

S/M No. : DSC150BEF0

Service Manual

Color Television

CHASSIS : SC-150

Model : DSC-3220E/3220L



DAEWOO ELECTRONICS Corp.

<http://svc.dwe.co.kr>

DEC . 2002

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1- Main Features

1-1 Specifications

TV standard	PAL - SECAM B/G D/K, PAL I/I, SECAM L/L'
Sound system	NICAM B/G, I, D/K, L, FM 2Carrier B/G, D/K
Power consumption	32" 16:9 Real Flat : 110W approx.
Sound Output Power	7W x2 (at 1KHz, 60% mod, 10% THD)
Speaker	10W(Normal) 8 ohm X 2
Teletext system	10 pages memory FASTEXT (FLOF or TOP)
Aerial input	75 ohm unbalanced
Channel coverage	Off-air channels, S-cable channels and hyperband
Tuning system	frequency synthesiser tuning system
Visual screen	32" : 76Cm
Channel indication	On Screen Display
program Selection	100 programmes
Aux. terminal	EURO-SCART 1 : Audio / Video In and Out, R/G/B In, Slow and Fast switching. EURO-SCART 2 : Audio / Video In and Out, SVHS In. Monitor Out AV3 : Audio-Video Jack on right side of cabinet. Headphone jack (3.5 mm) on right side of cabinet SVHS3 : Jack on right side of cabinet - sound input common with AV3.
Remote Control Unit	R-46G22

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Specification matrix

Chassis Name	SC-150	
Model Name	DSC-3220E	DSC-3220L
VCT Version	3834	
Software Version	A	
Remote Control	R46G22	
PCB Serial Number	4859812224(MAIN)/ 4959812324(Union)	
Tube	16:9 Real Flat	
SVHS 3	✓	
"Picture Improvements, Comb Filter, Horizontal Scaler"	✓	
Teletext Split Screen	✓	
Formats Available in Video Mode	Auto / 4:3 / 14:9 / Zoom 14:9 / Zoom 16:9 / Full Screen	
AV2 Monitor Output	✓	
MSP Version	3410G	3411G
Sound Dffects	Off / Spatial	Off / Spatial / Panorama / Dolby Virtual
Graphic Equalizer	✓	
AV3 Audio Input	Dedicated	
Teletext Page Memory	10 Page	
Top Teletext	Available : Selectable in factory / Service mode by option bits	
Flof Teletext	Available : Selectable in factory / Service mode by option bits	
Text Character Support	"Pan-European Latin, Cyrillic, Greek"	
OSD Languages	"English, French, German, Italian, Spanish,Dutch, Danish, Finnish, Norwegian, Swedish, Greek,Polish, Czech, Slovakian, Romanian, Russian, Bulgarian, Hungarian	
Tuner Options	"Philips, Alps,Partsnic"	

21 Pin EURO-SCART 1 :

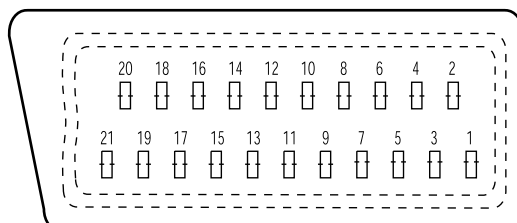
Pin	Signal Description	Matching value
1	Audio Output Right	0.5 Vrms, Impedance < $k\Omega$, (RF 54% Mod)
2	Audio Input Right	0.5 Vrms, Impedance > $10k\Omega$
3	Audio Output Left	0.5 Vrms, Impedance < $k\Omega$, (RF 54% Mod)
4	Audio Earth	
5	Blue Earth	
6	Audio Input Left	0.5 Vrms, Impedance > $10k\Omega$
7	Blue Input	0.7 Vpp \pm 0.1V, Impedance 75Ω
8	Slow Switching	TV : 0 to 2V, AV 16/9 : 4.5 to 7V, AV 4/3 : 9.5 to 12V , Impedance > $10k\Omega$
9	Green Earth	
10	N.C.	
11	Green Input	0.7 Vpp \pm 0.1V, Impedance 75Ω
12	N.C.	
13	Red Earth	
14	Blanking Earth	
15	Red Input	0.7 Vpp \pm 0.1V, Impedance 75Ω
16	Fast Switching	0 to 0.4V : Logic "0", 1 to 3V : Logic "1", Impedance 75Ω
17	Video Out Earth	
18	Video In Earth	
19	Video Output	1 Vpp \pm 3dB, Impedance 75Ω
20	Video Input	1 Vpp \pm 3dB, Impedance 75Ω
21	Common Earth	

21 Pin EURO-SCART 2 :

Pin	Signal Description	Matching value
1	Audio Output Right	0.5 Vrms, Impedance < $1k\Omega$, (RF 54% Mod) - Not available for cp885
2	Audio Input Right	0.5 Vrms, Impedance > $10k\Omega$
3	Audio Output Left	0.5 Vrms, Impedance < $1k\Omega$, (RF 54% Mod) - Not available for cp885
4	Audio Earth	
5	Earth	
6	Audio Input Left	0.5 Vrms, Impedance > $10k\Omega$
7	N.C.	
8	Slow Switching	TV: 0 to 2V, AV 16:9: 4.5V to 7V, AV 4:3: 9.5 to 12V
9	N.C.	
10	N.C.	
11	N.C.	
12	N.C.	
13	Earth	
14	Earth	
15	Chroma Input	\pm 3dB for a luminance signal of 1 Vpp
16	N.C.	
17	Earth	
18	Video In Earth	

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19	Video Output	1 Vpp± 3dB, Impedance 75Ω (Monitor output) - Not available for cp885
20	Video Input, Y In.	1 Vpp± 3dB, Impedance 75Ω
21	Common Earth	



1-2 Channel table

FREQUENCY TABLE

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C01	46.25	-	47.75	49.75
C02	48.25	55.75 (L)	53.75	59.25
C03	55.25	60.5 (L)	61.75	77.25
C04	62.25	63.75 (L)	175.25	85.25
C05	175.25	176.00	183.25	93.25
C06	182.25	184.00	191.25	175.25
C07	189.25	192.00	199.25	183.25
C08	196.25	200.00	207.25	191.25
C09	203.25	208.00	215.25	199.25
C10	210.25	216.00	223.25	207.25
C11	217.25	189.25 (LUX)	231.25	215.25
C12	224.25	69.25 (L)	239.25	223.25
C13	53.75	76.25 (L)	247.25	-
C14	-	83.25 (L)	49.75	-
C15	82.25	90.25	57.75	-
C16	-	97.25	65.75	-
C17	183.75	-	77.75	-
C18	192.25	-	85.75	-
C19	201.25	-	-	-
C20	-	-	-	-
C21	471.25	471.25	471.25	471.25
C22	479.25	479.25	479.25	479.25
C23	487.25	487.25	487.25	487.25
C24	495.25	495.25	495.25	495.25
C25	503.25	503.25	503.25	503.25
C26	511.25	511.25	511.25	511.25
C27	519.25	519.25	519.25	519.25
C28	527.25	527.25	527.25	527.25
C29	535.25	535.25	535.25	535.25
C30	543.25	543.25	543.25	543.25
C31	551.25	551.25	551.25	551.25
C32	559.25	559.25	559.25	559.25
C33	567.25	567.25	567.25	567.25
C34	575.25	575.25	575.25	575.25
C35	583.25	583.25	583.25	583.25
C36	591.25	591.25	591.25	591.25
C37	599.25	599.25	599.25	599.25
C38	607.25	607.25	607.25	607.25
C39	615.25	615.25	615.25	615.25
C40	623.25	623.25	623.25	623.25
C41	631.25	631.25	631.25	631.25

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C42	639.25	639.25	639.25	639.25
C43	647.25	647.25	647.25	647.25
C44	655.25	655.25	655.25	655.25
C45	663.25	663.25	663.25	663.25
C46	671.25	671.25	671.25	671.25
C47	679.25	679.25	679.25	679.25
C48	687.25	687.25	687.25	687.25
C49	695.25	695.25	695.25	695.25
C50	703.25	703.25	703.25	703.25
C51	711.25	711.25	711.25	711.25
C52	719.25	719.25	719.25	719.25
C53	727.25	727.25	727.25	727.25
C54	735.25	735.25	735.25	735.25
C55	743.25	743.25	743.25	743.25
C56	751.25	751.25	751.25	751.25
C57	759.25	759.25	759.25	759.25
C58	767.25	767.25	767.25	767.25
C59	775.25	775.25	775.25	775.25
C60	783.25	783.25	783.25	783.25
C61	791.25	791.25	791.25	791.25
C62	799.25	799.25	799.25	799.25
C63	807.25	807.25	807.25	807.25
C64	815.25	815.25	815.25	815.25
C65	823.25	823.25	823.25	823.25
C66	831.25	831.25	831.25	831.25
C67	839.25	839.25	839.25	839.25
C68	847.25	847.25	847.25	847.25
C69	855.25	855.25	855.25	855.25
C70	863.25	863.25	863.25	863.25
C71	69.25	-	-	-
C72	76.25	-	-	-
C73	83.25	-	-	-
C74	90.25	-	-	-
C75	97.25	-	-	-
C76	59.25	-	-	-
C77	93.25	-	-	-
S01	105.25	104.75	103.25	105.25
S02	112.25	116.75	111.25	112.25
S03	119.25	128.75	119.25	119.25
S04	126.25	140.75	127.25	126.25
S05	133.25	152.75	135.25	133.25
S06	140.25	164.75	143.25	140.25
S07	147.25	176.75	151.25	147.25
S08	154.25	188.75	159.25	154.25
S09	161.25	200.75	167.25	161.25

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
S10	168.25	212.75	-	168.25
S11	231.25	224.75	-	231.25
S12	238.25	236.75	-	238.25
S13	245.25	248.75	255.25	245.25
S14	252.25	260.75	263.25	252.25
S15	259.25	272.75	271.25	259.25
S16	266.25	284.75	279.25	266.25
S17	273.25	296.75	287.25	273.25
S18	280.25	136.00	295.25	280.25
S19	287.25	160.00	303.25	287.25
S20	294.25	-	-	294.25
S21	303.25	303.25	-	303.25
S22	311.25	311.25	311.25	311.25
S23	319.25	319.25	319.25	319.25
S24	327.25	327.25	327.25	327.25
S25	335.25	335.25	335.25	335.25
S26	343.25	343.25	343.25	343.25
S27	351.25	351.25	351.25	351.25
S28	359.25	359.25	359.25	359.25
S29	367.25	367.25	367.25	367.25
S30	375.25	375.25	375.25	375.25
S31	383.25	383.25	383.25	383.25
S32	391.25	391.25	391.25	391.25
S33	399.25	399.25	399.25	399.25
S34	407.25	407.25	407.25	407.25
S35	415.25	415.25	415.25	415.25
S36	423.25	423.25	423.25	423.25
S37	431.25	431.25	431.25	431.25
S38	439.25	439.25	439.25	439.25
S39	447.25	447.25	447.25	447.25
S40	455.25	455.25	455.25	455.25
S41	463.25	463.25	463.25	463.25

1-3 ATSS sorting method

The TV set sweeps all the TV bands from beginning of VHF to end of UHF. The TV controlling software for each program checks if a VPS CNI code is transmitted (this system exists for German, Swiss and Austrian transmissions). If no VPS CNI code is found then the system check if a CNI code is transmitted as part of the teletext transmission (Packet 8/30 format 1). If such a code (VPS or teletext) is found and if this code is in the ATSS list, the program is automatically named.

If the transmission does not have VPS CNI, and no teletext service is available, then there is no possibility of the program being automatically named.

The programs found are then sorted in 4 groups :

Group I : It contains all the pro grams from the selected country and named by the TV controlling software. Within this group the sorting order is fixed by the ATSS list.

Group II : It contains all the pro grams with a strong signal strength which are not listed in group I.

Group III : It contains all the pro grams with a weak signal strength which are not listed in group I.

Group IV : If two or more programs with the same code are found, only the strongest (or if they have the same level the one with the lowest frequency) is listed in group I, II or III. The others are listed in group IV.

Program number	Group	Skip
1	Group I	
2		
...		
n		
n+1	Group II	
...		
m		
m+1		
...	Group III	
p		
p+1		
...	Group IV	✓
q		
q+1		
...	not used	✓
99		
0		

Program number	Group	Skip
1	Group II	
...		
m		
m+1	Group III	
...		
p		
p+1	Group IV	✓
...		
q		
q+1	not used	✓
...		
99		
0		

Special case : **Country selection = Others**

Special case : **France**

Note : If two programs with the same name but a different code are found these two programs are listed in group I, II or III (e.g. Regional program SW3 in Germany).

The sorting order within group II, III, and IV is based on the channel frequency. The Program with the lowest frequency is allocated the first rank in its group, and so forth until the last program of the group which has the highest frequency.

Special case : France

If France is selected, the TV controlling software first sweeps all TV bands with France system selected (positive video modulation) and then a second time with Europe system selected (negative video modulation).

Special case : Switzerland

If Switzerland is selected the TV controlling software first sweeps all TV bands with Europe system selected (negative video modulation) and then a second time with France system selected (positive video modulation).

Special case : GB

Note for satellite receiver users : Before starting ATSS turn On your satellite receiver and tune "SKY NEWS".
If GB is selected the TV controlling software seeks for programs only in UHF (C21 to C70).

The sorting order is :

- 1 - BBC1
- 2 - BBC2
- 3 - ITV
- 4 - CH4
- 5 - CH5
- 6 - NEWS

If two or more "identical" programs (same name but different code e.g. BBC1 and BBC1 Scotland) are found the following programs in the list will be shifted up. (1 - BBC1, 2 - BBC1, 3 - BBC2, 4 -ITV, 5 - CH4, 6 - CH5, 7 - NEWS, ..)

If one of the program above is not found, the associated program number remains empty (freq.=467.25 Mhz - Skip selected - no name - system=GB).

example A : 1 - BBC1, 2 - BBC2, 3 - ITV , 4 - ----, 5 - CH5, 6 - NEWS , ...

example B (if 2 BBC1 found) : 1 - BBC1, 2 - BBC1, 3 - BBC2, 4 - IT V, 5 - -----, 6 - CH5, 7 -NEWS, ...

2 - Safety instruction

WARNING: Only competent service personnel may carry out work involving the testing or repair of this equipment.

X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 26 KV (25" - 28") at max beam current. The high voltage must not, under any circumstances, exceed 29.5 KV (25") or 30 KV (28"). Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY Radiation in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

SAFETY PRECAUTION

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back board removed involves a shock hazard from the receiver.
 - 1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
 - 2) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a high wattage resistor (metal oxide film resistor) in the circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 230 volts, 50 Hz. NEVER connect to DC supply or any other power or frequency.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this equipment have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY Radiation.

3 - Alignment instructions

3-1 Microcontroller configuration : Service mode

To switch the TV set into service mode please see instruction below.

- 1 - Select pr. number 91
- 2 - Adjust sharpness to minimum and exit all menu.
- 3 - Quickly press the key sequence : **RED - GREEN - menu**

To software version is displayed beside the word Service, e.g. “ SERVICE V2.00A”.

To exit SERVICE menu press **menu** key or **Std By** key.

3-2 Service mode navigation

Pr Up / Down remote keys : cycle through the service items available.

Vol- / + remote keys : Decrement / Increment the values within range.

0~7 digit keys : Toggle bits 0~7 in option byte

Order	Item	Default settingh for SC-150
1	PARABOLA	+124
2	HOR WIDTH	-1350
3	CORNER	-97
4	HOR.PARAL	-1
5	V.LINEAR	0
6	EW TRAPEZ	-30
7	S CORRECT	-21
8	H BOW	+100
9	VERT SIZE	+157
10	VERT CENT	+3889
11	RED GAIN	+97
12	GRN GAIN	+87
13	BLUE GAIN	+95
14	RED BIAS	+128
15	GRN BIAS	+128
16	HOR CEN	92
17	AGC LEVEL	-
18	G2-SCREEN	-
19	AFT	-
20	OPTION1	-
21	OPTION2	-
22	MAXV OL	Not used

3-3 Microcontroller configuration : Option bits

These option bits are available from Service mode. First find the OPTION control, and then use keys 0...7 on the remote keypad to control bits 0 to 7 respectively. The table below shows the options available ;

OPTION 1								
	B7	B6	B5	B4	B3	B2	B1	B0
1	TOP text off	FASTEXT FLOF off	TUBE 4:3	AUTO 4:3 switch to PANORAMA	X	SVHS3 disable	Tuner options 00=Philips 01=ALPS 10=Philips (AGC intern) 11=DAEWOO	
0	TOP text on	FASTEXT (FLOF) on	TUBE 16:9	AUTO 4:3 switch to 4:3		SVHS3 enable		

OPTION 2								
	B7	B6	B5	B4	B3	B2	B1	B0
1	Y	Y	Y	PICTURE TILT on	Normal I brightness	See table below. OPTION 2 bits B2 B1 B0		
0				PICTURE TILT off	Normal I brightness +5 steps			

Set all the unused bits, marked 'X', to be 0 for future compatibility.

3-4 TV set Alignment

3-4-1- Local oscillator alignment

Tune a colour bar pattern. The Frequency of the signal carrier must be accurate (Max +/- 10kHz deviation from the nominal channel frequency).

Find "AFT" item in service mode.

Adjust the coil L150 to bring the cursor to central position : 32.

3-4-2- G2 alignment

- Tune a colour bar pattern.
- Find the "G2 - SCREEN" item in service mode.
- Adjust screen volume (on FBT) to bring the cursor to central position : 32.

3-4-3- White balance

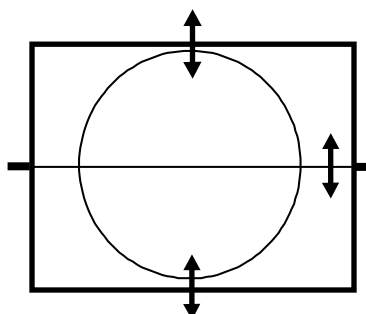
- Select a dark picture and adjust RED BIAS and GRN BIAS to the desired colour temperature.
- Select a bright picture and adjust REC, GRN and BLUE GAIN to the desired colour temperature.

3-4-4- Focus

Adjust the Focus volume (on FBT) to have the best resolution on screen.

3-4-5- Vertical geometry

Adjust V.LINEAR (linearity), S CORRECT (S. Corrention), VERT SIZE (Vertical amplitude), VERT CENT (vertical centing) to compensate for vertical distortion.

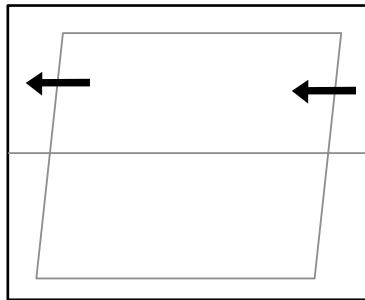


3-4-6- Horizontal picture centring

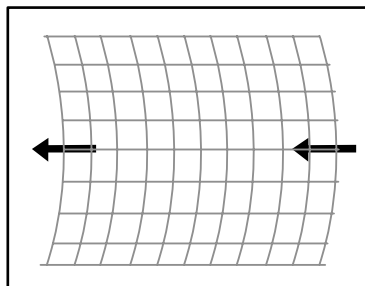
Adjust HOR CEN(Horizontal center) to have the picture in the center of the screen.

3-4-7- Eau/West comection

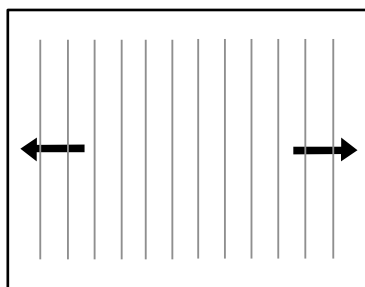
Adjust the PARABOLA, HOR WIDTH, CORNER, HOR PARAL, EW TRAPEZ, H BOW, to compensate for geometrical distorrin,



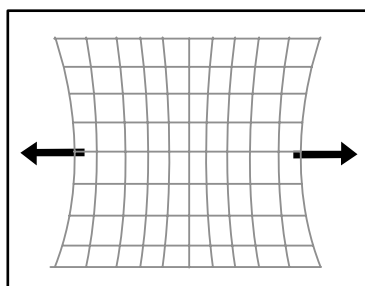
HOR PARAL



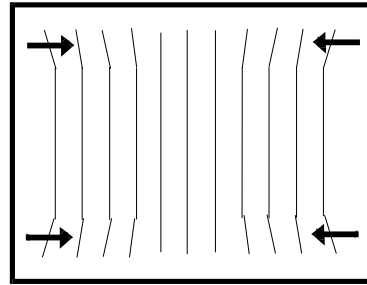
H BOW



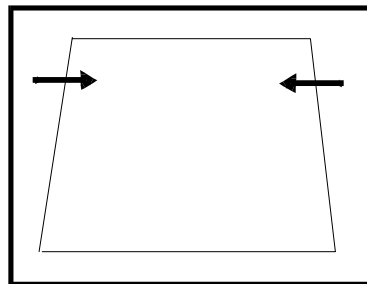
HOR WIDTH For HOR WIDTH, adjust for 91% overscan.



PARAROLA



CORNER



EW TRAPEZ

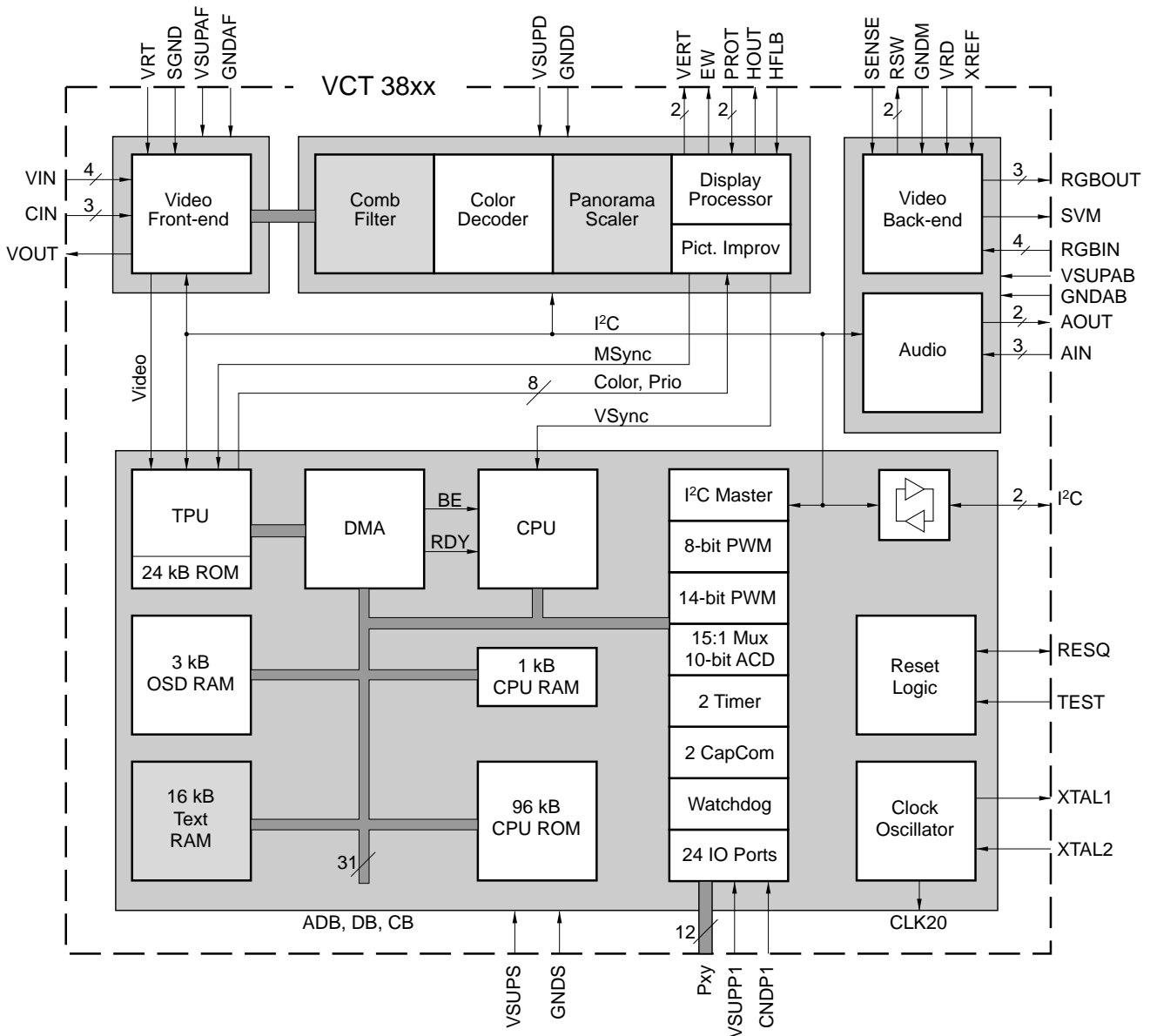
3-4-8- AGC

- Adjust the antenna signal level at $70 \text{ dB}\mu\text{V}\pm 2$
- Tune a colour bar pattern.
- Find the "AGC" item in service mode.
- Adjust AGC volume (RB10) to bring the cursor to central position : 32.

4 - IC description

4-1 VCT383XA TV signal processor - Teletext decoder with embedded 8 bit μ - Controller.

4-1-1- Block diagram of the VCT



4-1-2- TV-signal Processor

- Four composite video inputs, two S-VHS inputs
- Analogue YC r C b input
- Composite video monitor
- Multistandard colour decoder (1 crystal)
- Multistandard sync decoder
- Black-line detector
- Adaptive 2H comb filter Y/C separator

- Horizontal scaling (0.25 to 4)
- Panoramavision
- Black-level expander
- Dynamic peaking
- Soft limiter (gamma corection)
- Colour transient improvement
- Programmable RGB matrix
- Analogue RGB/Fastblank input
- Half-contrast switch
- Picture frame generator
- Scan velocity modulation output
- High-performance H/V deflection
- Angle and bow correction
- Separate ADC for tube measurements
- EHT compensation

4-1-3- μ -Controller

- 8-bit, 10-Mhz CPU (65C02)
- 96 kB program ROM on chip
- 1 kB program RAM on chip
- memory banking
- 16-input, 16-level interrupt controller
- patch module for 10 ROM locations
- two 16-bit reloadable timers
- capture compare module
- watchdog timer
- 14-bit PWM for voltage synthesis
- Four 8-bit PWMs
- 10-bit ADC with 15:1 input MUX
- I2C bus master interface
- 24 programmable I/O ports
- 80C51 μ -controller core standard instruction set and timing
- 1 μ s machine cycle
- 32-128Kx8-bit late programmed ROM
- 3-12Kx8-bit Auxiliary RAM (shared with Display and Acquisition)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- IDLE and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

4-1-4- Teletext Features

- Four programmable video inputs
- Adaptive data slicer
- Signal quality detection
- WST, PDC, VPS, and WSS acquisition

High-level command language
FLOF (Fasttext), and TOP support
10 pages memory on chip (10kB)

4-1-5- Display OSD Features

3kB OSD RAM on chip
WST level 1.5 compliant
WST level 2 parallel attributes
32 foreground/background colours
programmable colour look-up table
1024 mask programmable characters
17 national languages
(Latin, Cyrillic and Greek character sets)
Character matrix 10x10
4-color mode for user font

4-1-6- Audio Features

Three mono inputs
Two mono outputs
Programmable channel select
Volume control for one mono channel

4-1-7- General Features

Submicron CMOS technology
Low-power standby mode
Single 20.25 MHz crystal
64-pin PSDIP package

4-1-8- Data Capture

The Video Front End section takes in the analogue Composite Video and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.

The extraction of the data is performed in the digital domain. The first stage is to select and convert the analogue CVBS signal into a digital form. This is done using 8 bit ADC sampling at 20.25 Mhz.

The digital data services transmitted in the VBI are selected and acquired separately from the video part. This is done by the use of an adaptive data slicer. The following data types can be extracted : 625 line World System Teletext (WST), VPS, WSS. The data is acquired and decoded by the teletext decoder (TPU), then stored in an SRAM Interface.

4-1-9- Data Capture Features

Video Signal Quality detector
Data Capture for 625 line WST
Data Capture for VPS data (PDC system A)
Data Capture for Wide Screen Signalling (WSS) bit decoding
Real-time capture and decoding for WST Teletext in Hardware, to enable optimised microprocessor throughput
10 page memory stored On-Chip

Service manual SC-150

- Inventory of transmitted Teletext pages stored in the Page Table
- Signal quality detector for WST data
- Comprehensive Teletext language coverage
- Full Field Vertical Blanking Interval (VBI) data capture of WST data

4-1-10- TV processor version and μ Controller capacity

IC version	VCT 3832A	VCT 3834A
8 bit μ -controller	✓	✓
ROM size	96k	96k
RAM size	1k	1k
PAL decoder	✓	✓
SECAM decoder	✓	✓
NTSC decoder	✓	✓
Picture improvement	✓	✓
Teletext page memory	10 pages	10 pages
Adaptive Comb filter	X	✓
Panorama Scaler		✓

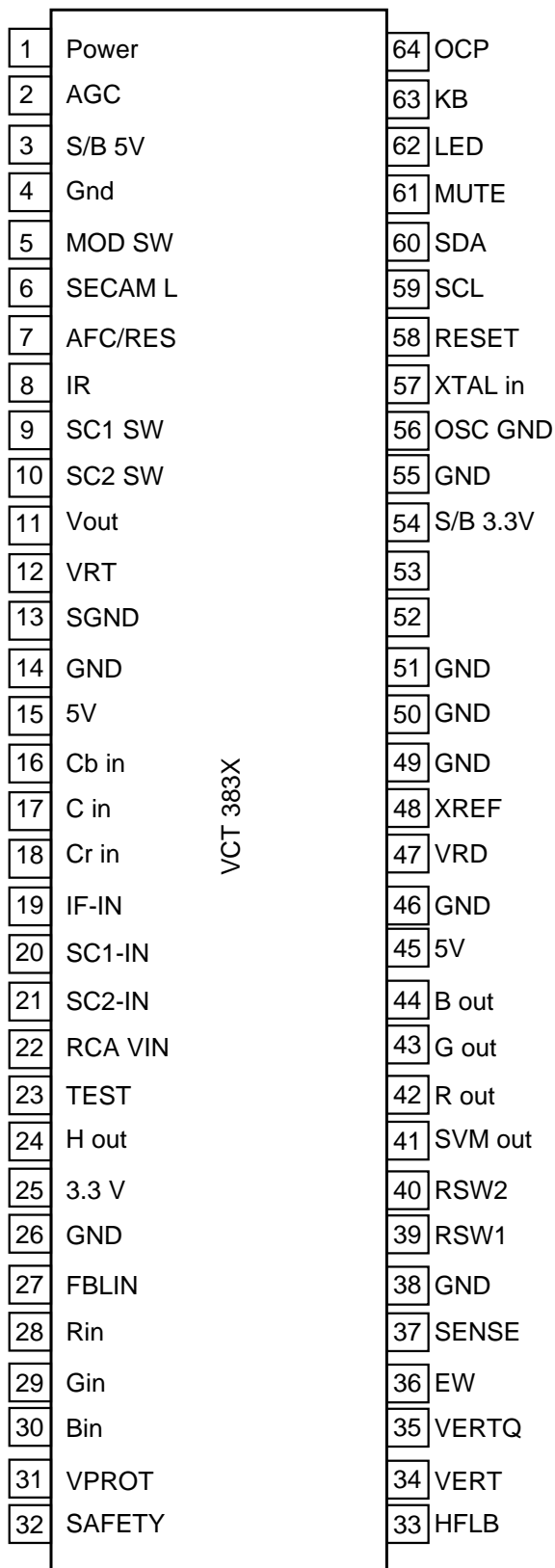
4-1-11- IC marking and version

Chassis	IC marking	OSD languages	ATSS countries	Text
SC-150	VCT3834A	English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek, Polish, Hungarian, Czech, Slovakian, Romanian, Russian, Bulgarian	GB, France, Germany, Italy, Belgium, Spain, Austria, Poland, Switzerland, Denmark, Finland, Netherlands, Norway, Sweden, Ireland, Hungary, Czech Republic, Others	Pan-European Latin. Cyrillic, Greek.

4-1-12- Pinning

PSDIP 64-pin	Pin Name	Type	Short Description
1	Power	OUT	High = SMPS ON, Low = SMPS in stand by mode.
2	AGC	IN	For service only, tuner AGC, TOP alignment.
3	VSUPP1	SUPPLY	Supply Voltage, Port (pin 1, 2, 5, 6, 7, 8, 9, 10, 61, 62, 63, 64).
4	GNDP1	SUPPLY	Ground, Port.
5	MOD_SW	OUT	High = Negative modulation, Low = Positive modulation (L/L').
6	SECAML/L'	OUT	High = L; Low = L.
7	AFC	IN	
8	IR	IN	
9	SC1.SW	IN	
10	SC2.SW	IN	
11	VOUT	OUT	Analog Video Output
12	VRT	IN	Reference Voltage Top, Video ADC
13	SGND	IN	Signal Ground for Analog Input

PSDIP 64-pin	Pin Name	Type	Short Description
14	GNDAF	SUPPLY	Ground, Analog Front-end
15	VSUPAF	SUPPLY	Supply Voltage, Analog Front-end
16	CBIN	IN	Analog Component Cb Input
17	CIN1	IN	Analog Chroma 1 Input
18	CIN2/CRIN	IN	Analog Chroma 2 Input / Analog Component Cr Input
19	VIN1	IN	Analog Video 1 Input
20	VIN2	IN	Analog Video 2 Input
21	VIN3	IN	Analog Video 3 Input
22	VIN4	IN	Analog Video 4 Input
23	TEST	IN	Test Pin, Reserved For Test
24	HOUT	OUT	Horizontal Drive Output
25	VSUPD	SUPPLY	Supply Voltage, Digital Circuitry
26	GNDD	SUPPLY	Ground, Digital Circuitry
27	FBLIN	IN	Fast Blank Input
28	RIN	IN	Analog Red Input
29	GIN	IN	Analog Green Input
30	BIN	IN	Analog Blue Input
31	VPROT	IN	Vertical Protection Input
32	SAFETY	IN	Safety Input
33	HFLB	IN	Horizontal Flyback Input
34	VERTQ/INTLC	OUT	Differential Vertical Sawtooth Output Interlace Control Output
35	VERT	OUT	Differential Vertical Sawtooth Output
36	EW	OUT	Vertical Parabola Output
37	SENSE	IN	Sense ADC Input
38	GNDM	SUPPLY	Ground, MADC Input
39	RSW1	OUT	Range Switch1 for Measurement ADC
40	RSW2	OUT	Range Switch2 for Measurement ADC
41	SVMOUT	OUT	Scan Velocity Modulation Output
42	ROUT	OUT	Analog Red Output
43	GOUT	OUT	Analog Green Output
44	BOUT	OUT	Analog Blue Output
45	VSUPAB	SUPPLY	Supply Voltage, Analog Back-end
46	GNDAB	SUPPLY	Ground, Analog Back-end
47	VRD	IN	DAC Reference
48	XREF	IN	Reference Input for RGB DACs
49	AIN3	IN	Analog Audio 3 Input
50	AIN2	IN	Analog Audio 2 Input
51	AIN1	IN	Analog Audio 1 Input
52	AOUT2	OUT	Analog Audio 2 Output
53	AOUT1	OUT	Analog Audio 1 Output
54	VSUPS	SUPPLY	Supply Voltage, Standby
55	GNDS	SUPPLY	Ground, Standby
56	XTAL1	IN	Analog Crystal Input
57	XTAL2	OUT	Analog Crystal Output
58	RESQ	IN/OUT	Reset Input/Output, Active Low
59	SCL	IN/OUT	I 2 C Bus Clock
60	SDA	IN/OUT	I 2 C Bus Data
61	Mute	OUT	High = Mute active
62	LED	OUT	High = Green, Low = Red
63	KB	IN	Local keyboard ADC input
64	OCF	IN	Over Current Protection input



4-2 MSP341x Multistandard Sound Processor

The MSP 341x is designed as a single-chip Multistandard Sound Processor for applications in analogue and digital TV sets, video recorders, and PC cards.

The MSP3411 has all functions of MSP3410 with the addition of a virtual surround sound feature.

A Surround sound effect can be reproduced with two loudspeakers. The MSP3411 includes virtualizer algorithm "3D Panorama" which has been approved by the Dolby laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP3411 includes Micronas "Panorama" algorithm.

MSP 341x features :

- sound IF input
- No external filters required
- Stereo baseband input via integrated AD converters
- Two pairs of DA converters
- Two carrier FM or NICAM processing
- AVC : Automatic Volume Correction
- Bass, treble, volume processing
- Full SCART in/out matrix without restrictions
- Improved FM-identification
- Demodulator short programming
- Autodetection for terrestrial TV - sound standards
- Precise bit-error rate indication
- Automatic switching from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- Reduction of necessary controlling
- Less external components

4-2-1- Basic Features of the MSP 341x

4-2-1-1 Demodulator and NICAM Decoder Section

The MSP 341x is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM or AM mono TV sound. Alternatively, two carrier FM systems according to the German terrestrial specs can be processed with the MSP 341x.

The MSP 341x facilitates profitable multistandard capability, offering the following advantages:

- Automatic Gain Control (AGC) for analogue input: input range: 0.10 - 3 Vpp
- integrated A/D converter for sound-IF input
- all demodulation and filtering is performed on chip and is individually programmable
- easy realisation of all digital NICAM standards (B/G, I, L and D/K)
- FM-demodulation of all terrestrial standards (include identification decoding)
- no external filter hardware is required
- only one crystal clock (18.432 MHz) is necessary

- high deviation FM-mono mode (max. deviation: approx. ± 360 kHz)

4-2-1-2 DSP-Section (Audio Baseband Processing)

- flexible selection of audio sources to be processed
- performance of terrestrial de-emphasise systems (FM, NICAM)
- digitally performed FM-identification decoding and de-matrixing
- digital baseband processing: volume, bass, treble
- simple controlling of volume, bass, treble

4-2-1-3 Analogue Section

- two selectable analogue pairs of audio baseband input (= two SCART inputs) input level: < 2 V RMS, input impedance: > 25 k Ω
- one selectable analogue mono input (i.e. AM sound): Not used in this chassis
- two high-quality A/D converters, S/N-Ratio: > 85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities
- loudspeaker: one pair of four-fold oversampled D/A converters. Output level per channel: max. 1.4 VRMS output resistance: max. 5 k Ω . S/N-ratio: > 85 dB at maximum volume Max. noise voltage in mute mode: < 10 μ V (BW: 20 Hz... 16kHz)
- one pair of four-fold oversampled D/A converters supplying a pair of SCART-outputs. output level per channel: max. 2 V RMS, output resistance: max. 0.5 k Ω , S/N-Ratio: > 85 dB (20 Hz... 16 kHz)

4-2-1-4 NICAM plus FM/AM-Mono

According to the British, Scandinavian, Spanish, and French TV-standards, high-quality stereo sound is transmitted digitally. The systems allow two high-quality digital sound channels to be added to the already existing FM/AM-channel. The sound coding follows the format of the so-called Near Instantaneous Companding System (NICAM 728). Transmission is performed using Differential Quadrature Phase Shift Keying (DQPSK. Table below offers an overview of the modulation parameters.)

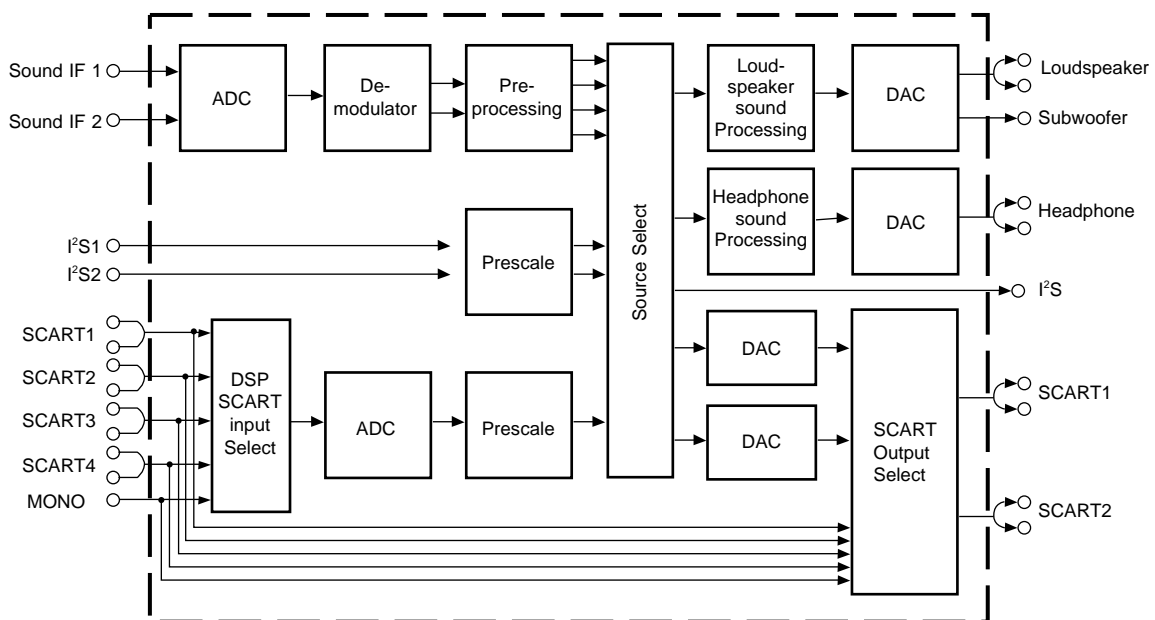
In the case of NICAM/FM (AM) mode, there are three different audio channels available: NICAM A, NICAM B, and FM/AM-mono. NICAM A and B may belong either to a stereo or to a dual language transmission. Information about operation mode and about the quality of the NICAM signal can be read by the controlling software via the control bus. In the case of low quality (high bit error rate), the controlling software may decide to switch to the analogue FM/AM-mono sound. Alternatively, an automatic NICAM-FM/AM switching may be applied.

4-2-1-5 German 2-Carrier System (DUAL FM System)

Since September 1981, stereo and dual sound programs have been transmitted in Germany using the 2-carrier system. Sound transmission consists of the already existing first sound carrier and a second sound carrier additionally containing an identification signal. More details of this standard are given in Tables below. For D/K very similar system is used.

TV standards

TV system	Position of sound carrier (MHz)	Sound modulation	Color system	Country
B/G	5.5 / 5.7421875	FM Stereo	PAL	Germany
B/G	5.5 / 5.85	FM-Mono / NICAM	PAL	Scandinavia, Spain
L	6.5 / 5.85	AM-Mono / NICAM	SECAM-L	France
I	6.0 / 6.552	FM-Mono / NICAM	PAL	UK
D/K	6.5 / 6.2578125 D/K1 6.5 / 6.7421875 D/K2 6.5 / 5.85 D/K-NICAM	FM Stereo FM-Mono / NICAM	SECAM-East	USSR Hungary



Architecture of MSP341x

Pin connections and short description

Pin No.	Pin Name	Type	Short description
1	TP	Out	Test pin
2	NC		Not Connected
3	NC		Not Connected
4	TP	Out	Test pin
5	TP	Out	Test pin
6	ADR_SEL	In	I2C bus Address select
7	STANDBYQ	In	Standby (Low-active)
8	NC		Not Connected
9	I2C_CL	In / Out	I2C Clock
10	I2C_DA	In / Out	I2C data
11	TP	In / Out	Test pin

Pin No.	Pin Name	Type	Short description
12	TP	In / Out	Test pin
13	TP	Out	Test pin
14	NC		Not Connected
15	TP	Out	Test pin
16	TP	Out	Test pin
17	TP	Out	Test pin
18	DVSUP		Digital power supply +5V
19	DVSS		Digital Ground
20	NC		Not Connected
21	NC		Not Connected
22	NC		Not Connected
23	NC		Not Connected
24	RESETQ	In	Power-On-reset
25	NC		Not Connected
26	NC		Not Connected
27	VREF2		Reference ground 2 high voltage part
28	DACM_R	Out	Loudspeaker out Right
29	DACM_L	Out	Loudspeaker out Left
30	NC		Not Connected
31	TP	Out	Test pin
32	NC		Not Connected
33	NC		Not Connected
34	NC		Not Connected
35	VREF1		Reference ground 1 high voltage part
36	SC1_OUT_R	Out	Scart output 1, right
37	SC1_OUT_L	Out	Scart output 1, left
38	NC		Not Connected
39	AHVSUP		Analog power supply 8.0V
40	CAPL_M		Volume capacitor MAIN
41	AHVSS		Analog ground
42	AGNDC		Analog reference voltage high voltage part
43	NC		Not Connected
44	NC		Not Connected
45	NC		Not Connected
46	NC		Not Connected
47	NC		Not Connected
48	ASG2		Analog Shield Ground 2
49	SC2_IN_L	In	Scart input 2 in, left
50	SC2_IN_R	In	Scart input 2 in, right
51	ASG1		Analog Shield Ground 1
52	SC1_IN_L	In	Scart input 1 in, left
53	SC1_IN_R	In	Scart input 1 in, right
54	VREFTOP		Reference voltage IF A/D converter
55	MONO_IN	In	Mono input
56	AVSS		Analog ground
57	AVSUP		Analog power supply
58	ANA_IN1+		In IF input 1

Pin No.	Pin Name	Type	Short description
59	ANA_IN1-	In	IF common
60	NC		Not Connected
61	TESTEN	In	Test pin
62	XTAL_IN	In	Crystal oscillator
63	XTAL_OUT	Out	Crystal oscillator
64	NC		Test pin

4-3 TDA 4470-Multistandard Video-IF and Quasi Parallel Sound Processor

4-3-1- Description

The TDA 4470 is an integrated bipolar circuit for multi-standard video/sound IF (VIF/SIF) signal processing in TV/VCR and multimedia applications. The circuit processes all TV video IF signals with negative modulation (e.g., B/G standard), positive modulation (e.g., L standard) and the AM, FM/NICAM sound IF signals.

4-3-2- Features

- 5V supply voltage ; low power consumption.
- Active carrier generation by FPLL principle (frequency-phase-locked-loop) for true synchronous demodulation.
- Very linear video demodulation, good pulse response and excellent intermodulation figures.
- Alignment-free AFC without external reference circuit, polarity of the AFC curve is switchable.
- VIF-AGC for negative modulated signals (peak sync. detection) and for positive modulation (peak white/black level detector).
- Tuner AGC with adjustable take over point.
- Alignment-free quasi parallel sound (QPS) mixer for FM/NICAM sound IF signals.
- Intercarrier output signal is gain controlled (necessary for digital sound processing).
- Complete alignment-free AM demodulator with gain controlled AF output.
- Separate SIF-AGC with average detection
- Two independent SIF inputs
- Parallel operation of the AM demodulator and QPS mixer (for NICAM-L stereo sound).

4-3-3- Pinning

Pin	Symbol	Function
1,2	$V_{i,SIF1}$	SIF1 input (symmetrical)
3	V_{SW}	Input selector switch
4,9,16	GND	Ground
5	V_{AGC}	SIF-AGC (time constant)
6,7	$V_{i,VIF}$	VIF input (symmetrical)
8	C_{AGC}	VIF-AGC (time constant)
10	R_{TOP}	Take Over Point, tuner AGC
11	I_{tun}	Tuner AGC output current
12	$V_{O,VID}$	Video output
13	V_{SW}	Standard switch
14	V_{SW}	Lswitch
15	C_{bl}	Black level capacitor
17	C_{ref}	Internal reference voltage
18	LF	Loop Filter

4-4 TDA8946J Stereo Audio Amplifier

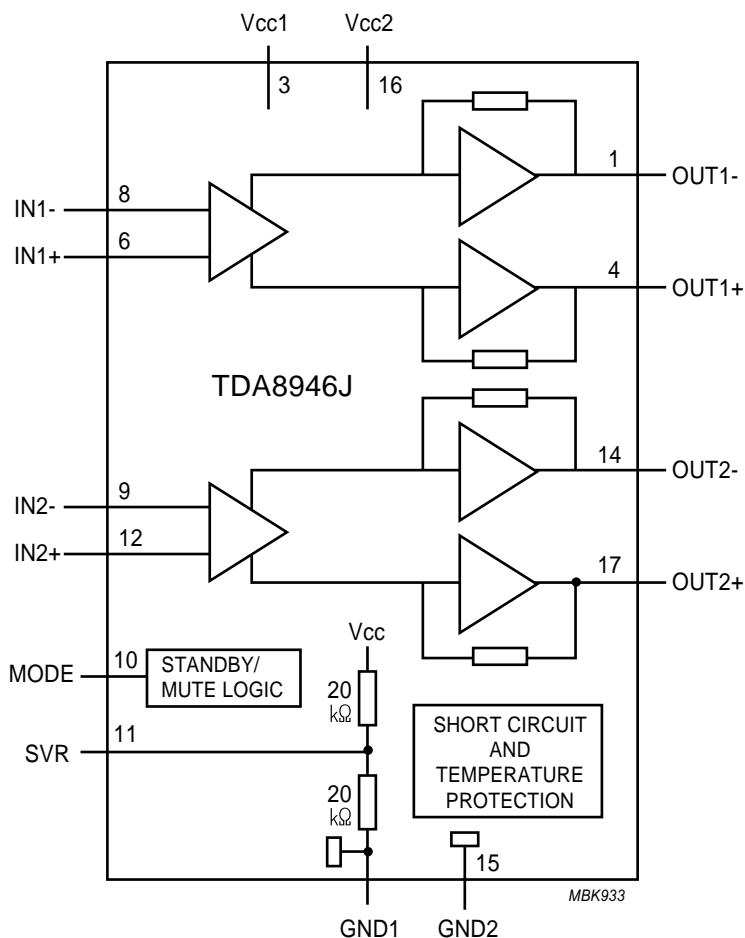
The TDA8946J is a dual-channel audio power amplifier with an output power of 2 X 15W at an 8Ω load and a 18V supply. The circuit contains two Bridges Tied Load(BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8946J comes in a 17-pin DIL power package.

4-4-1- Features

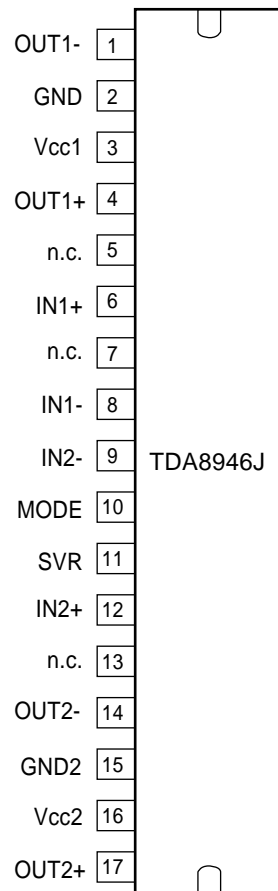
- Few external components
- Fixed gain
- Standby and mute mode
- No on/off switching pop noise
- low standby current
- High supply voltage ripple rejection
- Outputs short-circuit protected to ground, supply and across the load
- Thermally protected

Pin description

Pin	Symbol	Description
1	OUT1-	negative loudspeaker terminal 1
2	GND1	ground channel 1
3	Vcc1	supply voltage channel 1
4	OUT1+	positive loudspeaker terminal 1
5	n.c.	not connected
6	IN1+	positive input1
7	n.c.	not connected
8	IN1-	negative input1
9	IN2-	negative input2
10	MODE	mode selection input
11	SVR	half supply voltage decoupling (ripple rejection)
12	IN2+	positive input2
13	n.c	not connected
14	OUT2-	negative loudspeaker terminal 2
15	GND2	ground channel 2
16	Vcc2	supply voltage channel 2
17	OUT2+	positive loudspeaker terminal 2



Block diagram TDA8946J



Pin configuration

4-5 TDA8358J Vertical Amplifier

The TDA8358J are power circuit for use in 90° and 110° colour deflection systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be DC coupled.

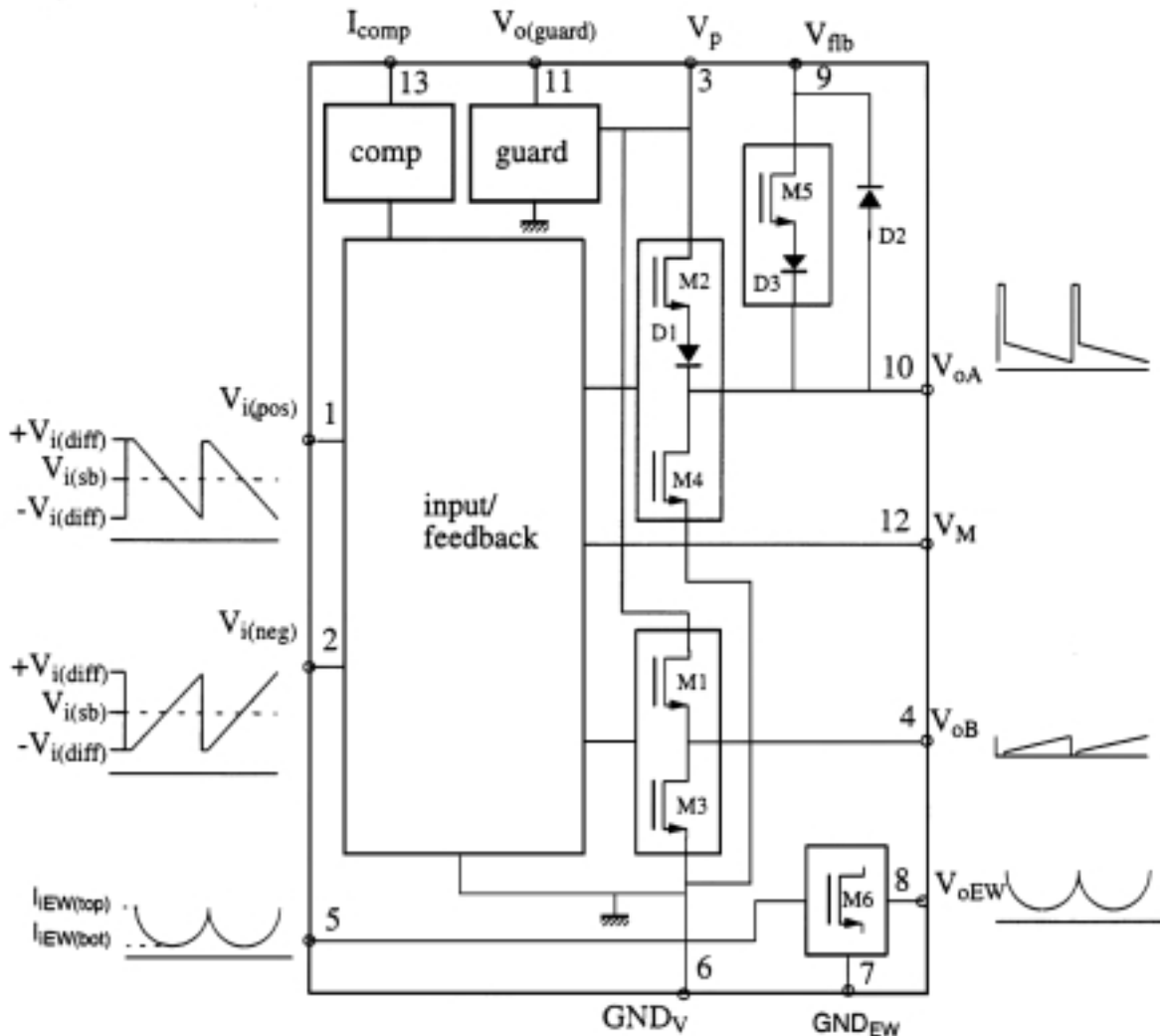
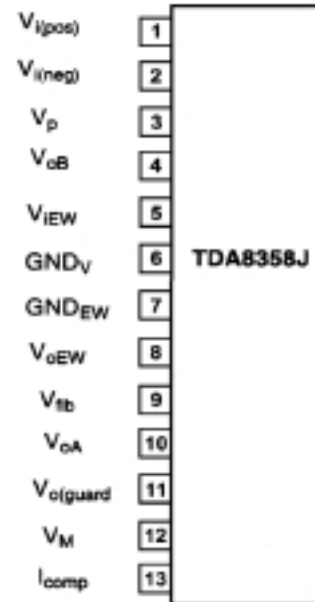
The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

4-5-1 TDA8358J

An East-West output stage is provided that is able to sink current from the diode modulator circuit.

Features :

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs
- East-West output stage



4-6 TDA6107Q

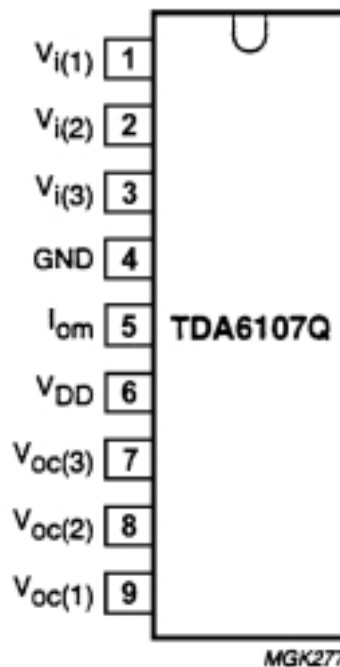
The TDA6107Q includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

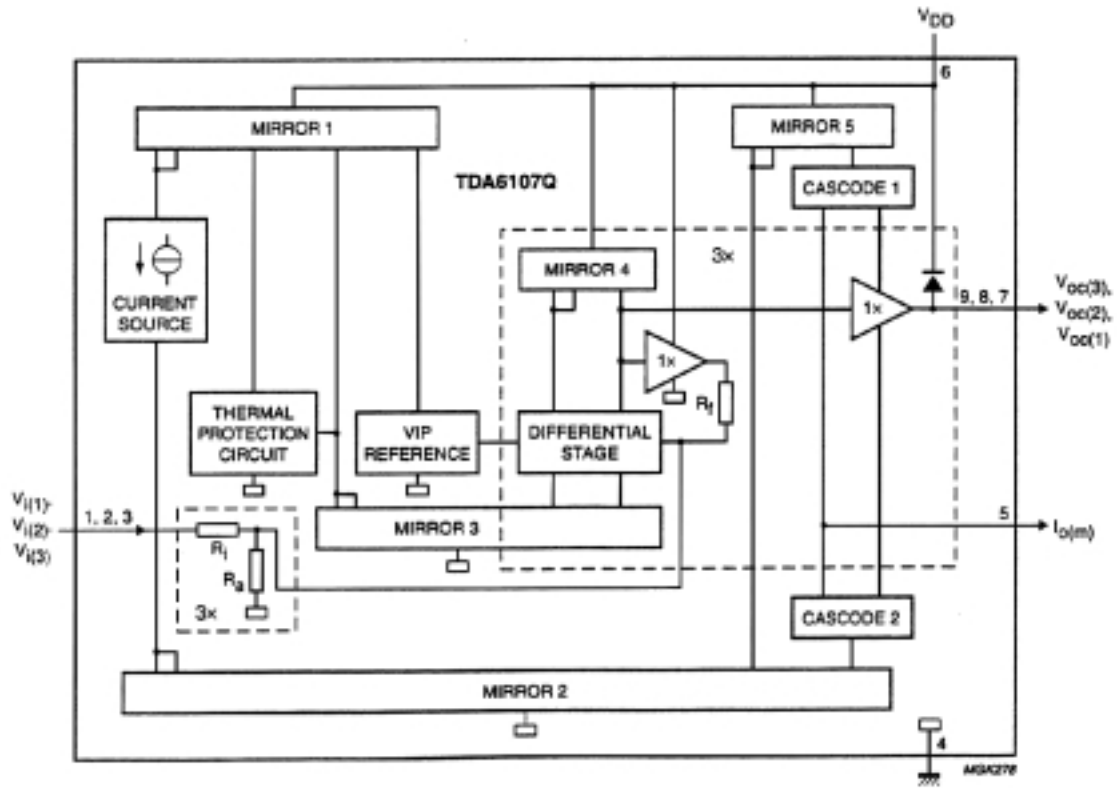
Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/ μ s
- No external components required
- Very simple application
- Single supply voltage of 200V
- Internal reference voltage of 2.5 V
- Fixed gain of 50.
- Black-current stabilisation (BCS) circuit
- Thermal protection

Pin description

Pin	Symbol	Description
1	$V_{i(1)}$	inverting input 1
2	$V_{i(2)}$	inverting input 2
3	$V_{i(3)}$	inverting input 3
4	GND	ground (fin)
5	I_{om}	black current measurement output
6	V_{DD}	supply voltage
7	$V_{oc(3)}$	cathode output 3
8	$V_{oc(2)}$	cathode output 2
9	$V_{oc(1)}$	cathode output 1





Block diagram TDA6107Q

4-7 24C16 - 16 Kb EEPROM

features :

- 16 Kbit serial I2C bus EEPROM
- Single supply voltage : 4.5 V to 5.5 V
- 1 Million Erase/Write cycles (minimum)
- 40 year data retention (minimum)

Pin description

Pin No.	Name	Description
1, 2, 3	E0, E1, E2	Device address - not used
5	SDA	Serral Data/Address Input/Output
6	SCL	Serial clock
7	WC	Write control
8	Vcc	Supply voltage
4	Vss	Ground

The memory device is compatible with the I2C memory standard. This is a two wire serial interface that uses a bi-directional data bus and serial clock. The memory carries a built-in 4-bit unique device type identifier code (1010) in accordance with the I2C bus definition.

Serial Clock (SCL)

The SCL input is used to strobe all data in and out of the memory.

Serial Data (SDA)

The SDA pin is bi-directional, and is used to transfer data in or out of the memory

4-8 STR - F6653

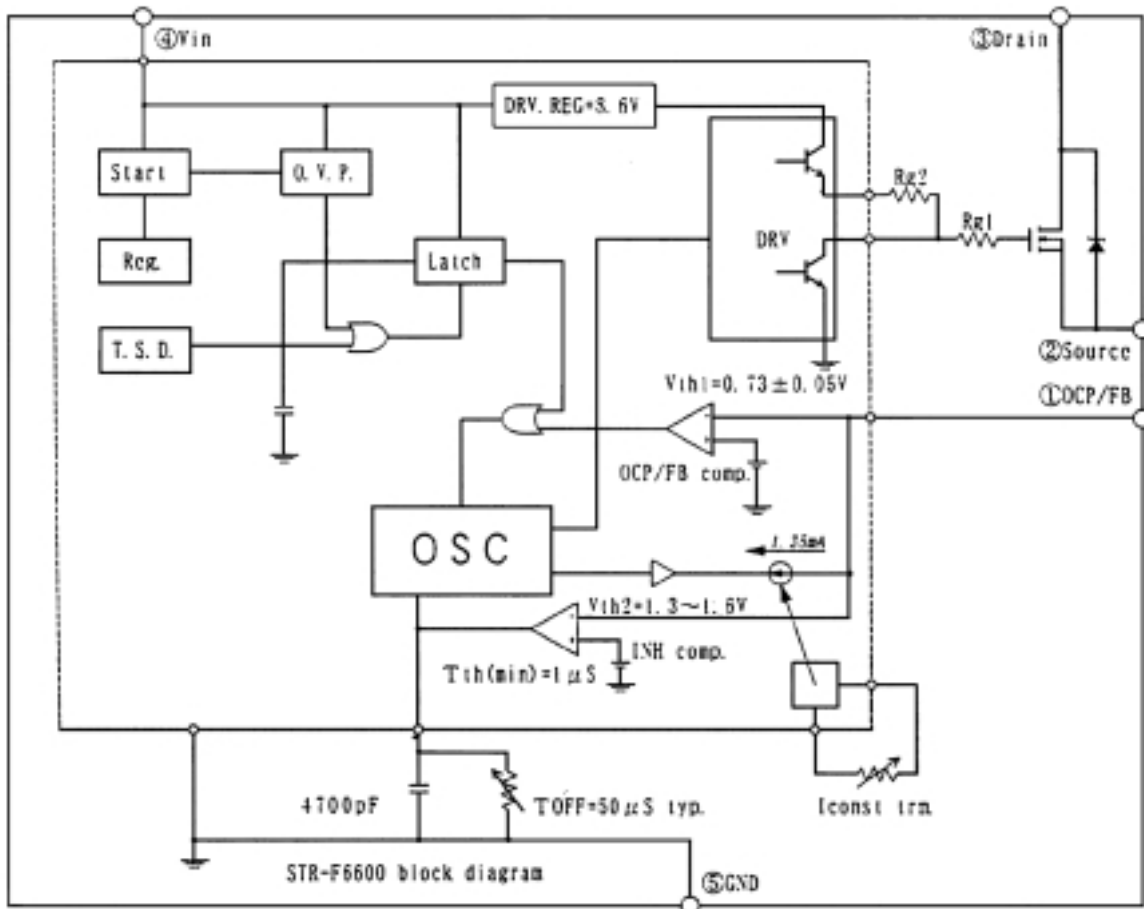
4-8-1 General description

The STR-F6653 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

4-8-2 Features

- Small SIP fully isolated molded 5 pins package
- Many protection functions :
 - * Pulse-by-pulse overcurrent protection (OCP)
 - * Overvoltage protection with latch mode (OVP)
 - * Thermal protection with latch mode (TSD)

4-8-3 Block diagram



4-8-4 Pins description

pin	name	symbol	description
1	Overcurrent / feedback	O.C.P./ F.B.	Input of over current detection signal and feedback signal
2	Source	S	MOSFET source
3	Drain	D	MOSFET drain
4	Supply	V _{IN}	Input of power supply for control circuit
5	Ground	GND	Ground

4-8-5 Control part electrical characteristics

DESCRIPTION	IC PIN NUMBER	SYMBOL	RATING			UNIT
			MIN.	TYPE	MAX	
Operation start voltage	4-5	V _{IN} (on)	14.4	16	17.6	V
Operation stop voltage	4-5	V _{IN} (off)	9	10	111	V
Circuit current in operation	4-5	I _{IN} (on)	-	-	30	mA
Circuit current in non-operation	4-5	I _{IN} (off)	-	-	100 mA	μA
Maximum OFF time	-	T _{OFF} (max)	45	-	55	μSEC
Minimum time for input of quaxi resonant signals	1-5	T _{TH} (2)	-	-	1.0	μSEC
Minimum off time	-	T _{OFF} (min)	-	-	1.5	μSEC
O.C.P./F.B. terminal threshold voltage 1	1-5	V _{TH} (1)	0.68	0.73	0.78	V
O.C.P./F.B. terminal threshold voltage 2	1-5	V _{TH} (2)	1.3	1.45	1.6	V
O.C.P./F.B. terminal extraction current	1-2	I _{OCP/FB}	1.2	1.35	1.5	mA
O.V.P. operation voltage	4-5	V _{IN} (OVP)	20.5	22.5	24.5	V
Latch circuit sustaining voltage	4-5	I _{IN} (H)	-	-	400	μA
Latch circuit release voltage	4-5	V _{IN} (La.off)	6.6	-	8.4	V
Thermal shutdown operating temperature	-	T _J (TSD)	140	-	-	°C

4-8-6 MOSFET electrical characteristics

DESCRIPTION	IC PINS NUMBER	SYMBOL	RATING			UNIT
			MIN.	TYPE	MAX	
Drain-to-source break voltage	3-2	V _{DSS}	650	-	-	V
Drain leakage current	3-2	I _{DSS}	-	-	300	μA
On-resistance	3-2	R _{DS (on)}	-	-	1.95	Ω
Switching time	3-2	t _f	-	- 2	50	noec
Thermal resistance	-	O _{CH -F}	-	-	0.95	°C/W

4-9 CXA1315P

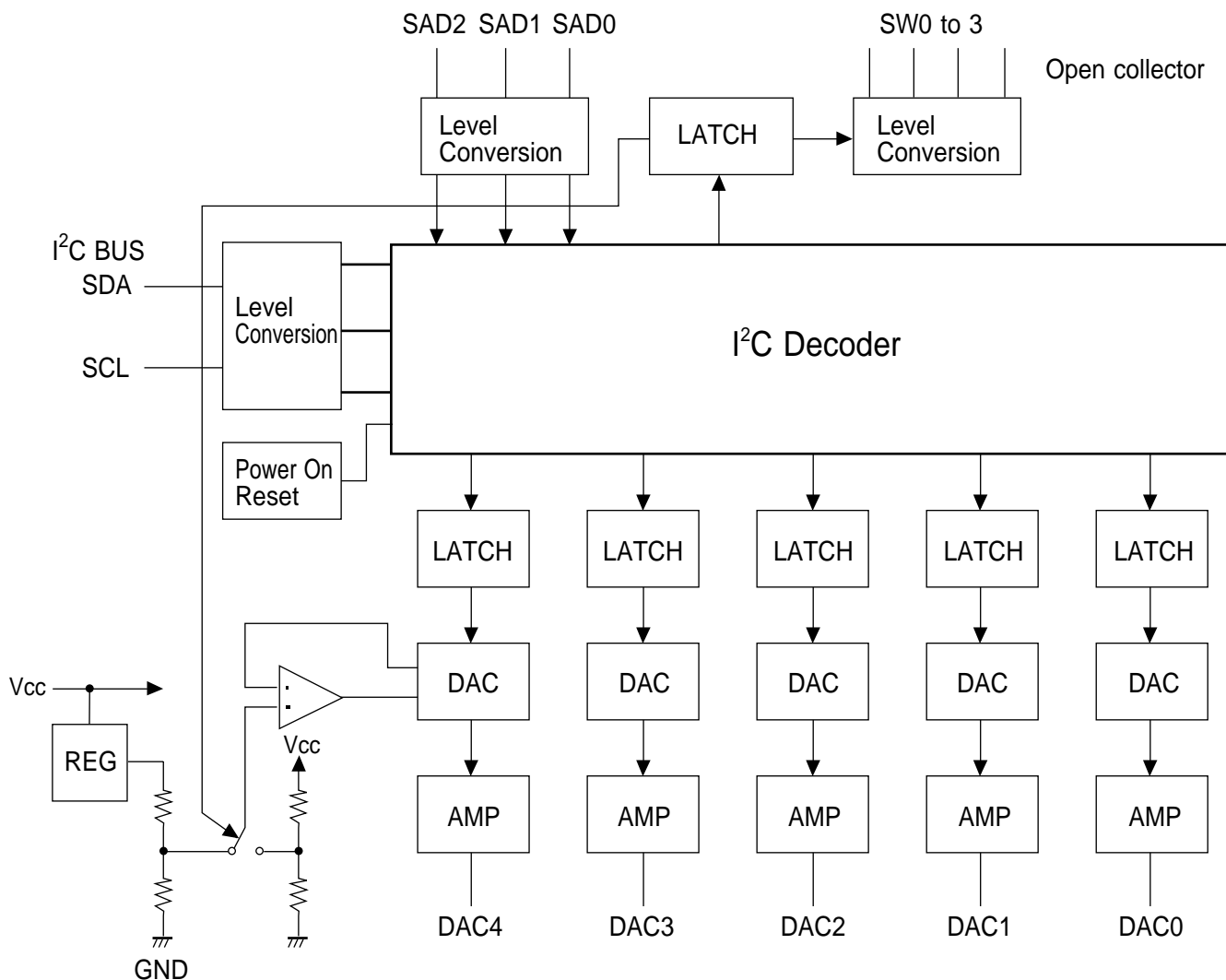
4-9-1 General description

The CXA1315M/P is developed as a 5-channel 8-bit D/A converter supporting with I²C bus.

4-9-2 Features

- Serial control through I²C bus
- 5-channel 8-bit D/A converter
- Built-in 4 general-purpose I/O ports (Digital I/O)
- I/O can be specified to respective ports independently
- Selection of 8 slave addresses possible through address select pins (3 pins)

4-9-3 Block diagram



4-9-4 Pin Description

Pin	Symbol	Description
1	SW1	I/O pin for general purpose I/O port
2	SW0	VILmax: 1.5V
9	SW2	VIHmin: 3V
10	SW3	VOLmax: 0.4V
3	DAC4	D/A converter output pin
4	DSC3	
5	DAC2	
6	DAC1	
7	DAC0	
10	GND	GND pin
11	SDA0	Slave address input pin
12	SDA1	Input at positive logic
13	SDA2	VILmax: 1.5V VIHmin: 3V
15	SCL	SCL input pin for I2C bus
16	Vcc	Power supply pin

Service manual SC-150

4-10 MM1118

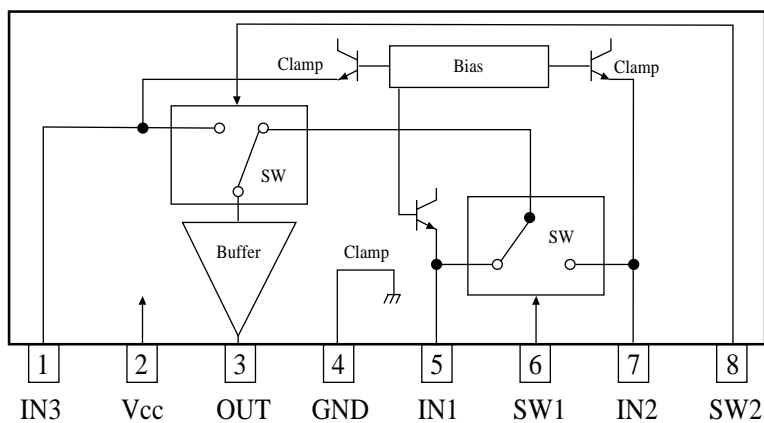
4-10-1 General description

This is a 3-input, 1-output video switch IC with a clamp function and built-in 6dB amp, for video signal switching. One of the inputs also has a mute function.

4-10-2 Features

- Built-in 6dB amp
- Clamp function
- Mute function
- Current consumption: 5.1mA typ.
- Operating power supply voltage range: 4.6~13.0V
- Frequency response: 10MHz
- Crosstalk: 64dB (at 4.43MHz)

4-10-3 Block diagram



Control input truth table

SW1	SW2	OUT
L	L	IN1
H	L	IN2
"	H	IN3

4-10-4 Pin Description

Pin	Symbol	Description
5	IN1	Input1
7	IN2	Input2
1	IN3	Input3
6	SW1	Switch1
8	SW2	Switch2
2	Vcc	Power supply
3	OUT	Output
4	GND	Ground

4-11 LA6515

4-11-1 General description

The LA6515 features an on-chip current limiter and provides high voltage gain and a high common-mode rejection ratio.

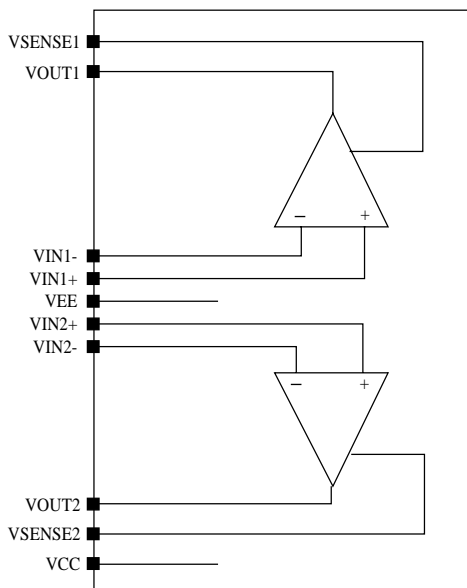
The LA6515 is an ideal choice for power applications such as DC servos, capstan drivers, actuator drivers, programmable power supplies and high-quality audio amplifiers.

The LA6515 is available in 10-pin SIPs and operates from -15V and 15V supplies.

4-11-2 Features

- 0.5A output current
- 100dB voltage gain
- 80dB common-mode rejection
- 0.15V/us slew rate
- 2mV offset voltage
- 10nA offset current
- On-chip current limiter
- 15V and 15V supplies

4-11-3 Block diagram

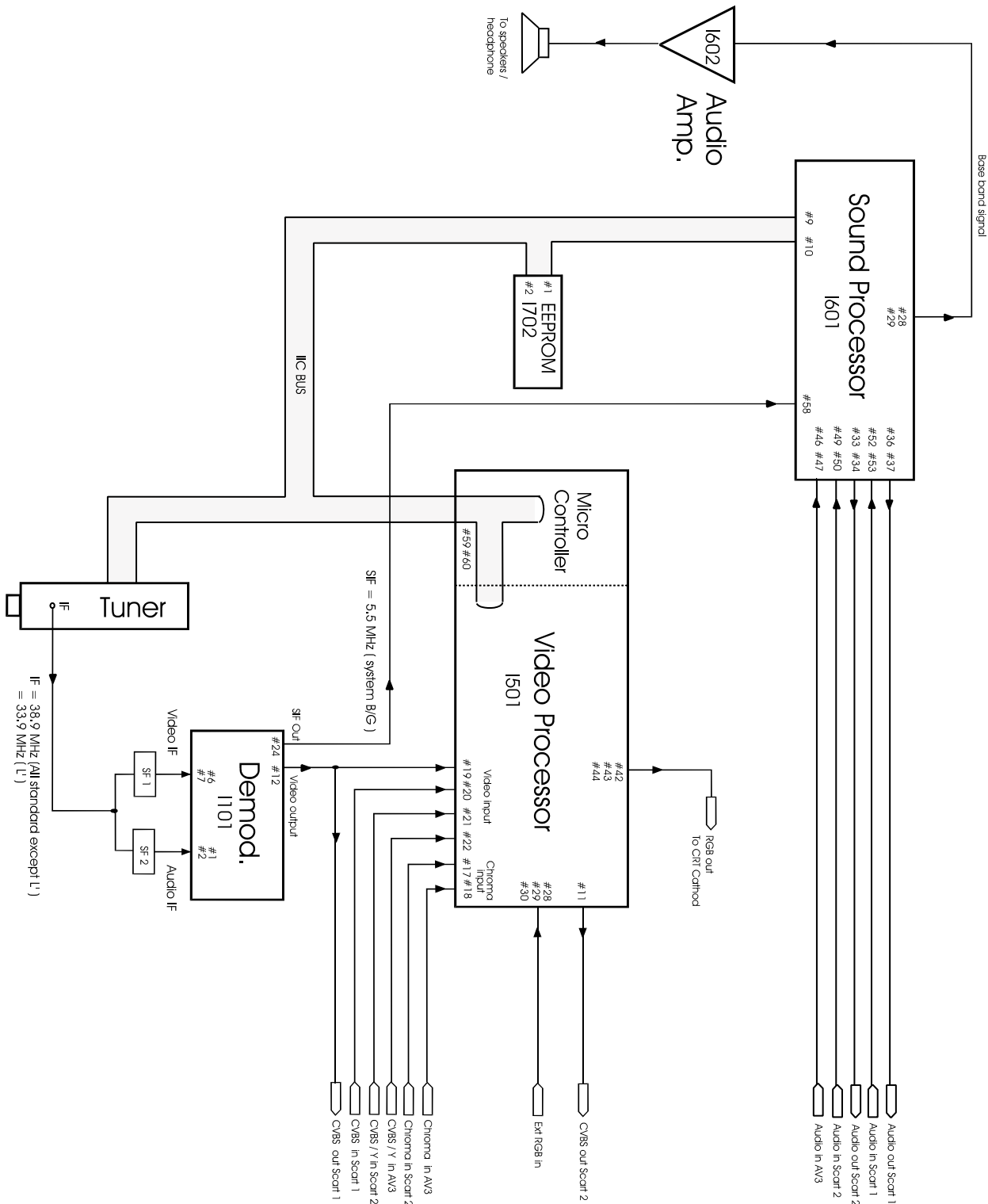


4-11-4 Pin Description

Pin	Symbol	Description
1	VSENSE1	Voltage detect
2	OUT1	Output
3	V1-	Inverting input
4	V1+	Non-inverting input
5	VEE	-15V supply
6	V2+	Non-inverting input
7	V2-	Inverting input
8	OUT2	Output
9	VSENSE2	Voltage detect
10	Vcc	15V supply

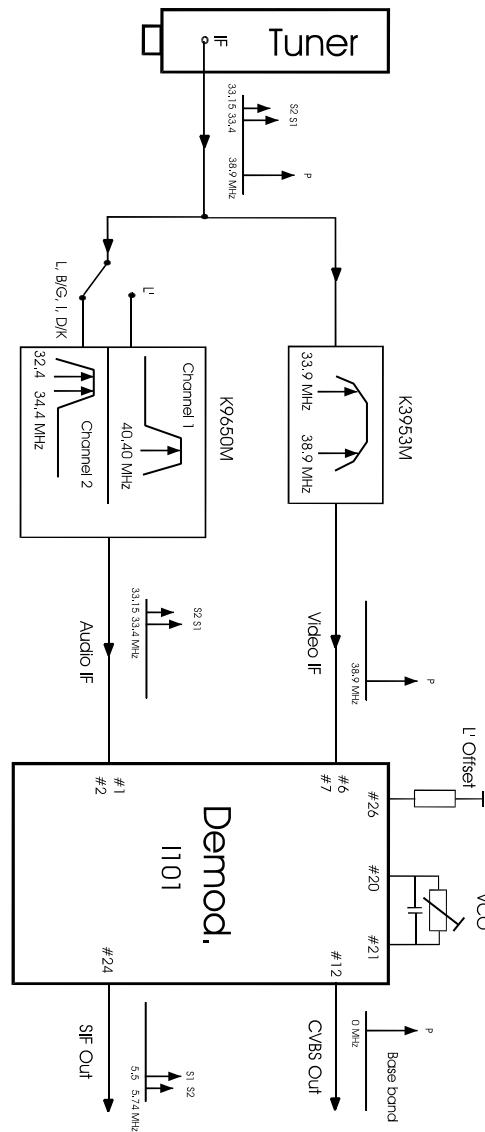
5 - Circuit description

5-1 Block diagram



5-2 IF section

5-2-1 Block diagram



5-2-2 Vision IF Amplifier

The video IF signal (VIF) is fed through a SAW filter to the differential input (Pin 6-7) of the VIF amplifier. This amplifier consists of three AC-coupled amplifier stages. Each differential amplifier is gain controlled by the automatic gain control circuit (VIF-AGC). The output signal of the VIF amplifier is applied to the FPLL carrier generation and the video demodulator.

SAW filters

Ref.	Standard	Features
K3953M	B/G - D/K - I - L/L'	- IF filter for video application - TV IF filter with Nyquist slopes at 33.9 MHz and 38.9 MHz - Constant group delay
K9650M	B/G - D/K - I - L/L'	- IF filter for audio application - TV IF audio filter with two channels - Channel 1 (L') with one pass band for sound carrier at 40.40 MHz - Channel 2 (L, D/K, I, B/G) with one pass band for sound carriers between 32.40 MHz and 33.40 MHz

5-2-3 Tuner-and VIF-AGC

At Pin 8, the VIF-AGC charges/discharges the AGC capacitor to generate a control Voltage for setting the gain of the VIF amplifier and tuner in order to keep the video output signal at a constant level. Therefore, in the case of all negative modulated signals (e.g., B/G standard) the sync. level of the demodulated video signal is the criterion for a fast charge/discharge of the AGC capacitor. For positive modulation (e.g., L standard) the peak white level of video signal controls the charge current. In order to reduce reaction time for positive modulation, where a large time constant is needed, an additional black level detector controls the discharge current in the event of decreasing VIF input signal. The control voltage (AGC voltage at Pin 8) is transferred to an internal control signal, and is fed to the tuner AGC to generate the tuner AGC current at Pin 11 (open collector output). The take over point of the tuner AGC can be adjusted at Pin 10 by a potentiometer or an external dc voltage (from interface circuit or microprocessor).

5-2-4 FPLL, VCO and AFC

The FPLL circuit (frequency phase locked loop) consists of a frequency and phase detector to generate the control voltage for the VCO tuning. In locked mode, the VCO is controlled by the phase detector and in unlocked mode, the frequency detector is superimposed. The VCO operates with an external resonance circuit (L and C parallel) and is controlled by internal varicaps. The VCO control voltage is also converted to a current and represents the AFC output signal at Pin 22. At the AFC switch (Pin 19) three operating conditions of the AFC are possible: AFC curve "rising" or "falling" and AFC "off". A practicable VCO alignment of the external coil is the adjustment to zero AFC output current at Pin 22. At center frequency the AFC output current is equal to zero. Furthermore, at Pin 14, the VCO center frequency can be switched for setting to the required L' value (L' standard). The optional potentiometer at Pin 26 allows an offset compensation of the VCO phase for improved sound quality (fine adjustment). Without a potentiometer (open circuit at Pin 26), this offset compensation is not active. The oscillator signal passes a phase shifter and supplies the in-phase signal (0°) and the quadrature signal (90°) of the generated picture carrier.

5-2-5 Video Demodulation and Amplifier

The video IF signal, which is applied from the gain controlled IF amplifier, is multiplied with the in-phase component of the VCO signal. The video demodulator is designed for low distortion and large bandwidth. The demodulator output signal passes an integrated low pass filter for attenuation of the residual vision carrier and is fed to the video amplifier. The video amplifier is realised by an operational amplifier with internal feedback and 8 MHz bandwidth (-3 dB). A standard dependent dc level shift in this stage delivers the same sync. level for positive and negative modulation. An additional noise clipping is provided. The video signal is fed to VIF-AGC and to the video output buffer. This amplifier with a 6 dB gain offers easy adaptation of the sound trap. For nominal video IF modulation the video output signal at Pin 12 is 2 Vpp.

5-2-6 Sound IF Amplifier and SIF-AGC

The SIF amplifier is nearly identical with the 3-stage VIF amplifier. Only the first amplifier stage exists twice and is switchable by a control voltage at Pin 3. Therefore with minimal external expense it is possible to switch between two different SAW filters. Both SIF inputs features excellent cross-talk attenuation and an input impedance which is independent from the switching condition. The SIF-AGC is related to the average level of AM- or FM-carrier and controls the SIF amplifier to provide a constant SIF signal to the AM demodulator and QPS mixer.

5-2-7 Quasi-Parallel-Sound (QPS) Mixer

The QPS mixer is realised by a multiplier. The SIF signal (FM or NICAM carrier) is converted to the intercarrier frequency by the regenerated picture carrier (quadrature signal) which is provided from the VCO. The intercarrier signal is fed via an output amplifier to Pin 24.

5-2-8 Standard Switch

To have equal polarity of the video output signal the polarity can be switched in the demodulation stage in accordance with the TV standard. Additionally a standard dependent dc level shift in the video amplifier delivers the same sync. level. In parallel to this, the correct VIF-AGC is selected for positive or negative modulated VIF signals. In the case of negative modulation (e.g., B/G standard) the AM output signal is switched off. For positive modulation (L standard) the AM demodulator and QPS mixer is active. This condition allows a parallel operation of the AM sound signal and the NICAM-L stereo sound.

5-2-9 L' Switch

With a control voltage at Pin 14 the VCO frequency can be switched for setting to the required L' value (L' standard). Also a fine adjustment of the L'-VCO center frequency is possible via a potentiometer. The L' switch is only active for positive modulated video IF-signals (standard switch in L mode).

5-2-10 Internal Voltage Stabiliser

The internal bandgap reference ensures constant performance independent of supply voltage and temperature.

5-3 Video - VCT description

5-3-1 Introduction

The VCT 38xxA includes complete video, display, and deflection processing. All processing is done digitally, the video front-end and video back-end are interfacing to the analogue world. Most functions can be controlled by software via I²C bus slave interface.

5-3-2 Video Front-end

This block provides the analogue interfaces to all video inputs and mainly carries out analogue-to-digital conversion for the following digital video processing. Most of the functional blocks in the front-end are digitally controlled (clamping, AGC, and clock-DCO). The control loops are closed by the Fast Processor ('FP') embedded in the video decoder.

5-3-3 Input Selector

Up to seven analogue inputs can be connected. Four inputs are for input of composite video or S-VHS luma signal. These inputs are clamped to the sync back porch and are amplified by a variable gain amplifier. Two chroma inputs can be used for connection of S-VHS carrier-chrominance signal. These inputs are internally biased and have a fixed gain amplifier.

5-3-4 Clamping

The composite video input signals are AC-coupled to the IC. The clamping voltage is stored on the coupling capacitors and is generated by digitally controlled current sources. The clamping level is the back porch of the video signal. S-VHS chrominance is also AC-coupled. The input pin is internally biased to the center of the ADC input range. Each channel is sampled at 10.125 MHz with a resolution of 8 bit.

5-3-5 Automatic Gain Control

A digitally working automatic gain control adjusts the magnitude of the selected baseband.

5-3-6 Digitally Controlled Clock Oscillator

The clock generation is also a part of the analogue front-end. The crystal oscillator is controlled digitally by the control processor. The clock frequency can be adjusted within ± 150 ppm. This adjustment is done in factory for every TV set.

5-3-7 Analogue Video Output

The input signal of the Luma ADC is available at the analogue video output pin (#11). The signal at this pin is buffered by a source follower. The output voltage is 2 V. The magnitude is adjusted with an AGC in 8 steps together with the main AGC.

5-3-8 Adaptive Comb Filter (VCT3834A only)

The adaptive comb filter is used for high-quality luminance/chrominance separation for PAL or NTSC signals. The comb filter improves the luminance resolution (bandwidth) and reduces interferences like cross-luminance and cross-color artefacts. The adaptive algorithm can eliminate most of the mentioned errors without introducing new artefacts or noise. The filter uses two line delays to process the information of three adjacent video lines. To have a fixed phase relationship of the colour subcarrier in the three channels, the system clock (20.25 MHz) is fractionally locked to the colour subcarrier. This allows the processing of all colour standards and substandards using a single crystal frequency. The CVBS signal in the three channels is filtered at the subcarrier frequency by a set of bandpass/notch filters. The output of the three channels is used by the adaptation logic to select the weighting that is used to reconstruct the luminance/chrominance signal from the 4 bandpass/notch filter signals. By using soft mixing of the 4 signals switching artefacts of the adaption algorithm are completely suppressed. The comb filter uses the middle line as reference, therefore, the comb filter delay is one line. If the comb filter is switched off, the delay lines are used to pass the luma/ chroma signals from the A/D converters to the luma/ chroma outputs. Thus, the comb filter delay is always one line.

5-3-9 Color Decoder

In this block, the standard luma/chroma separation and multi-standard colour demodulation is carried out. The colour demodulation uses an asynchronous clock, thus allowing a unified architecture for all colour standards. The colour killer uses the burst-phase/ burst-frequency measurement to identify a PAL/NTSC or SECAM colour signal. For PAL/NTSC, the colour is switched off (killed) as long as the colour subcarrier PLL is not locked. For SECAM, the killer is controlled by the toggle of the burst frequency. The burst amplitude measurement is used to switch-off the colour if the burst amplitude is below a programmable threshold. Thus, colour will be killed for very noisy signals. The colour amplitude killer has a programmable hysteresis. The burst-frequency measurement is also used for automatic standard recognition (together with the status of horizontal and vertical locking) thus allowing a completely independent search of the line and colour standard of the input signal. The following standards can be distinguished:
PAL B,G,H,I; NTSC M; SECAM; NTSC 44; PAL M; PAL N; PAL 60. In AV mode or when Prg No 0 is selected all the standards above are enabled by the controlling software. In INSTALL menu the controlling software enables PAL B,G, H,I and SECAM detection. The colour standard for each program number is stored in EEPROM. Outside INSTALL menu and for programmes numbers 1 to 99, the auto colour detection is disabled, the colour standard is recall from EEPROM and forced.

5-3-10 Horizontal Scaler (VCT3834A only)

The 4:2:2 YC r C b signal from the colour decoder is processed by the horizontal scaler. The scaler block allows a linear or nonlinear horizontal scaling of the input video signal in the range of 0.25 to 4. Nonlinear scaling, also called "Panoramavision", provides a geometrical distortion of the input picture. It is used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders. Also, the inverse effect can be produced by the scaler. The scaler contains a programmable decimation filter, a 1-line FIFO memory, and a programmable interpolation filter.

5-3-11 Video Sync Processing

To extract the sync information from the video signal, a linear phase low-pass filter eliminates all noise and video contents above 1 MHz. The sync is separated by a slicer; the sync phase is measured. A variable window can be selected to improve the noise immunity of the slicer. The phase comparator measures the falling edge of sync, as well as the integrated sync pulse. The sync phase error is filtered by a phase-locked loop that is computed by the Fast Processor. All timing in the front-end is derived from a counter that is part of this PLL, and it thus counts synchronously to the video signal. A separate hardware block measures the signal back porch and also allows gathering the maximum/minimum of the video signal. This information is processed by the FP and used for gain control and clamping. For vertical sync separation, the sliced video signal is integrated. The FP uses the integrator value to derive vertical sync and field information. The information extracted by the video sync processing is multiplexed onto the hardware front sync signal (FSY) and is distributed to the rest of the video processing system. The data for the vertical deflection, the sawtooth, and the East-West correction signal is calculated by the VCT 38xxA.

5-3-12 Display Processing

In the display processing the conversion from digital YC r C b to analogue RGB is carried out. In the luminance processing path, contrast and brightness adjustments and a variety of features, such as black-level expansion, dynamic peaking and soft limiting, are provided. In the chrominance path, the C r C b signals are converted to 4:4:4 format and filtered by a colour transient improvement circuit. The YC r C b signals are converted by a programmable matrix to RGB colour space. The digital OSD insertion circuit allows the insertion of a 5-bit OSD signal. The OSD signals and the display clock are synchronised to the horizontal flyback.

5-3-13 Chroma Transient Improvement

The intention of this block is to enhance the chroma resolution. A correction signal is calculated by differentiation of the colour difference signals. The differentiation can be selected according to the signal bandwidth, e.g. for PAL/NTSC/SECAM or digital component signals, respectively. The amplitude of the correction signal is adjustable. Small noise amplitudes in the correction signal are suppressed by an adjustable coring circuit. To eliminate 'wrong colours' which are caused by over and undershoots at the chroma transition, the sharpened chroma signals are limited to a proper value automatically.

5-3-14 Video Back-end

The digital RGB signals are converted to analogue RGBs using three video digital-to-analogue converters (DAC) with 10-bit resolution. An analogue brightness value is provided by three additional DACs. The adjustment range is 40 % of the full RGB range. Controlling the white-drive/analogue brightness and also the external contrast and brightness adjustments is done via the Fast Processor, located in the front-end. Control of the cutoff DACs is done via I 2 C bus registers. Finally cutoff and blanking values are added to the RGB signals. Cutoff (dark current) is provided by three 9-bit DACs. The adjustment range is 60 % of full scale RGB range. The analogue RGB-outputs are current outputs with current-sink characteristics. The maximum current drawn by the output stage is obtained with peak white RGB. An external half contrast signal can be used to reduce the output current of the RGB outputs to 50% . Cutoff and white-drive current measurement are carried out during the vertical blanking interval. They always use the small bandwidth setting.

5-3-15 CRT Measurement and Control

The display processor is equipped with an 8-bit ADC for all measuring purposes. The ADC is connected to the SENSE input pin. Cutoff and white-drive current measurement are carried out during the vertical blanking interval.

5-3-16 Average Beam Current Limiter

The average beam current limiter (BCL) uses the SENSE input for the beam current measurement. The BCL uses a different filter to average the beam current during the active picture. The filter bandwidth is approx. 2 kHz. The beam current limiter has an automatic offset adjustment that is active two lines before the first cutoff measurement line. The beam current limiter function is located in the front-end. The data exchange between the front-end and the back-end is done via a single-wire serial interface. The beam current limiter allows the setting of a threshold current. If the beam current is above the threshold, the excess current is low-pass filtered and used to attenuate the RGB outputs by adjusting the white-drive multipliers for the internal (digital) RGB signals, and the analogue contrast multipliers for the analogue RGB inputs, respectively. The lower limit of the attenuator is programmable, thus a minimum contrast can always be set. During the tube measurement, the ABL attenuation is switched off. After the white-drive measurement line it takes 3 lines to switch back to BCL limited drives and brightness.

5-3-17 Analogue RGB Insertion

The VCT 38xxA allows insertion of external analogue RGB signals. The RGB signal is key-clamped and inserted into the main RGB by the Fast-Blank switch. The external RGB input can be overlaid or underlaid to the digital picture. The external RGB signals can be adjusted independently as regards DC level (brightness) and magnitude (contrast). All signals for analogue RGB insertion (RIN, GIN, BIN, FBLIN) must be synchronised to the horizontal flyback, otherwise a horizontal jitter will be visible. The VCT 38xxA has no means for timing correction of the analogue RGB input signals. RGB signals are not digitalised and therefore cannot be processed by the picture scaler.

5-3-18 Fast-Blank Monitor

The presence of external analog RGB sources can be detected by means of a Fast-Blank monitor. With a special monitor logic it is possible to detect if there is an external RGB source active and if it is a full screen insertion or only a box. The monitor logic is connected directly to the FBLIN pin. The controlling software uses this information to disable all picture format using display scaler.

5-3-19 Vertical and East/West Deflection

The calculations of the vertical and East/West deflection waveforms is done by the internal Fast Processor (FP). The algorithm uses a chain of accumulators to generate the required polynomial waveforms. To produce the deflection waveforms, the accumulators are initialised at the beginning of each field. The initialisation values must be computed by the TV control processor and are written to the front-end once.

5-3-20 EHT Compensation

The vertical waveform can be scaled according to the average beam current. This is used to compensate the effects of electric high-tension changes due to beam current variations. EHT compensation for East/West deflection is done with an offset corresponding to the average beam current.

5-3-21 Reset Function

Reset of all VDP functions is performed by the RESQ pin. When this pin becomes active, all internal registers and counters are lost.

5-3-22 Standby and Power-On

The VDP does not have a standby mode. To disable all the analogue and digital video functions, it is necessary to switch off the supplies for analogue front-end (VSUP AF), analogue back-end (VSUP AB) and digital circuitry (VSUP D).

5-4- Microcontroller

5-4-1 Introduction

The TV controller basically consists of the CPU, RAM, ROM, and a number of peripheral modules.

For instance:

- a memory banking module is included to allow access to more than 64 kB memory.
- a bootloader software is included to allow in-system-downloading of external code to Flash memory via the I²C interface.

The TV controller runs the complete software necessary to control a TV set. The software includes control of the audio, video, OSD, and text processors on chip, as well, as control of external devices like tuner or stereo decoder.

Communication between the TV controller and external devices is done either via I²C bus interface or via programmable port pins. The TV Controller is clocked with $f_{OSC} = f_{XTAL} / 2$.

5-4-2 CPU

The CPU is fully compatible to WDC's W65C02 micro-processor. The processor has 8-bit registers/accumulator, an 8-bit data bus, and a 16-bit address bus.

5-4-3 μ - Controller I/O pin configuration and function

There exist different kinds of ports. The universal ports serve as digital I/O and have additional special input and output functions. A subset of the universal ports serves as input for the analogue-to-digital converter.

μ - Controller I/O pin configuration and function table

pin	name	configuration		description
		Stand by	TV ON	
1	Power	Push Pull Low	Push Pull High	Switch OFF / ON SMPS
2	AGC	High impedance	High impedance	Tuner AGC level input – For factory use only
5	Mod SW	High impedance	Push Pull	High = Negative modulation, Low = Positive modulation (L/L').
6	SECAM L'	High impedance	Push Pull	Low = L, High =L'
7	AFC	High impedance	High impedance	ADC input
8	IR	High impedance	High impedance	Interrupt input
9	SC1 SW	High impedance	High impedance	SCART 1 slow switching – ADC input
10	SC2 SW	High impedance	High impedance	SCART 2 slow switching – ADC input
61	Mute	Push Pull	Push Pull	High = Mute active
62	LED	Open Drain	Open Drain	
63	KB	High impedance	High impedance	Keyboard input – ADC input
64	OCP	High impedance	High impedance	Over Current Protection – Switch the set to Std by if < 2.

To reduce power consumption in stand by mode all ports not used are configured in high impedance mode.

5-4-4 Tuning

The AFC information is supplied by the demodulator IC, and becomes available on VCT pin 7 for controlling software. The controlling software uses this information for tuner frequency tracking (automatic following). The AFC window is typically between 50 KHz and 100 KHz.

The minimum frequency step of the tuner is 50 KHz.

This AFC function is disabled when a program is tuned using the direct frequency entry or after fine tuning adjustment. Therefore it is recommended to tune channel with the TV search function (manual or ATSS) or using the direct channel entry to enable the Automatic Frequency Control.

5-4-5 Automatic Format switching and WSS

When AUTO mode is selected by the user, the television will automatically select a mode for the user. The format information is supplied by SCART pin 8 level when in AV mode or by WSS data. The signal contains codes as defined in the WSS European Telecommunication Standard, ETS 300 294. Briefly, the signal is received at the beginning of line

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23, in each frame. This is bi-phase encoded using a clock frequency of 5 MHz. In total, 14 data bits are available, in 4 groups. Group 1 contains the codes for the received format.

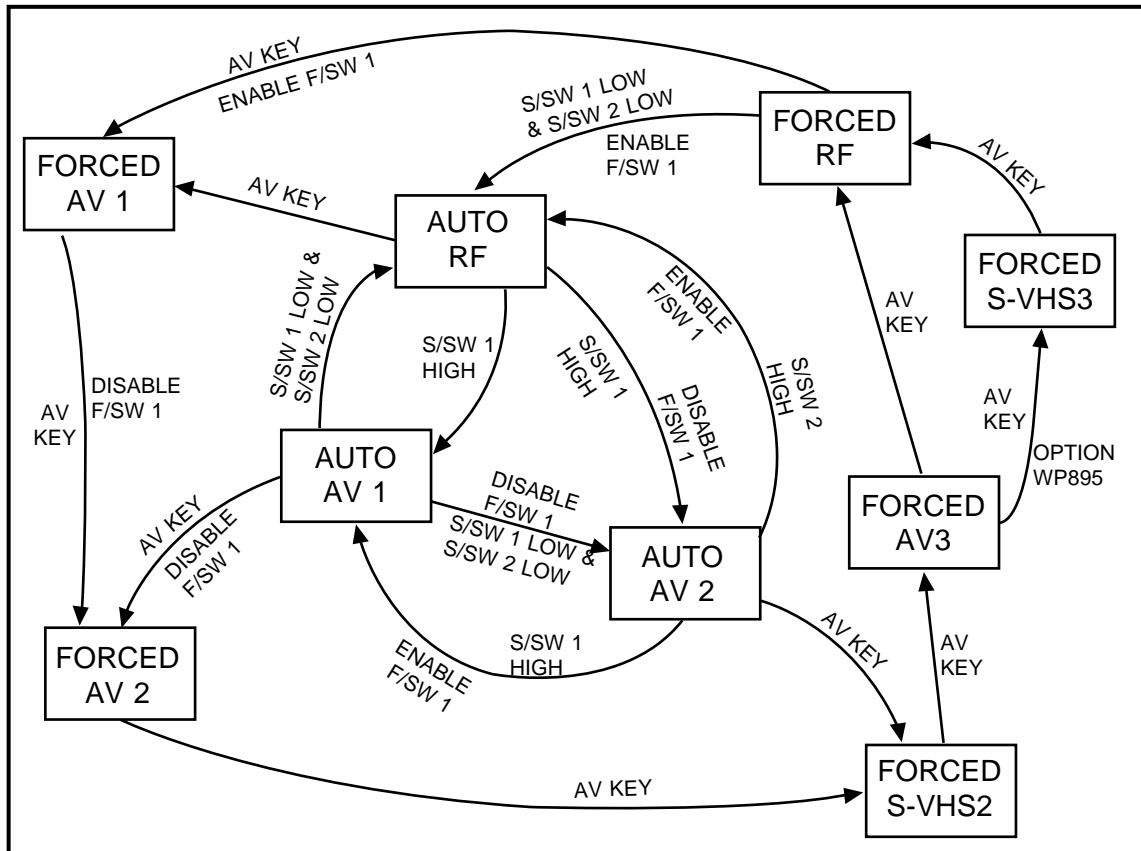
The mode chosen is defined by the following table. In effect the default mode is full screen.

The table below gives a summary of the FORMAT modes available (for WP895 and WP895F), and their given properties.

Format Name(OSD)	Zoom factor – TV with 16:9 CRT		Description	Application
	Vertical	Horizontal		
4:3	100%	75%	Picture is centred with black bars at the left and right hand side of the display	Standard 4/3 picture with 576 active lines
14:9	114%	87%	Picture is centred with black bars at the left and right hand side of the display	14:9 picture – letter box format with 504 active lines
ZOOM 14:9	114%	100%	Picture is displayed filling the full width of the screen by incorporating a small horizontal geometrical error (typically 8% linear)	14:9 picture – letter box format with 504 active lines
ZOOM 16:9	133%	100%	Picture is displayed filling the full screen (width and height)	16:9 picture – letter box format with 430 active lines
PANORAMA	100%	100%	Picture is displayed filling the full screen (width and height)	Used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders.

5-4-6 EXTERNAL source control logic

The following schematic, illustrates the logic of control for the two SCART connectors.



The terms used in the schematic are described below ;

1. AUTO represents a situation where the television has self-selected its picture source. This could be when the SCART SLOW SWITCHING pin has gone to a high state, and the AV 1 input is selected without the intervention of the user.
2. FORCED represents the change of source which has been commanded by the user (using the EXTERNAL button). The user always has priority, and can override the AUTO change of source by the television.
3. AV KEY represents the EXTERNAL button of the remote control, or on the television.
4. S/SW 1, or S/SW 2 represent the SLOW SWITCHING inputs of the first SCART (AV 1) or second SCART (AV 2), these each being pin number 8.
5. F/SW 1 represents the FAST SWITCHING input of the first SCART (AV 1), on pin number 16. The second SCART, AV 2, input does not possess a FAST SWITCHING input.

The HIGH state of a slow switching input represents the request from the external source to be selected by the television. Whether this is accepted or not depends on the position in the logic diagram. The general rule is that the user always has priority, so the use of the AV KEY will always result in a defined logic path being followed. Under certain circumstances, defined in the diagram, the change of state of a slow switching input will result in the automatic change of source by the television. This change, such as the change from RF broadcast to the AV 1 input,

can always be overridden by the user after the event.

Each line on the diagram, with its associated text, represents the exact conditions under which the change of state will occur. Sometimes this will be accompanied by another action which will be automatically performed by the television, being to either ENABLE or DISABLE F/SW 1.

5-4-7 Over Current Protection

In case of overload, the SMPS secondary voltages will drop. The voltage on pin 64 of microcontroller drops below a reference voltage (2.26V). The controlling software which continuously monitors this voltage will switch the set to stand by mode. To power on the set again the user must switch it off using the main power switch. Appropriate hysteresis guaranrees a reliable operation.

5-5 Teletext Display

National character option bits C12, C13, C14 are transmitted in the page header of a given teletext page. The national option bits are intended to change (or exchange) 13 characters within the G0 character set, according to the needs of each national language. However, for Cyrillic and Greek languages, a major character set change (a change of character mapping) needs to effected for correct display.

These codes represent, for a given broadcaster, the intended language that the teletext page should be displayed in. As there are only 3 bits, there are only 8 codes available to cover all the possible language combinations. This means that for a received code there are several possibilities meanings, and therefore several possibilities for display.

This is not as bad as it first seems, as we use the user-selected OSD language to identify the intention of the broadcaster. For example, a user wishing to see Russian teletext should select Russian OSD language, otherwise he would not have correct teletext display on the TV.

The table below allows the reader to understand the relationship between selected OSD language (which is under user control), the teletext language display (selected by national option bits in transmission page header) and the language mapping (either Latin or Greek/Cyrillic)

An example: For Greek teletext display, (if national option code 1 1 1 is received from the broadcaster), the user should select the Greek OSD language. Even if English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian or Swedish OSD languages are selected, the teletext will be correctly displayed.

However, if Polish, Hungarian, Czech, Slovakian, Rumanian or Russian OSD are selected, Latin font mapping is selected. The consequence will be incorrect teletext display, with NO GREEK CHARACTERS DISPLAYED. Rumanian national font options will be selected.

OSD Language	C 12	C 13	C 14	Teletext Language	ESC Teletext Language	Mapping
English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek	0	0	0	English	English	Latin
	0	0	1	German	German	Latin
	0	1	0	Swedish/Finnish	Swedish/Finnish	Latin
	0	1	1	Italian	Italian	Latin
	1	0	0	French	French	Latin
	1	0	1	Spanish	Spanish	Latin
	1	1	0	Turkish	Turkish	Latin
	1	1	1	English	Greek	Greek/Cyrillic
Polish, Hungarian, Czech, Slovakian, Rumanial	0	0	0	Polish	Polish	Latin
	0	0	1	German	German	Latin
	0	1	0	Hungarian	Hungarian	Latin
	0	1	1	Italian	Italian	Latin
	1	0	0	French	French	Latin
	1	0	1	Serb/Croat/Slovenian	Serb/Croat/Slovenian	Latin
	1	1	0	Czech/Slovak	Czech/Slovak	Latin
	1	1	1	Rumanian	Rumanian	LatinRussian
Russian Bulgarian	0	0	0	English	Serbian/Montenegrin	Greek/Cyrillic
	0	0	1	German	German	Latin
	0	1	0	Estonian	Estonian	Latin
	0	1	1	Lettish/Lithuanian	Lettish/Lithuanian	Latin
	1	0	0	English	Russian/Bulgarian	Greek/Cyrillic
	1	0	1	English	Ukrainian	Greek/Cyrillic
	1	1	0	Czech/Slovak	Czech/Slovak	Latin
	1	1	1	Rumanian	Rumanian	Latin

5-6 Sound processing

5-6-1 Analogue sound IF - input section

The input pins ANA_IN1+ and ANA_IN- offer the possibility to connect sound IF sources to the MSP 341xD. The analogue-to-digital conversion of the preselected sound IF signal is done by an A/D converter, whose output is used to control an analogue automatic gain circuit (AGC), providing an optimal level for a wide range of input levels.

5-6-2 Quadrature Mixers

The digital input coming from the integrated A/D converter may contain audio information at a frequency range of theoretically 0 to 9 MHz corresponding to the selected standards. By means of two programmable quadrature mixers, two different audio sources ; for example, NICAM and FM-mono, may be shifted into baseband position.

5-6-3 Phase and AM discrimination

The filtered sound IF signals are demodulated by means of the phase and amplitude discriminator block. On the output, the phase and amplitude is available for further processing.

AM signals are derived from the amplitude information, whereas the phase information serves for FM and NICAM demodulation.

5-6-4 NICAM decoder

In case of NICAM - mode, the phase samples are decoded according the DQPSK - coding scheme. The output of this block contains the original NICAM bitstream.

5-6-5 DSP section

All audio baseband functions are performed by digital signal processing (DSP). The DSP section controls the source and output selection, and the signals processing.

5-6-6 Sound Mode switching

In case of NICAM transmission, the controlling software reads the bit error rate and the operation mode from the NICAM Decoder. When the set is in "Auto detection" mode (default mode after ATSS) the controlling software sets automatically the sound mode (NICAM mono, NICAM Dual 1 or NICAM Dual 2) depending on the transmitted mode.

In the case of 2 Carrier FM transmission, the controlling software read the transmission mode and the signal quality level from the Stereo Detection Register. When the set is in "Auto detection" mode the controlling software automatically sets the sound mode (mono, Stereo, Dual 1, Dual 2) depending on the transmitted mode.

In "Auto detection" mode the controlling software evaluates the signal quality and automatically switches to the analogue sound carrier 1, if the transmission quality is too poor. To avoid unwanted automatic switching the threshold levels mono to stereo and stereo to mono are different.

In "forced mono " mode (Red OSD in status Display Window), the controlling software configures the MSP341xD to demodulate the analogue (FM or AM) sound carrier 1, no matter the signal quality. The sound mode " forced " or " Autodetect" is stored for each programme.

5-7 Sound amplification

The TDA8946J is a stereo BTL audio amplifier capable of delivering 2 x 15 W output power to an 8 W load at THD = 10%, using a 18 V power supply and an external heatsink. The voltage gain is fixed at 32dB.

With the three-level MODE input the device can be switched from 'standby' to 'mute' and to 'operating' mode. The TDA 8946J outputs are protected by an internal thermal shutdown protection mechanism and short-circuit protection.

5-7-1 Power amplifier

The power amplifier is a Bridge Tied Load (BTL) amplifier with an all-NPN output stage, capable of delivering a peak output current of 1.5 A.

The BTL principle offers the following advantages :

- Lower peak value of the supply current.
- The ripple frequency on the supply voltage is twice the signal frequency.
- No DC-blocking capacitor
- Good low frequency performance

5-7-2 Mode selection

The TDA894xJ has several functional modes, which can be selected by applying the proper DC voltage to pin MODE.

Mute : In this mode the amplifier is DC biased but not operational (no audio output). This allows the input coupling capacitors to be charged to avoid pop-noise. The device is in mute mode when $2.5\text{ V} < V_{\text{MODE}} < (V_{\text{CC}} - 1.5\text{ V})$.

Operating : In this mode the amplifier is operating normally. The operating mode is activated at $V_{\text{MODE}} < 0.5\text{ V}$.

5-8 Vertical deflection

The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. The differential input circuit is voltage driven. The input circuit is especially intended for direct connection to driver circuits which deliver symmetrical current signals, but is also suitable for asymmetrical currents. The output current of these devices is converted to voltages at the input pins via resistors R350 and R351. The differential input voltage is compared with the output current through the deflection coils measured as voltage across R398, which provides internal feedback information. The voltage across R398 is proportional to the output current.

5-8-1 Flyback voltage

The flyback voltage is determined by an additional supply voltage V_{fb} . The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage V_{p} optimum for the scan voltage and the second supply voltage V_{fb} optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage V_{fb} is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor.

5-8-2 Protection

The output circuit has protection circuits for :

- Too high die temperature
- overvoltage of output stage A

5-8-3 Guard circuit

The guard signal is not used.

5-8-4 Damping resistor

For HF loop stability a damping resistor (R331) is connected across the deflection coil.

5-8-5 EAST-WEST Amplifier (TDA8358J)

The East-West amplifier is current driven. It can only sink currents of the diode modulator circuit. A feedback resistor R397 is connected between the input and output of this inverting amplifier in order to convert the East-West correction input into an output voltage.

5-9 Power supply (STR F6654)

5-9-1 STR-F6654 general description

The STR-F6654 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

5-9-2 Power supply primary part operations

An oscillator generates pulses signals which turn on and off a MOSFET transistor.

5-9-2-1 Start-up circuit : V_{IN}

The start-up circuit is used to start and stop the operation of the control IC, by detecting a voltage appearing at V_{IN} pin (pin 4).

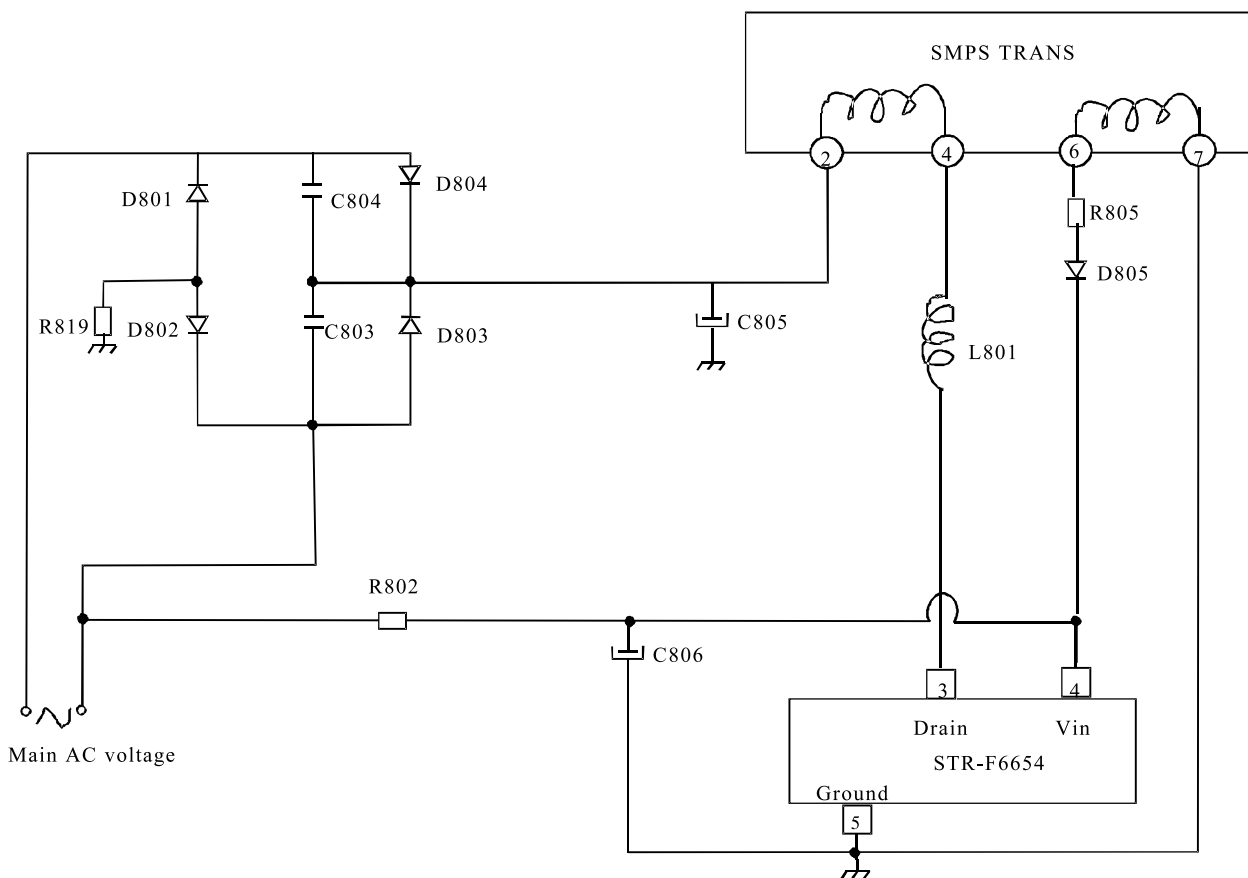


Fig : Power supply start-up circuit

When the power switch is pushed on, V_{IN} increases slowly. During this time, C806 is charged through R802.

As soon as V_{IN} reaches 16V, the STR-F6654 control circuit starts operating. Then, V_{IN} is obtained by smoothing the winding voltage which appears between pin6 and pin7 of the SMPS transformer.

As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating, V_{IN} starts dropping. However, as this winding voltage reaches the set value before V_{IN} voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below V_{IN} voltage at start-up). R805 resistor prevents that V_{IN} pin voltage varies according to the secondary side output current.

V_{IN} must be set higher than the shutdown voltage ($V_{IN}(\text{off}) = 11V_{\text{max}}$) and lower than the O.V.P. (overvoltage protection) operating voltage ($V_{\text{OVP}} = 20.5V_{\text{min}}$)

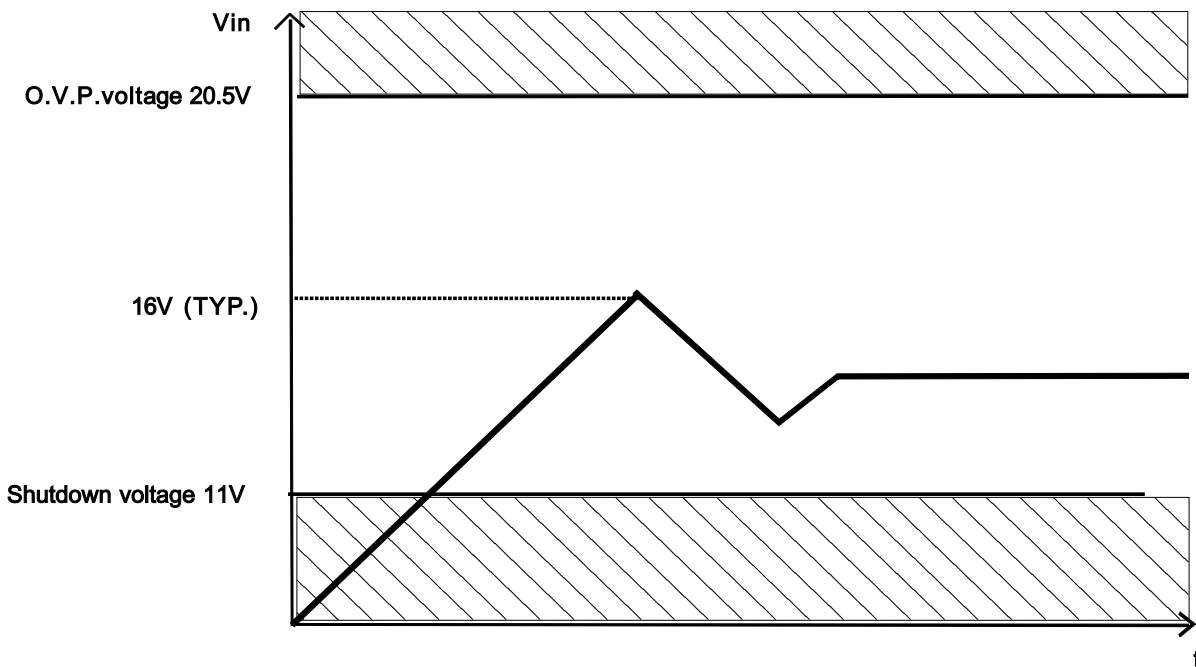


Fig : Waveform of Vin pin voltage at start-up

5-9-2-2 STR-F6654 oscillating operation

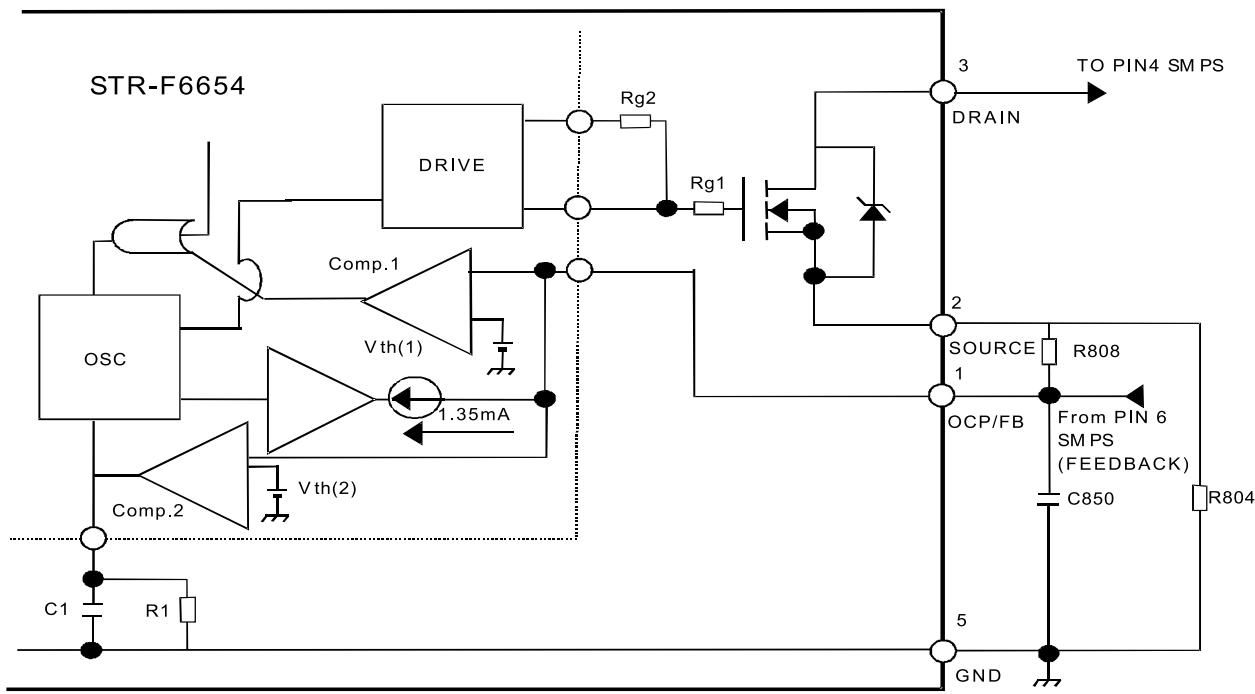


Fig : Oscillating operation

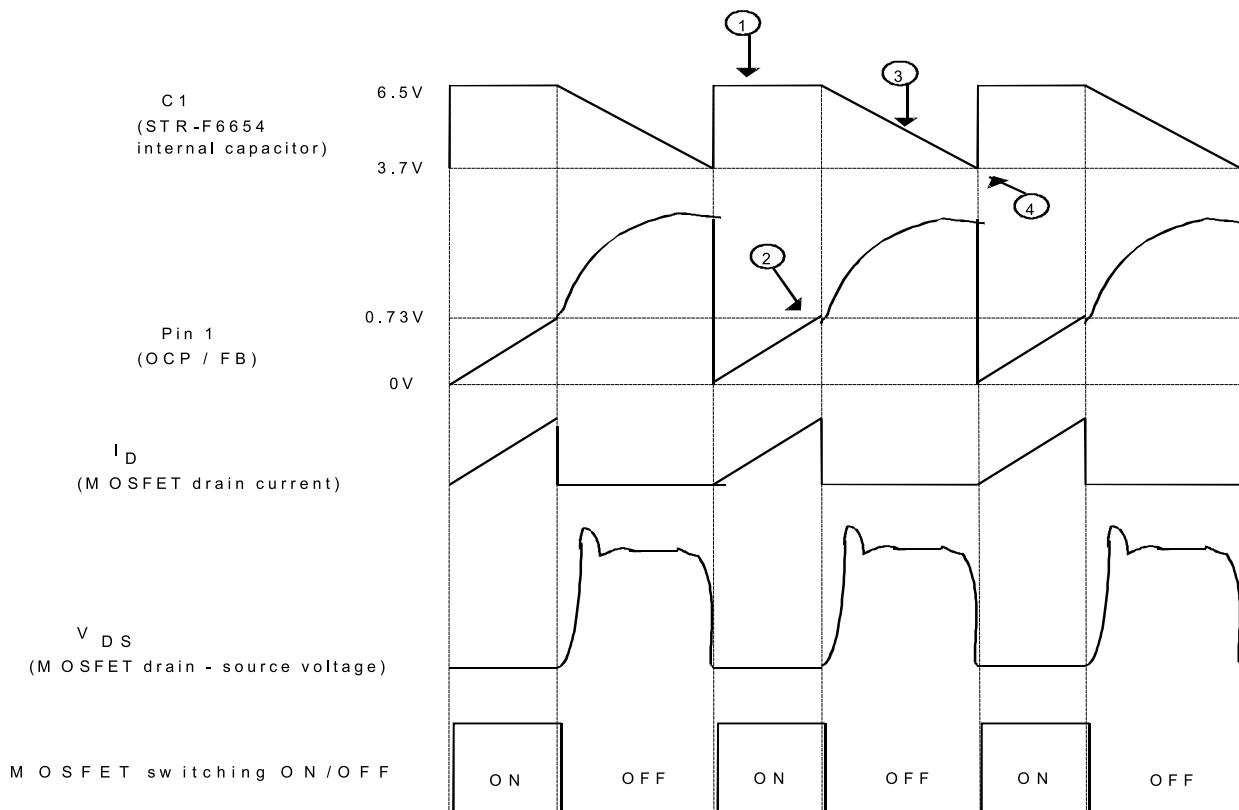


Fig : Waveforms during oscillating operation

- ① When the MOSFET is ON, the STR-F6654 internal capacitor C1 is charged at the constant voltage 6.5V. At the same time, the voltage at pin 1 (OCP / FB) increases with the same waveform as the MOSFET drain current.
- ② When the pin 1 voltage reaches the threshold voltage $V_{TH1} = 0.73V$, the STR-F6654 internal comparator 1 starts operating. The STR-F6654 internal oscillator is inverted and the MOSFET turns OFF.
- ③ When the MOSFET turns OFF, charging of STR-F6654 internal capacitor C1 is released and C1 starts discharging by the STR-F6654 internal resistance R1. So, C1 voltage starts falling in accordance with the gradient regulated by the constant discharging time of C1 and R1. So, this means that the fixed time determined by C1 and R1 is the OFF-time of the MOSFET.
- ④ When C1 voltage falls to around 3.7V, the STR-F6654 internal oscillator is reversed again and the MOSFET turns ON. C1 is quickly charged to around 6.5V

The MOSFET continues to oscillate by repeating the above procedure.

5-9-2-3 STR-F6654 protection circuits

overcurrent protection function (OCP)

Overcurrent protection is performed pulse by pulse detecting at STR-F6654 pin 1 (OCP) the peak of the MOSFET drain current in every pulse.

• latch circuit

This circuit sustains an output low from the STR-F6654 internal oscillator and stops operation of the power supply when overvoltage protection (OVP) and thermal shutdown (TSD) circuit are under operation

thermal shutdown circuit (TSD)

This circuit triggers the latch circuit when the frame temperature of STR-F6654 IC exceeds 140°C

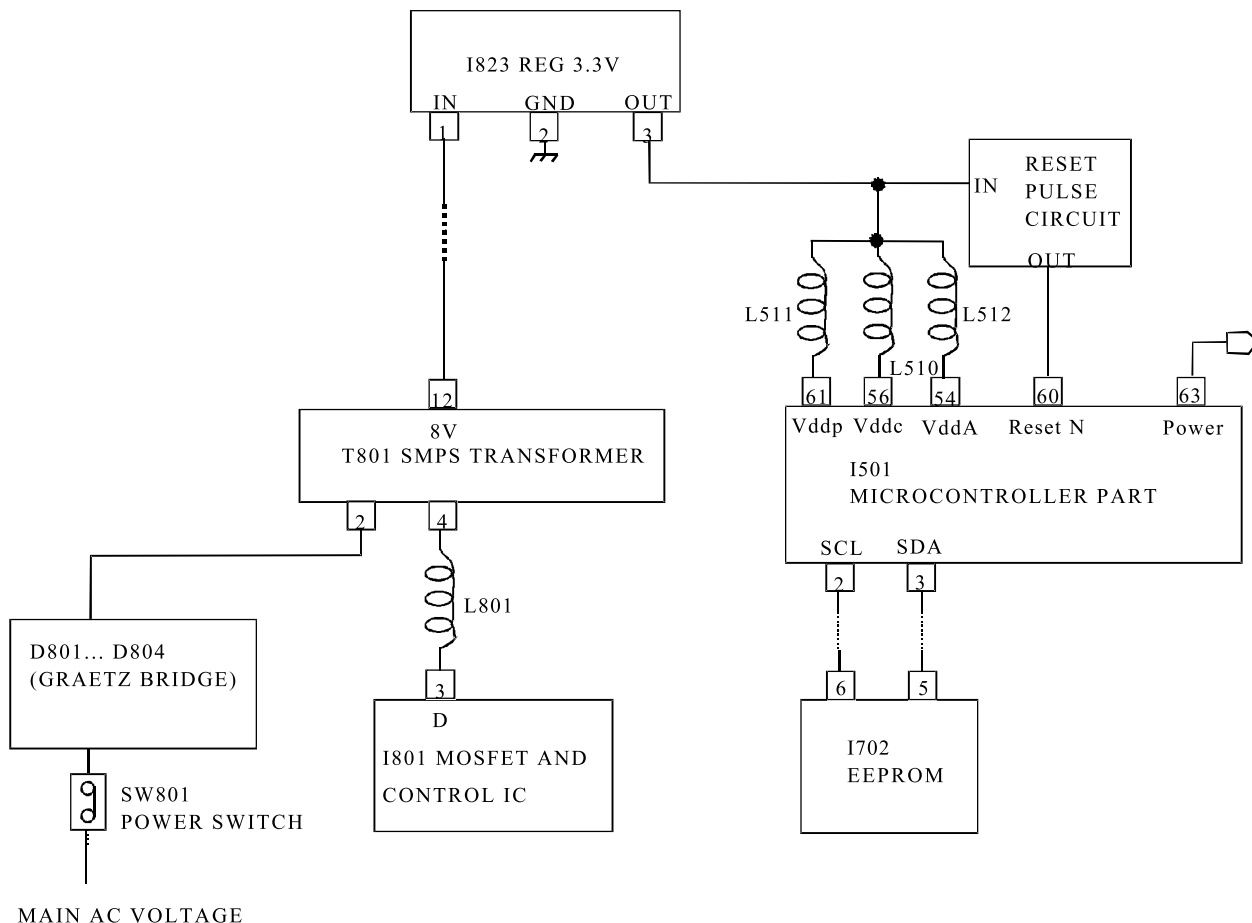
overvoltage protection circuit (OVP)

This circuit triggers the latch circuit when the V_{in} voltage exceeds 22V (typ.)

5-10 TV start-up, TV normal run and stand by mode operations

5-10-1 TV start-up operations

* Schematic diagram for start-up operations



Start-up operations

* TV start-up and microcontroller initialisation

- When SW801 power switch is pushed, main AC voltage is applied to T801 transformer (after rectification by D801... D804 diodes). Then, T801 SMPS transformer starts operating and supplies DC voltage to I823 (5V regulator).
- This regulator provides 5V / 3.3V DC voltage to I501 microcontroller power supply pins (pin 3 / pin 54) and to the reset pulse circuit which provides reset pulse to I501 microcontroller reset pin (pin 58).
- Then, the microcontroller starts its initialisation. Its power pin (pin 1) is set to high which allows delivery of power supply voltages (123V, 8V, 5V...). At this step, all ICs start working but no picture appears on screen: I501 IC doesn't provide horizontal drive voltage.
- Then, the microcontroller consults I702 EEPROM via I2C bus to know the last TV set mode (normal run mode or stand-by mode) before switching off.

. If the TV set was on normal run mode before switching off, the microcontroller delivers horizontal drive voltage at pin 24 and picture appears on screen.

. If the TV set was on stand-by mode before switching off, the microcontroller switches TV set to stand-by mode, decreasing power pin voltage (pin 1).

5-10-2 TV normal run and stand-by mode operations

Depending on remote control commands, I501 microcontroller part pin 1 (power) is set to :

- high for normal run mode
- low for stand-by mode

a) TV on normal run mode

* I501 microcontroller part pin 1 (power) effect

I501 microcontroller part pin 1 (power) is connected to the following circuit :

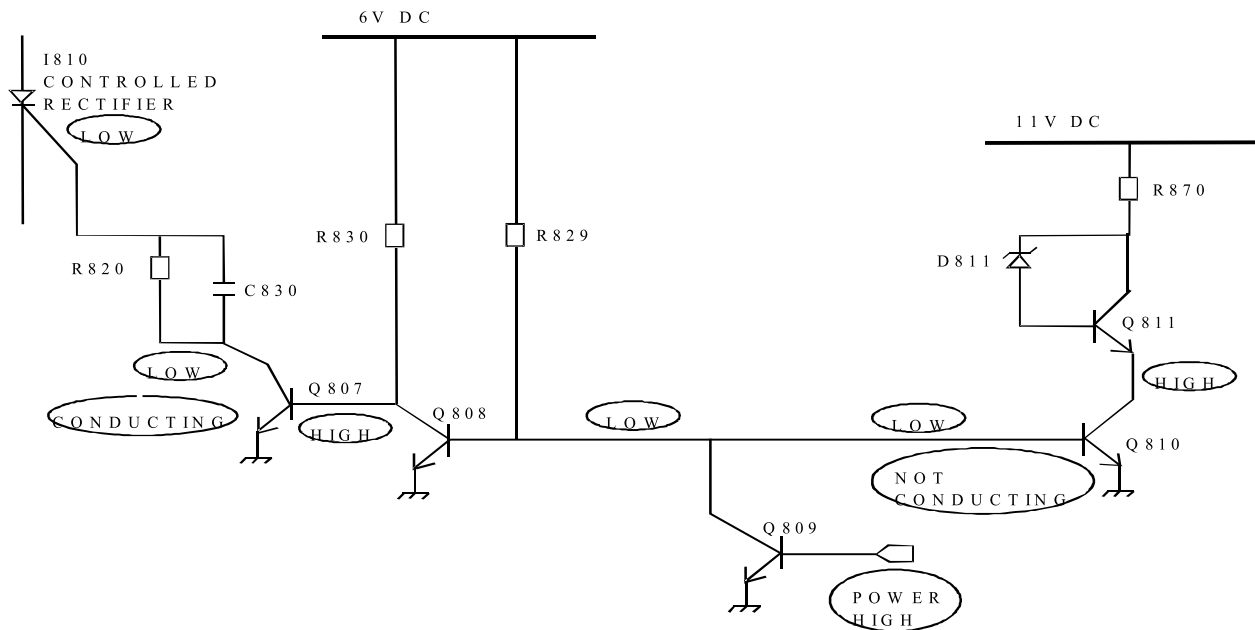


Fig : I501 microcontroller part pin 63 (POWER) effect

On normal run mode, I501 microcontroller pin 1 (power) is set to high

So, I810 controlled rectifier is not conducting

- Q809 is conducting. So, Q808 is not conducting and Q807 is conducting
- So, Q807 collector is connected to the ground and I810 controlled rectifier gate pin is set to low (no conducting)

So, current from 14V DC voltage (from T801 SMPS transformer pin 13) does not flow through Q811 and Q810 transistors but flows through I806 IC error amplifier

- Q809 is conducting. So, Q810 is not conducting and no current flows from Q810 collector to the ground
- Therefore, the power circuit diagram is the following one :

* power supply circuit diagram during TV set normal run

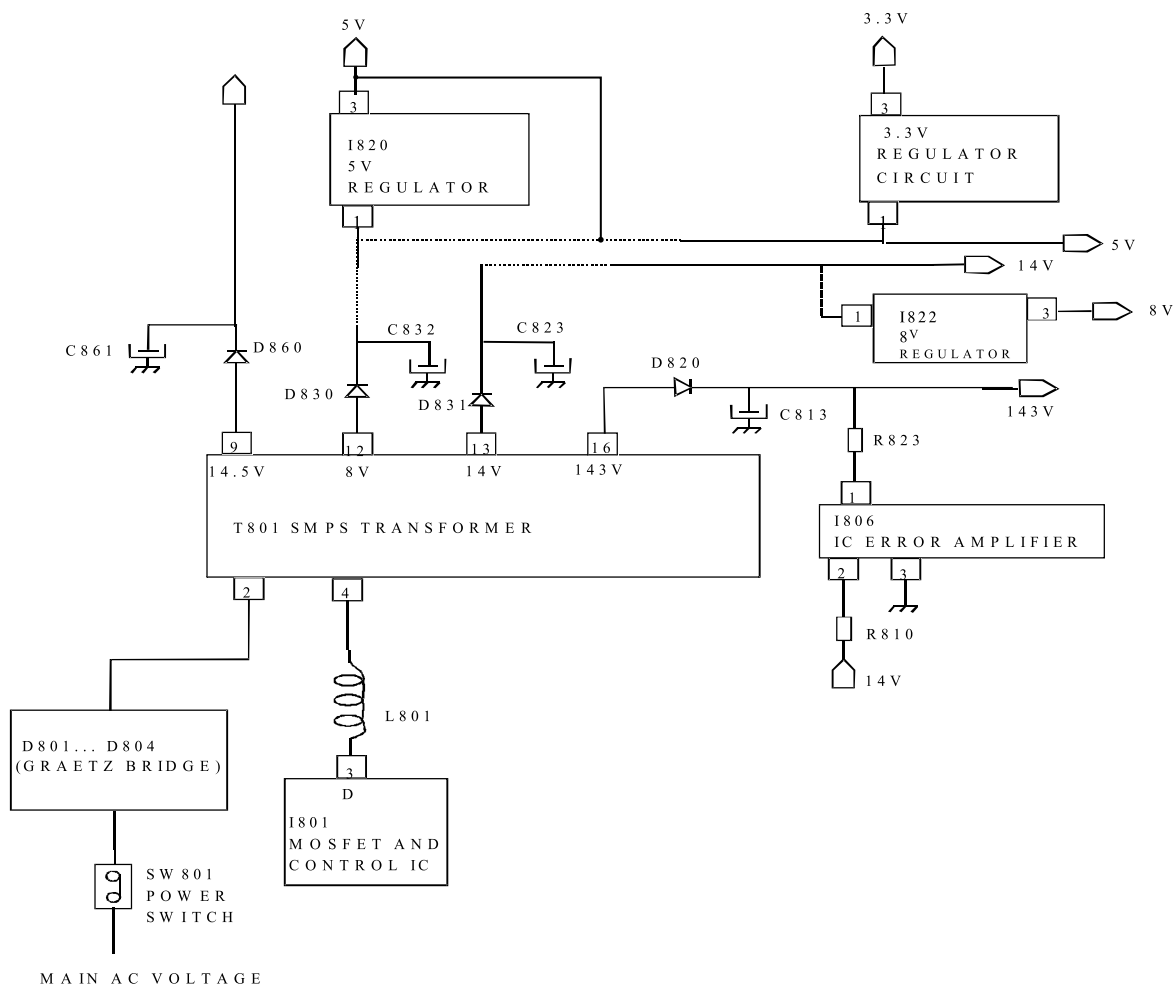


Fig : Power supply operation during TV set normal run

* power supply functioning during TV set normal run mode

- I801 transmits controlled pulses to T801 which generates DC voltages after rectifications by secondary part diodes and electro capacitors (by example by D820 and C813 on 143V supply voltage line).

- 8V, 5V, 3.3V supply voltage lines have stabilized voltages obtained by I820, I822, I823 voltage regulators.

- On 143V supply voltage line, R823 resistor has been chosen to reach exact DC voltage required on this line.

- 143V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

* power supply IC delivery during TV set normal run

power supply line	IC power supply delivery	Remarks
143V	FBT	FBT supplies 43V to I301 vertical IC FBT supplies 43V to T401 H- drive for CP785 FBT supplies 12V to I301 vertical IC FBT supplies 33V to the tuner FBT supplies 188V to I901 video amplifier pin 6
14.5V	I602 sound amplifier pins 3-16	
14V	T401 H- drive	
8V	I501 Main IC pins 14-39 I601 Sound Demod pins 38-39-40	
5V	I703 IR receiver pin 1 I501 Main IC pins 3-15-45 I601 Sound Demod pins 7-18-57 I702 EEPROM pin 8 tuner	
3.3V	I501 Main IC pins 25-54	

b) TV set on stand-by mode

* TV set circuit diagram on stand-by mode

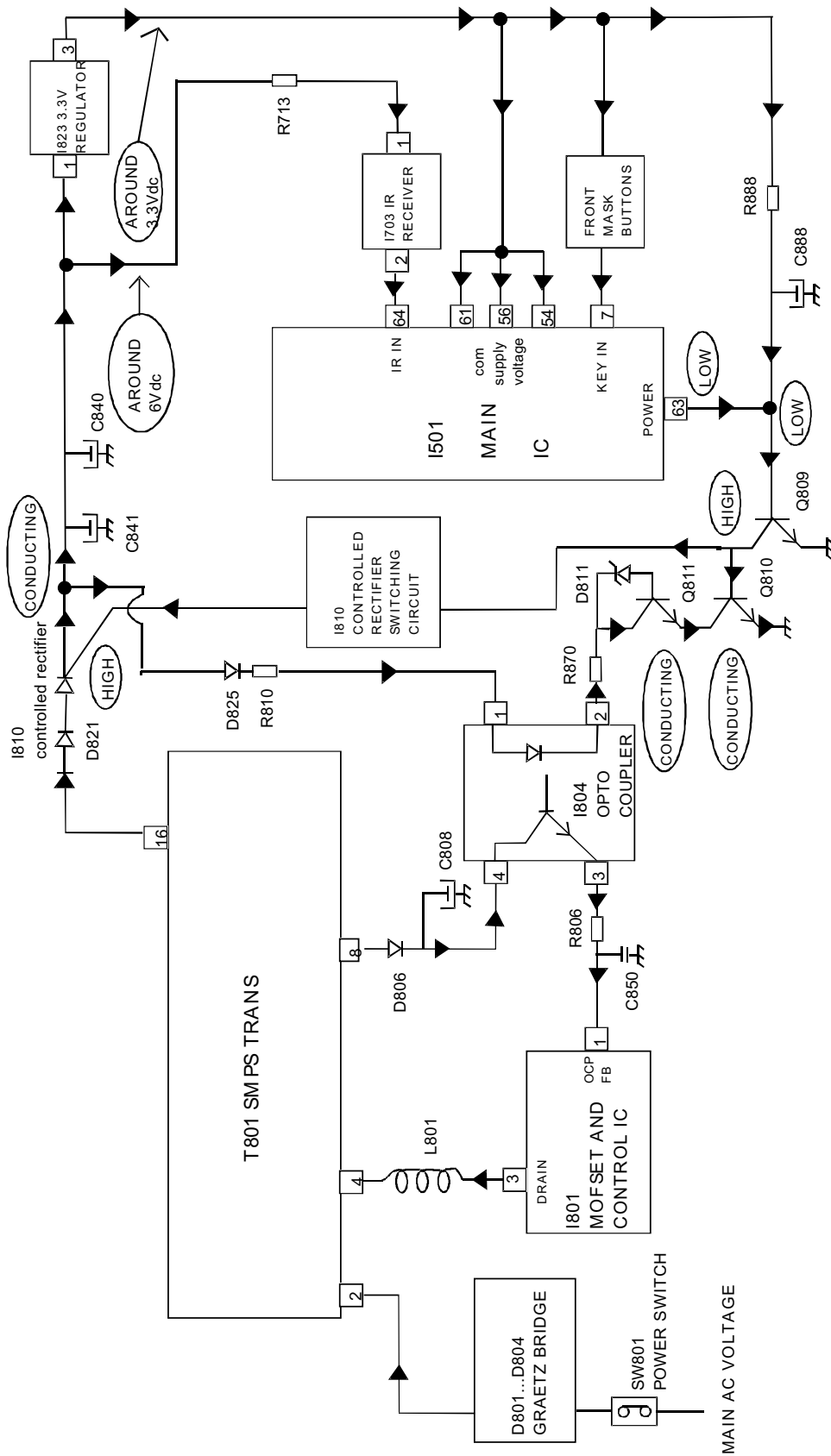


Fig : Power supply operation in stand - by mode

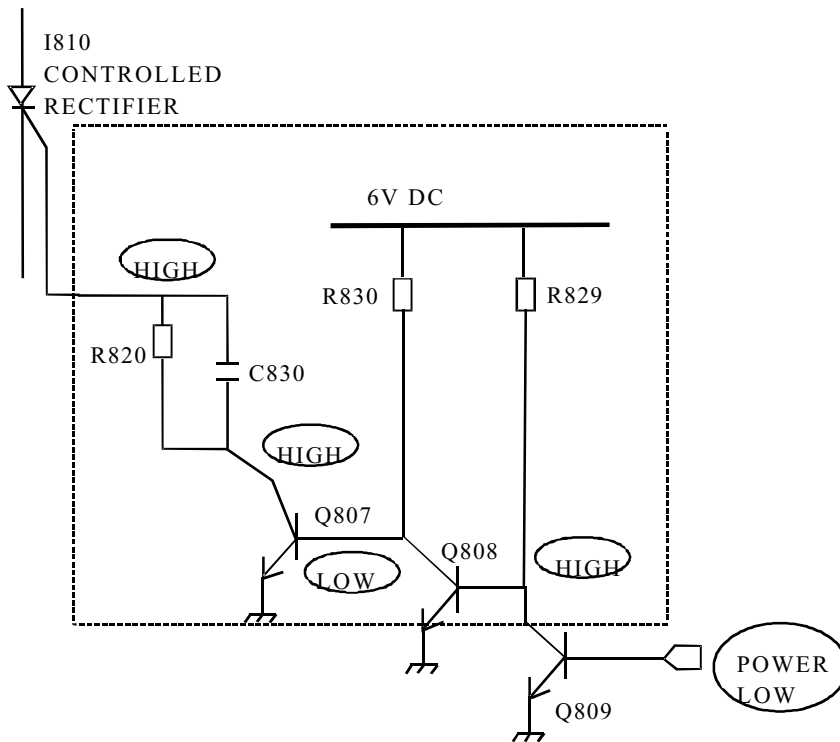


Fig : I810 controlled rectifier switching circuit

* TV set stand-by mode operations

- On stand-by mode, I501 microcontroller pin 1 (power) is set to low.
- So, Q809 collector is set to high.
- Then, I810 controlled rectifier gate pin is set to high and I810 is conducting.
- So, current flows from pin 16 SMPS transformer to the ground via I804 optocoupler and Q810 and Q811 transistors (which are conducting).
- In these conditions, I801 delivers pulses on light mode and T801 produces voltages with reduced power.
- As I810 is conducting, current flows also from pin 16 SMPS transformer to I823 (5V / 3.3V regulator) for I501 μ com, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).

Service manual SC-150

6-1. Service Parts List

z_loc	z_parts_code	parts_name	parts_descr	z_loc	z_parts_code	parts_name	parts_descr
ZZ100	48B4846G22	TRANSMITTER REMOCON	R-46G22 (AAA)	C890	CCYE3D103P	C CERA	2KV E 0.01MF P
ZZ110	PEPKCPD037	PACKING AS	DSC-3220E	D403	DDGP30L---	DIODE	DGP30L
M641	6520010100	STAPLE PIN	AUTO W65	D404	DRGP30J---	DIODE	RGP30J
M681	4856812400	BAND PP AUTO	T1.1XW17mmXL770M	D820	DRGP30J---	DIODE	RGP30J
M801	4958002200	BOX CARTON	DW-4	D860	DRGP30J---	DIODE	RGP30J
M811	4958102500	PAD	EPS	F801	5FSCB4022R	FUSE CERA	SEMKO F4AH 4A 250V MF51
M821	4958200701	BAG P.E	FOAM T0.5X1880X1380	I101	1TDA4470M-	IC IF	TDA4470-M
ZZ120	PEBCSHD037	COVER BACK AS	DSC-3220E	I301	1TDA8358J-	IC VERTICAL	TDA8358J
M211	4952102201	COVER BACK	HIPS	I301A	4857028227	HEAT SINK	AL EX BK
M211E	4857817610	CLOTH BLACK	FELT 300X20X0.7	I301B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN
ZZ131	58GD000004	COIL DEGAUSSING	DC-3200(D)	I501	1DW3834AE2	IC MICOM	DW3834-C4-AE2
ZZ132	49519A0110	CRT GROUND NET	DSC-3210E	I601	1MSP3410V3	IC SOUND PROCESSOR	MSP3410G-PP-B8-V3
ZZ140	PECACAD037	CABINET AS	DSC-3220E	I602	1TDA8946J-	IC AUDIO AMP	TDA8946J
M201A	4956000100	SCREW CRT FIX	SWRM10A L=35	I602A	4857028227	HEAT SINK	AL EX BK
M201B	4856215401	WASHER RUBBER	CR T1.0	I602B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN
M201C	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	I603	1KA4558---	IC AMP	KA4558
M201D	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	I702	1CAT24C16P	IC MEMORY	CAT24WC16P
M211A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	I801	1STRF6654-	IC SMPS	STR-F6654
M211B	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	I801A	4857027910	HEAT SINK	AL EX
M211C	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	I801B	7174301211	SCREW TAPPTITE	TT2 RND 3X12 MFZN
M211D	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	I804	1LTV817C---	IC PHOTO COUPLER	LTV-817C
M231	4952301301	PANEL CTRL	HIPS PAINT	I806	1SE130N---	IC	SE130N
M353	4853535600	HOLDER CORD	NYROLN 66	I810	TX0202DA---	THYRISTOR	X0202DA1BA2
M481	4954801001	BUTTON POWER	ABS PAINT	I820	1KA7805---	IC REGULATOR	KA7805
M481A	4856716000	SPRING	SWPA PIE0.5	I820A	4857026901	HEAT SINK	AL EX BK
M541	4955400100	SPEC PLATE	P.E FILM 91.5X63	I820B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
M561	4855617400	MARK BRAND	CU AU+ABS BK	I822	1KA7808---	IC REGULATOR	KA7808
M682	4856816300	CLAMP WIRE	NYLON 6 (V0)	I822A	4857026901	HEAT SINK	AL EX BK
S601	4858315610	SPEAKER	SP-5090F13	I822B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
S601A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	I823	1KA7805---	IC REGULATOR	KA7805
S601R	4850703S52	CONNECTOR	YH025-03+35098+ULW=400	IA01	1MM1118---	IC AV SWITCH	MM1118
S602	4858315610	SPEAKER	SP-5090F13	JPA1	4959103680	JACK SCART	DSAM-0266
S602A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	JPA2	4959103680	JACK SCART	DSAM-0266
S602L	4850703S54	CONNECTOR	YH025-03+35098+ULW=600	L150	58E0000041	COIL AFT	TRF-A005
V901	4859639160	CRT	W76ERF042X013	L380	5MC0000085	COIL CHOKE	CH-100A
V901A	4850706N14	CONNECTOR	YFSH500-06+YH396V+ULW=600	L381	5MC0000085	COIL CHOKE	CH-100A
ZZ200	PEFMSJD037	MASK FRONT AS	DSC-3220E	L401	58H0000077	COIL H-LINEARITY	TRL-40A1
M201	4952002401	MASK FRONT	HIPS PAINT	L402	58CD000022	COIL CHOKE	CH-700A
M201E	4857817610	CLOTH BLACK	FELT 300X20X0.7	L802	58C9430599	COIL CHOKE	AZ-9004Y(94MH)
ZZ300	PEMPMSD037	PCB MAIN MANUAL AS	DSC-3220E	LF801	5PLF3020---	FILTER LINE	LF-3020
10	2193102005	SOLDER BAR	SN:PB=63:47 S63S-1320	M351	4953500100	HOLDER CORD	FR HIPS
30	2291050616	FLUX SOLDER	JS-64T3	M351A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
40	2291050301	FLUX SOLVENT	IM-1000	M381	4953802800	FRAME MAIN PCB	FR HIPS BK
C402	CMYH3C562J	C MYLAR	1.6KV BUP 5600PF J	M381A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
C403	CMYH3C752J	C MYLAR	1.6KV BUP 7500PF J	M381B	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
C408	CMYE2G274J	C MYLAR	400V PU 0.27MF J	M681	4856815400	CLAMP WIRE	NYLON 66
C499	CEYD1H689W	C ELECTRO	50V RHD 6.8MF (16X35.5)	M683	4856812001	TIE CABLE	NYLON66 DA100
C801	CL1UC3474M	C LINE ACROSS	0.47MF 1J(UCVSNDV/SV)+Q/O	P402	4859240120	CONN WAFER	YFW500-06
C805	CEYN2G181P	C ELECTRO	400V LHS 180MF (25X35)	P404	4859238620	CONN WAFER	YPW500-02
C812	CH1BFE472M	C CERA AC	AC400V 4700PF M U/C/V	P800	4859907410	CORD POWER AS	M5206+TER=2250
C813	CEXF2E101V	C ELECTRO	250V RSS 100MF 18X35.5	M207	4853535500	HOLDER AC CORD	NYLON 66

z_loc	z_parts_code	parts_name	parts_descr
M222	4859906111	CORD POWER	M5206+H03VVH2-F=2250
M222T	4857417700	TERM CLAMP	PT-01-T3
Q401	T2SD1880—	TR	2SD1880
Q401A	4857024500	HEAT SINK	AL EX B/K
Q401B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
R801	DPC7R0M290	POSISTOR	2322 662 96709
R819	RX10T339J-	R CEMENT	10W 3.3 OHM J TRIPOD
RB02	RV4121103P	R SEMI FIXED	NVZ6THT 10K OHM
SF01	5PK3953M—	FILTER SAW	K3953M
SF02	5PK9650M—	FILTER SAW	K9650M
T401	50D19A1—	TRANS DRIVE	TD-19A1
T402	5DH0000028	FBT	LTC-305
T801	50M4936B2-	TRANS SMPS	2094.0057
T803	58CD000023	COIL CHOKE HYBRID	HCA208-049A
U100	4859721530	TUNER VARACTOR	DT5-BF18D N
X501	5XE20R250E	CRYSTAL QUARTZ	HC-49/U 20.2500MHZ 30PPM
X601	5XE18R432E	CRYSTAL QUARTZ	HC-49/U 18.43200MHZ 30PPM
Z101	5PMKT40MA-	FILTER CERA	MKT40MA100P
Z153	5PYXT5R5MB	FILTER CERA	XT 5.5MB
ZZ200	PEMPJ0D037	PCB MAIN (RHU) AS	DSC-3220E
C315	CEXF2C470C	C ELECTRO	160V RUS 47MF (13X25) TP
C415	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP
C430	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)
C440	CMXE2G273J	C MYLAR	400V PU 0.027MF J (TP)
C502	CEXF1C102V	C ELECTRO	16V RSS 1000MF (10X20) TP
C553	CEXF1C102V	C ELECTRO	16V RSS 1000MF (10X20) TP
C604	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C811	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)
C814	CEXF2E470V	C ELECTRO	250V RSS 47MF (16X25) TP
C823	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C832	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C840	CEXF1C222V	C ELECTRO	16V RSS 2200MF (16X31.5) TP
C841	CEXF1C332V	C ELECTRO	16V RSS 3300MF (16X25) TP
C861	CEXF1E102C	C ELECTRO	25V RUS 1000MF (13X20) TP
ZZ200	PEMPJBD037	PCB MAIN M-10 AS	DSC-3220E
E001	4856310600	EYE LET	BSR T0.2 (R2.3)
E002	4856310600	EYE LET	BSR T0.2 (R2.3)
E003	4856310600	EYE LET	BSR T0.2 (R2.3)
E004	4856310600	EYE LET	BSR T0.2 (R2.3)
E005	4856310300	EYE LET	BSR T0.2 (R1.6)
E006	4856310300	EYE LET	BSR T0.2 (R1.6)
E007	4856310300	EYE LET	BSR T0.2 (R1.6)
E008	4856310300	EYE LET	BSR T0.2 (R1.6)
E009	4856310600	EYE LET	BSR T0.2 (R2.3)
E010	4856310600	EYE LET	BSR T0.2 (R2.3)
E011	4856310300	EYE LET	BSR T0.2 (R1.6)
E012	4856310600	EYE LET	BSR T0.2 (R2.3)
E013	4856310600	EYE LET	BSR T0.2 (R2.3)
E014	4856310600	EYE LET	BSR T0.2 (R2.3)
E015	4856310600	EYE LET	BSR T0.2 (R2.3)
E016	4856310600	EYE LET	BSR T0.2 (R2.3)
E017	4856310600	EYE LET	BSR T0.2 (R2.3)

z_loc	z_parts_code	parts_name	parts_descr
E018	4856310300	EYE LET	BSR T0.2 (R1.6)
E019	4856310300	EYE LET	BSR T0.2 (R1.6)
E020	4856310300	EYE LET	BSR T0.2 (R1.6)
E021	4856310600	EYE LET	BSR T0.2 (R2.3)
E022	4856310600	EYE LET	BSR T0.2 (R2.3)
E023	4856310300	EYE LET	BSR T0.2 (R1.6)
E024	4856310300	EYE LET	BSR T0.2 (R1.6)
E025	4856310600	EYE LET	BSR T0.2 (R2.3)
E026	4856310600	EYE LET	BSR T0.2 (R2.3)
E027	4856310600	EYE LET	BSR T0.2 (R2.3)
E028	4856310600	EYE LET	BSR T0.2 (R2.3)
E029	4856310600	EYE LET	BSR T0.2 (R2.3)
E030	4856310600	EYE LET	BSR T0.2 (R2.3)
E031	4856310300	EYE LET	BSR T0.2 (R1.6)
E032	4856310600	EYE LET	BSR T0.2 (R2.3)
E033	4856310300	EYE LET	BSR T0.2 (R1.6)
E034	4856310300	EYE LET	BSR T0.2 (R1.6)
E035	4856310300	EYE LET	BSR T0.2 (R1.6)
E037	4856310600	EYE LET	BSR T0.2 (R2.3)
E038	4856310600	EYE LET	BSR T0.2 (R2.3)
E039	4856310600	EYE LET	BSR T0.2 (R2.3)
E040	4856310600	EYE LET	BSR T0.2 (R2.3)
E041	4856310300	EYE LET	BSR T0.2 (R1.6)
E042	4856310300	EYE LET	BSR T0.2 (R1.6)
E043	4856310300	EYE LET	BSR T0.2 (R1.6)
E044	4856310300	EYE LET	BSR T0.2 (R1.6)
E045	4856310300	EYE LET	BSR T0.2 (R1.6)
E046	4856310300	EYE LET	BSR T0.2 (R1.6)
E047	4856310300	EYE LET	BSR T0.2 (R1.6)
E048	4856310300	EYE LET	BSR T0.2 (R1.6)
E049	4856310300	EYE LET	BSR T0.2 (R1.6)
P102	485923162S	CONN WAFER	YW025-03 (STICK)
P401	485923172S	CONN WAFER	YW025-04 (STICK)
P403	485923202S	CONN WAFER	YW025-07 (STICK)
P501	485923182S	CONN WAFER	YW025-05 (STICK)
P502	485923162S	CONN WAFER	YW025-03 (STICK)
P603	485923172S	CONN WAFER	YW025-04 (STICK)
P701	485923512S	CONN WAFER	YW025-08 (STICK)
P801A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P801B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P802A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P802B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P803A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P803B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
PA01	485923522S	CONN WAFER	YW025-09 (STICK)
R399	RS02Z180JS	R M-OXIDE FILM	2W 18 OHM J SMALL
R406	RS02Z681JS	R M-OXIDE FILM	2W 680 OHM J SMALL
R415	RS02Z102JS	R M-OXIDE FILM	2W 1K OHM J SMALL
R450	RS02Z223JS	R M-OXIDE FILM	2W 22K OHM J SMALL
R802	RS02Z753JS	R M-OXIDE FILM	2W 75K OHM J SMALL
R803	RS02Z473JS	R M-OXIDE FILM	2W 47K OHM J SMALL
R804	RS02Z158J-	R M-OXIDE FILM	2W 0.15 OHM J

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z_loc	z_parts_code	parts_name	parts_descr	z_loc	z_parts_code	parts_name	parts_descr
R850	RS02Z129JS	R M-OXIDE FILM	2W 1.2 OHM J SMALL	C623	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
R890	RS02Z683J-	R M-OXIDE FILM	2W 68K OHM J (TAPPING)	C624	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
SP01	485923162S	CONN WAFER	YW025-03 (STICK)	C625	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
SP02	485923162S	CONN WAFER	YW025-03 (STICK)	C626	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
ZZ200	PEMPJRD037	PCB MAIN RADIAL AS	DSC-3220E	C627	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C102	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP	C628	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C106	CEXF1C221V	C ELECTRO	16V RSS 220MF (8X11.5) TP	C630	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C110	CXCH1H150J	C CERA	50V CH 15PF J (TAPPING)	C632	CEXF1E479A	C ELECTRO	25V RSM 4.7MF
C117	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	C633	CEXF1E479A	C ELECTRO	25V RSM 4.7MF
C118	CMXL1J474J	C MYLAR	63V MEU 0.47MF J	C634	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C121	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	C636	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C152	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	C638	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C153	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	C639	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C156	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	C641	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C157	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	C642	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C158	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	C660	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7
C164	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	C661	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C301	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	C662	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C305	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP	C665	CCXB1H222K	C CERA	50V B 2200PF K (TAPPING)
C313	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	C666	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C320	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	C667	CCXB1H222K	C CERA	50V B 2200PF K (TAPPING)
C340	CMXL1J683J	C MYLAR	63V MEU 0.068MF J	C668	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C350	CMXL1J103J	C MYLAR	63V MEU 0.01MF J	C669	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C351	CMXL1J103J	C MYLAR	63V MEU 0.01MF J	C670	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C401	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP	C770	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP
C412	CEXF2C339V	C ELECTRO	160V RSS 3.3MF (8X16) TP	C803	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)
C418	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	C804	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)
C420	CCXB2H222K	C CERA	500V B 2200PF K (TAPPING)	C806	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP
C424	CMXM2A333J	C MYLAR	100V 0.033MF J (TP)	C807	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)
C431	CMXM2A103J	C MYLAR	100V 0.01MF J (TP)	C808	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C504	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP	C809	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)
C508	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP	C820	CCXB3A471K	C CERA	1KV B 470PF K (T)
C511	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	C821	CCXB2H102K	C CERA	500V B 1000PF K (TAPPING)
C519	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	C824	CCXB3A471K	C CERA	1KV B 470PF K (T)
C520	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	C825	CCXB2H101K	C CERA	500V B 100PF K (TAPPING)
C521	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	C831	CCXB3A471K	C CERA	1KV B 470PF K (T)
C522	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	C835	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C525	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP	C844	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C546	CEXF1H339V	C ELECTRO	50V RSS 3.3MF (5X11) TP	C850	CCXB1H821K	C CERA	50V B 820PF K (TAPPING)
C549	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	C863	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C597	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP	C866	CCXB3A471K	C CERA	1KV B 470PF K (T)
C602	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP	CA12	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C605	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	CA33	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C608	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	F801A	4857415001	CLIP FUSE	PFC5000-0702
C610	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	F801B	4857415001	CLIP FUSE	PFC5000-0702
C611	CEXF1H339V	C ELECTRO	50V RSS 3.3MF (5X11) TP	I805	1K1A7042AP	IC REGULATOR	KIA7042AP
C612	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	Q103	TKTC3198Y-	TR	KTC3198Y
C613	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	Q104	TKTC3198Y-	TR	KTC3198Y
C614	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	Q120	TKTC3198Y-	TR	KTC3198Y
C615	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	Q150	TKTC3198Y-	TR	KTC3198Y
C616	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	Q151	TKTC3198Y-	TR	KTC3198Y
C619	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP	Q333	TKTC3198Y-	TR	KTC3198Y

z_loc	z_parts_code	parts_name	parts_descr
Q334	TKTC3198Y-	TR	KTC3198Y
Q402	T2SD1207T-	TR	2SD1207-T (TAPPING)
Q510	TKTC3198Y-	TR	KTC3198Y
Q511	TKTC3198Y-	TR	KTC3198Y
Q542	TKTA1266Y-	TR	KTA1266Y (TP)
Q543	TKTA1266Y-	TR	KTA1266Y (TP)
Q544	TKTA1266Y-	TR	KTA1266Y (TP)
Q550	TKTC3198Y-	TR	KTC3198Y
Q599	TKTA1266Y-	TR	KTA1266Y (TP)
Q601	TKTA1266Y-	TR	KTA1266Y (TP)
Q702	TKTA1266Y-	TR	KTA1266Y (TP)
Q703	TKTC3198Y-	TR	KTC3198Y
Q807	TKTC3198Y-	TR	KTC3198Y
Q808	TKTC3198Y-	TR	KTC3198Y
Q809	TKTC3198Y-	TR	KTC3198Y
Q810	TKTC3198Y-	TR	KTC3198Y
Q811	TKTC3198Y-	TR	KTC3198Y
Q850	TKTC3198Y-	TR	KTC3198Y
Q851	TKTC3198Y-	TR	KTC3198Y
QA01	TKTC3198Y-	TR	KTC3198Y
RB10	RV5426103P	R SEMI FIXED	ENV-DJAA03B14 10K OHM B
Z603	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z604	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z605	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z606	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z607	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z608	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
ZZ200	PEMPJAD037	PCB MAIN AXIAL AS	DSC-3220E
A001	4959812224	PCB MAIN	330X246 D1B
C101	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C103	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C104	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C116	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C119	CCZF1H103Z	C CERA	50V F 0.01MF Z
C120	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C151	CCZF1H103Z	C CERA	50V F 0.01MF Z
C154	CCZF1H103Z	C CERA	50V F 0.01MF Z
C160	CCZF1H103Z	C CERA	50V F 0.01MF Z
C161	CZCH1H220J	C CERA	50V CH 22PF J (AXIAL)
C163	CCZF1H103Z	C CERA	50V F 0.01MF Z
C341	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C370	CCZF1H473Z	C CERA	50V F 0.047MF Z
C500	CCZF1H103Z	C CERA	50V F 0.01MF Z
C501	CCZF1H103Z	C CERA	50V F 0.01MF Z
C503	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C506	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C507	CCZF1H103Z	C CERA	50V F 0.01MF Z
C509	CCZF1H103Z	C CERA	50V F 0.01MF Z
C510	CCZF1H473Z	C CERA	50V F 0.047MF Z
C512	CCZF1H103Z	C CERA	50V F 0.01MF Z
C513	CCZB1H471K	C CERA	50V B 470PF K (AXIAL)
C516	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)

z_loc	z_parts_code	parts_name	parts_descr
C526	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C528	CCZF1H223Z	C CERA	50V F 0.022MF Z
C529	CCZF1H223Z	C CERA	50V F 0.022MF Z
C530	CCZF1H223Z	C CERA	50V F 0.022MF Z
C534	CCZB1H333K	C CERA	50V B 0.033MF K AXL
C535	CCZB1H333K	C CERA	50V B 0.033MF K AXL
C536	CCZB1H333K	C CERA	50V B 0.033MF K AXL
C547	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C548	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C554	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C560	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C561	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C568	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C571	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C578	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C579	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C581	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C585	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C587	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C589	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C590	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C591	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C601	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C603	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C606	CCZB1H222K	C CERA	50V B 2200PF K AXIAL
C607	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C617	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C618	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C620	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C621	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C622	CZCH1H680J	C CERA	CH 50V 68PF J AXL 52MM
C629	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C631	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C635	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C637	CCZB1H222K	C CERA	50V B 2200PF K AXIAL
C650	CZCH1H680J	C CERA	CH 50V 68PF J AXL 52MM
C690	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C691	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C702	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C830	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C888	CCZF1H103Z	C CERA	50V F 0.01MF Z
CA01	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA02	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA03	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA04	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA07	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA10	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA13	CCZB1H471K	C CERA	50V B 470PF K (AXIAL)
CA14	CCZB1H471K	C CERA	50V B 470PF K (AXIAL)
CA15	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA16	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA17	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)

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z_loc	z_parts_code	parts_name	parts_descr	z_loc	z_parts_code	parts_name	parts_descr
CA18	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	D840	D1N4148—	DIODE	1N4148 (TAPPING)
CA30	CCZF1H103Z	C CERA	50V F 0.01MF Z	D841	D1N4148—	DIODE	1N4148 (TAPPING)
CA31	CCZF1H103Z	C CERA	50V F 0.01MF Z	D850	DUZ2R7B—	DIODE ZENER	UZ-2.7B
CA34	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	D890	DRU1P—	DIODE	RU1P
CA35	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	DA03	DUZ5R1BM—	DIODE ZENER	UZ-5.1BM
CA37	CCZB1H561K	C CERA	50V B 560PF K	DA06	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
CA38	CCZB1H561K	C CERA	50V B 560PF K	DA07	DUZ5R1BM—	DIODE ZENER	UZ-5.1BM
D100	DUZ33B—	DIODE ZENER	UZ-33B	DA08	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D101	D1N4148—	DIODE	1N4148 (TAPPING)	DA09	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D103	DBA282—	DIODE	BA282	DA1	DUZ5R1BM—	DIODE ZENER	UZ-5.1BM
D313	DRGP15J—	DIODE	RGP15J	DA10	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D351	DUZ12BM—	DIODE ZENER	UZ-12BM (UNIZON)	DA11	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D360	DUZ22BM—	DIODE ZENER	UZ-22BM	DA15	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D361	DUZ33B—	DIODE ZENER	UZ-33B	DA16	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D362	DUZ33B—	DIODE ZENER	UZ-33B	DA20	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D367	DUZ33B—	DIODE ZENER	UZ-33B	DA27	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D405	DRGP15J—	DIODE	RGP15J	DA32	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D407	DRGP15J—	DIODE	RGP15J	J101	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D408	DRGP15J—	DIODE	RGP15J	J103	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D410	D1N4004S—	DIODE	1N4004S	J104	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D411	D1N4004S—	DIODE	1N4004S	J105	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D450	DRGP15J—	DIODE	RGP15J	J106	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D520	D1N4148—	DIODE	1N4148 (TAPPING)	J107	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D521	D1N4148—	DIODE	1N4148 (TAPPING)	J108	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D533	D1N4148—	DIODE	1N4148 (TAPPING)	J109	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D534	D1N4148—	DIODE	1N4148 (TAPPING)	J110	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D537	D1N4148—	DIODE	1N4148 (TAPPING)	J111	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D550	D1N4148—	DIODE	1N4148 (TAPPING)	J112	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D551	D1N4148—	DIODE	1N4148 (TAPPING)	J113	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D591	DUZ2R7B—	DIODE ZENER	UZ-2.7B	J114	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D597	D1N4148—	DIODE	1N4148 (TAPPING)	J115	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D598	D1N4148—	DIODE	1N4148 (TAPPING)	J116	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D599	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM	J117	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D601	D1N4148—	DIODE	1N4148 (TAPPING)	J118	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D602	D1N4148—	DIODE	1N4148 (TAPPING)	J119	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D603	D1N4148—	DIODE	1N4148 (TAPPING)	J120	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D604	D1N4148—	DIODE	1N4148 (TAPPING)	J121	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D700	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM	J122	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D801	DLT2A05G—	DIODE	LT2A05G (TP)	J123	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D802	DLT2A05G—	DIODE	LT2A05G (TP)	J124	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D803	DLT2A05G—	DIODE	LT2A05G (TP)	J125	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D804	DLT2A05G—	DIODE	LT2A05G (TP)	J126	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D805	DRGP15J—	DIODE	RGP15J	J127	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D806	DRGP15J—	DIODE	RGP15J	J128	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D808	DRGP15J—	DIODE	RGP15J	J129	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D809	DRGP15J—	DIODE	RGP15J	J130	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D811	DUZ6R2BM—	DIODE ZENER	UZ-6.2BM	J131	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D821	DRGP15J—	DIODE	RGP15J	J132	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D824	D1N4148—	DIODE	1N4148 (TAPPING)	J133	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D825	D1N4148—	DIODE	1N4148 (TAPPING)	J134	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D830	DRGP15J—	DIODE	RGP15J	J135	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
D831	DRGP15J—	DIODE	RGP15J	J136	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING

z_loc	z_parts_code	parts_name	parts_descr
J137	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J
J138	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J139	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J140	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J141	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J142	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J143	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J144	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J145	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J146	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J147	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J148	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J149	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J150	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J151	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J152	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J153	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J154	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J155	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J156	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J158	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J159	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J160	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J161	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J162	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J163	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J164	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J165	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J166	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J167	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J168	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J169	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J170	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J171	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J173	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J174	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J175	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J176	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J177	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J178	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J179	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J180	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J181	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J182	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J183	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J184	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J185	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J186	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J187	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J188	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J189	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J190	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING

z_loc	z_parts_code	parts_name	parts_descr
J191	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J192	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J193	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J194	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J195	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J196	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J197	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J198	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J199	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J202	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J203	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J204	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J205	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J206	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J207	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J208	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J209	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J210	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
L101	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L105	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L153	5CPZ120K02	COIL PEAKING	12UH K (AXIAL 3.5MM)
L501	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L502	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L503	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L504	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L601	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L602	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L605	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L650	5MC0000100	COIL BEAD	HC-3550
L801	5MC0000100	COIL BEAD	HC-3550
LA01	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA02	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA03	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA04	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA30	5MC0000100	COIL BEAD	HC-3550
R101	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R103	RD-AZ123J-	R CARBON FILM	1/6 12K OHM J
R104	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R105	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R106	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J
R107	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J
R110	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R111	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R116	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R117	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R118	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J
R131	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R151	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R152	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R153	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J
R154	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J
R155	RD-AZ751J-	R CARBON FILM	1/6 750 OHM J

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R160	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	R543	RD-AZ241J-	R CARBON FILM	1/6 240 OHM J
R161	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	R544	RD-AZ202J-	R CARBON FILM	1/6 2K OHM J
R162	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J	R548	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R163	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J	R550	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R164	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J	R555	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R177	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J	R560	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R190	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	R561	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R191	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J	R562	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R301	RD-4Z472J-	R CARBON FILM	1/4 4.7K OHM J	R563	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R302	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	R566	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
R310	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J	R568	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R311	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J	R569	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R330	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J	R570	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R331	RD-2Z201J-	R CARBON FILM	1/2 200 OHM J	R572	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R333	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	R573	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R334	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	R576	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R340	RD-4Z334J-	R CARBON FILM	1/4 330K OHM J	R577	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R341	RD-4Z333J-	R CARBON FILM	1/4 33K OHM J	R578	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R350	RN-4Z2701F	R METAL FILM	1/4 2.70K OHM F	R579	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R351	RN-4Z2701F	R METAL FILM	1/4 2.70K OHM F	R580	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R370	RD-4Z159J-	R CARBON FILM	1/4 1.5 OHM J	R582	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R394	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	R583	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R395	RD-4Z394J-	R CARBON FILM	1/4 390K OHM J	R586	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R396	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	R587	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R397	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J	R588	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R398	RD-2Z109J-	R CARBON FILM	1/2 1 OHM J	R589	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R401	RD-4Z272J-	R CARBON FILM	1/4 2.7K OHM J	R590	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J
R402	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J	R591	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J
R403	RD-4Z472J-	R CARBON FILM	1/4 4.7K OHM J	R592	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R404	RD-2Z399J-	R CARBON FILM	1/2 3.9 OHM J	R593	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R420	RD-2Z152J-	R CARBON FILM	1/2 1.5K OHM J	R594	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R444	RD-2Z229J-	R CARBON FILM	1/2 2.2 OHM J	R595	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R500	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	R596	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R501	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	R597	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J
R502	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	R598	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J
R503	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	R599	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R504	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	R601	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R506	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	R602	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R507	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J	R603	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R508	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J	R604	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R509	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	R605	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R511	RD-AZ273J-	R CARBON FILM	1/6 27K OHM J	R606	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R517	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	R607	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R518	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	R610	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R530	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	R611	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R532	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	R612	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R533	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	R613	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J
R535	RD-AZ201J-	R CARBON FILM	1/6 200 OHM J	R614	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R537	RD-AZ201J-	R CARBON FILM	1/6 200 OHM J	R615	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R540	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	R616	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J
R541	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J	R617	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R542	RD-AZ303J-	R CARBON FILM	1/6 30K OHM J	R620	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J

z_loc	z_parts_code	parts_name	parts_descr
R621	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R622	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R624	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R625	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R641	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R642	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R646	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R647	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R649	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R650	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R651	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R652	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R660	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R661	RD-AZ912J-	R CARBON FILM	1/6 9.1K OHM J
R662	RD-AZ912J-	R CARBON FILM	1/6 9.1K OHM J
R663	RD-AZ100J-	R CARBON FILM	1/6 10 OHM J
R664	RD-AZ513J-	R CARBON FILM	1/6 51K OHM J
R700	RD-2Z332J-	R CARBON FILM	1/2 3.3K OHM J
R701	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R702	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R703	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R704	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R711	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R720	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J
R805	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J
R806	RD-2Z472J-	R CARBON FILM	1/2 4.7K OHM J
R807	RD-2Z272J-	R CARBON FILM	1/2 2.7K OHM J
R808	RD-2Z821J-	R CARBON FILM	1/2 820 OHM J
R810	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J
R811	RC-2Z565KP	R CARBON COMP	1/2 5.6M OHM K
R817	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R820	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R821	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J
R823	RD-2Z392J-	R CARBON FILM	1/2 3.9K OHM J
R829	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R830	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J
R841	RD-2Z470J-	R CARBON FILM	1/2 47 OHM J
R851	RD-AZ391J-	R CARBON FILM	1/6 390 OHM J
R852	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R855	RD-4Z335J-	R CARBON FILM	1/4 3.3M OHM J
R870	RD-4Z222J-	R CARBON FILM	1/4 2.2K OHM J
RA01	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
RA02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA03	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA04	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA05	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J
RA06	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA07	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J
RA08	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA09	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA11	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J

z_loc	z_parts_code	parts_name	parts_descr
RA12	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA13	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J
RA14	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA15	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
RA16	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA19	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA23	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA24	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
RA25	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA26	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J
RA29	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
RA32	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J
RA44	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J
RA51	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA52	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA90	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
RA91	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
ZZ400	PEUNSW/D037	PCB UNION AS	DSC-3220E
C900	CCXB3D102K	C CERA	2KV B 1000PF K (TAPPING)
C910	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP
C997	CEXF2E100V	C ELECTRO	250V RSS 10MF (10X20) TP
CF02	CMXE2J333J	C MYLAR	630V PU 0.033MF J (TP)
CF05	CMXE2J333J	C MYLAR	630V PU 0.033MF J (TP)
CF07	CMXE2J333J	C MYLAR	630V PU 0.033MF J (TP)
CF10	CMXE2J333J	C MYLAR	630V PU 0.033MF J (TP)
CF11	CMYH3D752J	C MYLAR	2KV BUP 7500PF J
I901	1TDA6107Q-	IC VIDEO AMP	TDA6107Q
I901A	4857031100	HEAT SINK	A1050P-H24 T2.0
I901B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
IC01	1KSM9HP—	IC PREAMP	KSM-9HP
IF01	1MC7812—	IC REGULATOR	MC7812 12V 1A (KA7812)
IF02	1KA4558—	IC AMP	KA4558
IT01	1LA6515—	IC OP AMP	LA6515
JZ01	4859105240	JACK PHONE	LGT1516-0100
JZ02	4859105340	JACK S-VHS	YKF51-5359
JZ03	4859105450	JACK PIN BOARD	YSC03P-4120-9S
LED1	DSL342MC3	LED	SLR-342MC3
LED2	DSL342VC3	LED	SLR-342VC3
LF01	58CD000021	COIL CHOKE	DTS-2619
M232	4952300701	PANEL AV	HIPS PAINT
M232A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
M321	4953200600	BRKT POWER	EGI T1.2
M321A	7063300612	SCREW MACHINE	M/C BIN 3X6 MFZN BK
M491	4954901601	BUTTON CH	ABS PAINT
M551	4955501000	DECO SENSOR	GPPS
M684	4856812001	TIE CABLE	NYLON66 DA100
P401A	4850704S03	CONNECTOR	YH025-04+YST025+ULW=300
P501A	4850705S04	CONNECTOR	YH025-05+YBNH250+ULW=400
P603A	4850704S04	CONNECTOR	YH025-04+YST025+ULW=400
P701A	4850708S03	CONNECTOR	YH025-08+YST025+ULW=500
P803	4850702S10	CONNECTOR	BL102NG+MXH40058-02=400
P903	4859238620	CONN WAFER	YPW500-02

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PA01A	4850709N04	CONNECTOR	YH025-09+YBNH250+USW=400	CZ02	CCZB1H561K	C CERA	50V B 560PF K
PF01	4850707S02	CONNECTOR	YH025-07+YST025+ULW=400	D911	D1N4004S—	DIODE	1N4004S
PF02	4859238620	CONN WAFER	YPW500-02	D912	D1N4004S—	DIODE	1N4004S
PF02A	4850702N06	CONNECTOR	YPH500-02+YLT500+ULW=200	D913	D1N4004S—	DIODE	1N4004S
PT01	4859231620	CONN WAFER	YW025-03	D997	DLT2A05G—	DIODE	LT2A05G (TP)
PT02	4850703S21	CONNECTOR	YH025-03+YBNH250+ULW=600	DF01	D1N4937G—	DIODE	1N4937G (TAPPING)
QF04	T4636LSRB-	TR	2SC4636LS-RB	DF02	D1N4937G—	DIODE	1N4937G (TAPPING)
R906	RF01Y249J-	R FUSIBLE	1W 2.4 OHM J	DF03	D1N4937G—	DIODE	1N4937G (TAPPING)
R907	RF01Y249J-	R FUSIBLE	1W 2.4 OHM J	DF04	D1N4937G—	DIODE	1N4937G (TAPPING)
R908	RF01Y249J-	R FUSIBLE	1W 2.4 OHM J	JC01	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
RF19	RF02Z479J-	R FUSIBLE	2W 4.7 OHM J (TAPPING)	JF1	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
RF20	RS01Z472J-	R M-OXIDE FILM	1W 4.7K OHM J (TAPPING)	JF2	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
RF21	RS01Z228J-	R M-OXIDE FILM	1W 0.22 OHM J	JF3	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
SCT1	4859303730	SOCKET CRT	ISD-07S	JF4	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
SW801	5S40000003	SW POWER PUSH	SS-160-7-G	JF5	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
TF01	50D28A1—	TRANS DRIVE	TD-28A1	JF6	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
ZZ200	PEUNJRD037	PCB UNION RADIAL AS	DSC-3220E	JF7	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
C902	CMXL2E104K	C MYLAR	250V MEU 0.1MF K	LT01	5CPZ569K02	COIL PEAKING	5.6UH K (AXIAL 3.5MM)
CF01	CEXF1C221V	C ELECTRO	16V RSS 220MF (8X11.5) TP	R901	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
CF03	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP	R902	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
CF04	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	R903	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
CF06	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	R910	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
CF08	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	R911	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
CF09	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	R912	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
CF13	CEXF1C221V	C ELECTRO	16V RSS 220MF (8X11.5) TP	R913	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
CF14	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	R921	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
CT01	CMXL1J474J	C MYLAR	63V MEU 0.47MF J	R922	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
CT02	CMXL1J474J	C MYLAR	63V MEU 0.47MF J	R923	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
CT03	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	R996	RD-2Z105J-	R CARBON FILM	1/2 1M OHM J
CT04	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	R997	RD-2Z102J-	R CARBON FILM	1/2 1K OHM J
F01	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF	RC01	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J
F02	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF	RC02	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J
G900	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	RC03	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
G901	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	RC04	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
G902	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	RF01	RD-4Z431J-	R CARBON FILM	1/4 430 OHM J
G903	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	RF02	RD-4Z561J-	R CARBON FILM	1/4 560 OHM J
QF01	TKTA1266Y-	TR	KTA1266Y (TP)	RF03	RD-4Z332J-	R CARBON FILM	1/4 3.3K OHM J
QF02	TKTA1266Y-	TR	KTA1266Y (TP)	RF04	RD-4Z361J-	R CARBON FILM	1/4 360 OHM J
QF03	TKTC3198Y-	TR	KTC3198Y	RF05	RD-4Z911J-	R CARBON FILM	1/4 910 OHM J
RF24	RN02B333JS	R METAL FILM	2W 33K OHM J SMALL	RF06	RD-4Z221J-	R CARBON FILM	1/4 220 OHM J
RF25	RN02B333JS	R METAL FILM	2W 33K OHM J SMALL	RF07	RD-4Z182J-	R CARBON FILM	1/4 1.8K OHM J
RF26	RN02B333JS	R METAL FILM	2W 33K OHM J SMALL	RF08	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J
SW701	5S50101Z90	SW TACT	THVV502GDA	RF09	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J
SW702	5S50101Z90	SW TACT	THVV502GDA	RF10	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J
SW703	5S50101Z90	SW TACT	THVV502GDA	RF11	RD-4Z221J-	R CARBON FILM	1/4 220 OHM J
SW704	5S50101Z90	SW TACT	THVV502GDA	RF12	RD-4Z513J-	R CARBON FILM	1/4 51K OHM J
SW705	5S50101Z90	SW TACT	THVV502GDA	RF13	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J
ZZ200	PEUNJAD037	PCB UNION AXIAL AS	DSC-3220E	RF14	RD-4Z104J-	R CARBON FILM	1/4 100K OHM J
A001	4959812324	PCB UNION	246X243 D1B	RF15	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J
CC01	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	RF16	RD-4Z153J-	R CARBON FILM	1/4 15K OHM J
CT05	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	RF17	RD-4Z242J-	R CARBON FILM	1/4 2.4K OHM J
CZ01	CCZB1H561K	C CERA	50V B 560PF K	RF18	RD-4Z183J-	R CARBON FILM	1/4 18K OHM J

z_loc	z_parts_code	parts_name	parts_descr
RF27	RD-4Z221J-	R CARBON FILM	1/4 220 OHM J
RT01	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J
RT02	RD-AZ683J-	R CARBON FILM	1/6 68K OHM J
RT03	RD-AZ334J-	R CARBON FILM	1/6 330K OHM J
RT04	RD-AZ362J-	R CARBON FILM	1/6 3.6K OHM J
RT05	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J

z_loc	z_parts_code	parts_name	parts_descr
RT06	RD-AZ683J-	R CARBON FILM	1/6 68K OHM J
RT07	RD-AZ563J-	R CARBON FILM	1/6 56K OHM J
RT08	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
RT09	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
RT10	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J

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6-2. Service Parts List option

* THE DIFFERENT PART LIST BY PCB & MICOM VERSION

MAIN PCB

MICOM/PCB Ver. Loc	4959812224-00	4959812224-01	
	DW3834-C4-AE2	DW3834-C4-AE2	New Micom(V0.24)
RB02	○	○	X
P502	○	○	X
P503	—	X	○

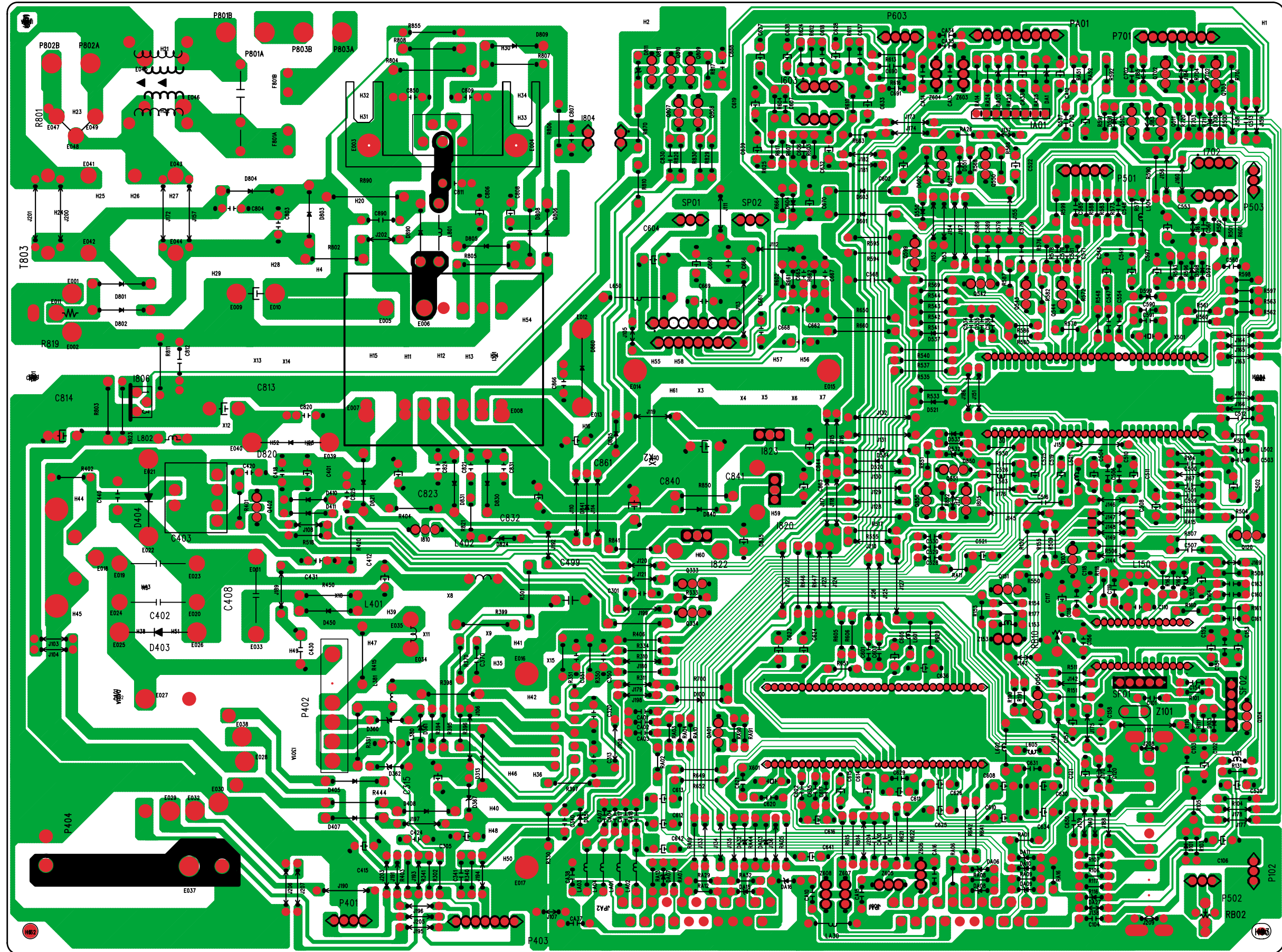
UNION PCB

MICOM/PCB Ver. Loc	4959812324-00	4959812324-01	
	DW3834-C4-AE2	DW3834-C4-AE2	New Micom(V0.25)
IT01	—	JUMPER	DEL
JT02	—	JUMPER	DEL
JT03	—	—	JUMPER
CT04	25V 47UF	←	DEL
CT06	—	—	25V 47UF
DT01	—	—	Z9.1
IT02	—	—	CXA1315P
RT04	1/6 3.6K	←	1/6 3K
RT08	1/6 10K	←	JUMPER
RT09	1/6 2.2K	←	DEL
RT10	1/6 10K	←	1/6 4.7K
RT11	—	—	1/6 100
RT12	—	—	1/6 100
RT13	—	—	1/6 200

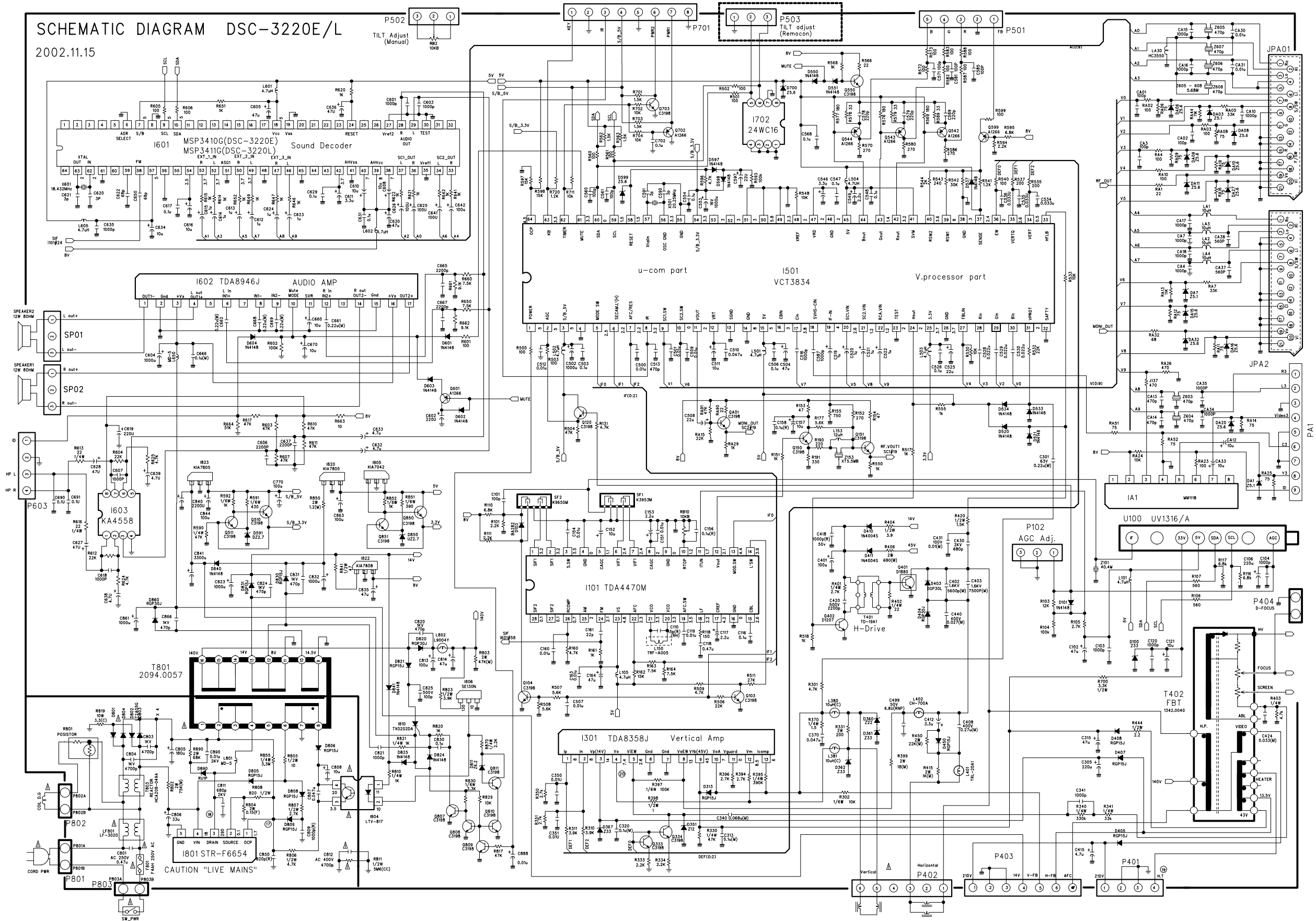
* THE DIFFERENT PART LIST BY MODEL NAME

LOC	DSC-3220E	DSC-3220L
I601	MSP3410G-PP-B8-V3	MSP3411G

8-1. PCB MAIN



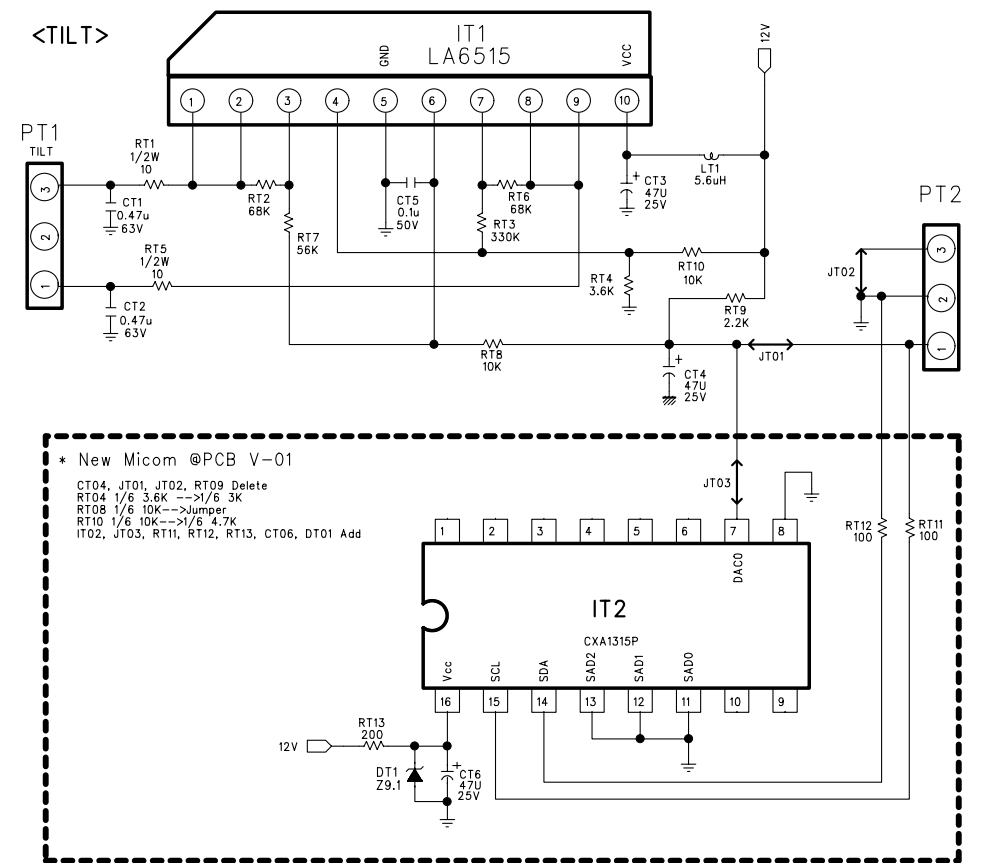
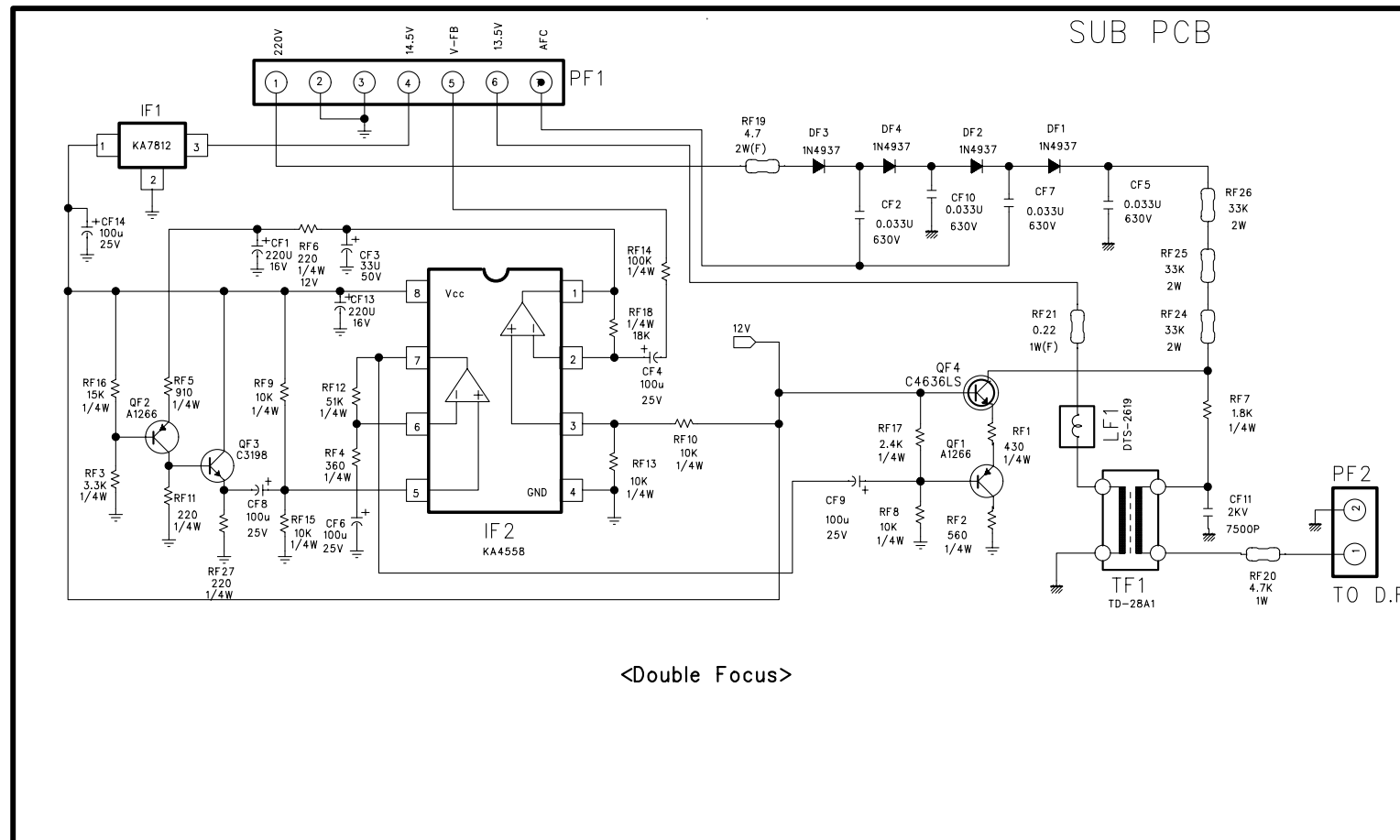
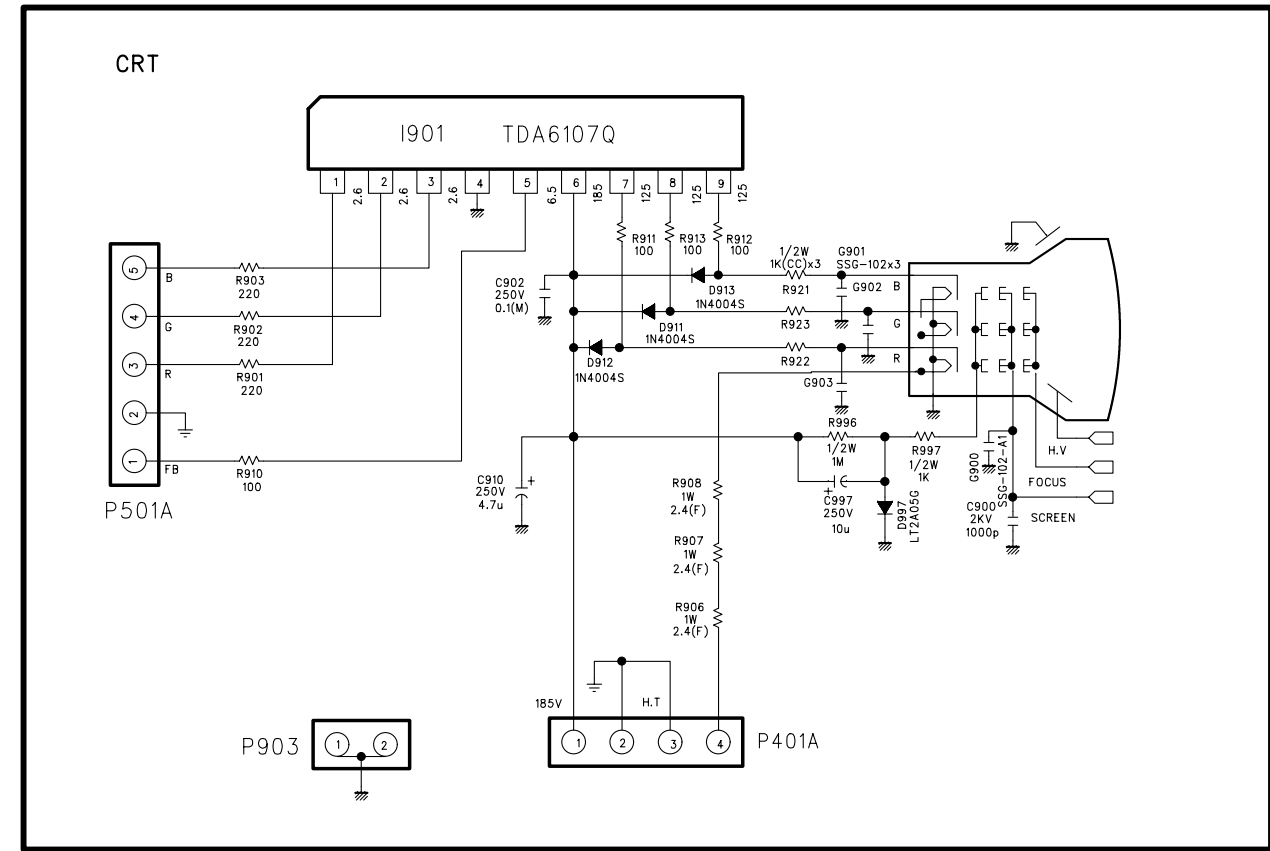
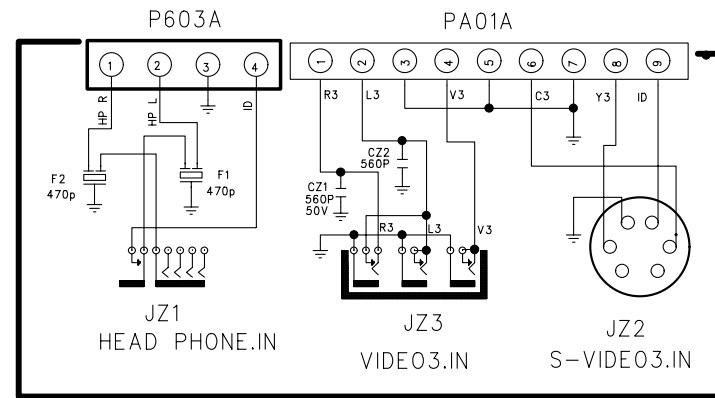
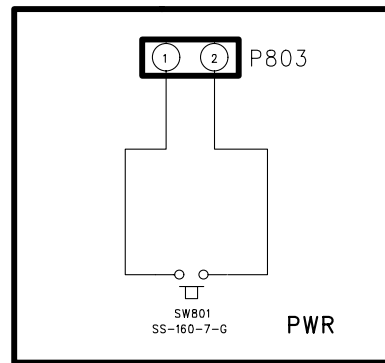
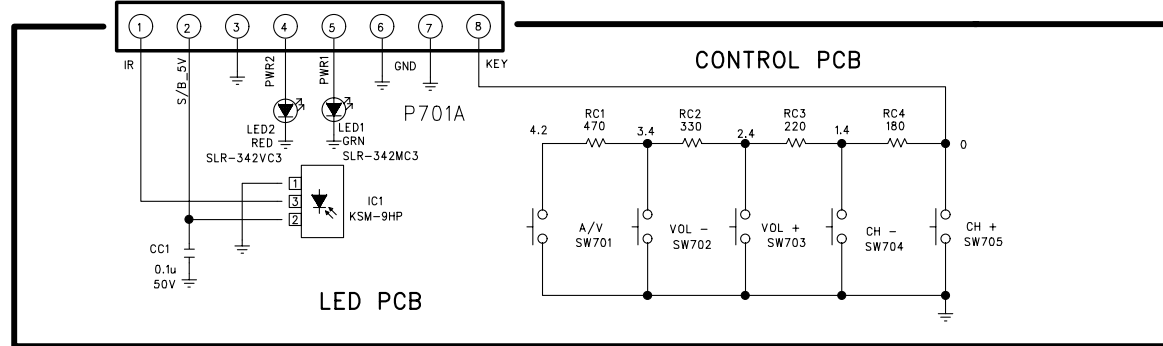
9-1. Schematic Diagram(MAIN)



9-2. Schematic Diagram(UNION)

DSC-3220E/L
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