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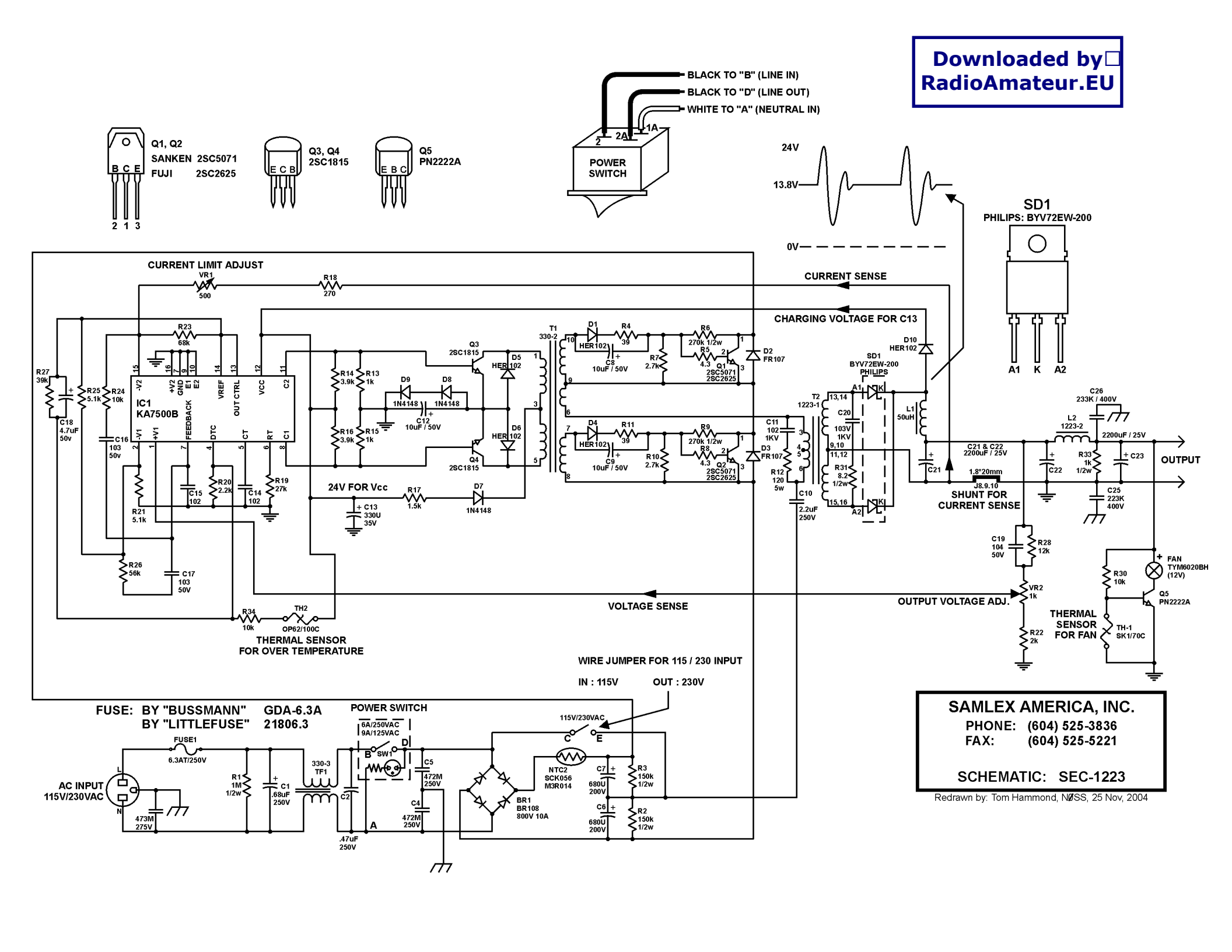

SAMLEX AMERICA, INC.
PHONE: (604) 525-3836
FAX: (604) 525-5221

SCHEMATIC: SEC-1223

Redrawn by: Tom Hammond, NØSS, 25 Nov, 2004

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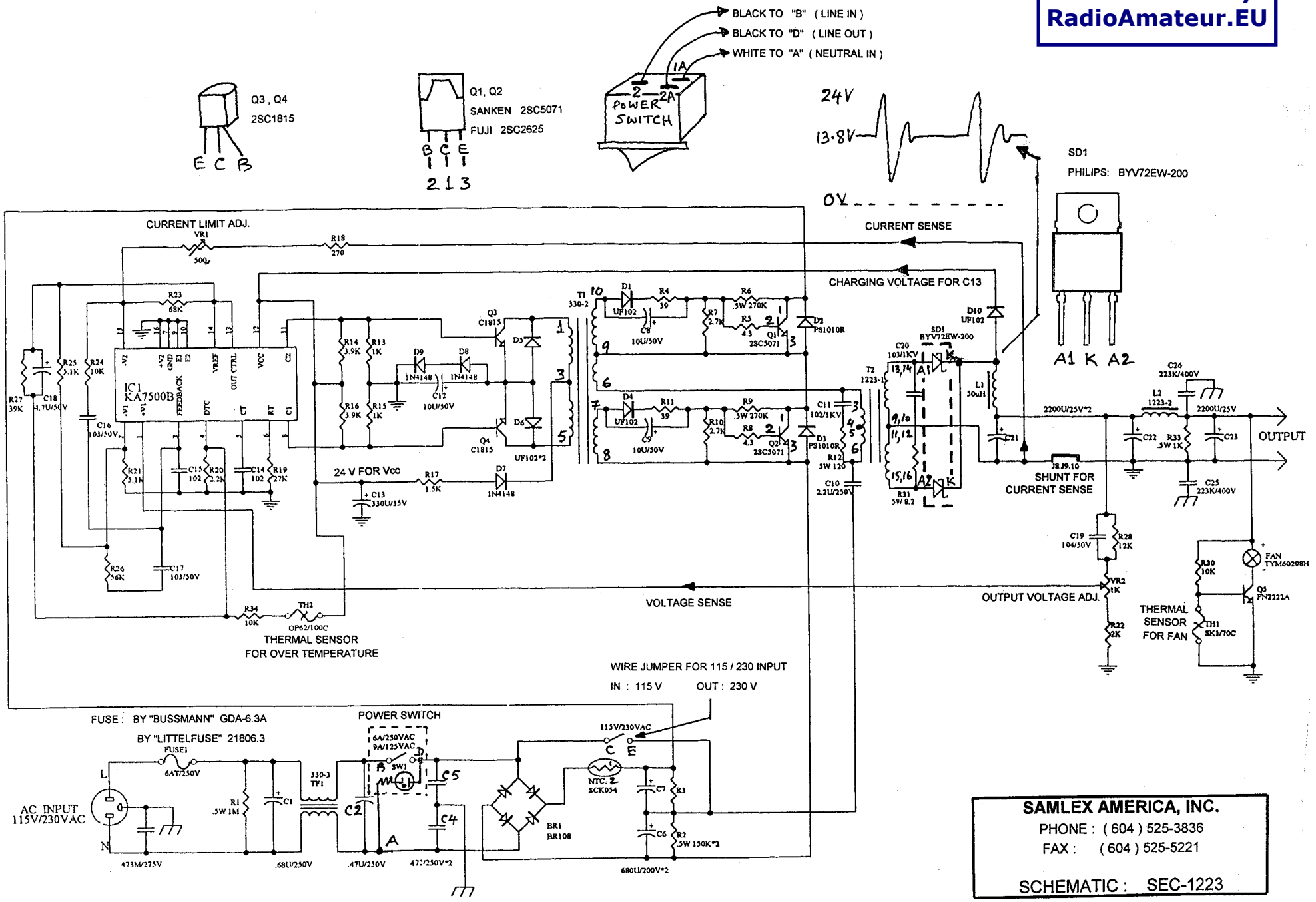

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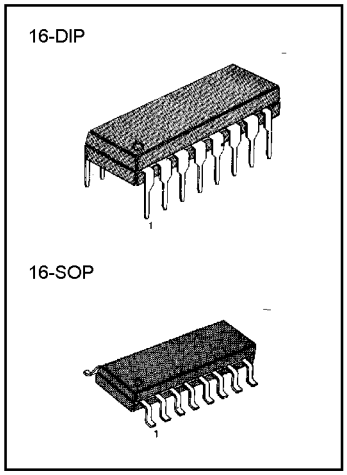
BILL OF MATERIALS - SEC-1223

Parts Name	Specification	Q'ty	Location
P.C.B	SEC12-23	1	
	SQM 5% 5 W 120R	1	R12
Resistor	CR 5% 1/2W 1K	1	R33
Resistor	CR 5% 1/2W 8.2	1	R31
Resistor	CR 5% 1/2W 150K	2	R2.R3
Resistor	CR 5% 1/2W 270K	2	R6.R9
Resistor	CR 5% 1/2W 1M	1	R1
Resistor	CR 5% 1/4W 4.3	2	R5.R8
Resistor	CR 5% 1/4W 270	1	R18
Resistor	39	2	R4.R11
Resistor	1K	2	R13.R15.
Resistor	1.5K	2	R17.29
Resistor	2K	1	R22
Resistor	2.2K	1	R20
Resistor	2.7K	2	R7.R10
Resistor	3.9K	2	R14.R16.
Resistor	5.1K	2	R21.R25
Resistor	10K	3	R24.30.34
Resistor	12K	1	R28
Resistor	27K	1	R19
Resistor	39K	1	R27
Resistor	56K	1	R26
Resistor	68K	1	R23
Jumper Wire	0.8M/M	4	J1.2.3.4.7
Jumper Wire	1.0M/M	1	J8
Jumper Wire	1.2M/M	2	J5.6
Metallized Cap.	(X Cap.) .68UF/250V	1	C1
Metallized Cap.	(X Cap.) .47 UF/250V	1	C2
Metallized Cap.	225K/250V	1	C10
Metallized Cap.	223K/400V	2	C25.C26
Multilayer Cap.	102/50V (NPO)	2	C14.15
Multilayer Cap.	103/50V (X7R)	2	C16.C17
Multilayer Cap.	104/50V (Z5U)	2	C19.24
Ceramic Cap.	102M/1KV	1	C11
Ceramic Cap.	103Z /1KV	1	C20
Ceramic Cap.	(Y Cap.) 222M/400V(AC)	2	AC Socket
Ceramic Cap.	(Y Cap.) 472M/250V(AC)	2	C4.5
Electrolytic Cap.	2200UF/25V (16*25)	3	C21.22.23
Electrolytic Cap.	330UF/35V (10*18)	1	C13
Electrolytic Cap.	4.7UF/50V (5*11)	1	C18
Electrolytic Cap.	10UF/50V (5*11)	3	C8.9.12

Electrolytic Cap.	680UF/200V (25*35)	2	C6.C7
N.T.C	SCK056 / M3R014	1	NTC 2
DIODE	HER102	5	D1.4.5.6.10
DIODE	FR107	2	D2.D3
DIODE	IN4148	3	D7.8.9
DIODE	BYV72EW-200 (PHILIPS)	1	SD1
	FUJI → ← SANKEN		
Transistor	2SC2625 / 2SC5071	2	Q1.Q2
Transistor	2SC1815	2	Q3.Q4
Transistor	PN2222A	1	Q5
IC	KA7500B (SAMSUNG)	1	IC1
	OR TL494IN (MOTOROLA)		
Variable Resistor	500 ohm (501)	1	VR1
Variable Resistor	1K (102)	1	VR2
Transformer	1223-1 (ETD-39)	1	T2
Transformer	330-2 (EE-19L)	1	T1
Transformer	330-3 (ET28)	1	TF1
Transformer	23UH	1	L1
Transformer	1223-2 (R6*20)	1	L2
Bridge Diode	BR108 800V, 10A	1	BR1
Fuse	(UL App.) 6.3AT/250V (5*20	1	FUSE1
Fuse Holder	5*20 (腳距7M/M)	2	FUSE1
Fan	TYM6020BH (12V)	1	Bottom CASE
Spade Terminal (Male)	P850	4	L.N.+.-
Dual Binding Post	WTN-1047	1	Bottom CASE
Housing	Upper COVER	1	
Housing	Bottom CASE	1	
Temperature Switch	OP62/100C/080M/M	1	TH-2
Temperature Switch	SK1/070/05/100	1	TH-1
Power Switch	R992KDET2F	1	Bottom Case
Power Socket	R-301 / SS-7B	1	Bottom Case
Power Cord	America 2 sides/0.75/2M	1	Accessory
Wire	1.8*20M/M	3	J8.9.10
Rubber Foot	T211308	4	Bottom Case
Rubber Tube	HU-12	2	C4.5
Heat Sink	P001 (18M/M)		Lock BR1
Heat Sink	L Type 25*96*8 4 Holes	1	Bottom Case
Fixing Metal	73009-A	1	Heat Sink
Rubber Tube	14*25M/M	2	Back of Q1, Q2
Rubber Sheet	TO-3P	1	Back of SD1
Cable Tie	YJ-98	2	A.B.D

VOLTAGE-MODE PWM CONTROLLER

The KA7500B is used for the control circuit of the pulse width modulation switching regulator. The KA7500B consists of 5V reference voltage circuit, two error amplifiers, flip flop, an output control circuit, a PWM comparator, a dead time comparator and an oscillator. This device can be operated in the switching frequency of 1 KHz to 300 KHz.



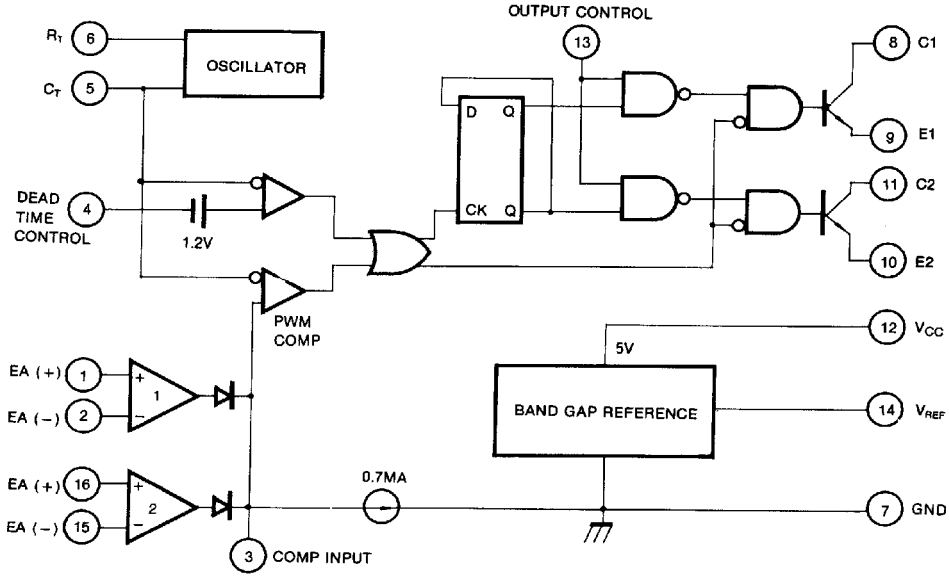
FEATURES

- Internal regulator provides a stable 5V reference supply trimmed to 1 %
- Uncommitted output TR for 200mA sink or source current
- Output control for push-pull or single-ended operation
- Variable duty cycle by dead time control (pin 4) Comlete PWM control circuit
- On-chip oscillator with master or slave operation
- Internal circuit prohibits double pulse at either output

ORDERING INFORMATION

Device	Package	Operating Temperature
KA7500B	16 DIP	0 ~ + 70℃
KA7500BD	16 SOP	0 ~ + 70℃

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	42	V
Collector Supply Voltage	V_C	42	V
Output Current	I_O	250	mA
Amplifier Input Voltage	V_{IN}	V_{CC} + 0.3	V
Power Dissipation (T_A = 25℃)	P_D	1 (KA7500B) 0.9 (KA7500BD)	W
Operating Temperature Range	T_{OPR}	0 ~ +70	℃
Storage Temperature Range	T_{STG}	-65 ~ + 150	℃

ELECTRICAL CHARACTERISTICS

(V_{CC} = 20V, f = 10KHz, T_A = 0℃ to + 70℃, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
REFERENCE SECTION						
Reference Output Voltage	V_{REF}	I_{REF} = 1mA	4.75	5.0	5.25	V
Line Regulation	ΔV_{REF}	V_{CC} = 7V to 40V		2.0	25	mV
Temperature Coefficient of V_{REF}	$\Delta V_{REF}/\Delta T$	T_A = 0℃ to 70℃		0.01	0.03	%/℃
Load Regulation	ΔV_{REF}	I_{REF} = 1mA to 10mA		1.0	15	mV
Short-Circuit Output Currnet	I_{SC}	V_{REF} = 0	10	35	50	mA
OSCILLATOR SECTION						
Oscillation Frequency	f	C_T = 0.01μF, R_T = 12KΩ		10		KHz
Frequency Change with Temperature	$\Delta f/\Delta T$	C_T = 0.01μF, R_T = 12KΩ			2	%
DEAD TIME CONTROL SECTION						
Input Bias Currnet	I_{BIAS}	V_{CC} = 15V, 0V < V_4 < 5.25V		-2.0	-10	μA
Maximum Duty Cycle	$D_{(MAX)}$	V_{CC} = 15V, V_4 = 0V O.C Pin = V_{REF}	45			%
Input Threshold Voltage	V_{ITH}	Zero Duty Cycle		3.0	3.3	V
		Max. Duty Cycle	0			
ERROR AMP SECTION						
Input Offset Voltage	V_{IO}	V_3 = 2.5V		2.0	10	mV
Input Offset Current	I_{IO}	V_3 = 2.5V		25	250	mA
Input Bias Current	I_{BIAS}	V_3 = 2.5V		0.2	1.0	μA
Common Mode Input Voltage	V_{CM}	7V < V_{CC} < 40V	-0.3		V_{CC}	V
Open-Loop Voltage Gain	G_{VO}	0.5V < V_3 < 3.5V	70	95		dB
Unit-Gain Bandwidth	BW			650		KHz

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ELECTRICAL CHARACTERISTICS

(V_{CC} = 20V, f = 10KHz, T_A = 0℃ to + 70℃, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
PWM COMPARATOR SECTION						
Input Threshold Voltage	V_{ITH}	Zero Duty Cycle		4	4.5	V
Input Sink Currnet	I_{SINK}	V_3=0.7V	-0.3	-0.7		mV
OUTPUT SECTION						
Output Saturation Voltage Common Emitter	$V_{CE(SAT)}$	V_E = 0, I_C = 200mA		1.1	1.3	V
Common Collector	$V_{CC(SAT)}$	V_C = 15V, I_E = -200mA		1.5	2.5	
Collector Off-State Currnet	$I_{C(OFF)}$	V_{CC} = 40V, V_{CE} = 40V		2	100	μA
Emitter Off-State Current	$I_{E(OFF)}$	V_{CC} = V_C = 40V, V_E = 0			-100	
TOTAL DEVICE						
Supply Current	I_{CC}	Pin 6 = V_{REF}, V_{CC} = 15V		6	10	mA
OUTPUT SWITCHING CHARACTERISTIC						
Rise Time	t_R					
Common Emitter				100	200	nS
Common Collector				100	200	
Fall Time	t_F					
Common Emitter				25	100	nS
Common Collector				40	100	

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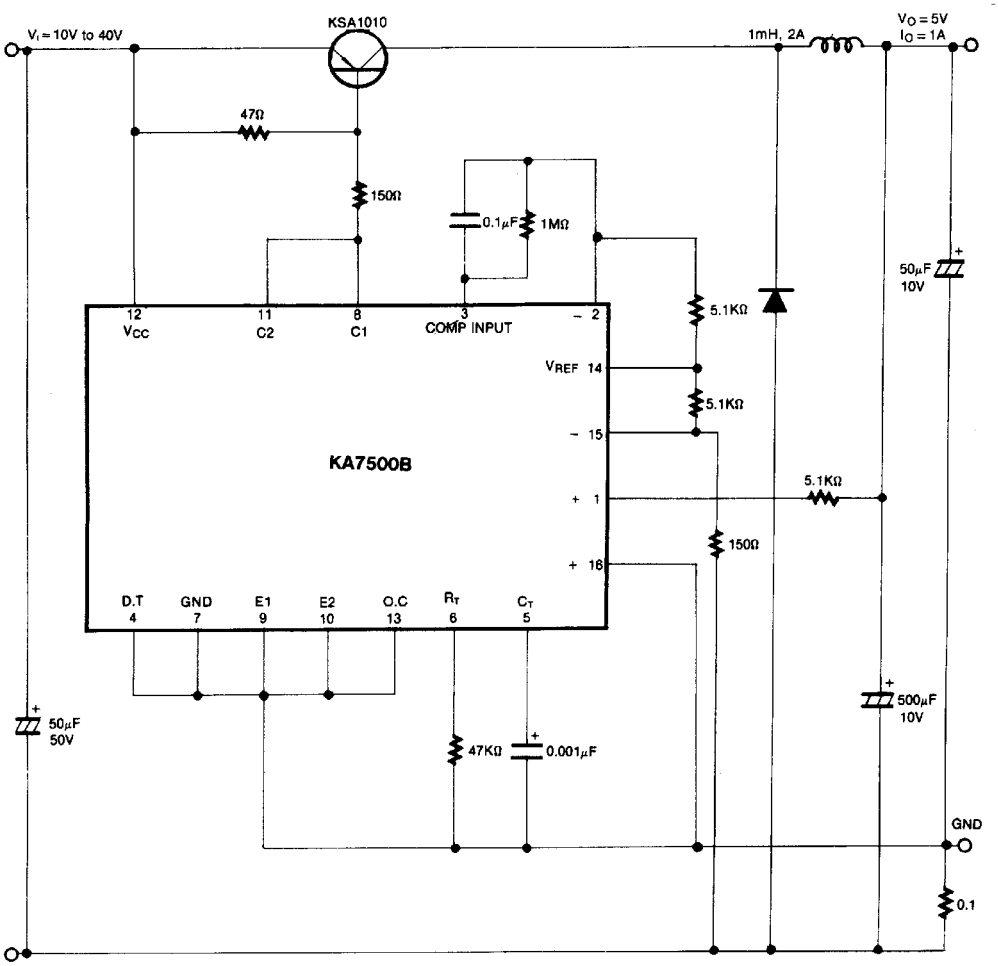
TYPICAL APPLICATION

PLUSE WIDTH MODULATED STEP-DOWN CONVERTER



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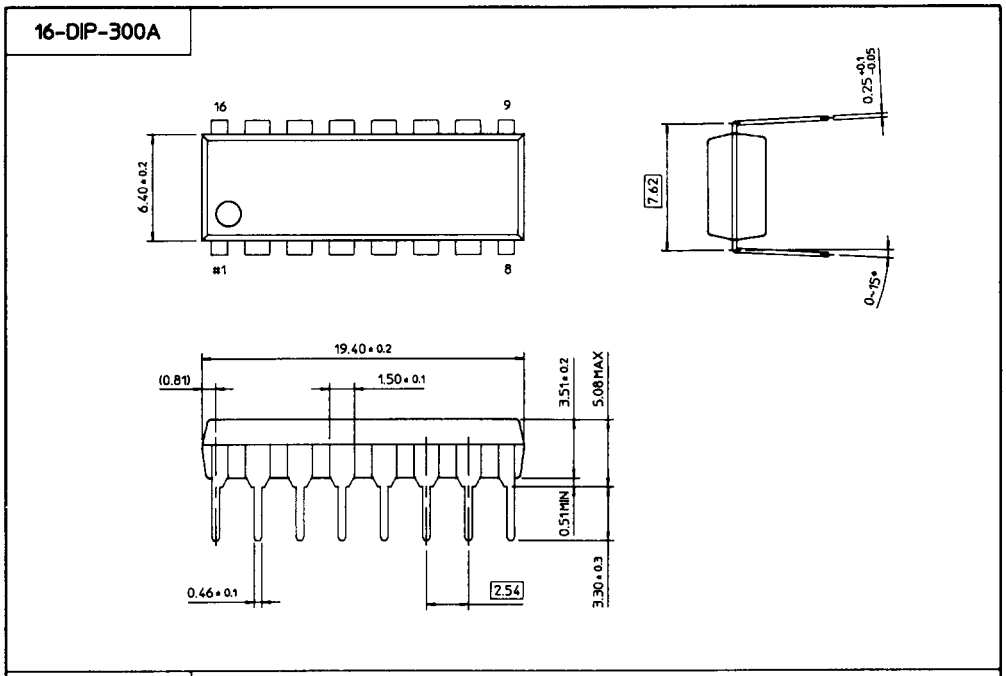
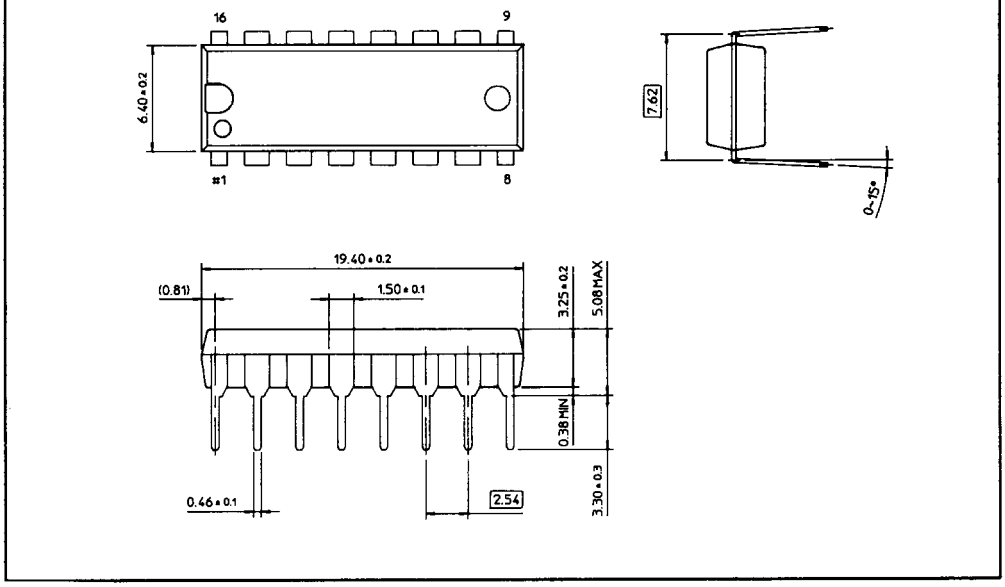
Dimensions in Milimeters

16-DIP-300A



16-DIP-300B



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AUXILLARY RFI (HASH) FILTERING ADDED TO THE SAMLEX SEC-1223 12VDC 23A SWITCHING P/S
BY NIGEL HAYTON, ZL2DF

Document preparation by: Tom Hammond, NØSS 12/16/2004

I needed to suppress the S9 80m birdies generated every 20kHz or so up the band by my Samlex SEC-1223 switching power supply.

The attached documentation and photos are the end result which has removed all the 80m birdies, leaving only faint (S1-2) birdies on 160m.

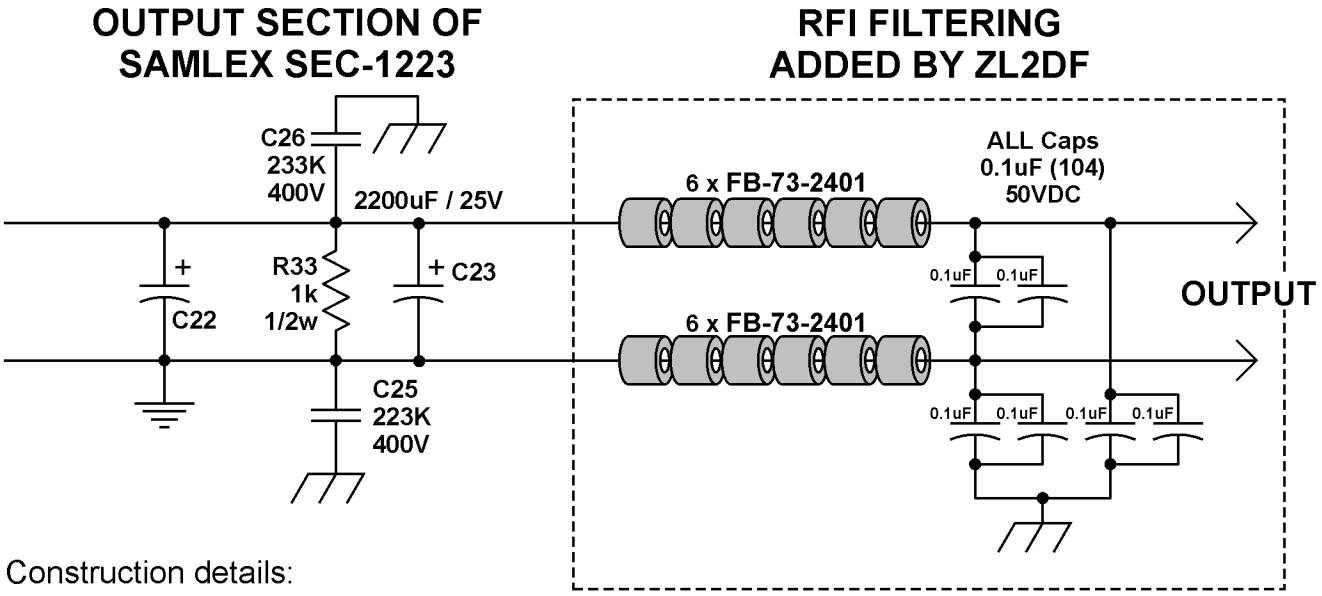
After research on the web, I located XQ2FOD's article on a 13.8V 40A switching supply and duplicated the output filtering he used. Here are some links to Manfred's excellent article:

http://www.qsl.net/xq2fod/Electron/PS40/PS40.html

and

http://ludens.cl/Electron/PS40/PS40.html

There are six (6) FB-73-2401 ferrite beads on each DC output lead, and each lead is also decoupled to circuit ground (and case) with 2x 0.1uf (104) 50VDC ceramics plus a further 2x 0.1uf 50VDC ceramic across the output.



Construction details:

First UNPLUG the power supply from the mains!

I found it easiest to lift the whole heatsink assembly from the bottom case (2 screws on case bottom), leaving the devices attached and being careful not to get all the thermal grease over oneself. I then unsoldered the output leads, slipped on the beads and resoldered them. The earth of the circuit diagram is connected to the four screws holding down the PCB as they clamp the PCB copper track to the case mounting studs at each of the screw holes. Hence terminating the capacitors at the corner screw.

It turned out easier than I first anticipated.

(Photos of Nigel's efforts are shown on the next page.)

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AUXILLARY RFI (HASH) FILTERING ADDED TO THE SAMLEX SEC-1223 12VDC 23A SWITCHING P/S
BY NIGEL HAYTON, ZL2DF
(PICTURES OF THE COMPLETED MOD)