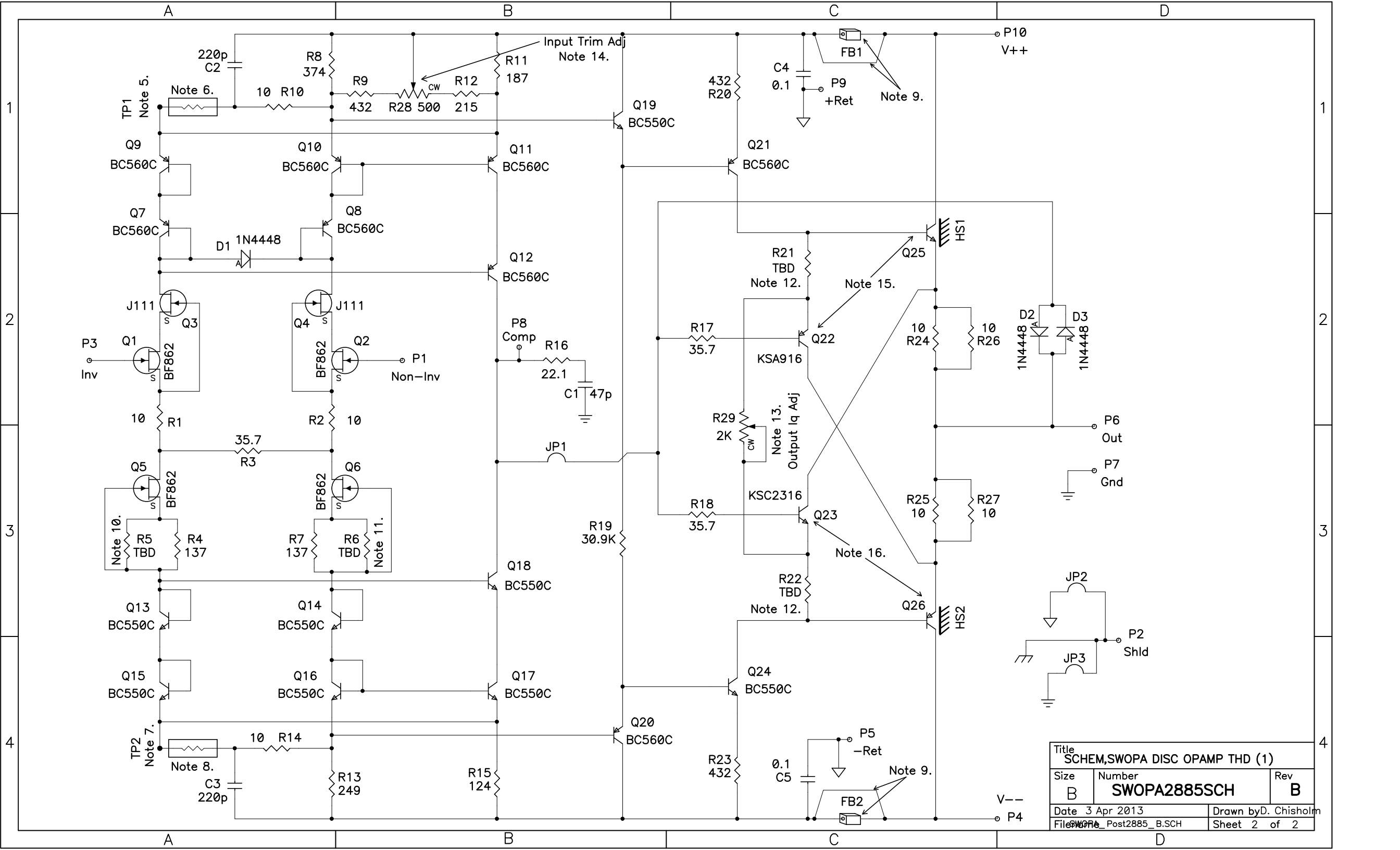


A		B		C		D	
1	Notes (Unless Otherwise Indicated):						1
	16 Provide thermal coupling between Q23 and Q26 by joining Q23 to Q26 with suitable adhesive or spring coupling device.						
	15 Provide thermal coupling between Q22 and Q25 by joining Q22 to Q25 with suitable adhesive or spring coupling device.						
	14 Input Balance Adjustment. Adjust to minimize input offset or overall THD as required by application.						
	13 Adjust for desired output stage bias current, or desired total module current. Typical adjustment values:						
	VARIANT:      Ic Q25/Q26      Iq (Total)      Min Load Z (Ohms)						
	-0            6.2 mA            25.0 mA            600						
	-1            27.8 mA            47.5 mA            150						
	12 Value sets range of output stage bias adjust. See Parts List.						
	11 Selected value.						
2	Selection criteria: 5 mA idle current through R13						
	Nominal value 162 ohms. Expected range 20 ohms to 4320 ohms.						
	10 Selected value.						
	Selection criteria: 10 mA idle current through R15						
	Nominal value 162 ohms. Expected range 20 ohms to 4320 ohms.						
	Select after selecting R7						
	9 Cut trace or remove jumper if indicated component is installed.						
	8 For alternative compensation method install R14 in this location rather than location shown.						
	7 Locate TP2 adjacent to R14 so that R14 may be installed either as shown, or in the alternate position between TP2 and C3.						
	6 For alternative compensation method install R10 in this location rather than location shown.						
3	5 Locate TP1 adjacent to R10 so that R10 may be installed either as shown, or in the alternate position between TP1 and C2.						
	4 Last Reference Designator used:						
	C5, D3, FB2, HS2, JU3, P10, Q26, R29						
	Reference Designator not used: None						
	3 Fixed resistors thin film or metal film, 250 mW min, 1% or better tol, except as noted.						
	Polarized capacitors aluminum electrolytic, rating as shown, tol +/-20% unless otherwise noted.						
	Non-polarized capacitors see parts list for construction & rating						
	2 Component values shown for reference only. Refer to parts list associated with specific variant and revision level.						
	1 VARIANTS:						
	SWOPA2885-0 T092 Output Devices						
SWOPA2885-1 T0126 Output Devices (High Bias)							
Revision Notes							
B. Schematic rev increased to synchronize with PWB rev.							
A. Preliminary development version of this dwg # and title. Not released. Circulated for comments. Circuit based on Post #2593 and #2643 in "Discrete Opamp Open Design" thread on "diyaudio.com". Available online at <							
<a href="http://www.diyaudio.com/forums/analog-line-level/218373-discrete-opa-p-open-design-260.html#post3324000">http://www.diyaudio.com/forums/analog-line-level/218373-discrete-opa-p-open-design-260.html#post3324000</a> > and <							
<a href="http://www.diyaudio.com/forums/analog-line-level/218373-discrete-opa-p-open-design-265.html#post3344901">http://www.diyaudio.com/forums/analog-line-level/218373-discrete-opa-p-open-design-265.html#post3344901</a> >.							
Title SCHEM,SWOPA DISC OPAMP THD (1)							
Size B		Number SWOPA2885SCH			Rev B		
Date 3 Apr 2013		Drawn byD. Chisholm			In		
Filename SWOPA_Post2885_B.SCH		Sheet 1 of 2					
A		B		C		D	



Assy Dwg #  
Dwg Title  
Rev  
Schem Dwg #  
Schem Title  
Rev

SWOPA2885ASY  
PCB ASSY,SW-OPA DISC OPAMP THD (1)  
SWOPA2885SCH  
SCHEM,SWOPA DISC OPAMP THD (1)  
B

Orig Date  
Assy Short Name  
Rev Date  
Orig Date  
Rev Date  
Engineer

6-May-13  
SWOPA Disc Opamp THD1  
6-May-13  
6-May-13  
6-May-13  
6-May-13  
Dale Chisholm

ITEM	REF DES	DESCRIPTION	Unit of Meas	VARIANT USAGE:		Original Part Manufacturer (Pref)		ORIGINAL COMPONENT MANUFACTURER				LINE COST PER VARIANT:		Original Part Manufacturer (Alternative)		ALTERNATIVE COMPONENT MANUFACTURER				LINE COST PER VARIANT:	
				-0	-1	MFGR	MFGR P/N	Unit Cost	Purch Qty	Mfrgr. Typical Source	Vendor P/N	-0	-1	MFGR	MFGR P/N	Unit Cost	Purch Qty	Vendor	Vendor P/N	-0	-1
1	<none>	SW-OPA DISC OPAMP THD(1) PWB	Ea	X	X	Pending	SWOPA2885PWB1			TBD	TBD	.0000	.0000	Pending	SWOPA2885PWB1			TBD	TBD	.0000	.0000
2	C1	Cap,Film PP 47pF	Ea	X	X	WIMA	FKP20100471D00KSSD	.1900	10	Mouser	505-FKP247/1000/10	.1900	.1900	WIMA	FKP20100471D00JSSD	.2886	25	TAW Electronics	FKP20100471D00JSSD	.2886	.2886
3	C2	Cap,Film PP 220pF 100V 5mm	Ea	X	X	WIMA	FKP20102201D00JSSD	.2400	10	Mouser	505-FKP2220/1000/5	.2400	.2400	WIMA	FKP20102201D00JSSD	.2821	25	TAW Electronics	FKP20102201D00JSSD	.2821	.2821
4	C3	Cap,Film PP 220pF 100V 5mm	Ea	X	X	WIMA	FKP20102201D00JSSD	.2400	10	Mouser	505-FKP2220/1000/5	.2400	.2400	WIMA	FKP20102201D00JSSD	.2821	25	TAW Electronics	FKP20102201D00JSSD	.2821	.2821
5	C4	Cap,Film 0.10uF 63V 5mm	Ea	X	X	WIMA	MKS2-.1/63/5	.2000	10	Mouser	505-MKS2.1/63/5	.2000	.2000	Kemet	R82DC3100AA50J	.1510	10	Digi-Key	399-5863-ND	.1510	.1510
6	C5	Cap,Film 0.10uF 63V 5mm	Ea	X	X	WIMA	MKS2-.1/63/5	.2000	10	Mouser	505-MKS2.1/63/5	.2000	.2000	Kemet	R82DC3100AA50J	.1510	10	Digi-Key	399-5863-ND	.1510	.1510
7	D1	Diode,SI Switch 100V 200mA 4nSec 1N4448	Ea	X	X	NXP Semiconductors	1N4448,113	.0920	1	Digi-Key	568-1361-1-ND	.0920	.0920	Vishay	1N4448TR	.0460	10	Mouser	78-1N4448	.0460	.0460
8	D2	Diode,SI Switch 100V 200mA 4nSec 1N4448	Ea	X	X	NXP Semiconductors	1N4448,113	.0920	1	Digi-Key	568-1361-1-ND	.0920	.0920	Vishay	1N4448TR	.0460	10	Mouser	78-1N4448	.0460	.0460
9	D3	Diode,SI Switch 100V 200mA 4nSec 1N4448	Ea	X	X	NXP Semiconductors	1N4448,113	.0920	1	Digi-Key	568-1361-1-ND	.0920	.0920	Vishay	1N4448TR	.0460	10	Mouser	78-1N4448	.0460	.0460
10	FB1	Bead,Ferrite Interference Supp 96 Ohms/25 MHz, 0.5A	Ea	X	X	Fair-Rite	2743007112	.1200	1	Mouser	623-2743007112	.1200	.1200	Panasonic	EXCELSA39	.1400	1	Digi-Key	P9818NK-ND	.1400	.1400
11	FB2	Bead,Ferrite Interference Supp 96 Ohms/25 MHz, 0.5A	Ea	X	X	Fair-Rite	2743007112	.1200	1	Mouser	623-2743007112	.1200	.1200	Panasonic	EXCELSA39	.1400	1	Digi-Key	P9818NK-ND	.1400	.1400
12	HS1	Heatsink,TO126 Clip On	Ea		X	Aavid Thermalloy	577500B00000G	.4000	1	Digi-Key	HS216_ND		.4000	Assmann WSW	V2110B	.4300	1	Digi-Key	A10750-ND		.4300
13	HS1	Heatsink,TO126 Clip On	Ea		X	Aavid Thermalloy	577500B00000G	.4000	1	Digi-Key	HS216_ND		.4000	Assmann WSW	V2110B	.4300	1	Digi-Key	A10750-ND		.4300
14	JP1	Jumper,Wire, 0.35" x 26AWG Solid	Ea	X	X	Belden	9976 009100	.0077	100 FT	Mouser	566-9976-100-09	.0077	.0077	General Cable/Carol	C2117A,12.02	.0076	100 FT	Digi-Key	C2117W-100-ND	.0076	.0076
15	JP2	Jumper,Wire, 0.35" x 26AWG Solid	Ea	X	X	Belden	9976 009100	.0077	100 FT	Mouser	566-9976-100-09	.0077	.0077	General Cable/Carol	C2117A,12.02	.0076	100 FT	Digi-Key	C2117W-100-ND	.0076	.0076
16	JP3	Jumper,Wire, 0.35" x 26AWG Solid	Ea	X	X	Belden	9976 009100	.0077	100 FT	Mouser	566-9976-100-09	.0077	.0077	General Cable/Carol	C2117A,12.02	.0076	100 FT	Digi-Key	C2117W-100-ND	.0076	.0076
17	P1	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
18	P2	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
19	P3	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
20	P4	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
21	P5	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
22	P6	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
23	P7	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
24	P8	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
25	P9	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
26	P10	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	X	X	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-31252000000000	.2200	.2200	Cambion	460-2627-2					.0000	.0000
27	Q1	XSTR,BF862 N-JFET Hi-Gm RF SOT23	Ea	X	X	NXP Semiconductors	BF862,215	.2700	1	Mouser	771-BF862-T/R	.2700	.2700	NXP Semiconductors	BF862,215	.3790	10	Digi-Key	568-1968-1-ND	.3790	.3790
28	Q2	XSTR,BF862 N-JFET Hi-Gm RF SOT23	Ea	X	X	NXP Semiconductors	BF862,215	.2700	1	Mouser	771-BF862-T/R	.2700	.2700	NXP Semiconductors	BF862,215	.3790	10	Digi-Key	568-1968-1-ND	.3790	.3790
29	Q3	XSTR,N-JFET J111 Hi-Vp Switch TO-92	Ea	X	X	Fairchild	J111	.1600	1	Mouser	512-J111	.1600	.1600	Fairchild	J111	.4900	1	Digi-Key	J111FS-ND	.4900	.4900
30	Q4	XSTR,N-JFET J111 Hi-Vp Switch TO-92	Ea	X	X	Fairchild	J111	.1600	1	Mouser	512-J111	.1600	.1600	Fairchild	J111	.4900	1	Digi-Key	J111FS-ND	.4900	.4900
31	Q5	XSTR,BF862 N-JFET Hi-Gm RF SOT23	Ea	X	X	NXP Semiconductors	BF862,215	.2700	1	Mouser	771-BF862-T/R	.2700	.2700	NXP Semiconductors	BF862,215	.3790	10	Digi-Key	568-1968-1-ND	.3790	.3790
32	Q6	XSTR,BF862 N-JFET Hi-Gm RF SOT23	Ea	X	X	NXP Semiconductors	BF862,215	.2700	1	Mouser	771-BF862-T/R	.2700	.2700	NXP Semiconductors	BF862,215	.3790	10	Digi-Key	568-1968-1-ND	.3790	.3790
33	Q7	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
34	Q8	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
35	Q9	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
36	Q10	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
37	Q11	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
38	Q12	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
39	Q13	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
40	Q14	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
41	Q15	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
42	Q16	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
43	Q17	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
44	Q18	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
45	Q19	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC550CUBU	.0500	1	Mouser	512-BC550CUBU	.0500	.0500	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	.1712	.1712
46	Q20	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000
47	Q21	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	X	X	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.1100	.1100	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.1000	.1000



Assy Dwg #  
Dwg Title  
Rev  
Schem Dwg #  
Schem Title  
Rev

SWOPA2885ASY  
PCB ASSY,SW-OPA DISC OPAMP THD (1)  
B  
SWOPA2885SCH  
SCHEM,SWOPA DISC OPAMP THD (1)  
B

Orig Date  
Assy Short Name  
Rev Date  
Orig Date  
  
Rev Date  
Engineer

6-May-13  
SWOPA Disc Opamp THD1  
6-May-13  
6-May-13  
  
6-May-13  
Dale Chisholm

ITEM	REF DES	DESCRIPTION	Unit of Meas	QTY PER VER:		PREFERRED MANUFACTURER				LINE COST PER VERSION:		ALTERNATE MANUFACTURER				LINE COST PER VERSION:					
				-0	-1	Original Part Manufacturer (Pref) MFGFR	MFGFR P/N	Unit Cost	Purch Qty	Pref. Mfg. Typical Source Vendor	Vendor P/N	-0	-1	Original Part Manufacturer (Alt) MFGFR	MFGFR P/N	Unit Cost	Purch Qty	Alternate Manufacturer Typical Source Vendor	Vendor P/N	-0	-1
1	<none>	SW-OPA DISC OPAMP THD(1) PWB	Ea	1	1	Pending	SWOPA2885PWB1			TBD	TBD	Pending	SWOPA2885PWB1			TBD	TBD	.0000	.0000		
2	C1	Cap,Film PP 47pF	Ea	1	1	WIMA	FKP2O100471D00KSSD	.1900	10	Mouser	505-FKP247/1000/10		WIMA	FKP2O100471D00JSSD	.2886	25	TAW Electronics	FKP2O100471D00JSSD	.2886	.2886	
3	C2, C3	Cap,Film PP 220pF 100V 5mm	Ea	2	2	WIMA	FKP2O102201D00JSSD	.2400	10	Mouser	505-FKP2220/1000/5		WIMA	FKP2O102201D00JSSD	.2821	25	TAW Electronics	FKP2O102201D00JSSD	.5642	.5642	
4	C4, C5	Cap,Film 0.10uF 63V 5mm	Ea	2	2	WIMA	MKS2-.1/63/5	.2000	10	Mouser	505-MKS2.1/63/5		Kemet	R82DC3100AA50J	.1510	10	Digi-Key	399-5863-ND	.3020	.3020	
5	D1, D2, D3	Diode,Si Switch 100V 200mA 4nSec 1N4448	Ea	3	3	NXP Semiconductors	1N4448,113	.0920	1	Digi-Key	568-1361-1-ND		Vishay	1N4448TR	.0460	10	Mouser	78-1N4448	.1380	.1380	
6	FB1, FB2	Bead,Ferrite Interference Supp 96 Ohms/25 MHz, 0.5A	Ea	2	2	Fair-Rite	2743007112	.1200	1	Mouser	623-2743007112		Panasonic	EXCELSA39	.1400	1	Digi-Key	P9818NK-ND	.2800	.2800	
7	HS1, HS2	Heatsink,TO126 Clip On	Ea	0	2	Aavid Thermalloy	577500B00000G	.4000	1	Digi-Key	HS216_ND		Assmann WSW	V2110B	.4300	1	Digi-Key	A10750-ND	.0000	.8600	
8	JP1, JP2, JP3	Jumper,Wire, 0.35" x 26AWG Solid	Ea	3	3	Belden	9976 009100	.0077	100 FT	Mouser	566-9976-100-09		General Cable/Carol	C2117A.12.02	.0076	100 FT	Digi-Key	C2117W-100-ND	.0228	.0228	
9	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10	Pin,0.040" Contact, Staked, 0.043" Mtg Hole, 0.170" Standoff, 0.062" PWB	Ea	10	10	Mill-Max	3125-2-00-00-00-00-08-0	.2200	10	Mouser	575-3125200000000	2.2000	2.2000	Cambion	460-2627-2				.0000	.0000	
10	Q1, Q2, Q5, Q6	XSTR,BF862 N-JFET Hi-Gm RF SOT23	Ea	4	4	NXP Semiconductors	BF862,215	.2700	1	Mouser	771-BF862-T/R	1.0800	1.0800	NXP Semiconductors	BF862,215	.3790	10	Digi-Key	568-1968-1-ND	1.5160	1.5160
11	Q3, Q4	XSTR,N-JFET J111 Hi-Vp Switch TO-92	Ea	2	2	Fairchild	J111	.1600	1	Mouser	512-J111	.3200	.3200	Fairchild	J111	.4900	1	Digi-Key	J111FS-ND	.9800	.9800
12	Q7, Q8, Q9, Q10, Q11, Q12, Q20, Q21	XSTR,BC560 PNP 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	8	8	Fairchild	BC560CTA	.1100	1	Mouser	512-BC560CTA	.8800	.8800	ON Semiconductor	BC560CG	.1000	1	Mouser	863-BC560CG	.8000	.8000
13	Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q24	XSTR,BC550 NPN 45V 100 mA Hi-HFE Lo-Noise TO-92	Ea	8	8	Fairchild	BC550CBU	.0500	1	Mouser	512-BC550CBU	.4000	.4000	ON Semiconductor	BC550CG	.1712	25	Digi-Key	BC550CGOS-ND	1.3696	1.3696
14	Q22	XSTR,KSA916 PNP 120V 800 mA Driver TO-92L ECB Pinout	Ea	1	1	Fairchild	KSA916YTA	.1600	1	Mouser	512-KSA916YTA	.1600	.1600	Fairchild	KSA916YTA	.5600	1	Digi-Key	KSA916YTACT-ND	.5600	.5600
15	Q23	XSTR,KSC2316 NPN 120V 800 mA Driver TO-92L ECB Pinout	Ea	1	1	Fairchild	KSC2316YTA	.0573	1	Arrow	KSC2316YTA	.0573	.0573	Fairchild	KSC2316YTA	.0573	1	Arrow	KSC2316YTA	.0573	.0573
16	Q25	XSTR,KSC2316 NPN 120V 800 mA Driver TO-92L ECB Pinout	Ea	1	0	Fairchild	KSC2316YTA	.0573	1	Arrow	KSC2316YTA	.0573	.0000	Fairchild	KSC2316YTA	.0573	1	Arrow	KSC2316YTA	.0573	.0000
17	Q25	XSTR,KSC2690A NPN 160V 1.2 A Med Pwr TO-126	Ea	0	1	Fairchild	KSC2690AYS	.3800	1	Mouser	512-KSC2690AYS	.0000	.3800	Fairchild	KSC2690AYS	.5400	1	Digi-Key	KSC2690AYSFS-ND	.0000	.5400
18	Q26	XSTR,KSA916 PNP 120V 800 mA Driver TO-92L ECB Pinout	Ea	1	0	Fairchild	KSA916YTA	.1600	1	Mouser	512-KSA916YTA	.1600	.0000	Fairchild	KSA916YTA	.5600	1	Digi-Key	KSA916YTACT-ND	.5600	.0000
19	Q26	XSTR,KSA1220A PNP 160V 1.2 A Med Pwr TO-126	Ea	0	1	Fairchild	KSA1220AYS	.3700	1	Mouser	512-KSA1220AYS	.0000	.3700	Fairchild	KSA1220AYS	.4300	1	Digi-Key	KSA1220AYSFS-ND	.0000	.4300
20	R1, R2, R10, R14, R24, R25, R26, R27	Res,Metal Film 1/4W 1% RN60 10.0 ohm	Ea	8	8	Vishay/Dale	RN60D10R0FRE6	.1100	1	Mouser	71-RN60D-F-10/R	.8800	.8800	Vishay/Dale	RN60D10R0FB14	.2723	100	Digi-Key	1135-1563-MIL	2.1784	2.1784
21	R3, R17, R18	Res,Metal Film 1/4W 1% RN60 35.7 ohm	Ea	3	3	Vishay/Dale	RN60D35R7FB14	.1100	1	Mouser	71-RN60D35R7F	.3300	.3300	Vishay/Dale	CMF5535R700FHFB	.5890	10	Digi-Key	CMF35.7HFCT-ND	1.7670	1.7670
22	R4, R7	Res,Metal Film 1/4W 1% RN60 137 ohm	Ea	2	2	Vishay/Dale	RN60D1370FB14	.1100	1	Mouser	71-RN60D-F-137	.2200	.2200	Vishay/Dale	CMF55137R00FHFB	.5890	10	Digi-Key	CMF137HFCT-ND	1.1780	1.1780
23	R5	Res,Metal Film 1/4W 1% RN60 Selected Value	Ea	1	1	Vishay/Dale	RN60D****FB14	.3300	1	Mouser	TBD	.3300	.3300	Vishay/Dale	CMF55*****0FHFB	.5890	10	Digi-Key	TBD	.5890	.5890
24	R6	Res,Metal Film 1/4W 1% RN60 Selected Value	Ea	1	1	Vishay/Dale	RN60D****FB14	.3300	1	Mouser	TBD	.3300	.3300	Vishay/Dale	CMF55*****0FHFB	.5890	10	Digi-Key	TBD	.5890	.5890
25	R8	Res,Metal Film 1/4W 1% RN60 374 ohm	Ea	1	1	Vishay/Dale	RN60D3740FB14	.1100	1	Mouser	71-RN60D3740F	.1100	.1100	Vishay/Dale	CMF55374R00FHFB	.5890	10	Digi-Key	CMF374HFCT-ND	.5890	.5890

ITEM	REF DES	DESCRIPTION	Unit of Meas	QTY PER VER:		Original Part Manufacturer (Pref)		Pref. Mfgr. Typical Source				LINE COST PER VERSION:		Original Part Manufacturer (Alt)		Alternate ManufacturerTypical Source				LINE COST PER VERSION:	
				-0	-1	MFGFR	MFGFR P/N	Unit Cost	Purch Qty	Vendor	Vendor P/N	-0	-1	MFGFR	MFGFR P/N	Unit Cost	Purch Qty	Vendor	Vendor P/N	-0	-1
26	R9, R20, R23	Res,Metal Film 1/4W 1% RN60 432 ohm	Ea	3	3	Vishay/Dale	RN60D4320FB14	.1100	1	Mouser	71-RN60D-F-432	.3300	.3300	Vishay/Dale	CMF55432R00FHFB	.5890	10	Digi-Key	CMF432HFCT-ND	1.7670	1.7670
27	R11	Res,Metal Film 1/4W 1% RN60 187 ohm	Ea	1	1	Vishay/Dale	RN60D1870FB14	.2000	1	Mouser	71-RN60D1870F	.2000	.2000	Vishay/Dale	CMF55187R00FHFB	.5890	10	Digi-Key	CMF187HFCT-ND	.5890	.5890
28	R12	Res,Metal Film 1/4W 1% RN60 215 ohm	Ea	1	1	Vishay/Dale	RN60D2150FB14	.1100	1	Mouser	71-RN60D-F-215	.1100	.1100	Vishay/Dale	CMF55215R00FHFB	.5890	10	Digi-Key	CMF215HFCT-ND	.5890	.5890
29	R13	Res,Metal Film 1/4W 1% RN60 249 ohm	Ea	1	1	Vishay/Dale	RN60D2490FB14	.1100	1	Mouser	71-RN60D-F-249	.1100	.1100	Vishay/Dale	RN60D2490FB14	.2723	100	Digi-Key	1135-1590-MIL	.2723	.2723
30	R15	Res,Metal Film 1/4W 1% RN60 124 ohm	Ea	1	1	Vishay/Dale	RN60D1240FB14	.1100	1	Mouser	71-RN60D-F-124	.1100	.1100	Vishay/Dale	CMF55124R00FHFB	.5890	10	Digi-Key	CMF124HFCT-ND	.5890	.5890
31	R16	Res,Metal Film 1/4W 1% RN60 22.1 ohm	Ea	1	1	Vishay/Dale	RN60D22R1FB14	.1100	1	Mouser	71-RN60D-F-22.1	.1100	.1100	Vishay/Dale	CMF5522R100FKFB	.4660	10	Digi-Key	CMF22.1HGCT-ND	.4660	.4660
32	R19	Res,Metal Film 1/4W 1% RN60 30.9K ohm	Ea	1	1	Vishay/Dale	RN60D3092FB14	.2000	1	Mouser	71-RN60D-F-30.9K	.2000	.2000	Vishay/Dale	CMF5530K900FHFB	.5890	10	Digi-Key	CMF30.9KHFBCT-ND	.5890	.5890
33	R21, R22	Res,Metal Film 1/4W 1% RN60 27.4 ohm	Ea	2	0	Vishay/Dale	RN60D27R4FB14	.1100	1	Mouser	71-RN60D-F-27.4	.2200	.0000	Vishay/Dale	CMF5527R400FHFB	.5890	10	Digi-Key	CMF27.4HFCT-ND	1.1780	.0000
34	R21, R22	Res,Metal Film 1/4W 1% RN60 90.9 ohm	Ea	0	2	Vishay/Dale	RN60D90R9FB14	.1100	1	Mouser	71-RN60D-F-90.9	.0000	.2200	Vishay/Dale	CMF5590R900FHFB	.5890	10	Digi-Key	CMF90.9HFCT-ND	.0000	1.1780
35	R28	Trimpot,Multiturn, Top Adj, 3/8" Thru Hole 500 ohms	Ea	1	1	Vishay/Sternice	T93YB501KT20	1.4400	1	Mouser	72-T93YB-500	1.4400	1.4400	BI Technologies	67YR500LF	1.4000	1	Digi-Key	987-1618-ND	1.4000	1.4000
36	R29	Trimpot,Multiturn, Top Adj, 3/8" Thru Hole 2000 ohms	Ea	1	1	Vishay/Sternice	T93YB202KT20	1.5800	1	Mouser	72-T93YB-2K	1.5800	1.5800	BI Technologies	67YR2KLF	1.4000	1	Digi-Key	987-1506-ND	1.4000	1.4000
37	TB1	PWB Design Feature Only. No Physical Part.	Ea	1	1	N/A	N/A	.0000	1	N/A	N/A	.0000	.0000	N/A	N/A	.0000	1	N/A	N/A	.0000	.0000
38	TB2	PWB Design Feature Only. No Physical Part.	Ea	1	1	N/A	N/A	.0000	1	N/A	N/A	.0000	.0000	N/A	N/A	.0000	1	N/A	N/A	.0000	.0000
39																					
Component Parts Cost:												\$13.534	\$14.866	\$0.000	\$0.000	Component Parts Cost:					