	Vishay
Schottky rectifier diode, 1A, 40V	Rail clamps	D11, D12	2	ST Micro
Schottky diode, 0.1A, 100V	Clipping indicator diode logic	D7-D10	4	ST Micro
LED, ultrabright, indicator, green, PCB right angle mount	Power good indicators	LED4, LED5	2	Everlight
LED, ultrabright, indicator, red, PCB right angle mount	Clipping indicator	LED3	1	Everlight
LED, blue, 1206 SMD, 40mcd@20mA, 130 degrees	Clipping window reference	LED1, LED2	2	Everlight

Subtotal for this section

RELAYS AND INDUCTORS

Relay, small signal DPDT, 2 form C, 24V 8.3mA coil, 1A contact	Headphone protection	K1	1	Omron
Power inductors, 50uH, 2.8A, vertical	CLC filter	L1, L2	2	Bourns

Subtotal for this section

CHASIS, PCB, AC ADAPTER

Aluminum chassis in black 1.77Hx4.27Wx3.15L inch, w/o ship	Case		1	Box Enclosures
PCB, 80mm x 100mm, 2 layer, 1.6mm thick, 100% e-test, HASL. w/o ship	PC board		1	iTeardStudio
AC Adapter, 115Vac, 24Vac out at 1000m, w/o ship (150mA per channel max)	AC Adapter - normal load		1	Triad
AC Adapter, 115Vac, 24Vac at 1.8A, w/o ship (for full ODA output current)	AC Adapter - full load		1	Triad

Subtotal for this section

RESISTORS AND POTS

Bourns pro audio 1K dual 9mm audio taper, 15mm shaft	volume pot	VR1	1	Bourns
40.2K 0.1% 1/4W 1206 SMD - optional	Input bias ground return, clipping ckt ref LED limit	R40, R41, R26	3	Vishay
4.99K Ohm 0.1% 1/8W 1206 SMD 0.6mm H	Input bias ground return	R40, R41	2	KOA Speer
16.9K Ohm 1/2W 1% Metal Film 1.9mm x 3.5mm	power-on LED current limit	R47, R48	2	Vishay/BC
0.5 Ohm 1/4W 1% Metal Film 2.29mm dia x 6.1mm L 150PPM/C, low current noise, mount vertically (tombstone)	Output parallel balance	R51-R58, R60, R61, R64, R65	12	Vishay
274 ohm 1/4 Watt 1% metal film 1.85mm x 3.9mm	Input RF filter	R3, R4	2	Vishay
274 ohm 0.1% 1/8W thin film 1206 SMD 0.55mm H	Input RF filter	R5, R6	2	Vishay
0 ohm jumpers, 1W thick film 0603 SMD	Jumpers for input jack gnd	R1, R2	2	KOA Speer
0 ohm jumpers, 5%, 250mW thick film 1206 SMD 0.6 H	Jumpers for pre-amp jack ground	R72	1	Yageo
10K 1/8W 1% metal film 1.85 x 3.9mm 50PPM/C	Gain stage input gnd return	R16, R17	2	Xicon
3.01K 0.1% 1/8W thin film SMD 1206 25 PPM/K 0.6H - optional	feedback w/ bass boost	R20, R21	2	Vishay
3.0K 1% 1/4W metal film 2.29mm dia x 6.1mm L optional	feedback w/ bass boost	R22, R23	2	Vishay
1.5K 1% 1/4W metal film 2.29mm dia x 6.1mm L low current noise	feedback w/o bass boost	R22, R23	2	Vishay
1.5k 0.1% 330mW thin film SMD 1206 25 PPM/C 0.6mm H / high power	optional pre-amp feedback	R44, R46	2	IRC
15K ohm 0.1% 1/8W thin film SMD 1206 25PPM 0.6H	(1.1x gain), Clipping LED limit	R10, R15, R42	3	KOA Speer
1.0K ohm 0.1% 330mW thin film SMD 1206 25PPM/C 0.6H / high power	(2.5x gain)	R9, R14	2	IRC
1.0K ohm 0.1% 330mW thin film SMD 1206 25PPM/C 0.6H / high power	Optional pre-amp 2.5x gain	R43, R45	2	IRC
499 ohm 0.1% 1/8W thin film 1206 SMD 25PPM 0.6mm H	(4x gain)	R8, R12	4	KOA Speer
301 ohm 0.1% 1/8W thin film 1206 SMD 25PPM 0.6mm H	(6x gain)	R7, R11	2	KOA Speer
110 Ohm 0.1% 1/8 watt thin film 1206 SMD	snubber	R13	1	KOA Speer
249R 0.1% 250mW thin film 1206 SMD 0.55mm H, 25PPM/K	Volt pre-regulator set	R27, R28	2	Vishay
3.40k 0.1% 250mW thin film 1206 SMD 0.55mm H, 25PPM/K	Volt pre-regulator set, LDO -7v	R24, R25	2	Vishay
15.8k 0.1% 1/8W thin film SMD 1206 25 PPM/K 0.6H	Voltage LDO regulator set	R33, R34	2	KOA Speer
2.10k 0.1% 250mW thin film SMD 1206 25 PPM/K 0.55 H	Voltage LDO regulator set 16v	R36	1	KOA Speer
2.15k 0.1% 250mW thin film SMD 1206 25 PPM/K 0.55 H	Voltage LDO regulator set 16v	R37	1	KOA Speer
3.30k 0.1% 250mW thin film SMD 1206 25 PPM/K 0.55 H	Voltage LDO regulator set 7v	R31	1	Vishay
10 Ohm 0.1% 1/8 watt thin film 1206 SMD	Voltage LDO regulator set 7V	R74	1	Vishay
3.32k 0.1% 1/8W thin film SMD 1206 25 PPM/K 0.6H	Voltage LDO regulator set 7v	R32	1	KOA Speer
1K 0.1% 1/4W metal film 2.29mm dia x 6.1mm L low current noise	Attenuation	R29, R30	2	Vishay
274k 1% 1/8W metal film 1.85mm x 3.5mm 50 ppm	Relay delay circuit	R63, R67	2	Xicon
0.51 Ohm (510mohm) 1% 2W thick film 2512 SMD	CLC Q reduction	R18, R19	2	Bourns
100k 1% 1/8W metal film 1.85mm x 3.5mm 50 ppm	Clipping detect ckt	R38	1	Xicon
499k 1% 1/8W metal film 1.85mm x 3.5mm 50 ppm	relay ckt	R62	1	Xicon
499k 1% 1/4W thick film 1206 SMD 0.55mm H	Relay delay circuit	R66	1	KOA Speer
24.3k 1% 1/8W metal film 1.85 x 3.5mm	Relay ckt vreg load	R59	1	Xicon
22k 1% 1/8W metal film 1.85mm x 3.5mm	Clipping detect circuit	R39	1	Xicon
2.2k 1% 1/8W metal film 1.85mm x 3.5mm	Clipping detect circuit	R35	1	Xicon
20R 0.1% 1/8W thin film SMD 1206 25 PPM/K 0.6H	Output loop cap decouple	R49, R50	2	KOA Speer

See build instructions, jumper with wires if not being used.	Damping factor resistors	R70, R71	2	
2.49k 1% 1/8W metal film 1.85mm x 3.5mm	Output minimum load	R59, R73	2	Xicon
20R 1% 2W metal film 3.68mm dia x 8.74mm L	Zobel network	R68, R69	2	Vishay / Dale

Subtotal for this section

CAPACITORS

220pF 5% 100V MLCC COG / NPO LS 2.54mm	Compensation, RF filters	C3, C4, C6, C7	4	Kemet
150pF 5% 100V MLCC COG / NPO LS 2.54mm	Compensation, RF filters	C16, C17	2	Kemet
220pF 5% 100V MLCC COG / NPO LS 2.54mm	Optional pre-amp compensation	C45, C46	2	Kemet
4.7uF 63Vdc/40Vac 10% 5mm LS 7.2mm wide x 8.5mm thick x 14mm film	Middle coupling	C28-C33, C35-C39, C41	12	Wima
0.1uF 5% 50V MLCC COG (NPO) 2.5mm LS 3.5mm t x 5.5mm w	LDO vreg feedforward, relay vreg bypass	C25, C26, C52	3	TDK
0.1uF 5% 50V MLCC COG (NPO) 2.5mm LS 3.5mm t x 5.5mm w	Bass Boost	C18, C19	2	TDK
390uF 25v Low ESR organic polymer 10mm dia x 25 mm high 5.0 mm LS	Power Rail Bypass	C43, C44, C60, C61	4	United Chemi-Con
100uF 25v 20% Low ESR electrolytic 6.3mm dia x 15 mm high 2.5 mm LS	Power Rail Bypass	C50, C51	2	Nichicon
1000uF 20%, 50V, low impedance aluminum electrolytic, 16mm dia, 25mm tall, 1600mA ripple@60Hz, LS 7.5mm	Main filter caps	C10, C11	2	Nichicon
820uF 20% 50V low impedance aluminum electrolytic, 12.5mm dia, 30mm tall, 1600mA rms ripple@60Hz, LS 5mm, 105C, 10,000 hour	Main filter caps	C14, C15	2	United Chemi-Con
4.7uF 50V 10%, MLCC X7R, 4.0mm wide 7.5mm long, 8.0-mm tall, 5mm LS	Relay time delay	C53	1	TDK
0.22uF 50V 10% stacked film	Gain & Output Decoupling	C12, C13, C22, C47-C49, C54-C59, C62	13	Epcos
100pF 100V MLCC 20% COG/NPO X2Y EMI filter 0805 SMD	EMI filters, cell phone	C1, C2, C65	3	Johanson
0.01 100V MLCC 20% COG/NPO X2Y EMI filter 0805 SMD use if no C8	EMI filters + snubber	C5	1	Syfer
0.01uF 630V 5% MLCC COG/NPO 1206 SMD - use if no C5	Snubber	C8	1	TDK
0.068uF 100V 10% MLCC X7R 1206 SMD	Snubber	C9	1	Murata
0.22uF 10% 50Vdc MLCC X7R 5mm LS	Clipping detect circuit	C27	1	Murata
10uF 25V, 20%, aluminum electrolytic, 2mm LS, 5mm dia, 7mm long	Clipping detect circuit	C42	1	Nichicon
10uF 10% 35V solid tantalum 2 5mm LS 6mm dia, ESR 2 ohms	Vreg caps	C20, C21, C23, C24	4	AVX
0.001uF 5% 50V COG / NPO axial MLCC 2.54mm dia x 4.32mm L - optional	Film & electro cap RF bypass		10	AVX
0.001uF 5% 100V COG / NPO MLCC 1206 0.85mm H - optional	Film & electro cap RF bypass	C34, C40	2	Murata
0.056uF 5% 63Vdc 40Vac MKT stacked film 5mm LS	Zobel network	C63, C64	2	Epcos

Subtotal for this section

GRAND TOTAL

LME49990MA/NOPB	\$2.58	\$5.16			926-LME49990MA/NOPB	LME49990MA-5/NOPB-ND	
LME49720MA/NOPB	\$2.67	\$2.67			926-LME49720MA/NOPB		
NJM4556AL	\$0.67	\$4.02			513-NJM4556AL		
TLO64BCDR	\$0.70			\$0.70	595-TLO64BCDR	TL064BCDR	
LT1963AET#PBF	\$5.53	\$5.53				LT1963AET#PBF-ND	
LM317TG	\$0.54	\$0.54			863-LM317TG	LM317TGOS-ND	
LT3015IT#PBF	\$7.36	\$7.36				LT3015IT#PBF-ND	
LM337TG	\$0.54	\$0.54			863-LM337TG	LM337TGOS-ND	
MC78L24ACPG	\$0.37	\$0.37			863-MC78L24ACPG	MC78L24ACPGOS-ND	
2N3904BU	\$0.10			\$0.10	512-2N3904BU	2N3904FS-ND	
2N7000	\$0.11	\$0.22			512-2N7000	2N7000FS-ND	70214736
		\$26.41		\$0.80			

1N4003GP-E3/54	\$0.11	\$0.55			625-1N4003GP-E3/54	1N4003GP-E3/54GITR-ND	70217645
2A05	\$0.14	\$0.28			821-2A05		
1N4752A-TR	\$0.25	\$0.25			78-1N4752A		
1N5819	\$0.12	\$0.24			511-1N5819		
BAT41	\$0.13			\$0.52	511-BAT41		
MV5464MP4B	\$0.39	\$0.78			638-MV5464.MP4B	1080-1114-ND	
MV5764MP4B	\$0.31			\$0.31	638-MV5764.MP4B		
EL-15-21/BHC-AN1P2/2T	\$0.27			\$0.54	638-152BHC-AN1P22T		
		\$2.10		\$1.37			

G6A-234P-ST-US-DC24	\$4.18	\$4.18			653-G6A-234P-DC24	Z107-ND	70176188
6100-470K-RC	\$0.63	\$1.26			652-6100-470K-RC		
		\$5.44					

B4-080BL	\$18.50		\$18.50				70020261
	\$14.00		\$14.00				
WAU24-1000	\$11.95		\$11.95		553-WAU24-1000		70218015
WAU28-1800	\$29.60				553-WAU24-1800		
		\$44.45					

PTD902-1015K-A102	\$1.99	\$1.99			652-PTD902-1015KA103		
RN732BTDD4022B25	\$0.50			\$1.50	660-RN732BTDD4022B25		
RN732BTDD4991B25	\$0.50	\$1.00			660-RN732BTDD4991B25		
SFR16S0001692FR500	\$0.20	\$0.40			594-SFR16S0001692FR5	SFR16S0001692FR500	7012494
CPF1R50000FLB14	\$0.99	\$11.88			71-CPF1-F-0.5		
SFR16S0002740FR500	\$0.20	\$0.40			594-SFR16S0002740FR5	SFR16S0002740FR500	
TNPW1206274RBEEA	\$0.55	\$1.10			71-TNPW1206274RBEEA		
RK73Z1JTDD	\$0.10	\$0.20			660-RK73Z1JTDD		
RC1206JR-07ORL	\$0.10	\$0.10			603-RC1206JR-07ORL	RC1206JR-07ORL	
270-10K-RC	\$0.15	\$0.30			270-10K-RC		
TNPW12063K01BEEN	\$0.85			\$1.70	71-TNPW12063K01BEEN		
CMF553K0000FKEB	\$0.59			\$1.18	71-CMF553K0000FKEB		
CMF551K5000FKBF	\$0.26	\$0.52			71-CMF55-1.5K		
PFC-W1206LF-03-1501-B	\$1.03			\$2.06	66-PFC12LF1.5K-B		
RN732BTDD1502B25	\$0.50	\$1.50			660-RN732BTDD1502B25		
PFC-W1206LF-03-1001-B	\$1.03	\$2.06			66-PFC12LF1.0K-B		
PFC-W1206LF-03-1001-B	\$1.03			\$2.06	66-PFC12LF1.0K-B		
RN732BTDD4990B25	\$0.50	\$2.00			660-RN732BTDD4990B25		
RN732BTDD3010B25	\$0.50	\$1.00			660-RN732BTDD3010B25		
RN732BTDD1100B25	\$0.50			\$0.50	660-RN732BTDD1100B25	RN732BTDD1100B25	
TNPW1206249RBEEA	\$0.55	\$1.10			71-TNPW1206249RBEEA	TNPW1206249RBEEA	
TNPW12063K40BEEN	\$0.85	\$1.70			71-TNPW12063K40BEEN		
RN732BTDD1582B25	\$0.50	\$1.00			660-RN732BTDD1582B25		
RN732BTDD2101B25	\$0.50	\$0.50			660-RN732BTDD2101B25		
RN732BTDD2151B25	\$0.50	\$0.50			660-RN732BTDD2151B25		
TNPW12063K30BEEN	\$0.85	\$0.85			71-TNPW12063K30BEEN		
TNPW120610R0BEEA	\$0.85	\$0.85			71-TNPW120610R0BEEA		
RN732BTDD3321B25	\$0.50	\$0.50			660-RN732BTDD3321B25		
CMF551K0000BHEB	\$1.17			\$2.34	71-CMF551K0000BHEB		
270-274K-RC	\$0.15	\$0.30			270-274K-RC		
CRM2512JXR510ELF	\$0.19	\$0.38			652-CRM2512JXR510ELF		
270-100K-RC	\$0.15			\$0.15	270-100K-RC	CMF100KQA-ND	70205723
270-499K-RC	\$0.15	\$0.15			270-499K-RC		
RN732BTDD4993B25	\$0.50	\$0.50			660-RN732BTDD4993B25		
270-24.3K-RC	\$0.15	\$0.15			270-24.3K-RC		
270-22K-RC	\$0.15			\$0.15	270-22K-RC		
270-2.2K-RC	\$0.15			\$0.15	270-2.2K-RC		
RN732BTDD20R0B25	\$0.50	\$1.00			660-RN732BTDD20R0B25		

270-2.49K-RC	\$0.15	\$0.30			270-2.49K-RC	
CPF220R000FKE14	\$0.49			\$0.98	71-CPF220R000FKE14	P20W-2BK-ND 70205173

\$34.23 \$11.79

C315C221J1G5TA	\$0.37	\$1.48			80-C315C221J1G	
C315C151J1G5TA	\$0.37	\$0.74			80-C315C151J1G	
C315C221J1G5TA	\$0.37			\$0.74	80-C315C221J1G	
MKS2C044701M00JSSD	\$4.33	\$51.96		\$43.30	505-MKS24.7/63/5	
FK16C0G1H104J	\$0.63	\$1.89			810-FK16C0G1H104J	
FK16C0G1H104J	\$0.63			\$1.26	810-FK16C0G1H104J	
APSG250ELL391MJB5S	\$3.12	\$12.48			661-APSG250E391MJB5S	
UPM1E101MED	\$0.39	\$0.78			647-UPM1E101MED	
UHD1H102MHD1TN	\$1.20	\$2.40			647-UHD1H102MHD1TN	
EGPA500ELL821MK30S	\$1.42	\$2.84			661-EGPA500ELL821MK3	
FK22X7R1H475K	\$1.83	\$1.83			810-FK22X7R1H475K	445-8482-ND
B32529C224K	\$0.14	\$1.82			871-B32529C224K	
101X15N101MV4E	\$0.72			\$2.16		709-1338-1-ND
1206J1000103MXTE03	\$2.01			\$2.01	843-1206J1000103MX3	
CGA5L4C0G2J103J	\$0.27			\$0.27	810-CGA5L4C0G2J103J	
GRM31MR72A683KA01L	\$0.14			\$0.14	81-GRM31MR72A683KA1L	GRM31MR72A683KA01L
RDER71H224K1M1C03A	\$0.35			\$0.35	81-RDER71H224K1M1C03	
UST1E100MDD1TE	\$0.27			\$0.27	647-UST1E100MDD1TE	
TAP106K035SCS	\$1.42	\$5.68			581-TAP106K035SCS	478-1842-ND 70195936
SA105A102JAR	\$0.38			\$3.80	581-SA105A102JAR	
GRM3195C2A102JA01D	\$0.20			\$0.40	81-GRM3195C2A102JA1D	
B32529C563J	\$0.11			\$0.22	871-B32529C563J	

\$83.90 \$50.50

\$173.79	\$44.45	\$79.60
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PJ-3064AM (\$1.49)	2154523 / 96F9609	35RAPCBV4	
	3665562 / 27B9344		The two switch tabs can be cut off the stereo jack (use flush cutters), above, and it will be the same as the version without the switch.
GCD014	1608727 / 65K7786	RAPC722X	Alt Kobiconn 163-7620E-E
			Alt Switchcraft PJRAS1X2S01AUX. Panel mount or on upper accessory PCB.
			Header is optional, wires can just go in holes
			Header is optional, wires can just go in holes
			See build instructions. Can use 1R, 10R, 20R, 120R, etc. for damp.

	1800191	761-6233	Also fits: OPA627AU and OPA827AID (FET input)
			Also at onlinecomponents.com
	/ 76C9088		
1963AET#PBF (\$6.55)	1273627 / 57M7479	6406053	
	59T5805 / 2066751		
	1652347 / 45J1422	5164755	
			Any 2N3904
	9845178 / 58K9650	6714733	Alt: 512-2N7000, Any 2N7000 with Vgs = 20Vdc or greater

	5374108 / 35C0674	7596674	1N4003 from anyone
			2A04
			Arrow and Future Electronics also have stock

	/ 36K1944	6278451	

	9307400 / 26K9063		Other colors available. Use longer B4-160 with 2 PCB to hold ODAC
			Use 2 PCB with B4-160 case to hold ODAC. Seede studio too.
	2137528 / 63M5191		20Vac output at 1amp or higher. 115Vac.
			For full 350mA per channel output current. Also WAU20-2000

			Alt: PTD902-1015K-B102 (1K dual linear taper)
			Use with 10K pot
			Use with 1K pot
			Or just use a solder blob to short the two SMD pads.
	9240276 / 68R0297	6182243	
			Alt: TNPW12061K50BEEN Don't use less than 1/4W
			Alt: TNPW12061K00BEEN, don't use less than 1/4W
			Alt: TNPW12061K00BEEN, don't use less than 1/4W
	1886668 / 84R1923		Alt: RN732BTDD2490B25
			Alt: W1206R033401B-R1
			Alt: ERA-8AEB332V
			Alt: TNPW12063K32BEEN
			Use 10K w/ 10K pot, adjust for desired attenuation
			Alt: CCF50274KFKR36
			Alt: RCWE2512R510FKEA
	63M2669 / 1536328		Alt: MFS1/4DCT52R1003F, CMF50100K00FHEK
			Alt: MFR-12FTF52-22K
			Alt: MFS1/4DCT52R2201F

			0R (jumper), 1R, 5R, 10R, 20R, 80R, 100R, 120R, etc. See build instr.
	1277013 / 41K8853		

	1457636		
	1457636		
			2 with 40.2K resistor. 12 with 4.9k resistor.
	1818631	715-2669	
			Alt: C322C475K5R5TA, any 4.7uF 50V X7R MLCC that fits
			Also in stock at Arrow and Verical
			Use only if C4 is not installed
TAP106K035SCS-VP	1650974 / 19C6247		
			optional bypassing, wire across cap leads on back of PCB
			optional bypassing