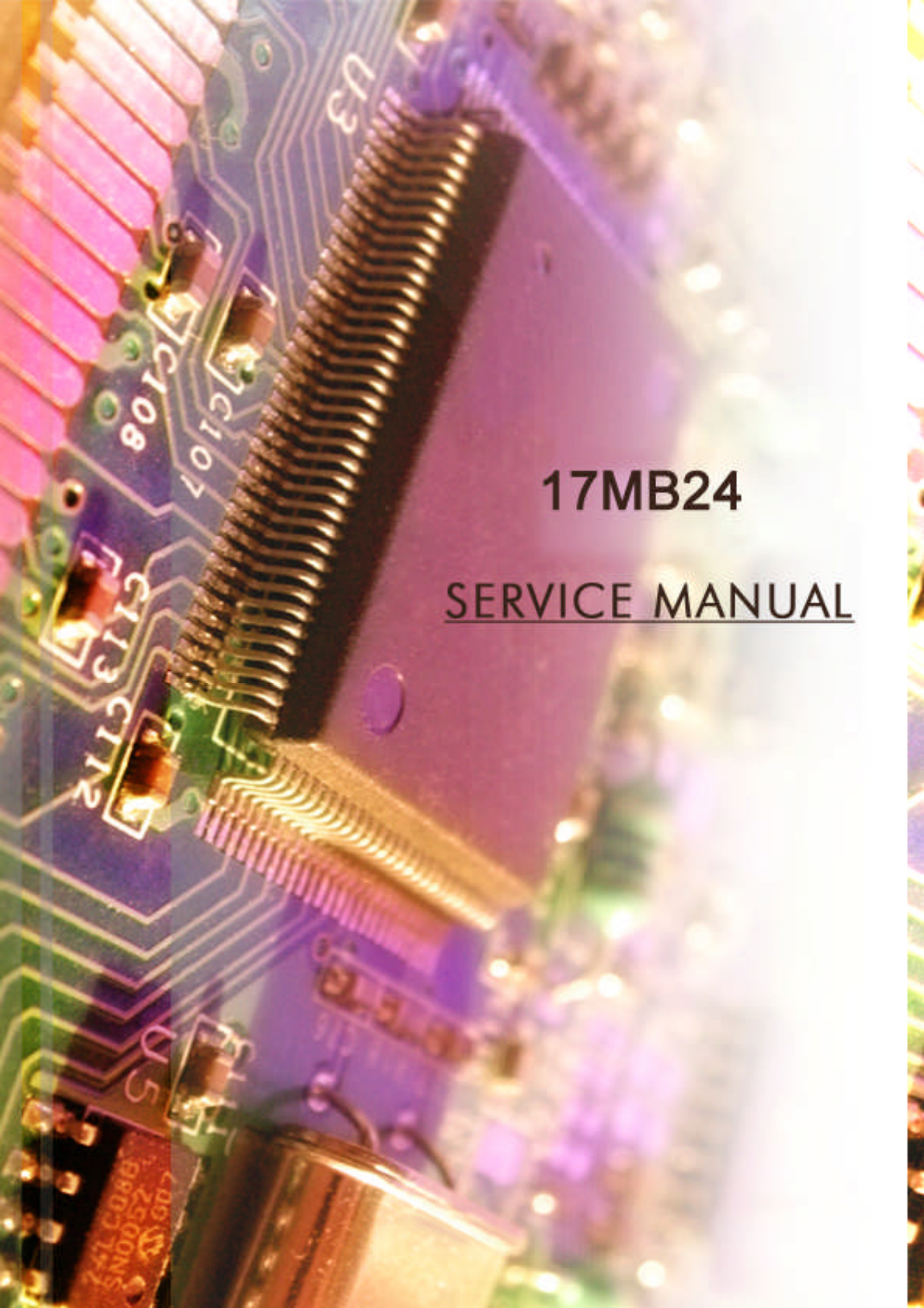


17MB24

SERVICE MANUAL

TABLE OF CONTENTS

1. INTRODUCTION

17MB24 Main Board consists of two major blocks. The first block is analog front-end and this block is handled by VCTI chip that is highly multifunctional. This IC does demodulation of Video & Audio from Tuner IF, CVBS, Audio, RGB, SVHS input selection and processing. It has an audio processor that supports equalizer or tone control, volume control, AVL, surround effect etc and supplies amplifier, headphone and CVBS & audio line outputs. It handles video processing such as colour standard detection and demodulation, picture alignment (brightness, contrast, colour etc.). The IC also does teletext decoding with fastext memory. After video processing, the processed video is applied to MST5*7a-M chip in RGB format.

The TV Tuner is an asymmetrical or a symmetrical IF output type and is PLL controlled. The IF signal is applied single saw filter. After the SAW filter block, IF signal is applied to VCTI IF inputs (Pin 16 and 17).

As VCTI can handle all the audio processing, there is no need for additional audio processor solution on the board. VCTI supports three Audio outputs. These outputs are assigned to Headphone, Speaker and I2C Controlled audio switch. The board employs TDA1905 and TDA1308 to drive speaker and headphone outputs respectively.

The Back End section is handled by MST chip. The RGB input can handle standard interlaced RGB output from VCTI, PC VGA RGB input and YPbPr. There are two set of ADC is present in MST so YPbPr and VGA sources should be multiplexed.

MST chip have an integrated LVDS transmitter and this LVDS transmitter can be activated or deactivated by registers so output of MST chip can be LVDS or TTL format.

Backlight is controlled via MST chip there are two pins to control inverter one of them is used for adjusting backlight the other one is used for backlight on/off control.

2. TUNER

As the thickness of the TV set has a limit, a horizontal mounted tuner is used in the product, which is suitable for CCIR systems B/G, H, L/ L', I/I', and D/K. The tuning is available through the digitally controlled I2C bus (PLL). Below you will find info on the Tuner in use.

General description of UV1316:

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'. The low IF output impedance has been designed for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient.

Features of UV1316:

1. Member of the UV1300 family small sized UHF/VHF tuners
2. Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
3. Digitally controlled (PLL) tuning via I2C-bus
4. Off-air channels, S-cable channels and Hyper band
5. Compact size
6. Complies to "CENELEC EN55020" and "EN55013"

Pinning:

1. Gain control voltage (AGC)	:	4.0V, Max: 4.5V
2. Tuning voltage		
3. I²C-bus address select	:	Max: 5.5V
4. I²C-bus serial clock	:	Min:-0.3V, Max: 5.5V
5. I²C-bus serial data	:	Min:-0.3V, Max: 5.5V
6. Not connected		
7. PLL supply voltage	:	5.0V, Min: 4.75V, Max: 5.5V
8. ADC input		
9. Tuner supply voltage	:	33V, Min: 30V, Max: 35V
10. Symmetrical IF output 1		
11. Symmetrical IF output 2		

3. AUDIO AMPLIFIER STAGE WITH TDA1905

The TDA1905 is a monolithic integrated circuit in POWERDIP package, intended for use as low frequency power amplifier in a wide range of applications in radio and TV sets. Stereo audio output power (2x3.5W – 16 Ohm at %10 THD), equalizer, FM radio, linear stereo, German-NICAM stereo, 5-Band equalizer control are supported.

4. POWER STAGE

The DC voltages required at various parts of the chassis and inverters are provided by a main power supply unit and power interface board. The main power supply unit is designed for 24V and 12V DC supply. Power stage which is on-chasis generates +12V for audio amplifier, 1.8V and 3.3V stand by voltage and 8V, 12V, 5V and 3.3Vsupplies for other different parts of the chassis.

signal name	value	VCTI,MSTAR PANEL,INVERTER	always on	current consuption
+5V	5V	VCTI		160mA
+5VIDTV	5V	IDTV		350mA
+5VDVD	5V	DVD		2,5A
+8V	8V	VCTI		12mA
+3V3	3,3V	VCTI		205mA
+1V8Stb	1,8V	VCTI	*	16mA
+3V3Stb	3,3V	VCTI	*	11mA
VDD	1,8V	MSTAR		220mA
VPO	3,3V	MSTAR		3mA
VAD	3,3V	MSTAR		144mA
VPLL	3,3V	MSTAR		9mA
VDPLL	3,3V	MSTAR		9mA
INV	12V/24V	INVERTER		
+VPP	3,3V	PANEL		1100mA
	5V	PANEL		1200mA
	12V	PANEL		595mA

5. MICROCONTROLLER (VCTI)

General Features

The VCT 49xyI, VCT 48xyI is an IC family of high-quality single-chip TV processors. Modular design and deep-submicron technology allow the economic integration of features in all classes of single-scan TV sets. The VCT 49xyI, VCT 48xyI family is based on functional blocks contained and approved in existing products like DRX 396xA, MSP 34x5G, VSP 94x7B, DDP 3315C, and SDA 55xx. Each member of the family contains the entire IF, audio, video, display, and deflection processing for 4:3 and 16:9 50/60-Hz mono and stereo TV sets. The integrated microcontroller is supported by a powerful OSD generator with integrated Teletext & CC acquisition including on-chip page memory.

– Submicron CMOS technology
– Low-power standby mode
– Single 20.25 MHz reference crystal
– 8-bit 8051 instruction set compatible CPU
– Up to 256 kB on-chip program ROM
– WST, PDC, VPS, and WSS acquisition
– Up to 10 pages on-chip teletext memory
– Multi-standard QSS IF processing with single SAW
– FM Radio and RDS with standard TV tuner
– TV-sound demodulation:
  • all A2 standards
  • all NICAM standards
  • BTSC/SAP with MNR (DBX optional)
  • EIA-J
– Baseband sound processing for loudspeaker channel:
  • volume and balance
  • bass/treble or equalizer
  • loudness and spatial effect (e.g. pseudo stereo)
  • Micronas AROUND (virtual Dolby optional)
  • Micronas BASS and Subwoofer output
  • further optional and licence requiring sound enhancements as BBE, SRS Wow
– CVBS, S-VHS, YCbCr and RGB inputs
– ITU656 input
– 4H adaptive comb filter (PAL/NTSC)
– multi-standard color decoder (PAL/NTSC/SECAM)
– Macrovision Detection
– Nonlinear horizontal scaling “panorama vision”
– Luma and chroma transient improvement (LTI, CTI)
– Non-linear color space enhancement (NCE)
– Dynamic black level expander (BLE)
– Selective Color Enhancer (SCE)
– 8/10 bit ITU656 output
– Soft start/stop of H-drive

DRX Features

The DRX - Analog TV IF- Demodulator performs the entire multistandard Quasi Split Sound (QSS) TV IF processing, AGC, video demodulation, and generation of the second sound IF (SIF) requiring only one SAW filter. The alignment-free DRX does not need special external components. All control functions and status registers are accessible via I2C bus interface. Therefore, it simplifies the design of high-quality, highly standardized IF stages.

– Multistandard QSS IF processing with a single SAW
– Highly reduced amount of external components (no tank circuit, no potentiometers, no SAW switching)
– Programmable IF frequency (38.9 MHz, 45.75 MHz, 32.9 MHz, 58.75 MHz, 36.125 MHz)
– Digital IF processing for the following standards:
B/G, D/K, I, L/L', and M/N
– Standard specific digital post filtering
– Standard specific digital video/audio splitting
– Standard specific digital picture carrier recovery:
  • alignment-free
  • quartz-stable and accurate
  • stable frequency lock at 100% modulation and overmodulation up to 150%
  • quartz-accurate AFC information
– Programmable standard specific digital group delay equalization
– Automatically frequency-adjusted Nyquist slope, therefore optimal picture and sound performance over complete lock in frequency range
– Standard-specific digital AGC and delayed tuner AGC with programmable tuner Take Over Point

Multistandard Sound Processor (MSP) Features

The MSP receives the digital Sound IF signal from the DRX part. The MSP is able to demodulate all TV sound standards worldwide including the digital NICAM system. Depending on the **VCTI** version, the following demodulation modes can be performed. TV stereo sound standards that are unavailable for a specific **VCTI** version are processed in analog mono sound of the standard. In that case, stereo or bilingual processing will not be possible.

– Sound demodulator and stereo decoder
– Audio processing for loudspeaker channels:
  • volume
  • Automatic Volume Correction (AVC)
  • bass/treble or equalizer
  • loudness
  • balance
  • configurable Subwoofer output
– Optional features for loudspeaker channels:
  • Virtual Dolby Surround (VDS)
  • SRS WOW
  • BBE High Definition Sound
– PMQFP144-2 package:

  • 6 analog audio inputs
  • 4 analog audio outputs
– PSSDIP88-1 package:
  • 4 analog audio inputs
  • 2 analog audio outputs
  • 2 configurable analog audio inputs/outputs

Video Features

The TVT is a Teletext decoder for decoding World System Teletext data, as well as Video Programming System (VPS), Program Delivery Control (PDC), and Wide-Screen Signalling (WSS) data used for PALplus transmissions (line 23). The device also supports Closed Caption acquisition and decoding. The TVT provides an integrated general-purpose, fully 8051-compatible microcontroller with television-specific hardware features. The microcontroller has been enhanced to provide powerful features such as memory banking, data pointer, additional interrupts, etc. The on-chip display unit for displaying Level 1.5 Teletext data can also be used for customer-defined onscreen displays.
The TVT has an internal XRAM of 20 KB and an internal ROM of up to 256 KB. ROMless versions can address up to 1 MB of external RAM and ROM. The 8-bit microcontroller runs at 296 ns cycle time. The controller with dedicated hardware does most of the internal TTX acquisition processing, transfers data to/from external memory interface, and receives/transmits data via I2C-bus interface. In combination with dedicated hardware, the slicer stores TTX data in a VBI buffer of 1 KB. The microcontroller firmware performs all the acquisition tasks (hamming and parity checks, page search, and evaluation of header control bits) once per field. Additionally, the firmware can provide high-end Teletext features like Packet-26 handling, FLOF/TOP and list-pages. The interface-to-user software is optimized for minimal overhead. TVT is realized in deep submicron technology with 1.8 V supply voltage and 3.3 V I/O (TTL compatible).

– 11 analog video inputs (CVBS/Y/C/RGB/YCbCr)
– 3 analog video outputs
– integrated Y+C adder
– integrated high-quality A/D converters and associated clamp and AGC circuits
– high-performance 4H comb filter (PAL/NTSC) with vertical peaking
– multistandard color decoder PAL/NTSC/SECAM including all substandards
– macrovision-compliant multistandard sync processing
– macrovision detection
– RGB/YCbCr component processing and associated contrast, color saturation and tint circuits
– high-quality soft mixer controlled by fast blank (alpha blending)
– fast blank monitor via I2C
– ITU656 input
– linear horizontal scaling (0.25 to 4)
– nonlinear horizontal scaling “panorama vision”
– split screen (OSD and video side by side)
– letter box detector (auto-wide)
– noise measurement

Controller Features

The TVT is a Teletext decoder for decoding World System Teletext data, as well as Video Programming System (VPS), Program Delivery Control (PDC), and Wide-Screen Signalling (WSS) data used for PALplus transmissions (line 23). The device also supports Closed Caption acquisition and decoding. The TVT provides an integrated general-purpose, fully 8051-compatible microcontroller with television-specific hardware features. The microcontroller has been enhanced to provide powerful features such as memory banking, data pointer, additional interrupts, etc.

– Single external 20.25 MHz crystal, all necessary clocks are generated internally
– Normal mode: 40.5 MHz CPU clock, Power Save mode: 10.125 MHz
– Up to 256 KB on-chip program ROM
– 256 byte on-chip program RAM
– 128 byte on-chip extended stack RAM
– 20 kilobyte on-chip extended data RAM (XRAM)
– Memory banking up to 1 MB
– Non-multiplexed 8-bit data and 20-bit address bus
– Eight 16-bit data pointer registers (DPTR)
– 4-level, 24-input interrupt controller
– Patch module for 16 ROM locations
– Two 16-bit reloadable timers
– Capture-compare timer for infrared decoding
– Watchdog timer
– UART
– Real time clock (RTC)
– PWM units (2 channels 14-bit, 6 channels 8-bit)
– 8-bit ADC (4 channels)
– I2C bus master/slave interface
– Up to 24 programmable I/O ports
– Flash version for PMQFP144 and PSSDIP88 packages (SST39LF020 or compatible)
– ROM-less version with 1 MB address space for external program and data memory

OSD & Teletext Features

The on-chip display unit for displaying Level 1.5 Teletext data can also be used for customer-defined onscreen displays. The TVT has an internal XRAM of 20 KB and an internal ROM of up to 256 KB. ROMless versions can address up to 1 MB of external RAM and ROM.
In combination with dedicated hardware, the slicer stores TTX data in a VBI buffer of 1 KB. The microcontroller firmware performs all the acquisition tasks (hamming and parity checks, page search, and evaluation of header control bits) once per field. Additionally, the firmware can provide high-end Teletext features like Packet-26 handling, FLOF/TOP and list-pages. The interface-to-user software is optimized for minimal overhead.

Port Allocation

Pin No.			Pin Name	Type	Connection (If not used)	Short Description
PSSDIP88-1 PY	PSSDIP88-1 PZ	PMQFP144-2 XM				
1	88	128	GND	SUPPLY	OBL	Ground Platform
2	87	129	VSUP5.0BE	SUPPLY	OBL	Supply Voltage Analog Video Back-end, 5.0 V
3	86	130	TEST / SUBW	IN OUT	GND	Test Input, reserved for Test Subwoofer Output
4	85	131	VERT+	OUT	GND	Differential Vertical Sawtooth Output
5	84	132	VERT-	OUT	GND	Differential Vertical Sawtooth Output
6	83	133	EW	OUT	GND	Vertical Parabola Output
7	82	134	RSW2	OUT	LV	Range Switch 2 Output
8	81	135	RSW1	OUT	LV	Range Switch 1 Output
9	80	136	SENSE	IN	GND	Sense ADC Input
10	79	137	GNDM	IN	GND	Reference Ground for Sense ADC
11	78	138	FBIN	IN	GND	Fast Blank Input, Back-end
12	77	139	RIN	IN	GND	Analog Red Input, Back-end
13	76	140	GIN	IN	GND	Analog Green Input, Back-end
14	75	141	BIN	IN	GND	Analog Blue Input, Back-end
15	74	142	SVMOUT	OUT	VSUP5.0BE	Scan Velocity Modulation Output
16	73	143	ROUT	OUT	VSUP5.0BE	Analog Red Output
17	72	144	GOUT	OUT	VSUP5.0BE	Analog Green Output
18	71	1	BOUT	OUT	VSUP5.0BE	Analog Blue Output
19	70	2	VRD		OBL	Reference Voltage for RGB DACs
20	69	3	XREF		OBL	Reference Current for RGB DACs
21	68	4	VSUP3.3BE	SUPPLY	OBL	Supply Voltage Analog Video Back-end, 3.3 V
22	67	5	GND	SUPPLY	OBL	Ground Platform
23	66	6	GND	SUPPLY	OBL	Ground Platform
24	65	7	VSUP3.3IO	SUPPLY	OBL	Supply Voltage I/O Ports, 3.3 V
25	64	8	VSUP3.3DAC	SUPPLY	OBL	Supply Voltage Video DACs, 3.3 V
26	63	9	GNDDAC	SUPPLY	OBL	Ground Video DACs
27	62	10	SAFETY	IN	GND	Safety Input

Pin No.			Pin Name	Type	Connection (If not used)	Short Description
PSSDIP88-1 PY	PSSDIP88-1 PZ	PMQFP144-2 XM				
28	61	11	HFLB	IN	HOUT	Horizontal Flyback Input
29	60	12	HOUT	OUT	LV	Horizontal Drive Output
30	59	13	VPROT	IN	GND	Vertical Protection Input
–	–	37	PWMV	OUT	LV	PWM Vertical Output
–	–	38	DFVBL	OUT	LV	Dynamic Focus Vertical Blanking Output
31	58	39	SDA	IN/OUT	OBL	I^2C Bus Data Input/Output
32	57	40	SCL	IN/OUT	OBL	I^2C Bus Clock Input/Output
33	56	41	P21	IN/OUT	LV	Port 2, Bit 1 Input/Output
34	55	42	P20	IN/OUT	LV	Port 2, Bit 0 Input/Output
35	54	43	P17	IN/OUT	LV	Port 1, Bit 7 Input/Output
36	53	44	P16	IN/OUT	LV	Port 1, Bit 6 Input/Output
37	52	45	P15	IN/OUT	LV	Port 1, Bit 5 Input/Output
38	51	46	P14	IN/OUT	LV	Port 1, Bit 4 Input/Output
39	50	47	P13	IN/OUT	LV	Port 1, Bit 3 Input/Output
40	49	48	P12	IN/OUT	LV	Port 1, Bit 2 Input/Output
41	48	49	P11	IN/OUT	LV	Port 1, Bit 1 Input/Output
42	47	50	P10	IN/OUT	LV	Port 1, Bit 0 Input/Output
43	46	53	VSUP3.3FE	SUPPLY	OBL	Supply Voltage Analog Video Front-end, 3.3 V
44	45	54	GND	SUPPLY	OBL	Ground Platform
45	44	55	GND	SUPPLY	OBL	Ground Platform
46	43	56	VSUP1.8FE	SUPPLY	OBL	Supply Voltage Analog Video Front-end, 1.8 V
47	42	57	VOUT3	OUT	LV	Analog Video 3 Output
48	41	58	VOUT2	OUT	LV	Analog Video 2 Output
49	40	59	VOUT1	OUT	LV	Analog Video 1 Output
50	39	60	VIN1	IN	GND	Analog Video 1 Input
51	38	61	VIN2	IN	GND	Analog Video 2 Input
52	37	62	VIN3	IN	GND	Analog Video 3 Input
53	36	63	VIN4	IN	GND	Analog Video 4 Input
54	35	64	VIN5	IN	GND	Analog Video 5 Input
55	34	65	VIN6	IN	GND	Analog Video 6 Input
56	33	66	VIN7	IN	GND	Analog Video 7 Input
57	32	67	VIN8	IN	GND	Analog Video 8 Input
58	31	68	VIN9	IN	GND	Analog Video 9 Input

Pin No. PSSDIP88-1 PY	Pin No. PSSDIP88-1 PZ	Pin No. PMQFP144-2 XM	Pin Name	Type	Connection (If not used)	Short Description
59	30	69	VIN10	IN	GND	Analog Video 10 Input
60	29	70	VIN11	IN	GND	Analog Video 11 Input
61	28	98	P23	IN/OUT	LV	Port 2, Bit 3 Input/Output
62	27	99	P22	IN/OUT	LV	Port 2, Bit 2 Input/Output
63	26	100	XTAL2	OUT	OBL	Analog Crystal Output
64	25	101	XTAL1	IN	OBL	Analog Crystal Input
65	24	102	VSUP1.8DIG	SUPPLY	OBL	Supply Voltage Digital Core, 1.8 V
66	23	103	GND	SUPPLY	OBL	Ground Platform
67	22	104	GND	SUPPLY	OBL	Ground Platform
68	21	105	VSUP3.3DIG	SUPPLY	OBL	Supply Voltage Digital Core, 3.3 V
69	20	106	VSUP5.0IF	SUPPLY	OBL	Supply Voltage IF ADC, 5.0 V
70	19	107	VSUP5.0FE	SUPPLY	OBL	Supply Voltage Analog IF Front-end, 5.0 V
71	18	108	RESETQ	IN/OUT	OBL	$\overline{\text{Reset}}$ Input/Output
72	17	109	IFIN+	IN	$VREF_{IF}$	Differential IF Input
73	16	110	IFIN-	IN	$VREF_{IF}$	Differential IF Input
74	15	111	VREFIF		OBL	Reference Voltage, IF ADC
75	14	112	TAGC	OUT	LV	Tuner AGC Output
76	13	113	AIN1R / SIF	IN/OUT	GND	Analog Audio 1 Input, Right Analog 2nd Sound IF Output
77	12	114	AIN1L	IN	GND	Analog Audio 1 Input, Left
78	11	115	AIN2R	IN	GND	Analog Audio 2 Input, Right
79	10	116	AIN2L	IN	GND	Analog Audio 2 Input, Left
–	–	117	AIN3R	IN	GND	Analog Audio 3 Input, Right
–	–	118	AIN3L	IN	GND	Analog Audio 3 Input, Left
–	–	119	AOUT2R	OUT	LV	Analog Audio 2 Output, Right
–	–	120	AOUT2L	OUT	LV	Analog Audio 2 Output, Left
80	9	–	AIN3R / AOUT2R	IN / OUT	LV	Analog Audio 3 Input, Right Analog Audio 2 Output, Right
81	8	–	AIN3L / AOUT2L	IN / OUT	LV	Analog Audio 3 Input, Left Analog Audio 2 Output, Left
82	7	121	AOUT1R	OUT	LV	Analog Audio 1 Output, Right
83	6	122	AOUT1L	OUT	LV	Analog Audio 1 Output, Left
84	5	123	SPEAKERR	OUT	LV	Analog Loudspeaker Output, Right
85	4	124	SPEAKERL	OUT	LV	Analog Loudspeaker Output, Left

Pin No.			Pin Name	Type	Connection (If not used)	Short Description
PSSDIP88-1 PY	PSSDIP88-1 PZ	PMQFP144-2 XM				
86	3	125	VREFAU		OBL	Reference Voltage, Audio
87	2	126	VSUP8.0AU	SUPPLY	OBL	Supply Voltage Analog Audio, 8.0 V
88	1	127	GND	SUPPLY	OBL	Ground Platform

6. SCALER & DEINTERLACER (MST)

The MST5*7 is total solution graphics processing IC for LCD displays with panel resolutions up to WXGA+/SXGA+. It is configured with a high-speed integrated triple-ADC/PLL, a high quality display processing engine, and an integrated multi-purpose output display interface that can support all major panel interface formats. To further reduce system costs, the MST5*7 also integrates intelligent power management control capability for green-mode requirements and spread-spectrum support for EMI management.

General Features

- Two RGB analog input ports support up to 165 MHz (UXGA @ 60Hz)
- Full SOG and composite sync support, including copy protected signals

Display Features

- Patent-pending Hybrid Image Resolution Converter
- Variable sharpness control
- Interlaced to progressive conversion
- Patent-pending Dynamic Frame-Rate generator (DFR) – short line storage frame extension technique eliminates short lines in output frames
- Media Window Enhancement (MWE)
- Peaking and coring functions for sharpness enhancement and noise reduction
- Brightness and contrast control
- Programmable 10-bit gamma correction
- sRGB support

Auto Detection Features

- Auto input signal format (SOG, composite, separated HSYNC, and VSYNC)
- Input mode detection support analyzes input video signal (H/V polarity, H/V frequency, interlace/field detect) – extensive status registers support robust detection of all VESA and IBM modes
- Auto-tuning function including support for phase selection, image position, offset & gain and jitter detection
- Smart screen-fitting

OSD Features

- Built-in OSD generator with 291 character font programmable RAM

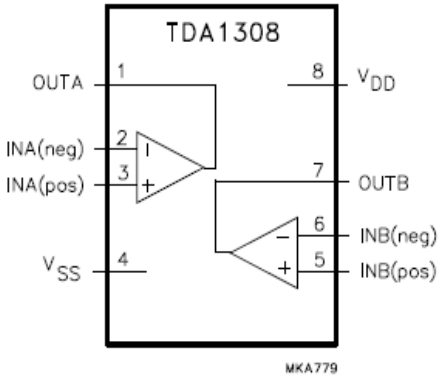
- Internal OSD rotation degree of 90 and 270
- Supports 2/4/8 multi-color fonts
- Supports 8/16/256 color palette
- Supports 1K code attributes
- Gradient color function
- Hardware button animation function
- Pattern generator for production test
- Supports OSD MUX and alpha blending capability

7. SERIAL 32K I2C EEPROM 24LC32

24LC32A is a 32 Kbit Electrically Erasable PROM. The device is organized as four blocks of 8K x 8-bit memory with a 2-wire serial interface. Low-voltage design permits operation down to 1.8V, with standby and active currents of only 1 µA and 1 mA, respectively. It has been developed for advanced, lowpower applications such as personal communications or data acquisition. The 24XX32A also has a page write capability for up to 32 bytes of data. Functional address lines allow up to eight devices on the same bus, for up to 256 Kbits address space. The 24XX32A is available in the standard 8-pin (Vcc, WP, SDA (i2c data), SCL (i2c clock), GNDx4). WP pin is critcal pin. If WP is high, writing is not possible to EEPROM. If WP is low, writing is possible to EEPROM.

8. CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.



9. SAW FILTER

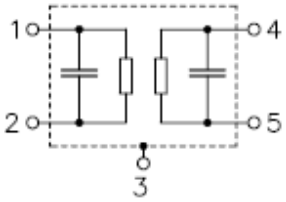
X6966D Standard:

• B/G
• D/K
• I

• L/L’

Features:

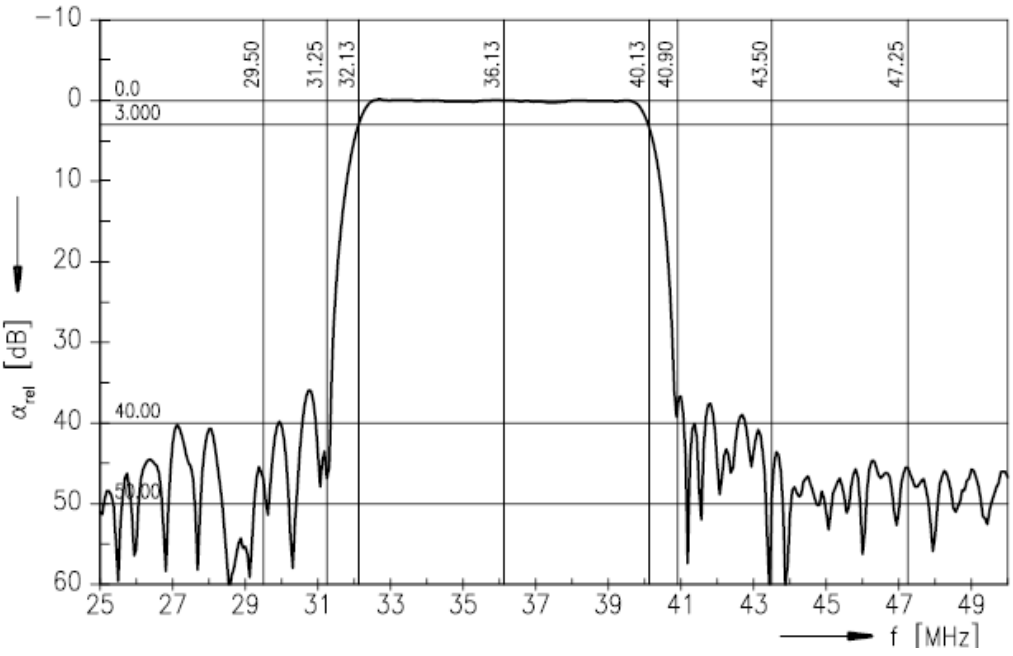
• IF filter for digital cable TV
• Standard IC package

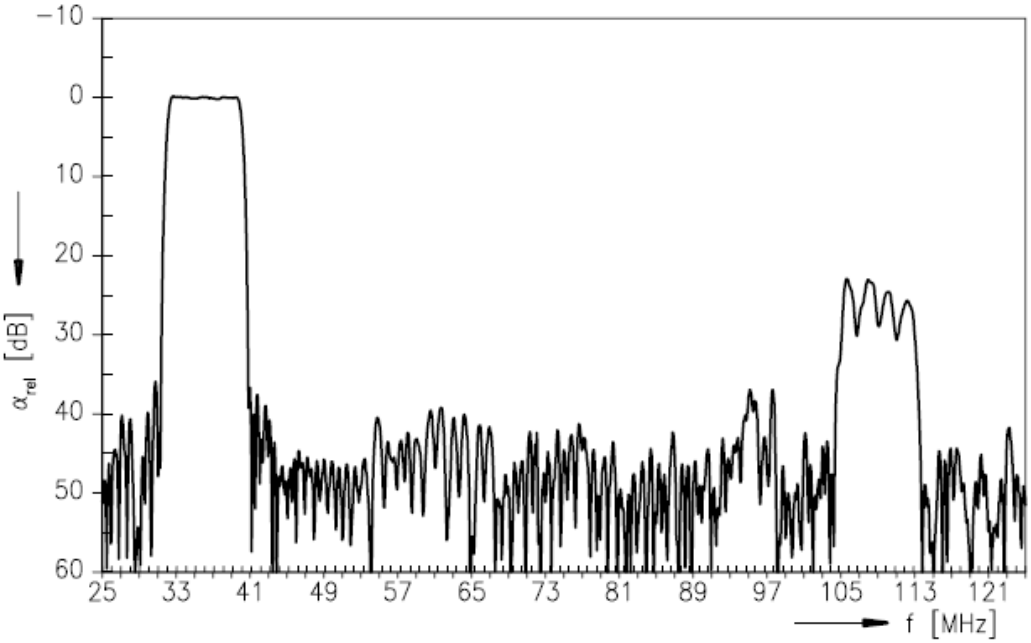


Pin configuration:

1 Input
2 Input - ground
3 Chip carrier - ground
4 Output
5 Output

Frequency response:





10. IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM

LM1117
LM1086
LM317
MP1593
IRF7314
FDC642P
74HCT4053
TEA6420
PI5V330
TDA1308
TDA1905

10.1. LM1117

10.1.1. General Description

The LM1117 is a series of low dropout voltage regulators with a dropout of 1.2V at 800mA of load current. It has the same pin-out as National Semiconductor's industry standard LM317. The LM1117 is available in an adjustable version, which can set the output voltage from 1.25V to 13.8V with only two external resistors. In addition, it is also available in five fixed voltages, 1.8V, 2.5V, 2.85V, 3.3V, and 5V. The LM1117 offers current limiting and thermal shutdown. Its circuit includes a zener trimmed bandgap reference to as-sure output voltage accuracy to within ±1%. The LM1117 series is available in SOT- 223, TO-220, and TO-252 D-PAK packages. A minimum of 10μF tantalum capacitor is required at the output to improve the transient response and stability.

10.1.2. Features

• Available in 1.8V, 2.5V, 2.85V, 3.3V, 5V, and Adjustable Versions
• Space Saving SOT-223 Package

• Current Limiting and Thermal Protection
• Output Current 800mA
• Line Regulation 0.2% (Max)
• Load Regulation 0.4% (Max)
• Temperature Range
— LM1117 0°C to 125°C
— LM1117I -40°C to 125°C

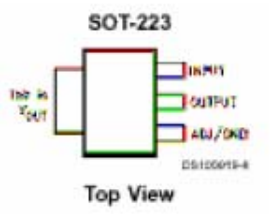
10.1.3. Applications

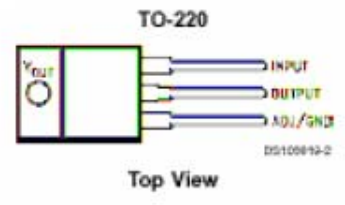
• 2.85V Model for SCSI-2 Active Termination
• Post Regulator for Switching DC/DC Converter
• High Efficiency Linear Regulators
15
32” TFT TV Service Manual 10/01/2005
• Battery Charger
• Battery Powered Instrumentation

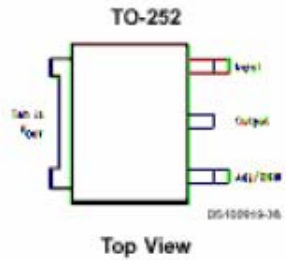
10.1.4. Absolute Maximum Ratings

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
DC Input Voltage	V_{IN}		7	V
Lead Temperature (Soldering, 5 Seconds)	T_{SOL}		260	℃
Storage Temperature Range	T_{STG}	−65	150	℃
Operating Junction Temperature Range	T_{OPR}	0	125	℃

10.1.5. Connection Diagrams







10.2. LM1086

10.2.1. General Description

The LM1086 is a low dropout three terminal regulator with 1.5A output current capability. The output voltage is adjustable with the use of a resistor divider. Dropout is guaranteed at a maximum of 500 mV at maximum output current. It's low dropout voltage and fast transient response make it ideal for low voltage microprocessor applications. Internal current and thermal limiting provides protection against any overload condition that would create excessive junction temperature.

10.2.2. Features

• Low Dropout Voltage 500mV at 1.5A Output Current

- Fast Transient Response
- 0.015% Line Regulation
- 0.1% Load Regulation
- Internal Thermal and Current Limiting
- Adjustable or Fixed Output Voltage(1.5, 2.5, 2.85, 3.0, 3.3, 5.0V)
- Surface Mount Package SOT-223 & TO-263 (D2 Package)
- 100% Thermal Limit Burn-in

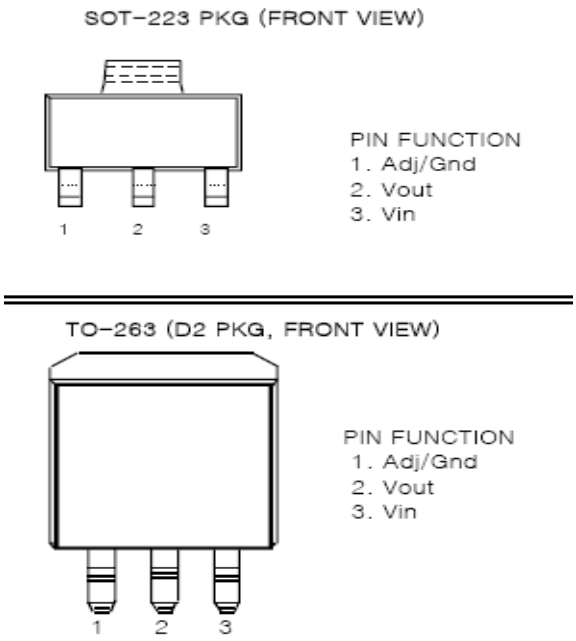
10.2.3. Applications

- Battery Charger
- Adjustable Power Supplies
- Constant Current Regulators
- Portable Instrumentation
- High Efficiency Linear Power Supplies
- High Efficiency "Green" Computer Systems
- SMPS Post-Regulator
- Power PC Supplies
- Powering VGA & Sound Card

10.2.4. Absolute Maximum Ratings

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Supply Voltage	Vin	7	V
Operating Junction Temperature Range	Topr	0~125	℃
Storage Temperature Range	Tstg	-65~150	℃
Thermal Resistance Junction to Case TO-263	Tjc	3	C/W
Thermal Resistance Junction to Ambient TO-263	Tja	60	C/W
Lead Temperature (Soldering) 10 sec.	Tsol	300	℃
Maximum Output Current	Imax	1.5	A

10.2.5. Connection Diagrams



10.3. LM317

10.3.1. General Description

The LM117/LM217/LM317 are monolithic integrated circuit in TO-220, ISOWATT220, TO-packages intended for use as positive adjustable voltage regulators. They are designed to supply more than 1.5A of load current with an output voltage adjustable 1.2 to 37V range. The nominal output voltage is selected by means of only a resistive divider, making exceptionally easy to use and eliminating the stocking of many fixed regulators.

10.3.2. Features

- Output voltage range: 1.2 to 37V
- Output current in excess of 1.5A
- 0.1% Line and Load Regulation
- Floating Operation for High Voltages
- Complete Series of Protections: Current Limiting, Thermal Shutdown and SOA Control

10.3.3. Connection Diagrams

Pin 1. Adjust
2. V_{out}
3. V_{in}

D2T SUFFIX
PLASTIC PACKAGE
CASE 936
(D^2PAK)

10.4. MP1593

10.4.1. General Description

The MP1593 is a step-down regulator with an internal Power MOSFET. It achieves 3A continuous output current over a wide input supply range with excellent load and line regulation. Current mode operation provides fast transient response and eases loop stabilization. Fault condition protection includes cycle-by-cycle current limiting and thermal shutdown. Adjustable soft-start reduces the stress on the input source at turn-on. In shutdown mode the regulator draws 20μA of supply current. The MP1593 requires a minimum number of readily available external components to complete a 3A step down DC to DC converter solution.

10.4.2. Features

- 3A Output Current
- Programmable Soft-Start
- 100mΩ Internal Power MOSFET Switch
- Stable with Low ESR Output Ceramic Capacitors
- Up to 95% Efficiency
- 20μA Shutdown Mode
- Fixed 385KHz Frequency
- Thermal Shutdown
- Cycle-by-Cycle Over Current Protection
- Wide 4.75 to 28V Operating Input Range
- Output Adjustable from 1.22V
- Under Voltage Lockout
- Available in 8-Pin SOIC Package

10.4.3. Applications

- Distributed Power Systems
- Battery Chargers
- Pre-Regulator for Linear Regulators
- Flat Panel TVs
- Set-Top Boxes
- Cigarette Lighter Powered Devices
- DVD/PVR Devices

10.4.4. Absolute Maximum Ratings

Supply Voltage V_{IN} ..... –0.3V to 30V
Switch Voltage V_{SW} ..... –0.5V to V_{IN}+0.3V
Boost Voltage V_{BS} ..... V_{SW}–0.3V to V_{SW}+6V
All Other Pins ..... –0.3V to 6V
Junction Temperature ..... 150°C
Lead Temperature ..... 260°C
Storage Temperature ..... -65°C to 150°C

10.4.5. Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Units
Shutdown Supply Current		V_{EN} = 0V		20	30	µA
Supply Current		V_{EN} = 2.6V; V_{FB} = 1.4V		1.0	1.2	mA
Feedback Voltage	V_{FB}	4.75V ≤ V_{IN} ≤ 28V; V_{COMP} < 2V	1.194	1.222	1.250	V
Error Amplifier Voltage Gain	A_{EA}			400		V/V
Error Amplifier Transconductance	G_{EA}	ΔI_{COMP} = ±10 µA	500	800	1120	µA/V
High Side Switch On Resistance	$R_{DS(ON)1}$			100	140	mΩ
Low Side Switch On Resistance	$R_{DS(ON)2}$			10		Ω
High Side Switch Leakage Current		V_{EN} = 0V; V_{SW} = 0V		0	10	µA
Current Limit			3.3	4.7	6.5	A
Current Sense to COMP Transconductance	G_{CS}			6.2		A/V
Oscillation Frequency	f_{OSC1}		335	385	435	KHz
Short Circuit Oscillation Frequency	f_{OSC2}	V_{FB} = 0V	25	45	60	KHz
Maximum Duty Cycle	D_{MAX}	V_{FB} = 1.0V		90		%
Minimum Duty Cycle	D_{MIN}	V_{FB} = 1.5V			0	%
EN Threshold Voltage			0.9	1.2	1.5	V

10.4.6. Pin Functions

Pin1:BS

High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 10nF or greater capacitor from SW to BS to power the high side switch.

Pin2:IN

Power Input. IN supplies the power to the IC, as well as the step-down converter switches. Drive IN with a 4.75V to 28V power source. Bypass IN to GND with a suitably large capacitor to eliminate noise on the input to the IC.

Pin3:SW

Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.

Pin4:GND

Ground.

Pin5:FB

Feedback Input. FB senses the output voltage to regulate that voltage. Drive FB with a resistive voltage divider from the output voltage. The feedback threshold is 1.222V.

Pin6:COMP

Compensation Node. COMP is used to compensate the regulation control loop. Connect a series RC network from COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required.

Pin7:EN

Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator, drive EN low to turn it off. An Under Voltage Lockout (UVLO) function can be implemented by the addition of a resistor divider from VIN to GND. For complete low current shutdown its needs to be less than 0.7V. For automatic startup, leave EN unconnected.

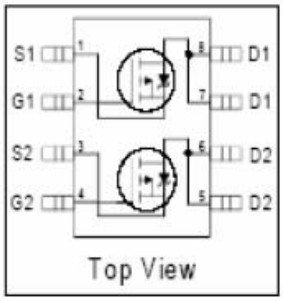
Pin8:SS

Soft-Start Control Input. SS controls the soft-start period. Connect a capacitor from SS to GND to set the soft-start period. A 0.1μF capacitor sets the soft-start period to 10ms. To disable the soft-start feature, leave SS unconnected.

10.5. IRF7314-IRF7316

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications. The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques.

IRF7314 HEXFET® Power MOSFET **IRF7316**



V_{DSS} = -20V

$R_{DS(on)}$ = 0.058Ω

V_{DSS} = -30V

$R_{DS(on)}$ = 0.058Ω

10.5.1. Absolute Maximum Ratings

7314 (T_A = 25°C Unless Otherwise Noted)

		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current⑤	T_A = 25°C	I_D	-5.3	A
	T_A = 70°C		-4.3	
Pulsed Drain Current		I_{DM}	-21	
Continuous Source Current (Diode Conduction)		I_S	-2.5	
Maximum Power Dissipation ⑤	T_A = 25°C	P_D	2.0	W
	T_A = 70°C		1.3	
Single Pulse Avalanche Energy		E_{AS}	150	mJ
Avalanche Current		I_{AR}	-2.9	A
Repetitive Avalanche Energy		E_{AR}	0.20	mJ
Peak Diode Recovery dv/dt③		dv/dt	-5.0	V/ ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to + 150	°C

7316 (T_A = 25°C Unless Otherwise Noted)

		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current⑤	T_A = 25°C	I_D	-4.9	A
	T_A = 70°C		-3.9	
Pulsed Drain Current		I_{DM}	-30	
Continuous Source Current (Diode Conduction)		I_S	-2.5	
Maximum Power Dissipation ⑤	T_A = 25°C	P_D	2.0	W
	T_A = 70°C		1.3	
Single Pulse Avalanche Energy		E_{AS}	140	mJ
Avalanche Current		I_{AR}	-2.8	A
Repetitive Avalanche Energy		E_{AR}	0.20	mJ
Peak Diode Recovery dv/dt ③		dv/dt	-5.0	V/ ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to + 150	°C

10.6. FDC642P

10.6.1. General Description

This p-channel 2.5V specified MOSFET is produced using Fairchild's advanced PowerTrench process that has been especially tailored to minimize on state resistance and yet maintain low gate charge for superior switching performance.

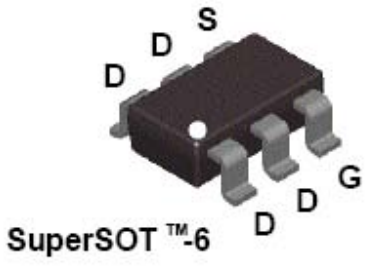
10.6.2 . Features

- -4 A, -20 V. $R_{DS(ON)}$ = 0.065 Ω @ V_{GS} = -4.5 V
  $R_{DS(ON)}$ = 0.100 Ω @ V_{GS} = -2.5 V
- Fast switching speed.
- Low gate charge (7.2nC typical).
- High performance trench technology for extremely low $R_{DS(ON)}$.
- SuperSOT™-6 package: small footprint (72% smaller than standard SO-8); low profile (1mm thick).

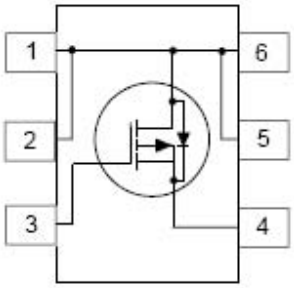
10.6.3. Absolute Maximum Ratings

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±8	V
I_D	Drain Current - Continuous	(Note 1)	-4	A
	Drain Current - Pulsed	(Note 1a)	-20	
P_D	Power Dissipation for Single Operation	(Note 1a)	1.6	W
		(Note 1b)	0.8	
T_J, T_{stg}	Operating and Storage Junction Temperature Range		-55 to +150	°C

10.6.4. Connection Diagram



SuperSOT ™-6



10.7. 74HCT4053

10.7.1. General Description

The 74HC/HCT4053 are high-speed Si-gate CMOS devices and are pin compatible with the “4053” of the “4000B” series. They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT4053 are triple 2-channel analog multiplexers/demultiplexers with a common enable input (E). Each multiplexer/demultiplexer has two independent inputs/outputs (nY0 and nY1), a common input/output (nZ) and three digital select inputs (S1 to S3).

With E LOW, one of the two switches is selected (low impedance ON-state) by S1 to S3. With E HIGH, all switches are in the high impedance OFF-state, independent of S1 to S3.

VCC and GND are the supply voltage pins for the digital control inputs (S1, to S3, and E). The VCC to GND ranges are 2.0 to 10.0 V for HC and 4.5 to 5.5 V for HCT. The analog inputs/outputs (nY0 and nY1, and nZ) can swing between VCC as a positive limit and VEE as a negative limit. VCC - VEE may not exceed 10.0 V.

For operation as a digital multiplexer/demultiplexer, VEE is connected to GND (typically ground).

10.7.2. Features

- Low “ON” resistance:

80 W (typ.) at VCC - VEE = 4.5 V
70 W (typ.) at VCC - VEE = 6.0 V
60 W (typ.) at VCC - VEE = 9.0 V

- Logic level translation:to enable 5 V logic to communicate with ± 5 V analog signals
- Typical “break before make” built in
- Output capability: non-standard
- ICC category: MSI

10.7.3. Application

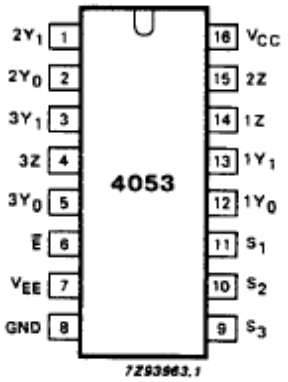
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

10.7.4. Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN.	MAX.	UNIT	CONDITIONS
V_{CC}	DC supply voltage	–0.5	+11.0	V	
$\pm I_{IK}$	DC digital input diode current		20	mA	for $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V
$\pm I_{SK}$	DC switch diode current		20	mA	for $V_S < -0.5$ V or $V_S > V_{CC} + 0.5$ V
$\pm I_S$	DC switch current		25	mA	for -0.5 V $< V_S < V_{CC} + 0.5$ V
$\pm I_{EE}$	DC V_{EE} current		20	mA	
$\pm I_{CC}$; $\pm I_{GND}$	DC V_{CC} or GND current		50	mA	
T_{stg}	storage temperature range	–65	+150	°C	
P_{tot}	power dissipation per package				for temperature range: –40 to + 125 °C 74HC/HCT
	plastic DIL		750	mW	above + 70 °C: derate linearly with 12 mW/K
	plastic mini-pack (SO)		500	mW	above + 70 °C: derate linearly with 8 mW/K
P_S	power dissipation per switch		100	mW	

10.7.5. Connection Diagram

PIN NO.	SYMBOL	NAME AND FUNCTION
2, 1	$2Y_0$ to, $2Y_1$	independent inputs/outputs
5, 3	$3Y_0$ to, $3Y_1$	independent inputs/outputs
6	$\overline{E}$	enable input (active LOW)
7	V_{EE}	negative supply voltage
8	GND	ground (0 V)
11, 10, 9	S_1 to S_3	select inputs
12, 13	$1Y_0$, $1Y_1$	independent inputs/outputs
14, 15, 4	1Z to 3Z	common inputs/outputs
16	V_{CC}	positive supply voltage


4053
2Y1 1
2Y0 2
3Y1 3
3Z 4
3Y0 5
E 6
VEE 7
GND 8
16 VCC
15 2Z
14 1Z
13 1Y1
12 1Y0
11 S1
10 S2
9 S3
7Z93963.1

10.8.TEA6420

10.8.1 General Description

The TEA6420 switches 5 stereo audio inputs on 4 stereo outputs. All the switching possibilities are changed through the I2C bus.

10.8.2. Features

- 5 Stereo Inputs
- 4 Stereo Outputs Gain Control 0/2/4/6dB/ Mute for Each Output
- Cascadable (2 different addresses)
- Serial Bus Controlled
- Very Low Noise & Very Low Distortion

10.8.3. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	10.2	V
T_{oper}	Operating Ambient Temperature	0, + 70	°C
T_{stg}	Storage Temperature	- 20, + 150	°C

10.8.4. Electrical Characteristics

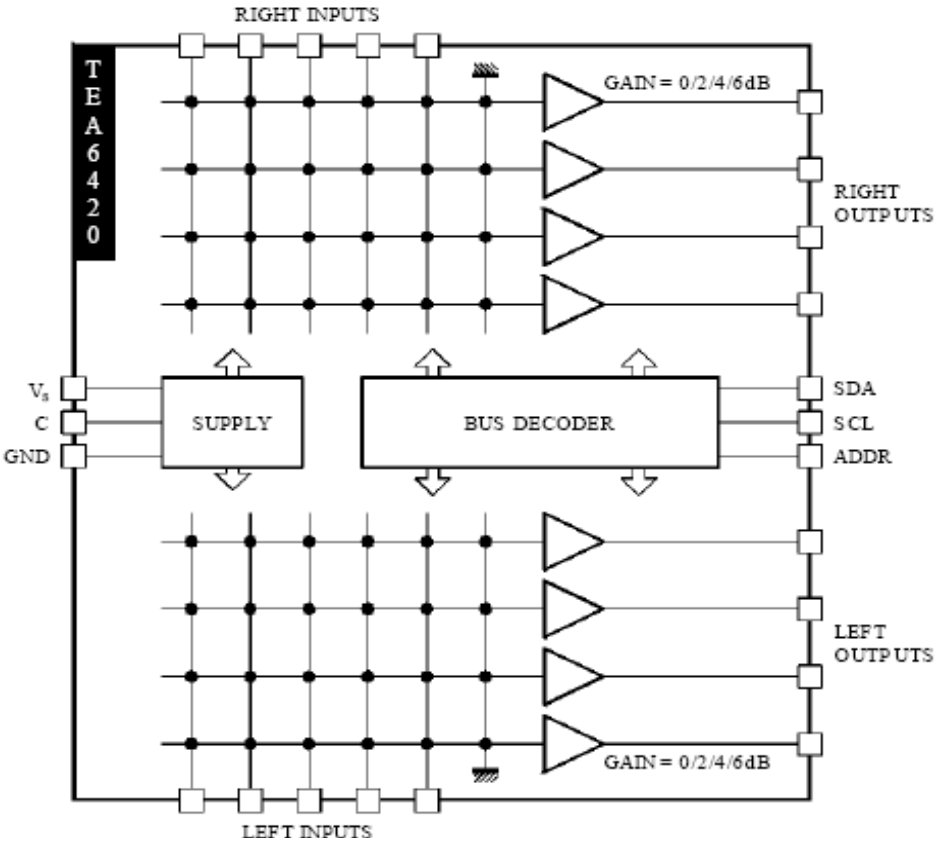
SUPPLY

V_S	Supply Voltage		8	9	10.2	V
I_S	Supply Current			5	8	mA
SVR	Ripple Rejection	V_{IN} = 500mV_{RMS}, BW = 20 - 20kHz	70	80		dB

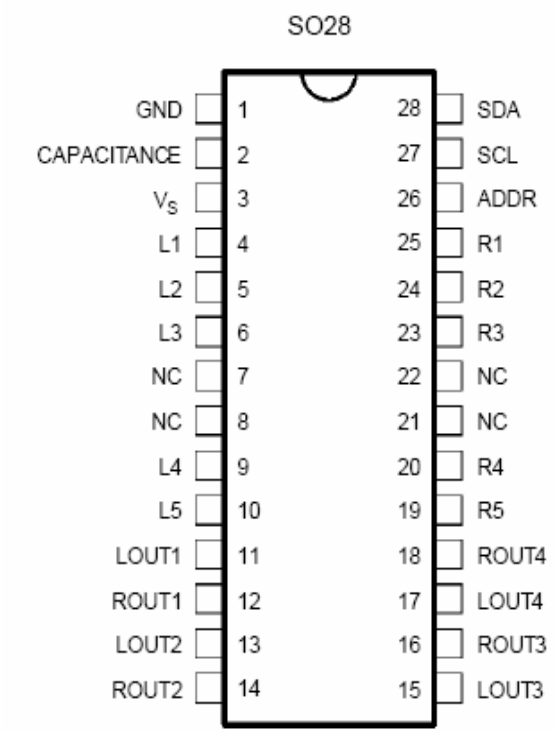
MATRIX

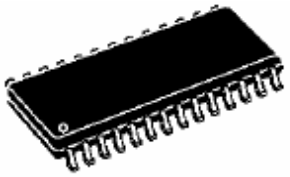
V_{IN}	Input DC Level		4.5	5	5.5	V
R_I	Input Resistance		30	50	100	kΩ
C_S	Channel Separation	V_{IN} = 2V_{RMS}, f = 1kHz, Gain = 0dB V_{IN} = 2V_{RMS}, f = 1kHz, Gain = 6dB	80 70	90 82		dB dB

10.8.5. Block Diagram



10.8.6. Connection Diagram





SO28
(Plastic Micropackage)

ORDER CODE : TEA6420D

10.9. PI5V330

10.9.1. General Description

The PI5V330 is well suited for video applications when switching composite or RGB analog. A picturein- picture application will be described in this brief. The pixel-rate creates video overlays so two or more pictures can be viewed at the same time. An inexpensive NTSC titler can be implemented by superimposing the output of a character generator on a standard composite video background.

10.9.2. Features

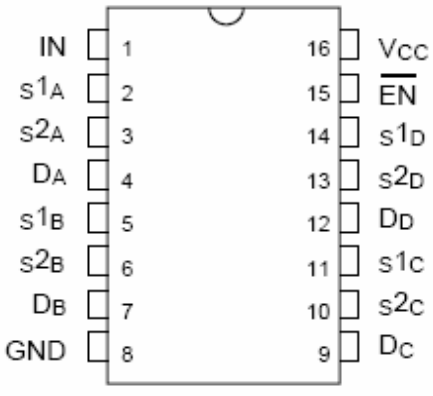
• High-performance solution to switch between video sources
• Wide bandwidth: 200 MHz
• Low On-Resistance: 3Ω
• Low crosstalk at 10 MHz: –58dB
• Ultra-low quiescent power (0.1μA typical)
• Single supply operation: +5.0V
• Fast switching: 10ns
• High-current output: 100mA

10.9.3. Absolute Maximum Ratings

Storage Temperature .....–65°C to +150°C
Ambient Temperature with Power Applied .....–40°C to +85°C
Supply Voltage to Ground Potential (Inputs & V_{CC} Only)...–0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only) –0.5V to +7.0V
DC Input Voltage .....–0.5V to +7.0V
DC Output Current.....120mA
Power Dissipation 0.5W

10.9.4. Connection Diagram

Pin Name	Description
$S1_A$, $S1_B$, $S1_C$, $S1_D$ $S2_A$, $S2_B$, $S2_C$, $S2_D$	Analog Video I/O
IN	Select Input
$\overline{EN}$	Enable
D_A, D_B D_C, D_D	Analog Video I/O
GND	Ground
V_{CC}	Power



10.10. TDA1308

10.10.1. General Description

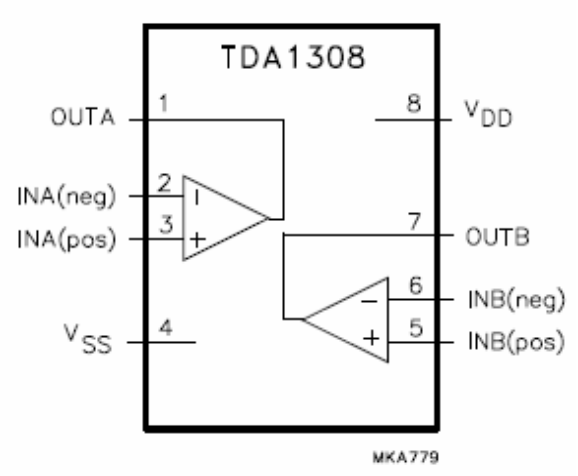
The TDA1308 is an integrated class AB stereo headphone driver contained in an SO8 or a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications. It gets its input from two analog audio outputs (DACA_L and DACA_R) of MSP 34x0G. The gain of the output is adjustable by the feedback resistor between the inputs and outputs.

10.10.2 Features

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- High signal-to-noise ratio
- High slew rate
- Low distortion
- Large output voltage swing.

10.10.3. Pinning

SYMBOL	PIN	DESCRIPTION
OUTA	1	Output A
INA(neg)	2	Inverting input A
INA(pos)	3	Non-inverting input A
V_{SS}	4	Negative supply
INB(pos)	5	Non-inverting input B
INB(neg)	6	Inverting input B
OUTB	7	Output B
V_{DD}	8	Positive supply



10.11. TDA1905

10.11.1. General Description

The TDA1905 is a monolithic integrated circuit in POWERDIP package, intended for use as low frequency power amplifier in a wide range of applications in radio and TV sets:
– muting facility
– protection against chip over temperature
– very low noise
– high supply voltage rejection
– low ”switch-on” noise
– voltage range 4V to 30V
The TDA 1905 is assembled in a new plastic package, thePOWERDIP, that offers the same assembly ease, space and cost saving of a normal dual in-line packagebutwith apower dissipationofup to6Wand a thermal resistance of 15°C/W (junction to pins).

10.11.2. Absolute Maximum Ratings

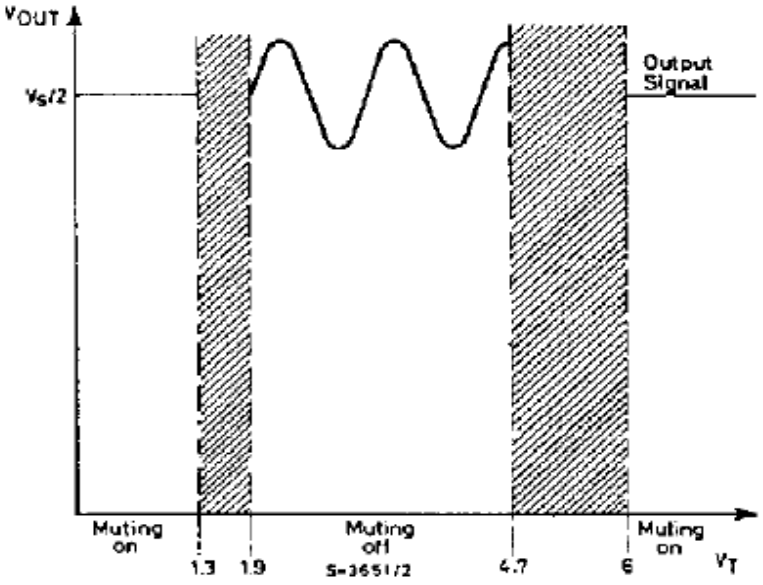
Symbol	Parameter	Value	Unit
V_s	Supply voltage	30	V
I_o	Output peak current (non repetitive)	3	A
I_o	Output peak current (repetitive)	2.5	A
V_i	Input voltage	0 to + V_s	V
V_i	Differential input voltage	± 7	V
V_{11}	Muting thresold voltage	V_s	V
P_{tot}	Power dissipation at T_{amb} = 80°C	1	W
	T_{case} = 60°C	6	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

10.11.3. Electrical Characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage		4		30	V
V_o	Quiescent output voltage	V_s = 4V V_s = 14V V_s = 30V	1.6 6.7 14.4	2.1 7.2 15.5	2.5 7.8 16.8	V
I_d	Quiescent drain current	V_s = 4V V_s = 14V V_s = 30V		15 17 21	 35	mA
$V_{CE\ sat}$	Output stage saturation voltage	I_C = 1A I_C = 2A		0.5 1		V
P_o	Output power	d = 10% f = 1KHz V_s = 9V R_L = 4Ω (*) V_s = 14V R_L = 4Ω V_s = 18V R_L = 8Ω V_s = 24V R_L = 16Ω	 2.2 5 5 4.5	 2.5 5.5 5.5 5.3		W
d	Harmonic distortion	f = 1KHz V_s = 9V R_L = 4Ω P_o = 50 mW to 1.5W V_s = 14V R_L = 4Ω P_o = 50 mW to 3W V_s = 18V R_L = 8Ω P_o = 50 mW to 3W V_s = 24V R_L = 16Ω P_o = 50 mW to 3W		 0.1 0.1 0.1 0.1		%
V_i	Input sensitivity	f = 1KHz V_s = 9V R_L = 4Ω P_o = 2.5W V_s = 14V R_L = 4Ω P_o = 5.5W V_s = 18V R_L = 8Ω P_o = 5.5W V_s = 24V R_L = 16Ω P_o = 5.3W		 37 49 73 100		mV
V_i	Input saturation voltage (rms)	V_s = 9V V_s = 14V V_s = 18V V_s = 24V	0.8 1.3 1.8 2.4			V
R_i	Input resistance (pin 8)	f = 1KHz	60	100		KΩ
I_d	Drain current	f = 1KHz V_s = 9V R_L = 4Ω P_o = 2.5W V_s = 14V R_L = 4Ω P_o = 5.5W V_s = 18V R_L = 8Ω P_o = 5.5W V_s = 24V R_L = 16Ω P_o = 5.3W		 380 550 410 295		mA
η	Efficiency	f = 1KHz V_s = 9V R_L = 4Ω P_o = 2.5W V_s = 14V R_L = 4Ω P_o = 5.5W V_s = 18V R_L = 8Ω P_o = 5.5W V_s = 24V R_L = 16Ω P_o = 5.3W		 73 71 74 75		%

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
BW	Small signal bandwidth (-3dB)	V_s = 14V R_L = 4Ω P_o = 1W		40 to 40,000			Hz
G_v	Voltage gain (open loop)	V_s = 14V f = 1KHz			75		dB
G_v	Voltage gain (closed loop)	V_s = 14V R_L = 4Ω f = 1KHz P_o = 1W		39.5	40	40.5	dB
e_N	Total input noise		R_g = 50Ω R_g = 1KΩ (°) R_g = 10KΩ		1.2 1.3 1.5	 4.0	μV
			R_g = 50Ω R_g = 1KΩ (°°) R_g = 10KΩ		2.0 2.0 2.2	 6.0	μV
S/N	Signal to noise ratio	V_s = 14V P_o = 5.5W R_L = 4Ω	R_g = 10KΩ R_g = 0 (°)		90 92		dB
			R_g = 10KΩ R_g = 0 (°°)		87 87		dB
SVR	Supply voltage rejection	V_s = 18V R_L = 8Ω f_{ripple} = 100 Hz Rg = 10KΩ V_{ripple} = 0.5V_{rms}		40	50		dB
T_{sd}	Thermal shut-down case temperatura (*)	P_{tot} = 2.5W			115		°C

10.11.4. Muting Function



R_5 = 200 KΩ @ 1.9V ≤ V_T ≤ 4.7V

R5 = 10 Ω @ 0V ≤ VT ≤ 1.3V
6V ≤ VT ≤ V_s

VT_{OFF}	Muting-off threshold voltage (pin 4)		1.9		4.7	V
VT_{ON}	Muting-on threshold voltage (pin 4)		0		1.3	V
			6.2		V_s	
R_5	Input-resistance (pin 5)	Muting off	80	200		KΩ
		Muting on		10	30	Ω
R_4	Input resistance (pin 4)		150			KΩ
A_T	Muting attenuation	$R_g + R_1 = 10K\Omega$	50	60		dB

10.SERVICE MENU SETTINGS

Remote control code for openning the SERVICE MENU: MENU 4725

1. First APS **<Yes/No>**
2. BURN_IN_MODE **<Yes/No>**
3. FACTORY MENU
    - 3.1.1. Language
      <English, Deutsch, Francais, Spanish, Portuguese, Italiano, Svenska, Dansk, Türkçe, Hungarian, Czech, Polish or Croatian>
    - 3.1.2. Country
      <Germany, Denmark, Spain, France, Finland, Great Britain, Greece, Hungary, Italy, Norway, Netherlands, Portugal, Poland, Swenden, Slovenia, Slovakia,Turkey, Others, Japan, Korea, America, Austria, Belgium, Switzerland, Czech Rep.>
    - 3.1.3. Volume **<0..63>**
    - 3.1.4. HP Volume **<0..63>**
    - 3.1.5. Teletext Region
      < East Europe, West Europe, Cyrillic, Turkish/Greek, Arabic/Hebrew >
    - 3.1.6. Menu Colour **<Opaque, Transparent>**
    - 3.1.7. Picture Mode
        - 3.1.7.1.1.1. Brightness (Bright) **<0..63>**
        - 3.1.7.1.1.2. Contrast (Bright) **<0..63>**
        - 3.1.7.1.1.3. Colour (Bright) **<0..63>**
        - 3.1.7.1.1.4. Brightness (Standard) **<0..63>**
        - 3.1.7.1.1.5. Contrast (Standard) **<0..63>**
        - 3.1.7.1.1.6. Clour (Standard) **<0..63>**
        - 3.1.7.1.1.7. Brightness (Soft) **<0..63>**
        - 3.1.7.1.1.8. Contrast (Soft) **<0..63>**
        - 3.1.7.1.1.9. Colour (Soft) **<0..63>**

4. VCTI DAC Adjust.
    - 4.1.1. Cutoff Red **<0..512>**
    - 4.1.2. Cutoff Green **<0..512>**
    - 4.1.3. Cutoff Blue **<0..512>**
    - 4.1.4. Whitedrv. Red **<0..512>**
    - 4.1.5. Whitedrv. Green **<0..512>**
    - 4.1.6. Whitedrv. Blue **<0..512>**

- 4.1.7. PAL CVBS Brigh **<0..63>**
- 4.1.8. PAL RGB Brigh **<0..63>**
- 4.1.9. NTSC CVBS Brigh **<0..63>**
- 4.1.10. NTSC RGB Brigh **<0..63>**
- 4.1.11. PAL CVBS Color **<0..63>**
- 4.1.12. PAL RGB Color **<0..63>**
- 4.1.13. NTSC CVBS Color **<0..63>**
- 4.1.14. NTSC RGB Color **<0..63>**

5. Txt & FE OSD Settings
   - 5.1.1. Txt&FE OSD H-Shift **<0..256>**
   - 5.1.2. Txt&FE OSD V-Shift **<0..256>**
   - 5.1.3. Txt H-Shift Split Screen **<0..256>**
   - 5.1.4. Txt&FE OSD Pixel Clock **<0..256>**
   - 5.1.5. YDELAY PAL **<0..256>**
   - 5.1.6. YDELAY NTSC **<0..256>**

6. Options1
   - 6.1.1. IDTV **<Yes, No>**
   - 6.1.2. SVHS-EXT2 **<Yes, No>**
   - 6.1.3. FRONT-AV **<Yes, No>**
   - 6.1.4. SVHS **<Yes, No>**
   - 6.1.5. PC **<Yes, No>**
   - 6.1.6. YPBPR **<Yes, No>**
   - 6.1.7. HP ITEM ON MENU **<Yes, No>**
   - 6.1.8. BLUE SCREEN **<Yes, No>**
   - 6.1.9. SEARCH FOR BG, DK, I **<Yes, No>**
   - 6.1.10. SERAC FOR L/L' **<Yes, No>**
   - 6.1.11. Pref. Search Standard **<BG-DK-I, L-L', M>**
   - 6.1.12. Station Ident **<Yes, No>**
   - 6.1.13. POWER ON TO STANDBY **<Yes, No>**

7. Options2
   - 7.1.1. Tuner Options
     - 7.1.1.1.1. Control Byte **<128..256>**
     - 7.1.1.1.2. BSW1 **<0..256>**
     - 7.1.1.1.3. BSW2 **<0..256>**
     - 7.1.1.1.4. BSW3 **<0..256>**
     - 7.1.1.1.5. VHF1-3-L **<0..256>**
     - 7.1.1.1.6. VHF1-3-H **<0..256>**
     - 7.1.1.1.7. VHF3-UHF_L **<0..256>**
     - 7.1.1.1.8. VHF3-UHF_H **<0..256>**
     - 7.1.1.1.9. Top Setting-PAL **<0..256>**
     - 7.1.1.1.10. Top Setting-SECAM **<0..256>**
   - 7.1.2. Blue Back. On Menu **<Yes, No>**
   - 7.1.3. Dynamic Bass On Menu **<Yes, No>**
   - 7.1.4. Vir. Dolby On Menu **<Yes, No>**
   - 7.1.5. APS Delay Time(ms) **<0..256>**
   - 7.1.6. Video Peaking **<0..256>**
   - 7.1.7. Comb Filter/CTI/LTI **<Yes, No>**

8. Audio Options
   - 8.1.1. Equalizer **<Yes, No>**

8.1.2. Carrier Mute **<Yes, No>**
8.1.3. FM Presc_AVL_off **<0..256>**
8.1.4. NICAM Presc_AVL_off **<0..256>**
8.1.5. Scart Presc_AVL_off **<0..256>**
8.1.6. FM Presc_AVL_on **<0..256>**
8.1.7. NICAM Presc_AVL_on **<0..256>**
8.1.8. Scart Presc_AVL_on **<0..256>**
8.1.9. Line-out Via HP **<Yes, No>**

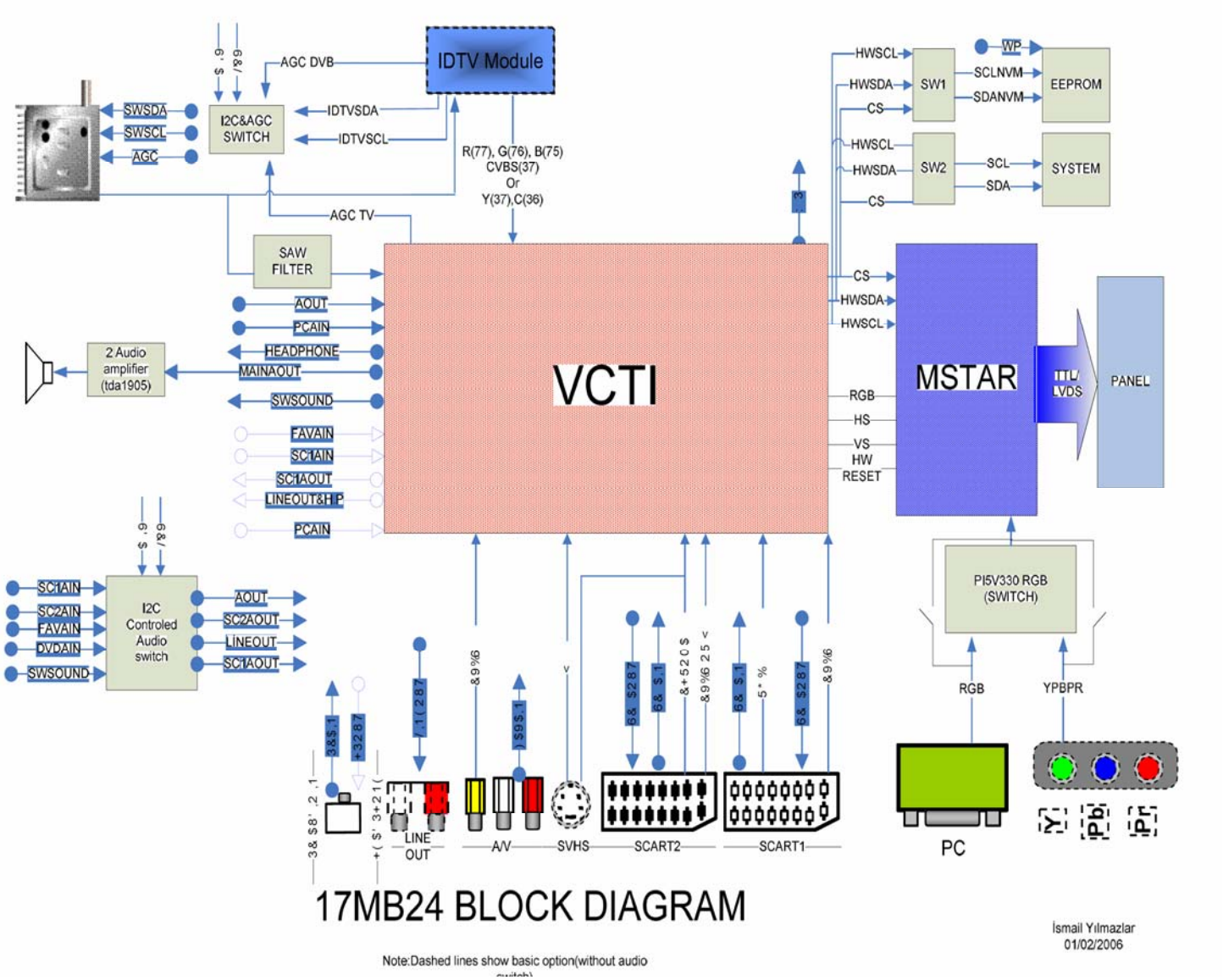
9. 9-Auto calibration
   9.1.1. Exit
   9.1.2. AutoColor
   9.1.3. AdcGain
   R 99 G 99 B 99
   9.1.4. ADC Offset
   R 133 G 129 B 145
   9.1.5. Color temp **Cool**
   9.1.6. Gain
   R 140 G 140 B 140
   9.1.7. Offset
   R 118 G 120 B 127
   9.1.8. Con Max **145**
   9.1.9. Bri Mid **104**
   9.1.10. Color **32**
   9.1.11. Sharp **9**

10. 10-INIT NVM **<Yes/No>**
11. 11-SELECTED PANEL **<A201SN02_V4, PANEL_5, PANEL_6, PANEL_7, PANEL_8, PANEL_9, >**

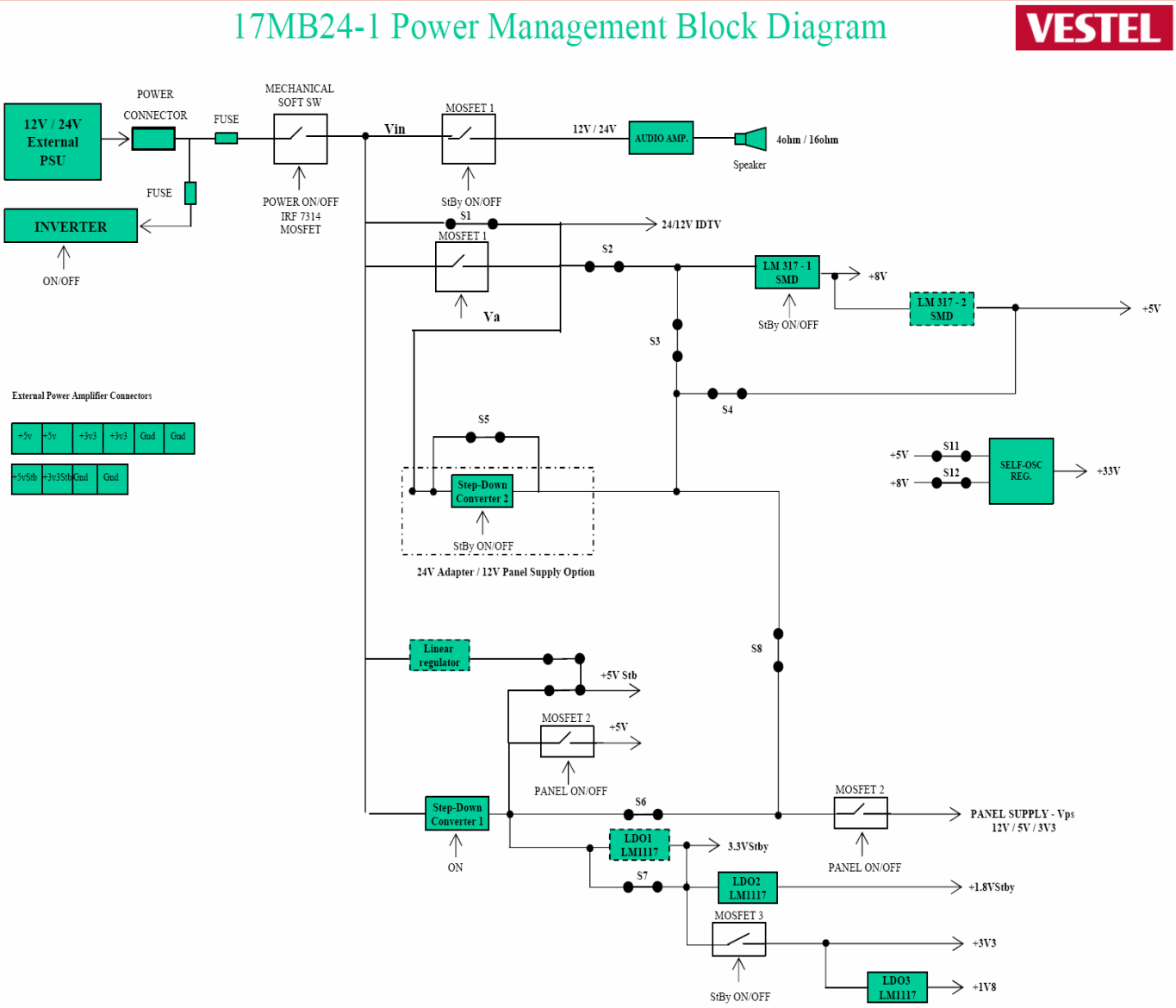
17.06.2006Remote Control Type: RC1090, OTHERS, RC1243

12. BLOCK DIAGRAMS

12.1. General Block Diagram

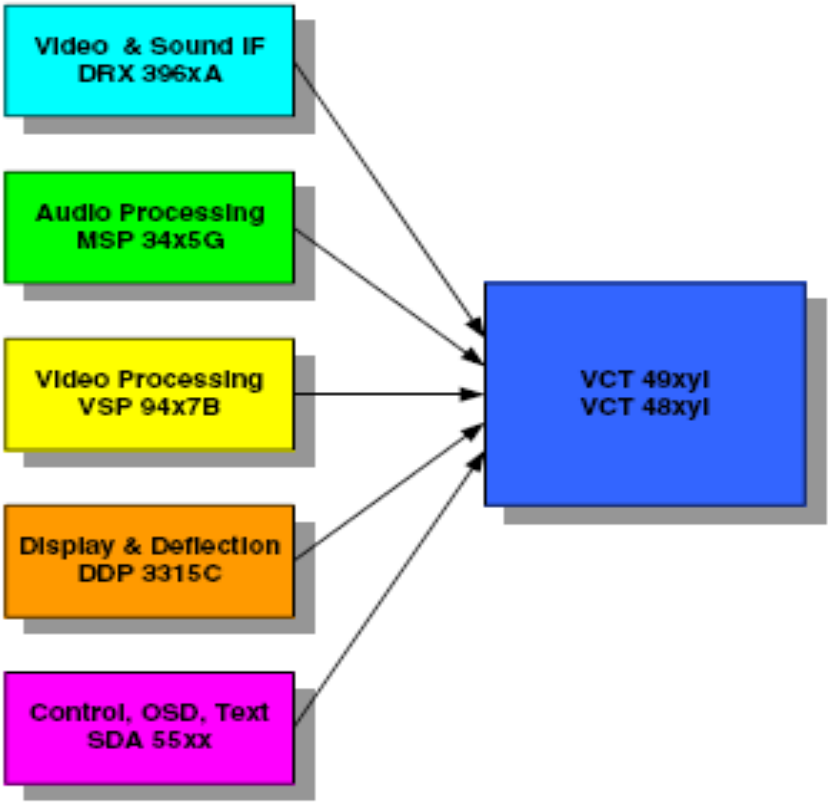


12.2. Power Management

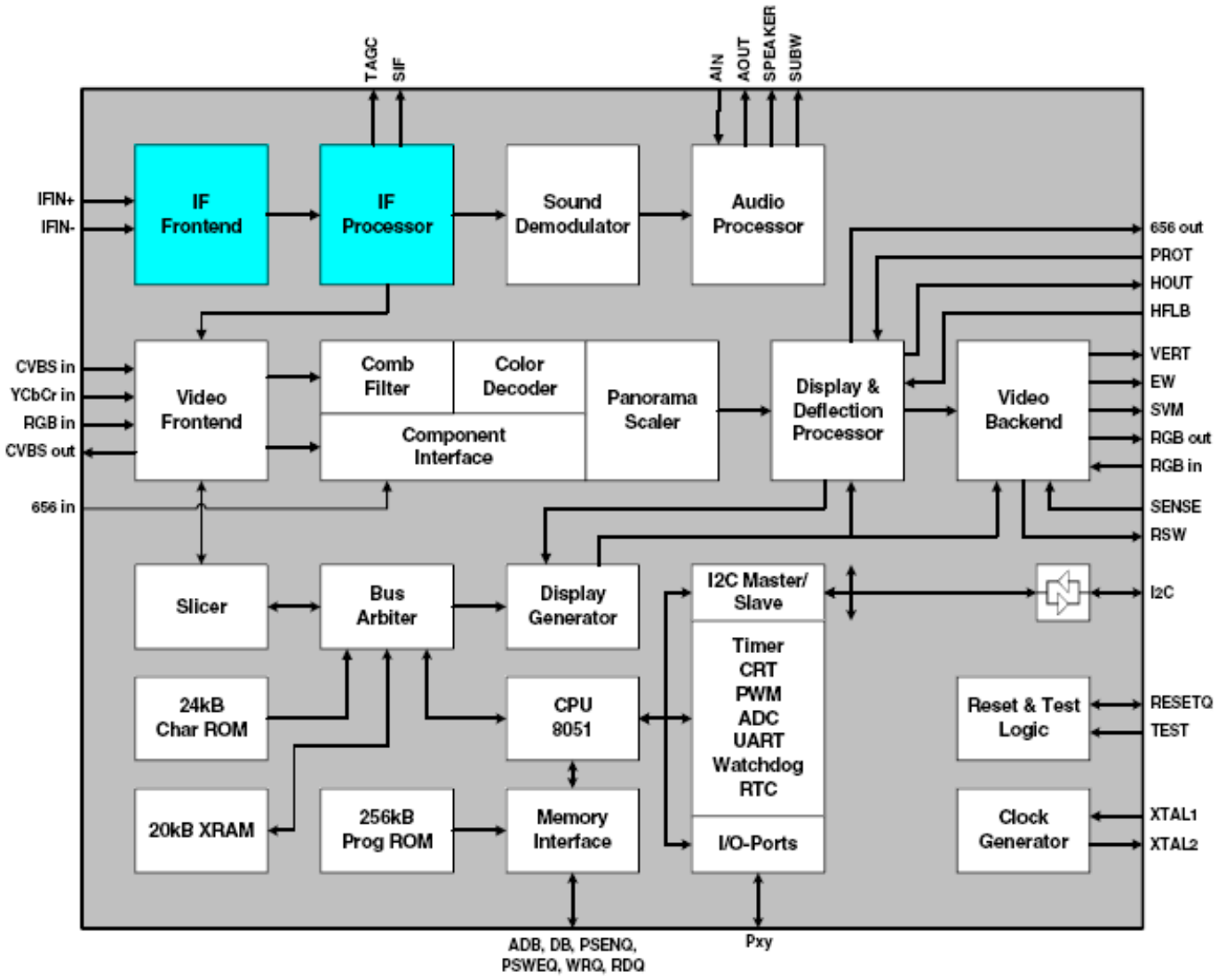


12.3. VCTI (μC)

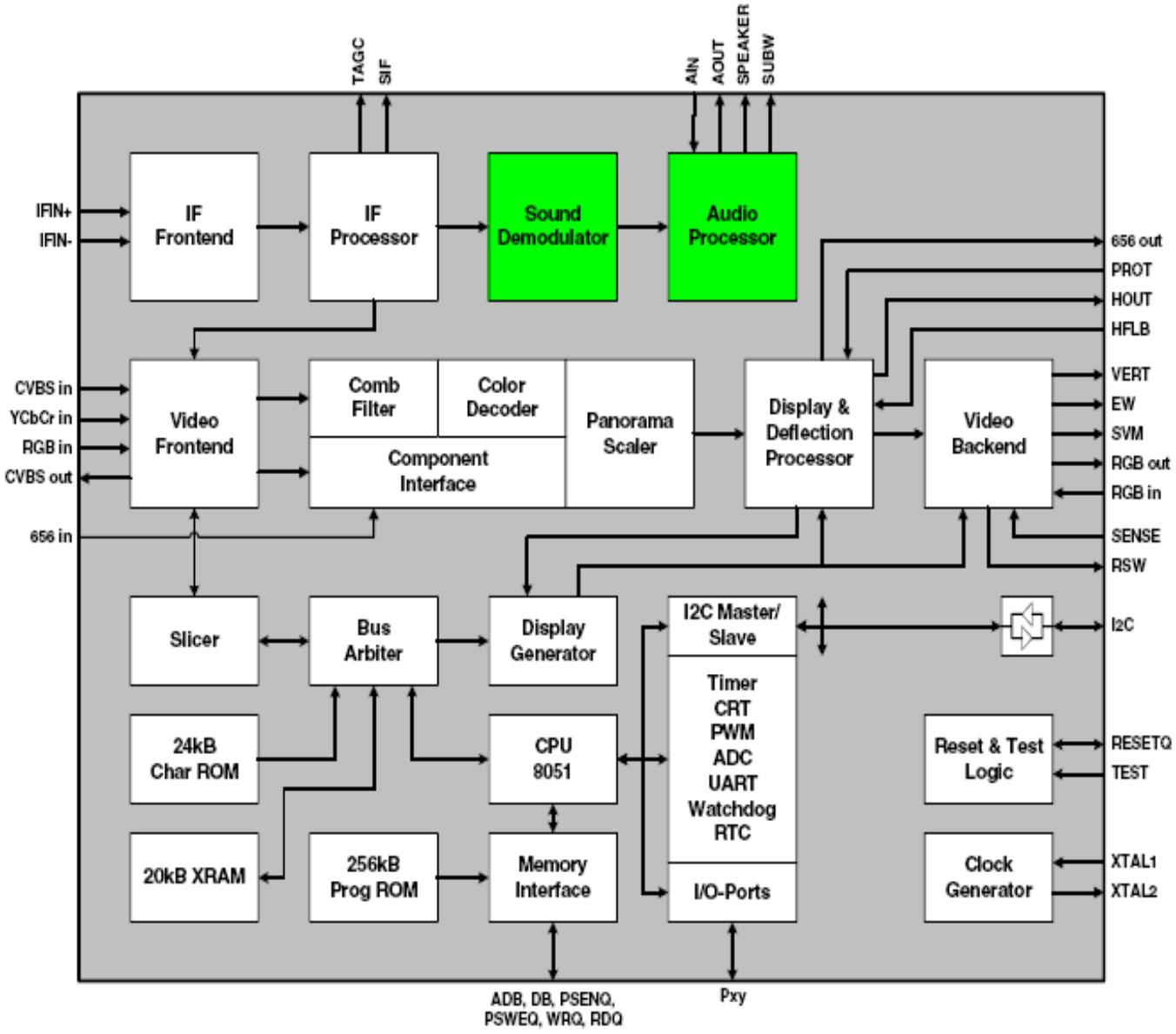
12.3.1. General Block Diagram

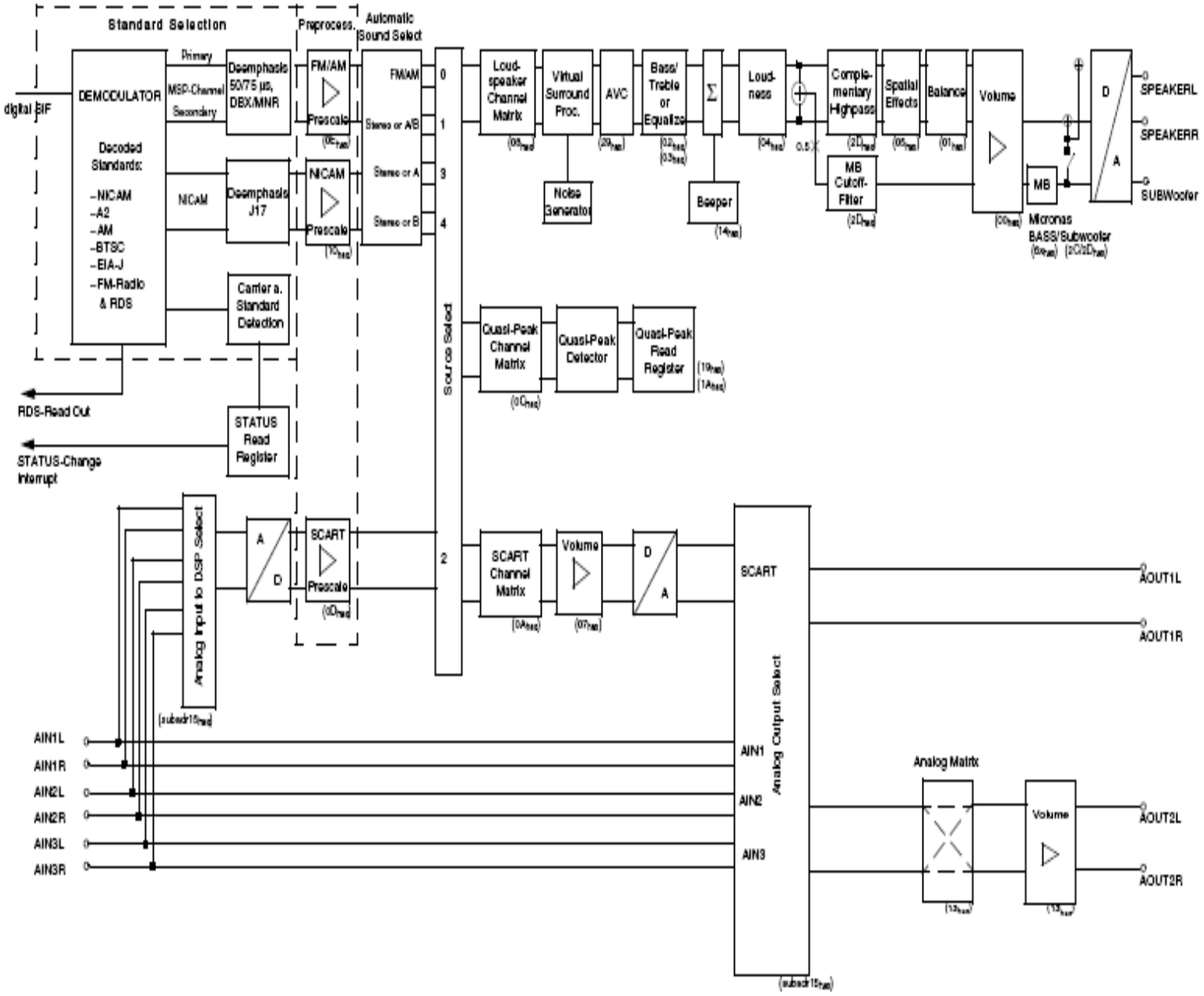


12.3.2 DRX (IF Demodulator) Block Diagram

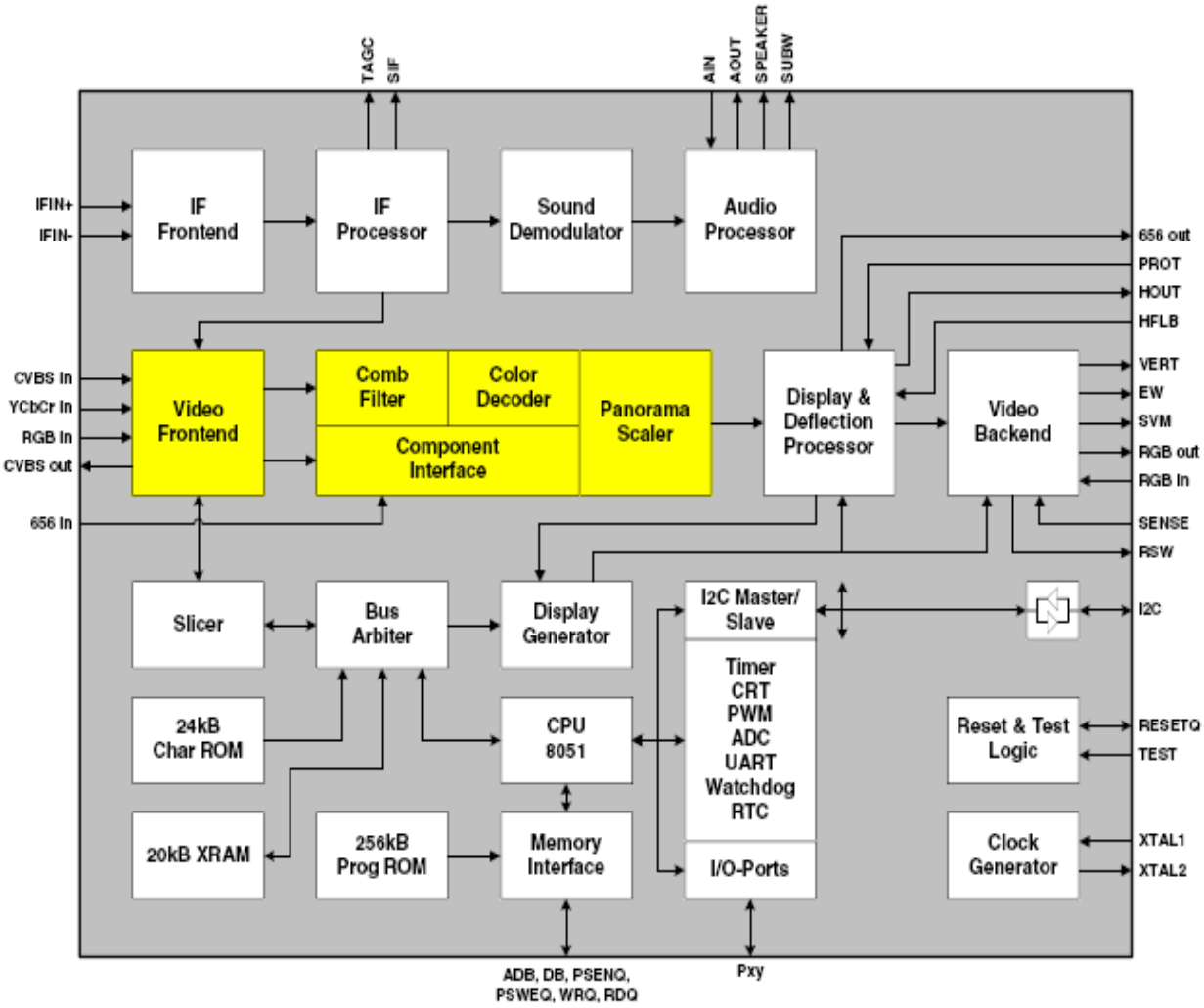


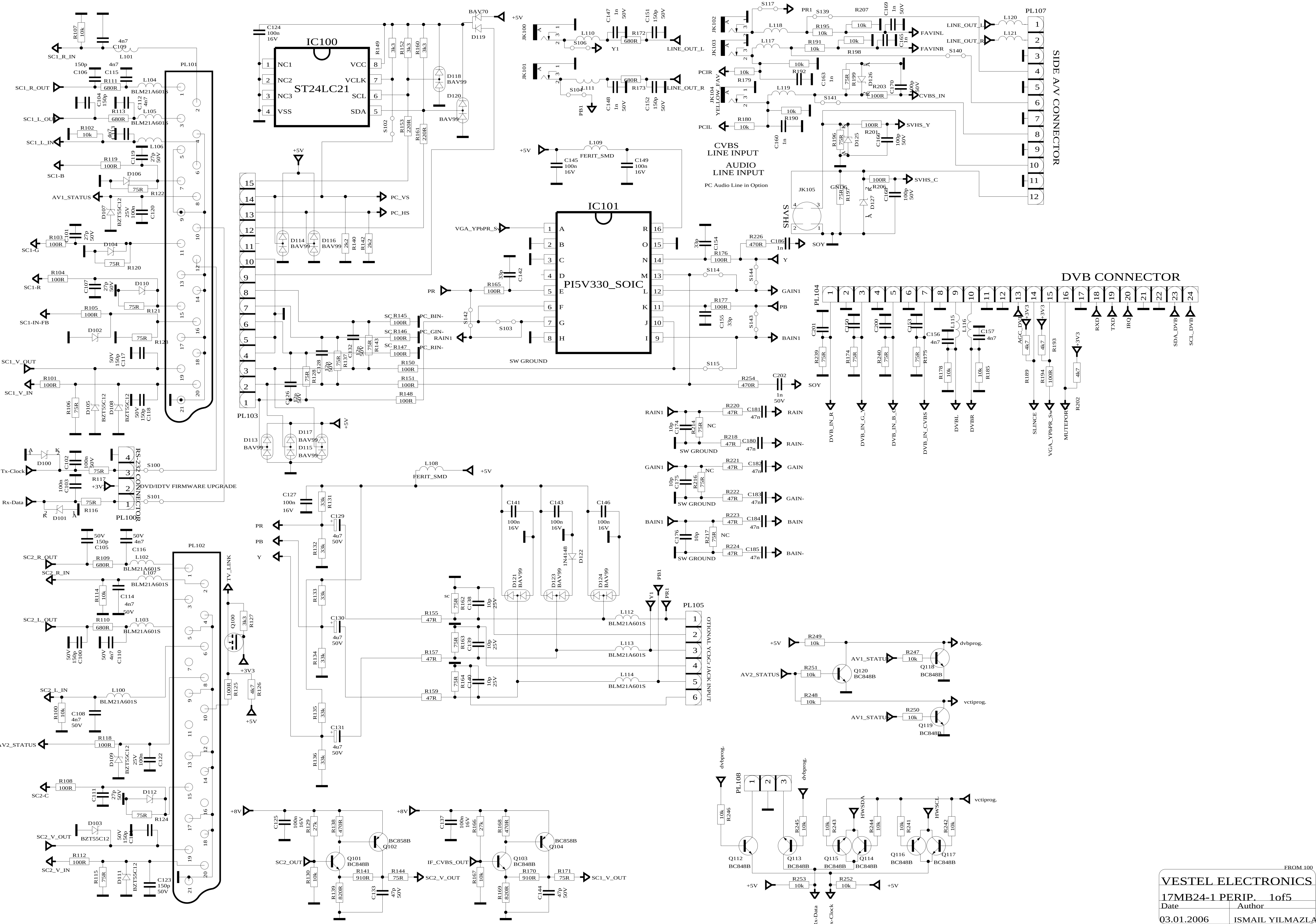
12.3.3. MSP Block Diagram




Standard Selection
Preprocess.
Automatic Sound Select
digital IF
DEMODULATOR
Decoded Standards:
–NICAM
–A2
–AM
–BTSC
–EIA-J
–FM-Radio & RDS
Primary
MSP-Channel
Secondary
NICAM
Deemphasis 50/75 µs, DBX/MNR
Deemphasis J17
Carrier a. Standard Detection
FM/AM Prescale
NICAM Prescale
FM/AM
Stereo or AB
Stereo or A
Stereo or B
Source Select
0
1
3
4
2
Loud-speaker Channel Matrix
Virtual Surround Proc.
Noise Generator
AVC
Bass/ Treble or Equalize
Beeper
Loud-ness
0.5
Comple-mentary Highpass
MB Cutoff-Filter
Spatial Effects
Balance
Volume
MB
Micronas BASS/Subwoofer
D
A
SPEAKERL
SPEAKERR
SUBWoofer
Quasi-Peak Channel Matrix
Quasi-Peak Detector
Quasi-Peak Read Register
RDS-Read Out
STATUS Read Register
STATUS-Change Interrupt
Analog Input to DSP Select
A
D
SCART Prescale
SCART Channel Matrix
Volume
D
A
SCART
Analog Output Select
AIN1
AIN2
AIN3
AOUT1L
AOUT1R
AIN1L
AIN1R
AIN2L
AIN2R
AIN3L
AIN3R
Analog Matrix
Volume
AOUT2L
AOUT2R

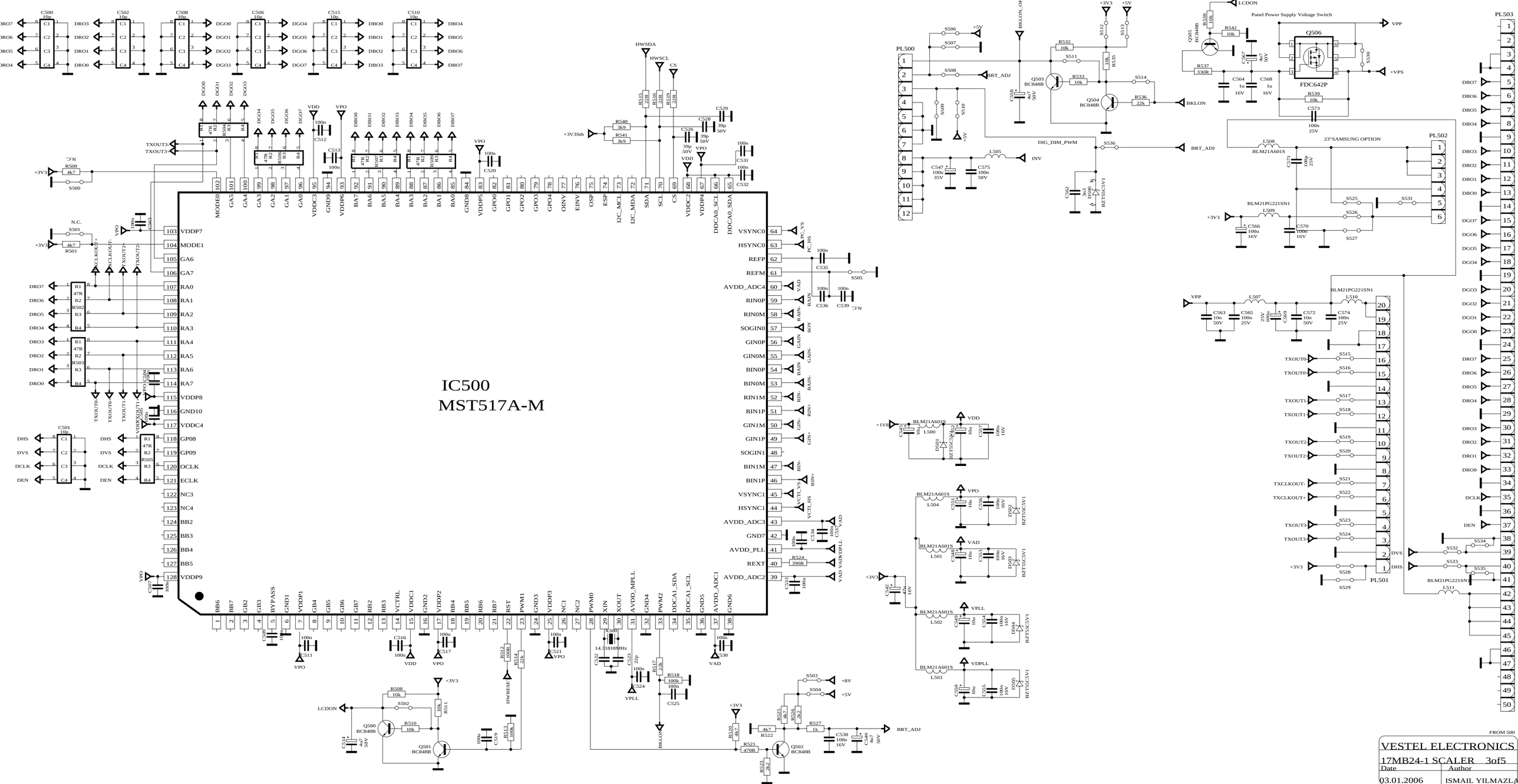
12.3.4. Video Processor Block Diagram

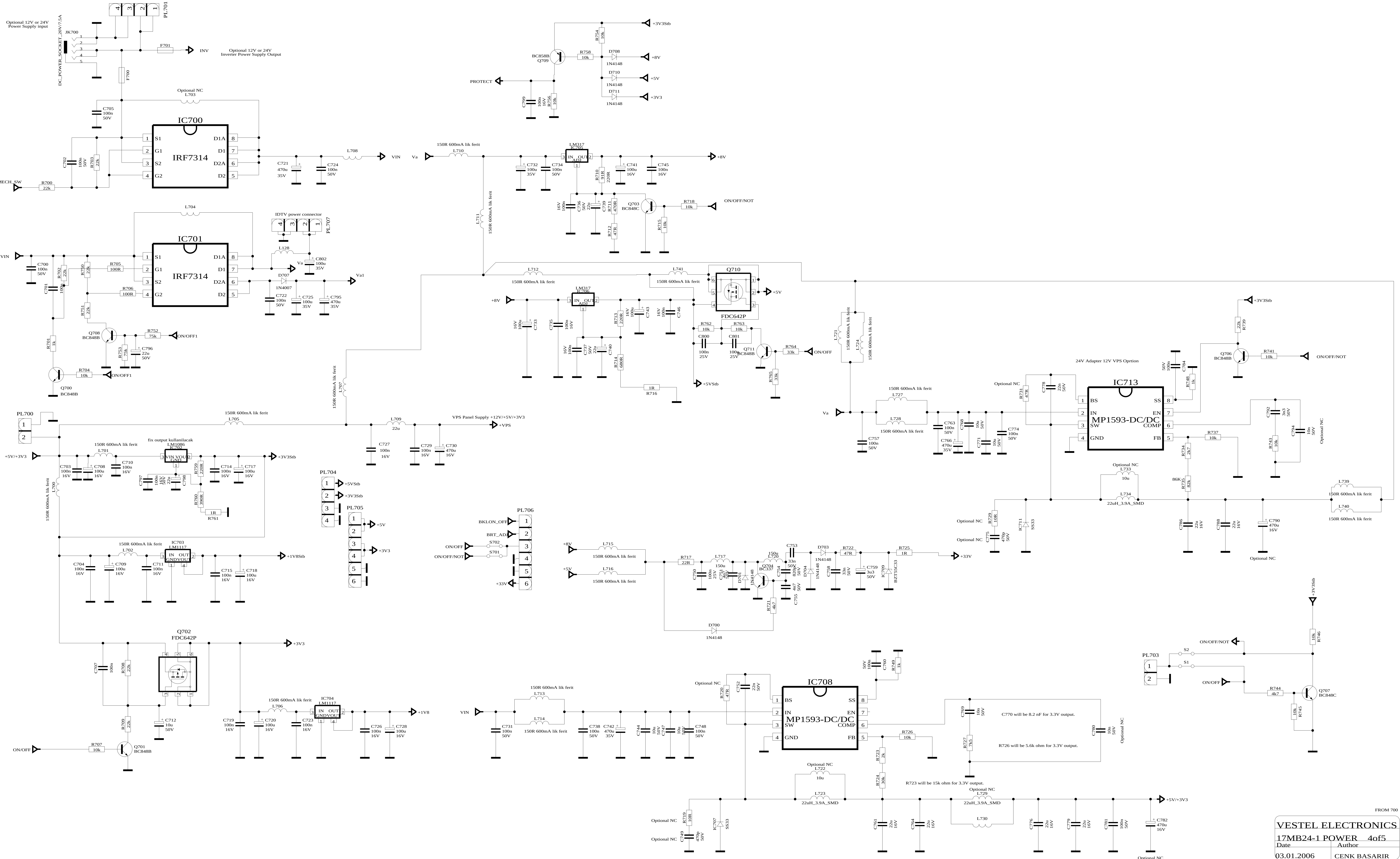




IC100
ST24LC21
NC1
NC2
NC3
VSS
VCC
VCLK
SCL
SDA
IC101
PI5V330_SOIC
PL101
PL102
PL103
PL104
PL105
PL107
PL108
PL100
SIDE A/V CONNECTOR
DVB CONNECTOR
RS-232 CONNECTOR
DVD/IDTV FIRMWARE UPGRADE
CVBS LINE INPUT
AUDIO LINE INPUT
PC Audio Line in Option
SVHS
JK105
OTIONAL YCbCr JACK INPUT
SW GROUND
SC1_R_IN
SC1_R_OUT
SC1_L_OUT
SC1_L_IN
SC1-B
AV1_STATUS
SC1-G
SC1-R
SC1-IN-FB
SC1_V_OUT
SC1_V_IN
Tx-Clock
Rx-Data
SC2_R_OUT
SC2_R_IN
SC2_L_OUT
SC2_L_IN
AV2_STATUS
SC2-C
SC2_V_OUT
SC2_V_IN
PC_VS
PC_HS
VGA_YPbPR_Sw
PR
PB
Y
SOY
GAIN1
PB1
BAIN1
RAIN1
LINE_OUT_L
LINE_OUT_R
FAVINL
FAVINR
PCIR
PCIL
YELLOW_FAV
CVBS_IN
SVHS_Y
SVHS_C
TV_LINK
dvbprog.
vctiprog.
HWSDA
HWSCL
IF_CVBS_OUT
SC2_OUT
FROM 100
VESTEL ELECTRONICS
17MB24-1 PERIP. 1of5
Date
Author
03.01.2006
ISMAIL YILMAZLA

IC300
TEA6420
GND
CAPACITANCE
VS
L1
L2
L3
NC1
NC2
L4
L5
L0UT1
ROUT1
LOUT2
ROUT2
SDA
SCL
ADDR
R1
R2
R3
NC4
NC3
R4
R5
ROUT4
LOUT4
ROUT3
LOUT3
SC2_L_IN
DVBR
FAVINL
SWAUD_OUT_L
SC1_L_IN
SWITCH_SOUND_L
SWAUD_OUT_L
SWAUD_OUT_R
SDA
SCL
SC2_R_IN
DVBL
FAVINR
SWAUD_OUT_R
SC1_R_IN
SWITCH_SOUND_R
OUT1
OUT2
OUT3
OUT4
+3V3
+8V
I2C CONTROL FOR MSTAR AND PERIPHERALS
HWSDA
HWSCL
SDANVM
SCLNVM
SDA
SCL
CS
TU300
TECH2949PG40B
AGC
TU
AS
SCL
SDA
NC
VS
VST
IF2
IF1
NC/ADC
TV/DVB_SWITCH
GND_TUNER
AGC_SW
+5V
+33V
SCL_SW
SDA_SW
LINE_OUT_L
LINE_OUT_R
SC1_L_OUT
SC1_R_OUT
SVHS_C
SVHS_Y
IC301
74HCT4053
SCL_DVB
SCL
AGC_DVB
AGC_SW
AGC_TV
SDA_DVB
SDA
TV/DVB_SWITCH
IC302
VCT4932
GND1
VSUP8.0AU
VREFAU
SPEAKERL
SPEAKERR
AOUT1L
AOUT1R
AIN3L/AOUT2L
AIN3R/AOUT2R
AIN2L
AIN2R
AIN1L
SIF/AIN1R
TAGC
VREFIF
IFIN-
IFIN+
RESETQ
GNDIF
VSUP5.0IF
VSUP3.3DIG
GND2
GND3
VSUP1.8DIG
XTAL1
XTAL2
P22
P23
VIN11
VIN10
VIN9
VIN8
VIN7
VIN6
VIN5
VIN4
VIN3
VIN2
VIN1
VOUT1
VOUT2
VOUT3
VSUP1.8FE
GND4
GND8
VSUP5.0BE
TEST
VERT+
VERT-
EW
RSW2
RSW1
SENSE
GNDM
FBIN
RIN
GIN
BIN
SVMOUT
ROUT
GOUT
BOUT
VRD
XREF
VSUP3.3BE
GND7
GND6
VSUP3.3IO
VSUP3.3DAC
GNDDAC
SAFETY
HFLB
HOUT
VPROT
SDA
SCL
P21/PWMV
P20/DFVBL
P17
P16
P15
P14
P13
P12
P11
P10
VSUP3.3FE
GND5
IRQ
TIMER
REDO
GREENO
BLUEO
HWSDA
HWSCL
CS
POWCON.
AV2_STATUS
AV1_STATUS
MUTEPORT
TXD
RXD
VCTI_VS
VCTI_HS
PROTECT
HWRESET
OSGA_YPbPr_Sw
DVB_IN_R
DVB_IN_G_Y
DVB_IN_B_C
L303
L304
L306
L307
L308
L305
L310
L311
L312
L313
L314
L315
L316
L318
L319
L309
KEYPAD
PL303
PL300
PL301
PL302
PL304
PL305
FOR MSTAR DEBUG
FOR FLASH PROG.AND VCTI DEBUG
IC303
24LC32A
ID-TV UYGULAMASINDA 2K LIK EEPROM TAKILACAK 3001617
FROM 300
ON/OFF
ON/OFF1
SLINCE
IR
MECH_SW
TV/DVB_SWITCH
VIN
SC1-IN-FB
SC1-B
SC1-G
SC1-R
SC2_V_IN
SC2-C
DVB_IN_B_C
DVB_IN_G_Y
CVBS_IN
SC1_V_IN
DVB_IN_CVBS
IF_CVBS_OUT
SC2_OUT
MAIN_L
MAIN_R
SWITCH_SOUND_L
SWITCH_SOUND_R
HP_L
HP_R
SWAUD_OUT_L
SWAUD_OUT_R
PCIL
PCIR
AGC_TV
KEY
IF1
IF2
VESTEL ELECTRONICS
17MB24-1 VCTI 2of5
Date
03.01.2006
Author
ISMAIL YILMAZLA

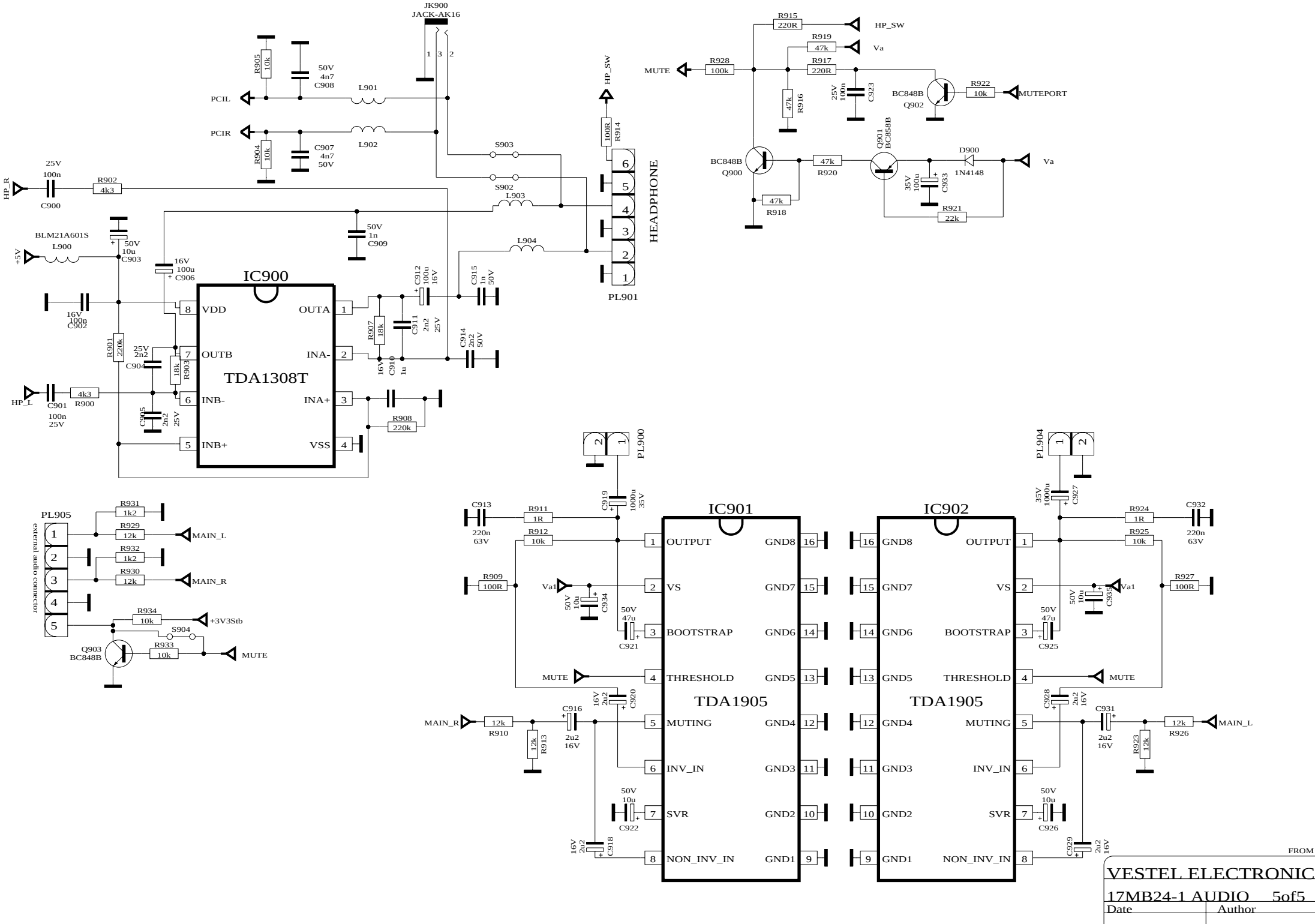

IC500
MST517A-M
VESTEL ELECTRONICS
17MB24-1 SCALER 3of5
Date
03.01.2006
Author
ISMAIL YILMAZLI
FROM 500
PL500
PL501
PL502
Panel Power Supply Voltage Switch
23"SAMSUNG OPTION
FDC642P
Q506
LCDON
BRT_ADJ
BKLON
DIG_DIM_PWM
INV
+VPS
VPP
HWSDA
HWSCL
CS



VESTEL ELECTRONICS

17MB24-1 POWER 4of5

Date	Author
03.01.2006	CENK BASARIR



VESTEL ELECTRONICS

17MB24-1 AUDIO 5of5

Date	Author
03.01.2006	ISMAIL YILMAZLA

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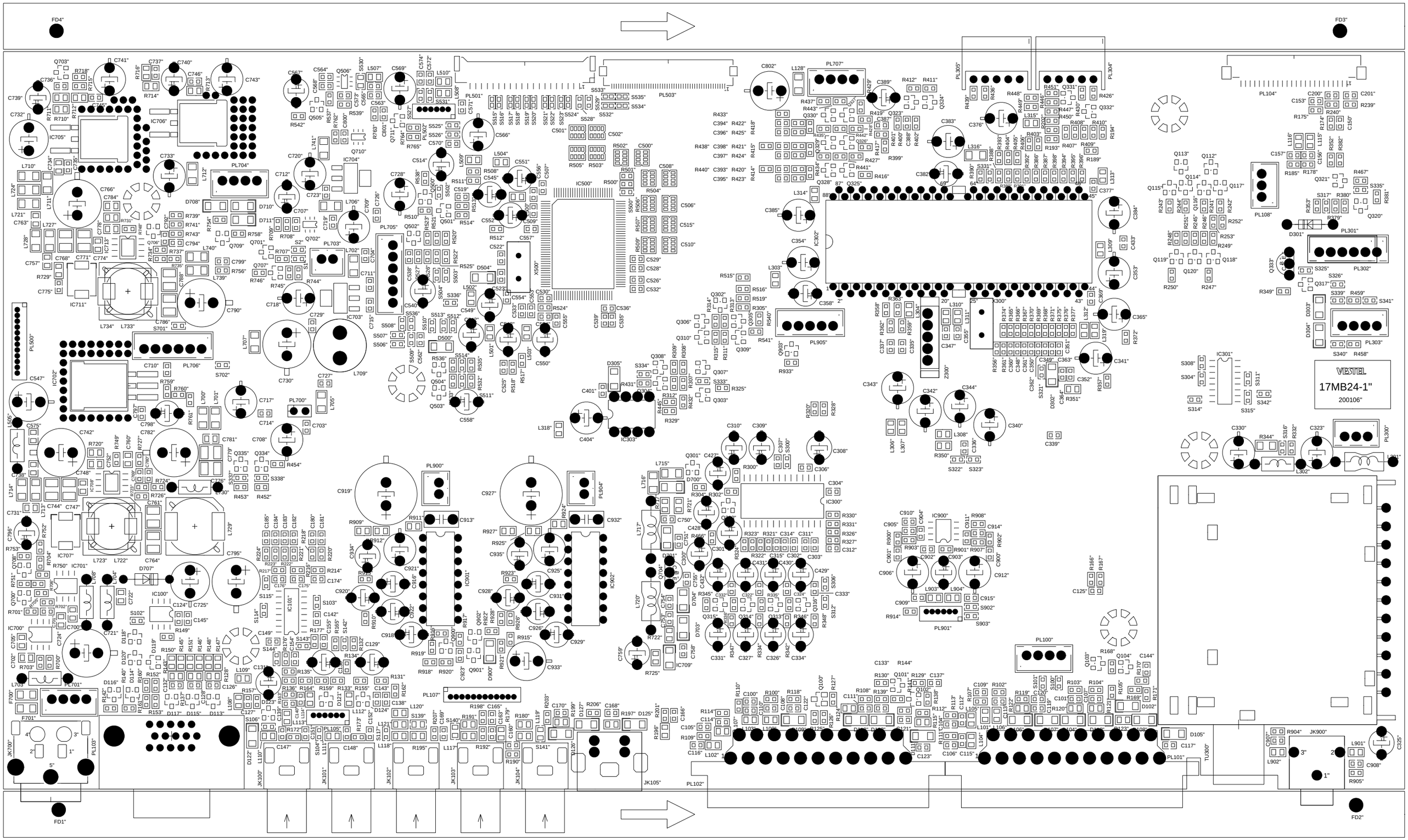

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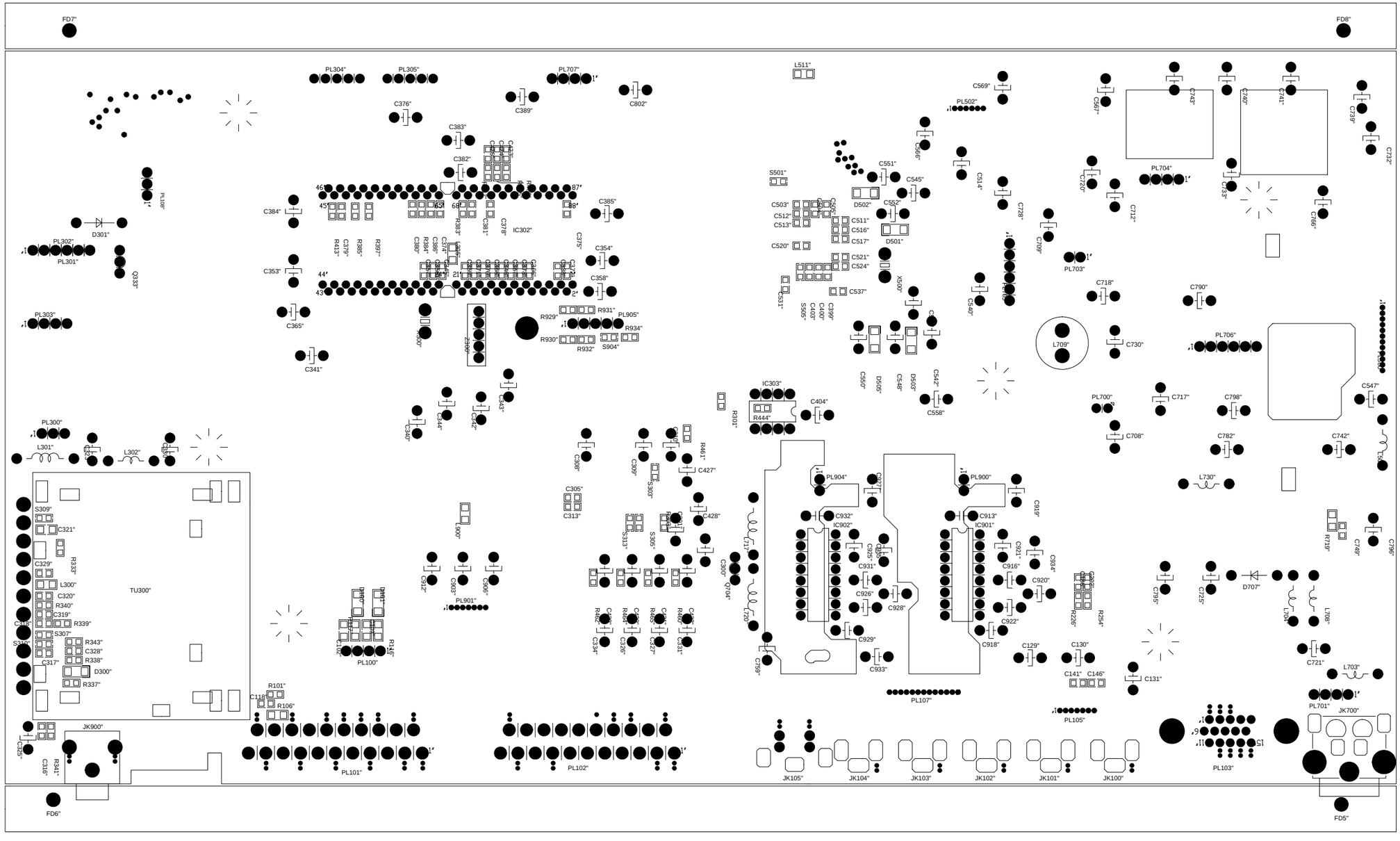
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