

A close-up photograph of a television's internal circuit board. The board is green with various electronic components, including capacitors labeled C108, C107, C113, C112, and C111. A large, multi-pin connector is visible, with a label U3 nearby. The background is blurred, showing other parts of the television's internal structure.

**15 INCH
17MB20
TFT TV
SERVICE MANUAL**

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1. INTRODUCTION

17MB20 Main Board consists of two major blocks. The first block is analog front-end and this block is handled by highly multifunctional VCTI49XY chip. This IC performs demodulation of Video & Audio from Tuner IF, and 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 audio outputs for audio amplifier, scart and line out. It handles video processing such as colour standard detection and demodulation, picture alignment (brightness, contrast, colour etc.). The IC also performs teletext decoding with fastext memory. The processed video is sent to TSU36AWL-M(-1) chip in RGB format and to the scart video output in CVBS format.

The TV Tuner is a PLL controlled asymmetrical or a symmetrical IF output type. The IF signal is applied to a single saw filter. After the SAW filter block, VSB modulated sound and picture signals are digitally filtered and demodulated by VCTI.

Since VCTI handles all audio processing issues, there is no need for additional audio processor solution on the board. VCTI supports three Audio outputs. These outputs are assigned to audio amplifier, scart audio out and line out. The board employs TDA2822M Class AB Audio Amplifier to drive both the speaker and headphone outputs.

The Back End section is handled by TSU36AWL-M(-1) chip. TSU has two ADC inputs. The ADC inputs can handle standard interlaced RGB output from VCTI, PC RGB graphics input and YPbPr input via VGA Connector. ADC0 is assigned to YPbPr input or RGB input via VGA connector and ADC1 is assigned to VCTI RGB output. Scaling and deinterlacing is performed in Back End.

TSU chip has an integrated LVDS transmitter which provides double LVDS output support.

Backlight brightness level adjustment and backlight on/off control for the inverter, and Panel Logic Circuitry Power on/off control is performed by TSU chip.

OSD is displayed by the OSD generator embedded in TSU chip.

2. AUDIO AMPLIFIER STAGE WITH TDA2822M

The system is designed with 2XTDA2822M audio amplifiers for main speaker and headphone L/R outputs. There is no any other dedicated audio amplifier for the headphone audio output. In order to switch the audio amplifier output to the speakers or headphone, the headphone output jack is detached for all TV sets with headphone output option.

The TDA2822M is a monolithic integrated circuit in 8 lead minidip package, intended for use as low frequency Class AB power amplifier in a wide range of applications in radio and TV sets. For left and right channels two TDA2822M audio amplifiers are used in bridge mode operation to provide 2x2W audio output power with 16 Ohm Speakers at %10 THD.

The DC voltages required at various parts of the chassis and inverter are provided by an external power supply unit and power interface board. The external power supply unit is designed to provide +12Vdc supply. Various voltages required for the chassis operation is obtained by a power interface board (17PWI20) which is mounted on the chassis. The power interface board consists of a step down converter, Linear and LDO voltage regulators, and power mosfets.

The output voltage of the step down converter(IC102) is determined with respect to the panel logic boards power supply voltage. For the +3.3V panel logic board power supply voltage option, IC105(LM1086 linear regulator) is bypassed with a jumper option.

+12V external power supply input is switched by IRF 7314 power mosfet(IC100) in TV sets with mechanical switch option to go into standby mode. For the TV sets without power off mode (i.e. the TV sets that go directly into standby mode when the external power supply input is connected) this power mosfet is bypassed by a jumper option.

Second IRF7314 power mosfet(IC101) provides switching control for the +12V and Audio Amplifier power supply voltage. +1.8V and +3.3V

Switching control for +1.8V and +3.3V voltages are achieved by NTGS3446 power mosfets (IC103 and IC104 respectively)

Switching control for the panel logic circuit power supply voltage is achieved by FDC642 power mosfet (Q101)

Maximum voltage and current requirements for the system are given in the below table.

Main Board Requirements

<u>Voltage</u>	<u>Max Current</u>
+33V	5mA
+12V	Audio
+8V	12mA
+5V	160mA
+3.3V	370mA
+1.8V	220mA
+12VStby	30mA
+ 5VStby	30mA
+3.3Vstby	205mA
+1.8Vstby	400mA

Panel Logic Cct Requirments

<u>Voltage</u>	<u>Max Current</u>
3.3V	1100mA
5V	1200mA
12V	N/A

4. TUNER

As the depth of the TV set has a mechanical 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).

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. I ² C-bus address select | : | Max: 5.5V |
| 4. I ² C-bus serial clock | : | Min:-0.3V, Max: 5.5V |
| 5. I ² C-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 | | |

5. MICROCONTROLLER (VCTI)

General Features

The VCT 49xyl, VCT 48xyl 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 49xyl, VCT 48xyl 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

PSSDIP88-1 PY	Pin No.		Pin Name	Type	Connection (If not used)	Short Description
	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

PSSDIP88-1 PY	Pin No.		Pin Name	Type	Connection (If not used)	Short Description
	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 ² C Bus Data Input/Output
32	57	40	SCL	IN/OUT	OBL	I ² C 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

PSSDIP88-1 PY	Pin No.		Pin Name	Type	Connection (If not used)	Short Description
	PSSDIP88-1 PZ	PMQFP144-2 XM				
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	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

PSSDIP88-1 PY	Pin No.		Pin Name	Type	Connection (If not used)	Short Description
	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 (TSU)

There are two pin compatible IC versions. TSU36AWL-M is a total solution graphics processing IC for LCD displays with panel resolutions up to SXGA(1280X1024), and TSU36AWL-M-1 provides support for resolutions up to SXGA+(1400X1050). TSU36AWL-M(-1) 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 TSU36AWL-M(-1) 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. SAW FILTER

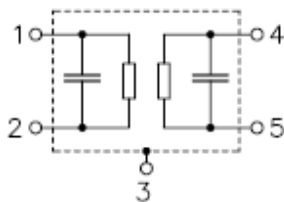
X6897D:

Standard:

- B/G
- D/K
- I
- L/L'

Features:

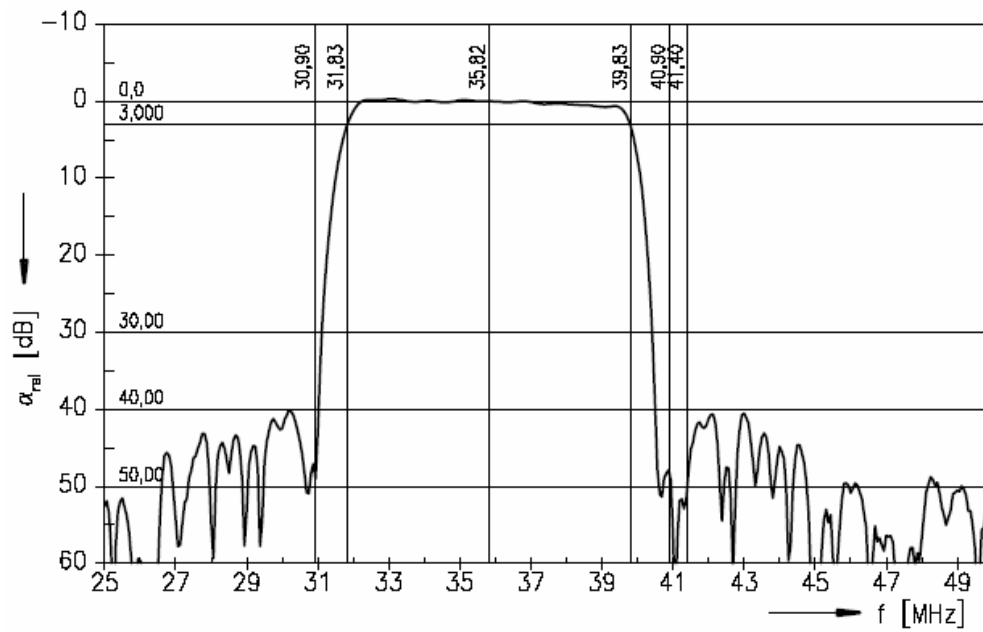
- IF filter for digital cable TV
- Standard IC package

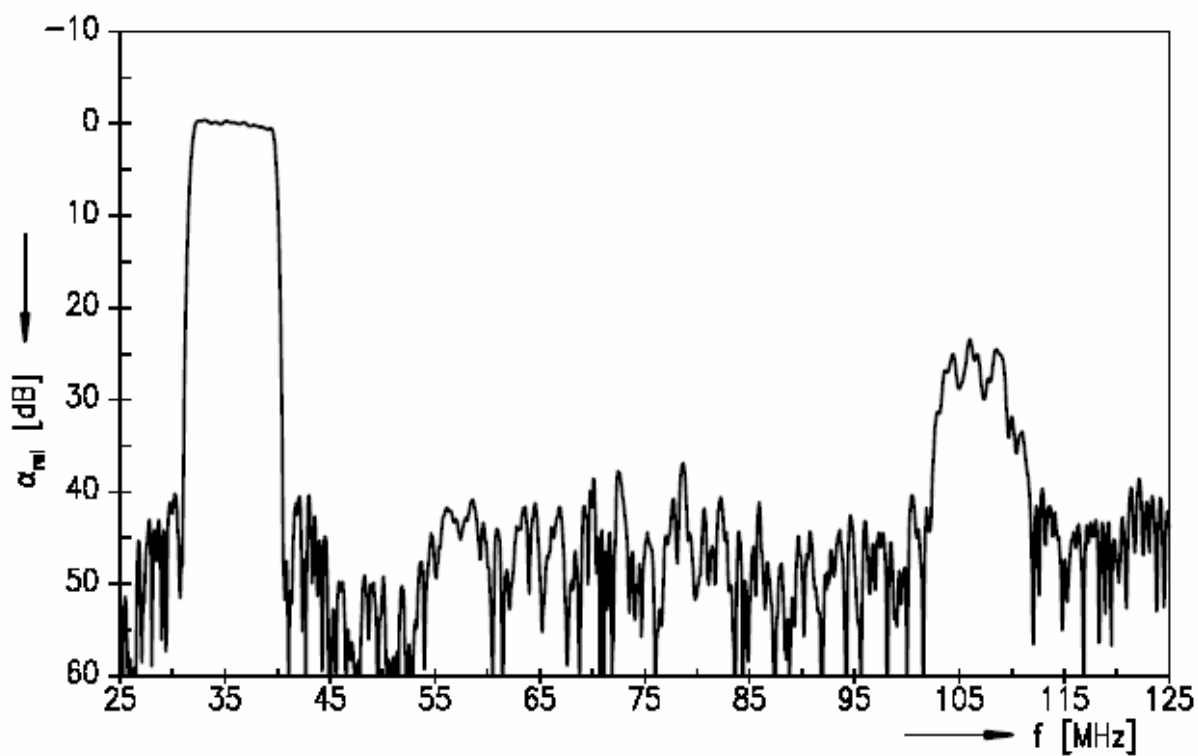
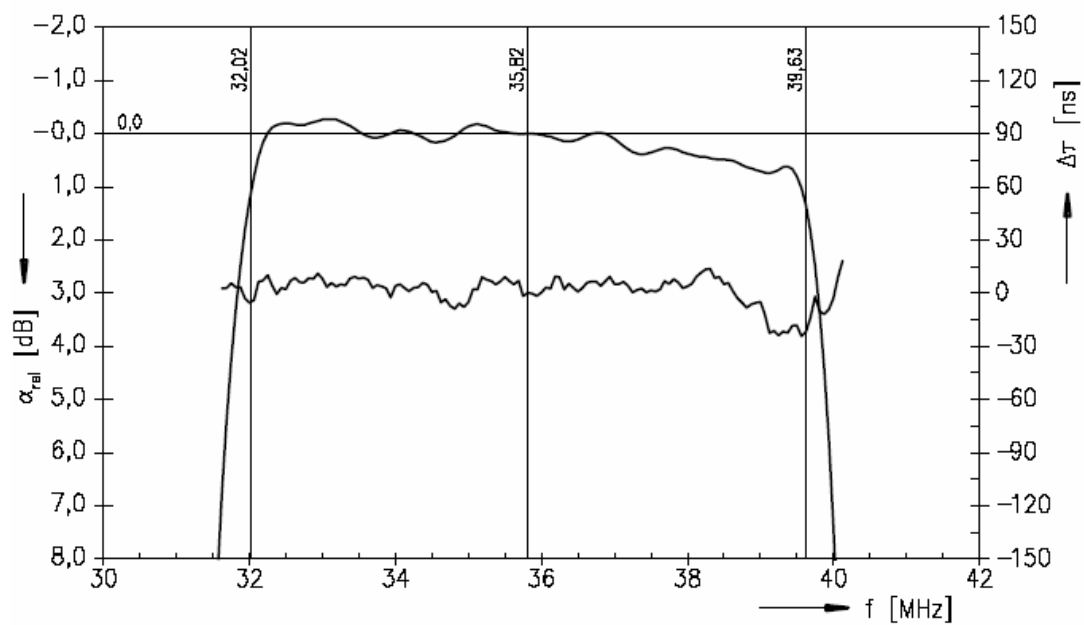


Pin configuration:

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

Frequency response:





8. IC SPECIFICATIONS

LM1117
LM1086
LM317
MP1593
IRF7314
FDC642P
NTGS3446
74HCT4053
74HC4052
24C64
24LC21
TDA2822M

8.1. LM1117

8.1.1. 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 assure output voltage accuracy to within $\pm 1\%$. The LM1117 series is available in SOT-223, TO-220, and TO-252 D-PAK packages. A minimum of 10 μ F tantalum capacitor is required at the output to improve the transient response and stability.

8.1.2. 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

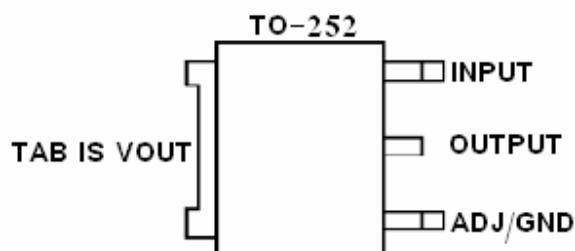
8.1.3. Applications

- 2.85V Model for SCSI-2 Active Termination
- Post Regulator for Switching DC/DC Converter
- High Efficiency Linear Regulators
- Battery Charger
- Battery Powered Instrumentation

8.1.4. Absolute Maximum Ratings

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

8.1.5. Connection Diagram



8.2. LM1086

8.2.1. 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. Its 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.

8.2.2. 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

8.2.3. Applications

- Battery Charger
- Adjustable Power Supplies

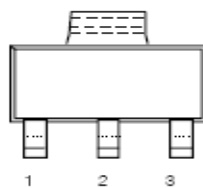
- Constant Current Regulators
- Portable Instrumentation
- High Efficiency Linear Power Supplies
- High Efficiency "Green" Computer Systems
- SMPS Post-Regulator
- Power PC Supplies
- Powering VGA & Sound Card

8.2.4. Absolute Maximum Ratings

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Supply Voltage	V _{in}	7	V
Operating Junction Temperature Range	T _{opr}	0–125	°C
Storage Temperature Range	T _{stg}	–65–150	°C
Thermal Resistance Junction to Case TO-263	T _{jc}	3	C/W
Thermal Resistance Junction to Ambient TO-263	T _{ja}	60	C/W
Lead Temperature (Soldering) 10 sec.	T _{sol}	300	°C
Maximum Output Current	I _{max}	1.5	A

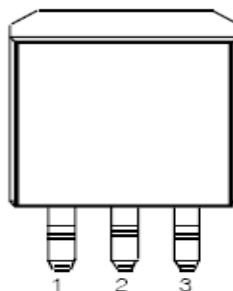
8.2.5. Connection Diagrams

SOT-223 PKG (FRONT VIEW)



PIN FUNCTION
 1. Adj/Gnd
 2. Vout
 3. Vin

TO-263 (D2 PKG, FRONT VIEW)



PIN FUNCTION
 1. Adj/Gnd
 2. Vout
 3. Vin

8.3. LM317

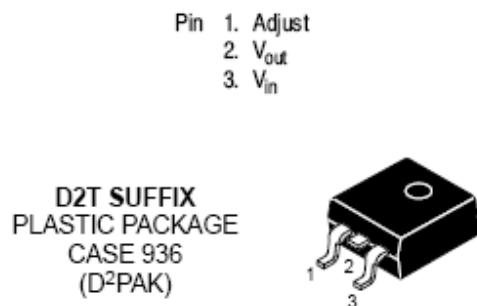
8.3.1. General Description

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.

8.3.2. 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

8.3.3. Connection Diagram



8.4. MP1593

8.4.1. General Description

The MP1593 is a step-down converter 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 20 μ A 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.

8.4.2. 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

8.4.3. Applications

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

8.4.4. 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

8.4.5. 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}	$4.75V \leq V_{IN} \leq 28V$; $V_{COMP} < 2V$	1.194	1.222	1.250	V
Error Amplifier Voltage Gain	A_{EA}			400		V/V
Error Amplifier Transconductance	G_{EA}	$\Delta I_{COMP} = \pm 10 \mu A$	500	800	1120	$\mu A/V$
High Side Switch On Resistance	$R_{DS(ON)1}$			100	140	m Ω
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

8.4.6. 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

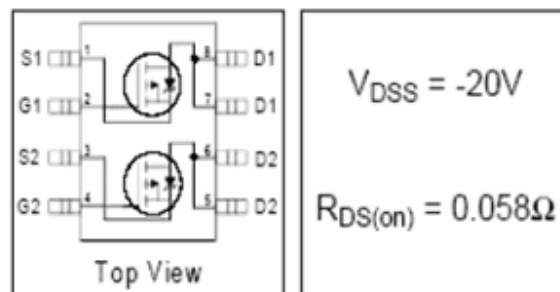
Soft-Start Control Input. SS controls the soft-start period. Connect a capacitor from SS to GND to set the soft-start period. A 0.1 μ F capacitor sets the soft-start period to 10ms. To disable the soft-start feature, leave SS unconnected.

8.5. IRF7314

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



8.5.1. 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 Current ^③	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 ^③	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/dt ^③		dv/dt	-5.0	V/ ns
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to + 150	°C

8.6. FDC642P

8.6.1. 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.

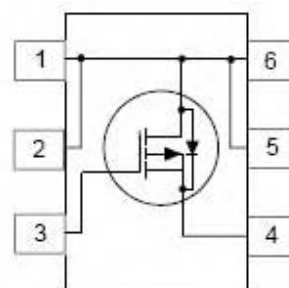
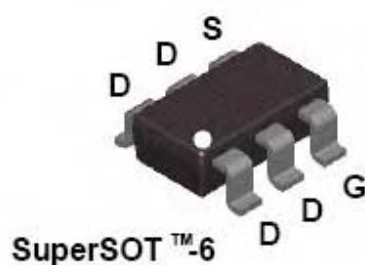
8.6.2 . Features

- -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).

8.6.3. Absolute Maximum Ratings

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	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) (Note 1b)	1.6	W
		0.8	
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$

8.6.4. Connection Diagram



8.7. NTGS3446

8.7.1. General Description

NTGS3446 is an N-channel power mosfet with 5A continuous drain current and low $R_{DS(on)}$ voltage.

8.7.2 . Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive
- Diode Exhibits High Speed, Soft Recovery
- Avalanche Energy Specified
- I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature

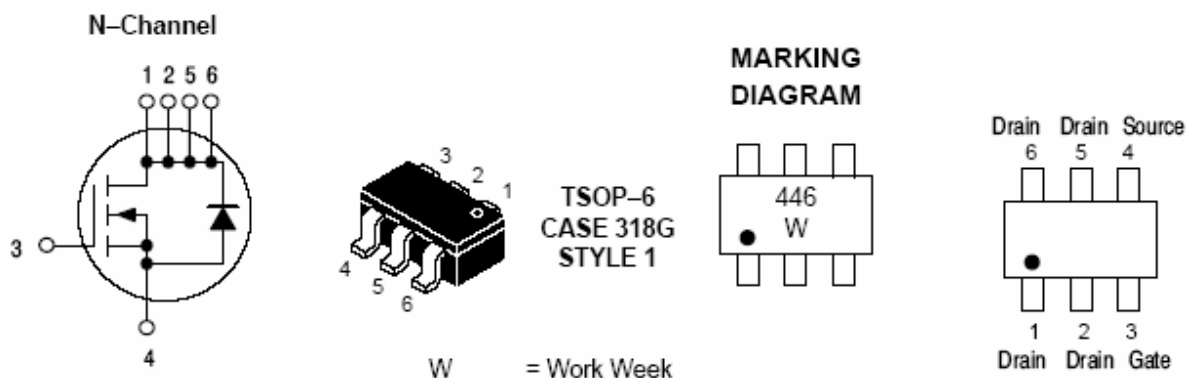
8.7.3. Absolute Maximum Ratings

$T_c=25^{\circ}\text{C}$ unless otherwise noted

Rating	Symbol	Value	Unit
Drain–Source Voltage	V_{DSS}	20	Vdc
Gate–Source Voltage – Continuous	V_{GS}	± 20	Vdc
Drain – Continuous – Continuous @ 70°C – Single Pulse ($t_p \leq 10 \mu s$)	I_D I_D I_{DM}	5.8 TBD 20	Adc
Total Power Dissipation	P_D	1.6	Watts
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to 150	°C
Single Drain–to–Source Avalanche Energy – Starting $T_J = 25^\circ C$ ($V_{DD} = 20 \text{ Vdc}$, $V_{GS} = 4.5 \text{ Vdc}$, $I_L = 5.8 \text{ A}$, $L = \text{TBD mH}$, $R_G = 25 \Omega$)	E_{AS}	TBD	mJ
Thermal Resistance Junction–to–Ambient (Note 1.) Steady State Junction–to–Ambient (Note 2.) Junction–to–Lead Steady State	$R_{\theta JA}$ $R_{\theta JA}$ $R_{\theta JL}$	TBD TBD TBD	°C/W

1. When surface mounted to Min Pad.
2. When surface mounted to 1" x 1" FR4 Board.

8.7.4. Connection Diagram



8.8. 74HCT4053

8.8.1. 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).

8.8.2. 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

8.8.3. Applications

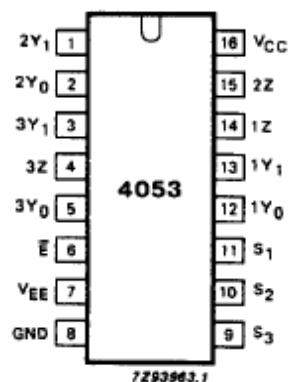
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

8.8.4. 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	

8.8.5. Pin Description

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



8.8.6. Function Table

INPUTS		CHANNEL ON
$\overline{E}$	S_n	
L	L	$nY_0 - nZ$
L	H	$nY_1 - nZ$
H	X	none

8.9. 74HC4052

8.9.1. General Description

The 74HC/HCT4052 are high-speed Si-gate CMOS devices and are pin compatible with the “4052” of the “4000B” series. They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT4052 are dual 4-channel analog multiplexers/demultiplexers with common select logic. Each multiplexer/demultiplexer has four independent inputs/outputs (nY0 and nY3) and a common input/output (nZ). The common channel select logics include two digital select inputs (S0 and S1) and an active low enable input. (E'). With E' LOW, one of the two switches is selected (low impedance ON-state) by S0 and S1. With E' HIGH, all switches are in the high impedance OFF-state, independent of S0 and S1.

VCC and GND are the supply voltage pins for the digital control inputs (S1, S1, 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 nY3, 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).

8.9.2. Features

- Low "ON" resistance:
 - 80 Ω (typ.) at VCC - VEE = 4.5 V
 - 70 Ω (typ.) at VCC - VEE = 6.0 V
 - 60 Ω (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

8.9.3. Applications

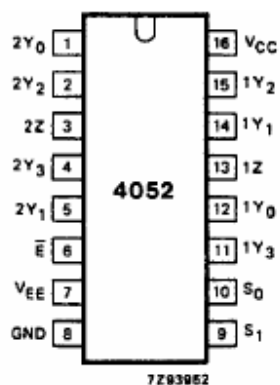
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

8.9.4. 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	

8.9.5. Pin Description

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 5, 2, 4	$2Y_0$ to $2Y_3$	independent inputs/outputs
6	$\bar{E}$	enable input (active LOW)
7	V_{EE}	negative supply voltage
8	GND	ground (0 V)
10, 9	S_0, S_1	select inputs
12, 14, 15, 11	$1Y_0$ to $1Y_3$	independent inputs/outputs
13, 3	$1Z, 2Z$	common inputs/outputs
16	V_{CC}	positive supply voltage



8.9.6. Function Table

INPUTS			CHANNEL ON
$\bar{E}$	S_1	S_0	
L	L	L	$nY_0 - nZ$
L	L	H	$nY_1 - nZ$
L	H	L	$nY_2 - nZ$
L	H	H	$nY_3 - nZ$
H	X	X	none

8.10. TDA2822M

9.10.1. General Description

The TDA2822M is a monolithic integrated circuit in 8 lead minidip package, intended for use as dual audio power amplifier in a wide range of applications in radios, portable cassette players and TV sets.

8.10.2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_s	Supply Voltage	15	V
I_o	Peak Output Current	1	A
P_{tot}	Total Power Dissipation at $T_{amb} = 50^\circ\text{C}$ at $T_{case} = 50^\circ\text{C}$	1 1.4	W W
T_{stg}, T_j	Storage and Junction Temperature	- 40, + 150	$^\circ\text{C}$

8.10.3. Thermal Data

Symbol	Parameter	Value	Unit
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient Max.	100	$^\circ\text{C/W}$
$R_{th\ j-case}$	Thermal Resistance Junction-pin (4) Max.	70	$^\circ\text{C/W}$

8.10.3. Electrical Characteristics (Bridge Mode)

V_s=6V, T_{amb}=25°C Unless otherwise specified

V _s	Supply Voltage		1.8		15	V
I _d	Quiescent Drain Current	R _L = ∞		6	9	mA
V _{os}	Output Offset Voltage (between the outputs)	R _L = 8Ω			± 50	mV
I _b	Input Bias Current			100		nA
P _o	Output Power (f = 1kHz, d = 10%)	R _L = 32Ω V _s = 9V V _s = 6V V _s = 4.5V V _s = 3V V _s = 2V R _L = 16Ω V _s = 9V V _s = 6V V _s = 3V R _L = 8Ω V _s = 6V V _s = 4.5V V _s = 3V V _s = 4.5V R _L = 4Ω V _s = 3V V _s = 2V	320 50 900 200	1000 400 200 65 8 2000 800 120 1350 700 220 1000 350 80		mW
d	Distortion	P _o = 0.5W, R _L = 8Ω, f = 1kHz		0.2		%
G _v	Closed Loop Voltage Gain	f = 1kHz		39		dB
R _i	Input Resistance	f = 1kHz	100			kΩ
e _N	Total Input Noise	R _s = 10kΩ B = Curve A B = 22Hz to 22kHz		2.5 3		μV μV
SVR	Supply Voltage Rejection	f = 100Hz		40		dB
B	Power Bandwidth (-3dB)	R _L = 8Ω, P _o = 1W		120		kHz

8.11. 24C64

8.11.1. General Description

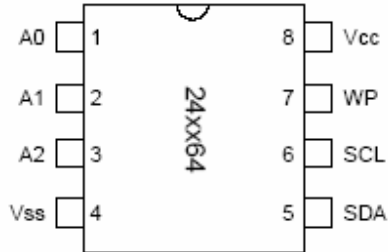
24C64 is a 64Kbit E2PROM. The device is organized as four blocks of 8K x 8K-bit memory with a 2-wire serial interface. Low-voltage design permits operation down to 1.8V, with standby and active currents of only 1 μA and 1 mA, respectively. It has been developed for advanced, lowpower applications such as personal communications or data acquisition. The 24XX64 also has a page write capability for up to 32 bytes of data and a random or sequential page read capability up to the 64K boundary. Functional address lines allow up to eight devices on the same bus, for up to 512 Kbits address space.

8.11.2. Absolute Maximum Ratings

V_{cc} 7.0V
 All inputs and outputs w.r.t. V_{ss} -0.6V to V_{cc} +1.0V
 Storage temperature -65°C to +150°C
 Ambient temp. with power applied -65°C to +125°C
 Soldering temperature of leads (10 seconds) +300°C
 ESD protection on all pins ≥ 4 kV

8.11.3. Pin Connections

8L PDIP/SOIC



Name	Function
A0,A1,A2	User Configurable Chip Selects
Vss	Ground
SDA	Serial Data
SCL	Serial Clock
WP	Write Protect Input
Vcc	+1.8 to 5.5V (24AA64) +2.5 to 5.5V (24LC64) +4.5 to 5.5V (24C64)

8.12. 24LC21

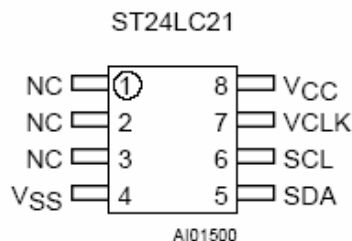
8.12.1. General Description

24LC21 is a 1Kbit E2PROM, organized by 8 bits. This device operates in two modes: Transmit Only mode and I2C bidirectional mode. When powered the device is initially in transmit only mode with E2PROM data clocked out during the rising edge of the signal applied on VCLK. The device switches to the I2C bidirectional mode upon the falling edge of the signal applied on SCL pin. The device can not switch from the I2C bidirectional mode to the Transmit only mode(except power off-on). The device can operate with a power supply value as low as +2.5V

8.12.2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
T _A	Ambient Operating Temperature grade 1	0 to 70	°C
T _{STG}	Storage Temperature	-65 to 150	°C
T _{LEAD}	Lead Temperature, Soldering (SO8 package) 40 sec (PSDIP8 package) 10 sec	215 260	°C
V _{IO}	Input or Output Voltages	-0.3 to 6.5	V
V _{CC}	Supply Voltage	-0.3 to 6.5	V
V _{ESD}	Electrostatic Discharge Voltage (Human Body model) ⁽²⁾	4000	V
	Electrostatic Discharge Voltage (Machine model) ⁽³⁾	500	V

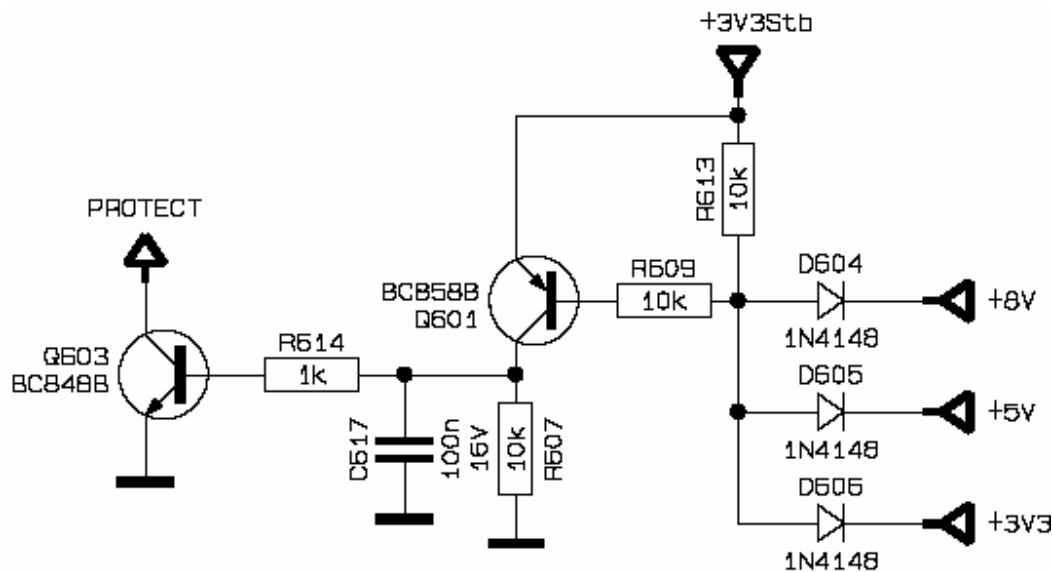
8.12.3. Pin Connections



SDA	Serial Data Address Input/Output
SCL	Serial Clock (I ² C mode)
Vcc	Supply Voltage
Vss	Ground
VCLK	Clock Transmit only mode

9.OPEN-SHORT CIRCUIT PROTECTION

In case of a component fault(open or short) there is a risk of exceeding the maksimum current rating for each of the power supply voltages. So a protection application is implemented in 17MB20. When the TV is ON if one of the ON Mode voltages (+8V, +5V, +3.3V and +12V) goes below the +2V threshold level the protection circuit pulls the PROTECT signal to low and the controller takes the chassy into Standby Mode. Since these voltages are only present in ON Mode, they are all switched off in the Standby Mode. Hence the risk of fire or component damage is prevented.

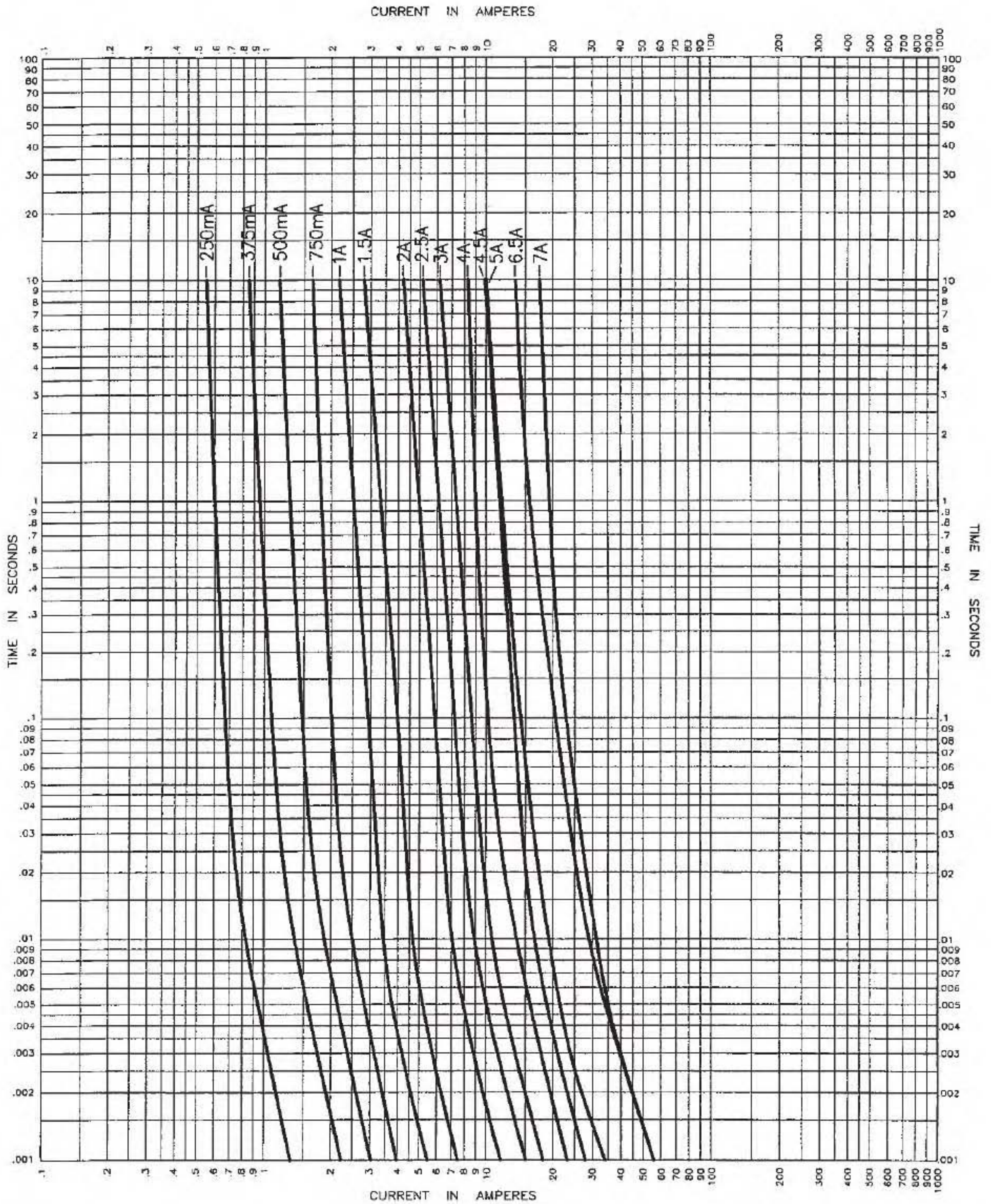


For the other voltages the above application cannot be implemented. So fuses are inserted serially in the required power supply lines in order to avoid component damage in case of a component failure. The fuse positions and ratings are given in the below table:

Fuse Position	Voltage Label	Current Rating	Voltage Rating	
			AC	DC
F600	+12V_INV	7A	32V	32V
F601	+12V_PSU	5A	32V	32V
F603	+3V3Stb	500mA	32V	63V
F100	+12VStb	5A	32V	32V
F102	+12V_AUD	1A	32V	63V

In a possible case of fuse replacement, the inserted fuse must satisfy the above specifications. The fuses are subjected to inrush current for some time time interval, which may cause fuse interruption after service replacement. So, it is recommended to replace the fuses with the original part numbers. The current vs. time graph is given below.

TIME CURRENT CURVE



10.SERVICE MENU SETTINGS

Remote control code for opening 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, UK, Greece, Hungary, Italy, Norway, Netherlands, Portugal, Poland, Swenden, Slovenia, Slovakia,Turkey, S.Afrika, Others, Japan, Korea, America, Austria, Belgium, Switzerland, Czech Rep.>
 - 3.1.3. Volume <0..63>
 - 3.1.4. Teletext Region
< East Europe, West Europe, Cyrillic, Turkish/Greek, Arabic/Hebrew >
 - 3.1.5. Menu Colour <Gray, Transparent>
 - 3.1.6. PC Sharpness <0..31>
 - 3.1.7. PC Colour <0..63>
 - 3.1.8. Picture Mode
 - 3.1.8.1.1.1. Brightness (Bright) <0..63>
 - 3.1.8.1.1.2. Contrast (Bright) <0..63>
 - 3.1.8.1.1.3. Colour (Bright) <0..63>
 - 3.1.8.1.1.4. Sharpness (Bright) <0..31>
 - 3.1.8.1.1.5. Brightness (Standard) <0..63>
 - 3.1.8.1.1.6. Contrast (Standard) <0..63>
 - 3.1.8.1.1.7. Colour (Standard) <0..63>
 - 3.1.8.1.1.8. Sharpness (Standard) <0..31>
 - 3.1.8.1.1.9. Brightness (Soft) <0..63>
 - 3.1.8.1.1.10. Contrast (Soft) <0..63>
 - 3.1.8.1.1.11. Colour (Soft) <0..63>
 - 3.1.8.1.1.12. Sharpness (Soft) <0..31>
4. VCTI DAC Adjust.
 - 4.1.1. Cutoff Red <0..511>
 - 4.1.2. Cutoff Green <0..511>
 - 4.1.3. Cutoff Blue <0..511>
 - 4.1.4. Whitedrv. Red <0..511>
 - 4.1.5. Whitedrv. Green <0..511>
 - 4.1.6. Whitedrv. Blue <0..511>
 - 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..255>
- 5.1.2. Txt&FE OSD V-Shift <0..255>
- 5.1.3. Txt H-Shift Split Screen <0..255>
- 5.1.4. Txt&FE OSD Pixel Clock <0..255>
- 5.1.5. YDELAY PAL <0..3>
- 5.1.6. YDELAY NTSC <0..3>
- 5.1.7. PKCOR (RF) <0..31>

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. BLUE SCREEN <Yes, No>
- 6.1.8. SEARCH FOR BG, DK, I <Yes, No>
- 6.1.9. SERAC FOR L/L' <Yes, No>
- 6.1.10. Pref. Search Standard <BG-DK-I, L-L', M>
- 6.1.11. Station Ident <Yes, No>
- 6.1.12. 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..15>
 - 7.1.1.1.10. Top Setting-SECAM <0..15>
- 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..250>
- 7.1.6. Video Peaking <-8..15>
- 7.1.7. Comb Filter/CTI/LTI <Yes, No>
- 7.1.8. APS Test Mode <Yes, No>

8. Audio Options

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

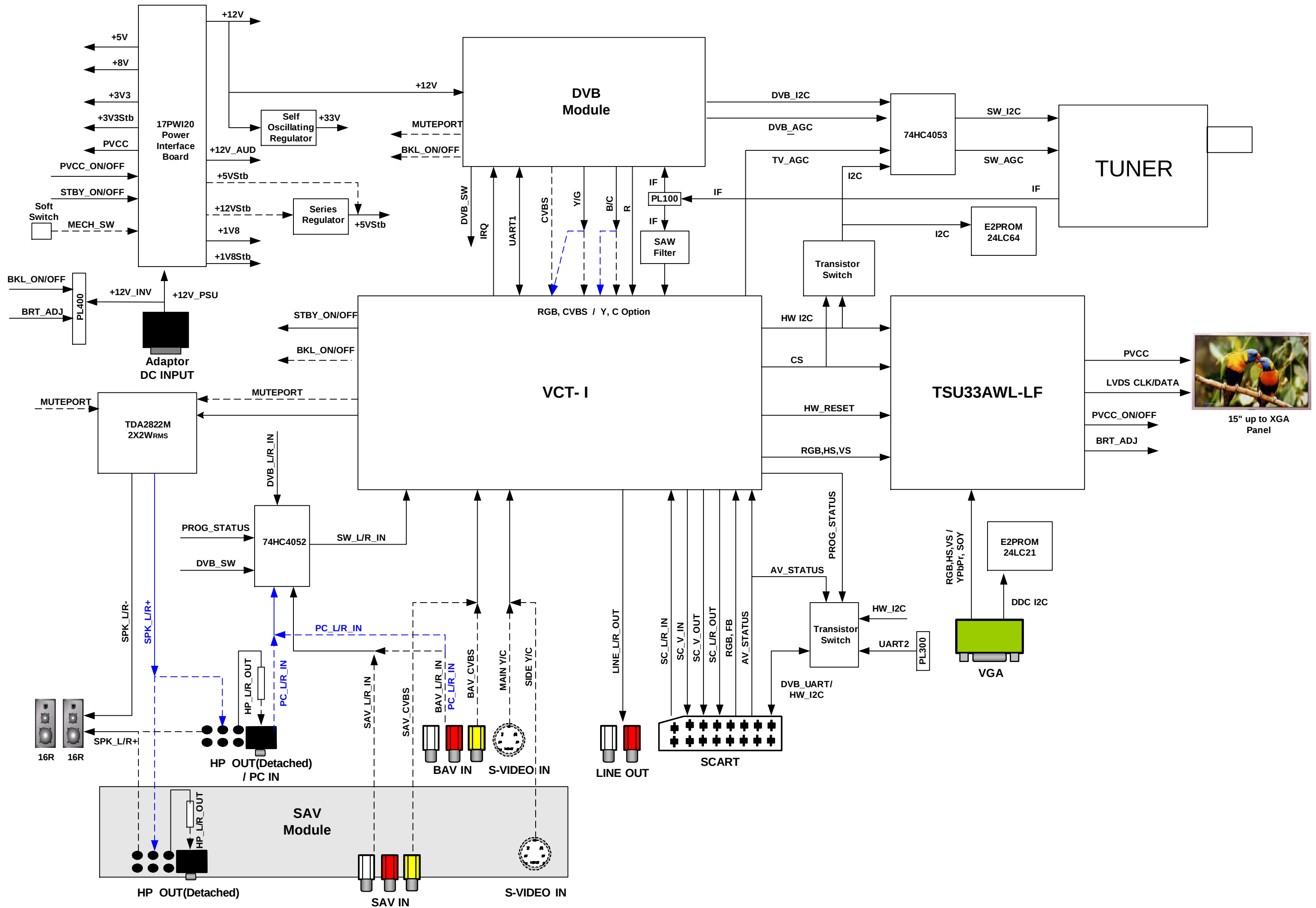
11. 11-SELECTED PANEL**<SVA150XGA, M190A1, M190E5>**

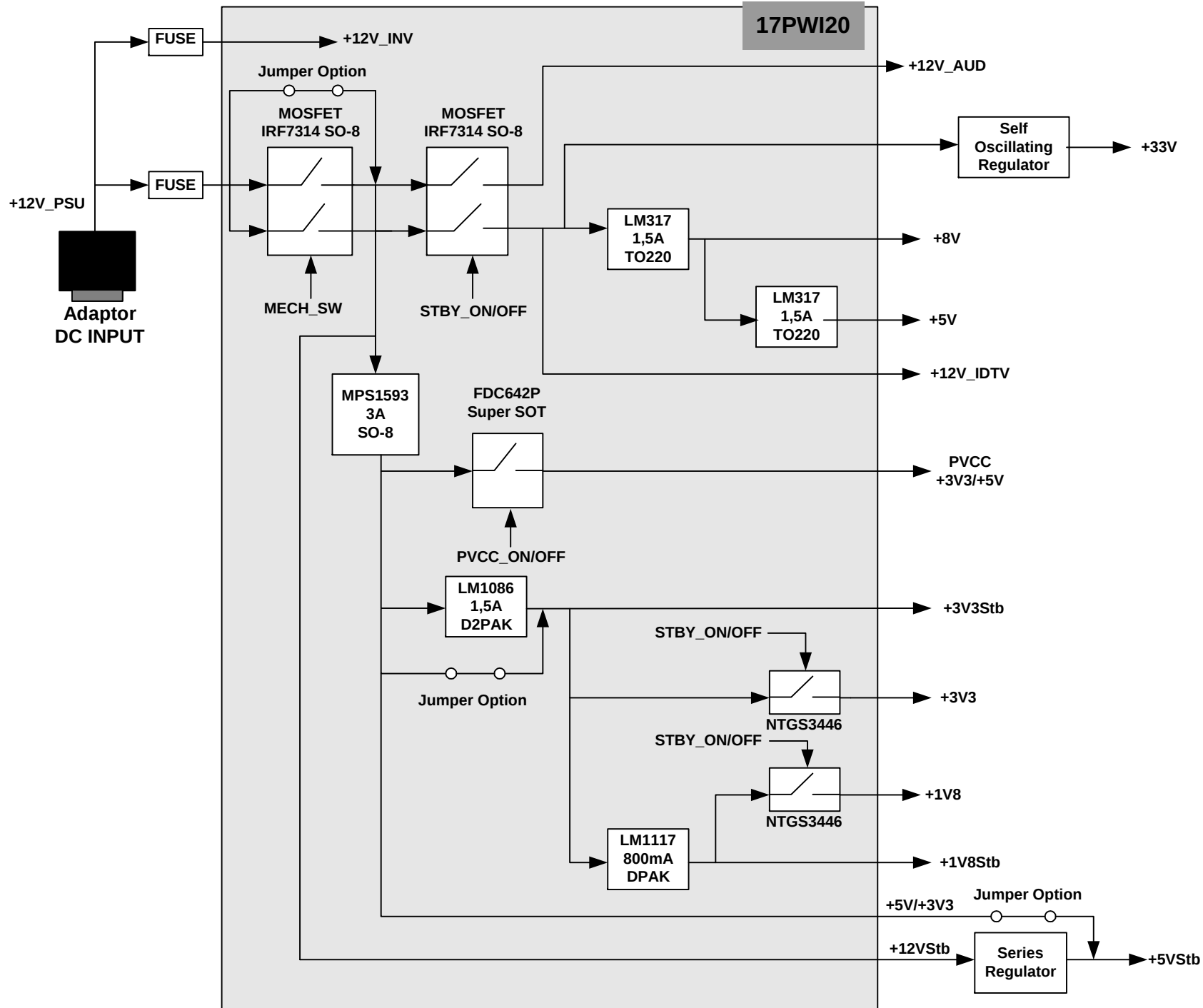
Remote Control Type: RC1090, OTHERS, RC1243

SW Version → 17MB20_STD_0.0.XX

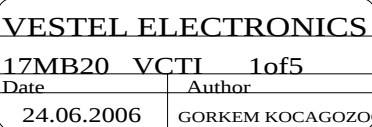
11. BLOCK DIAGRAMS AND SCHEMATICS

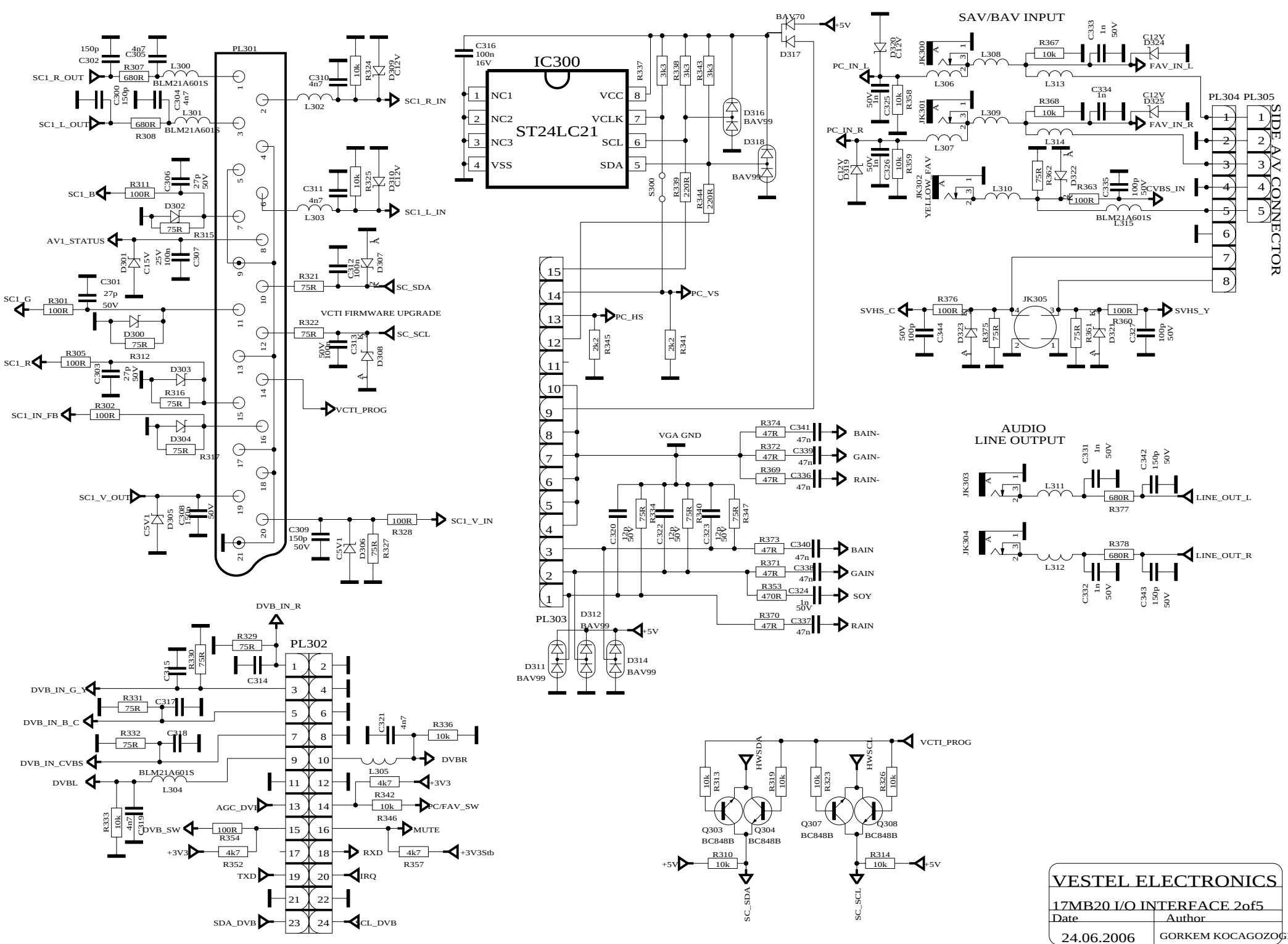
17MB20 Block diagrams and schematics are give in the following pages.

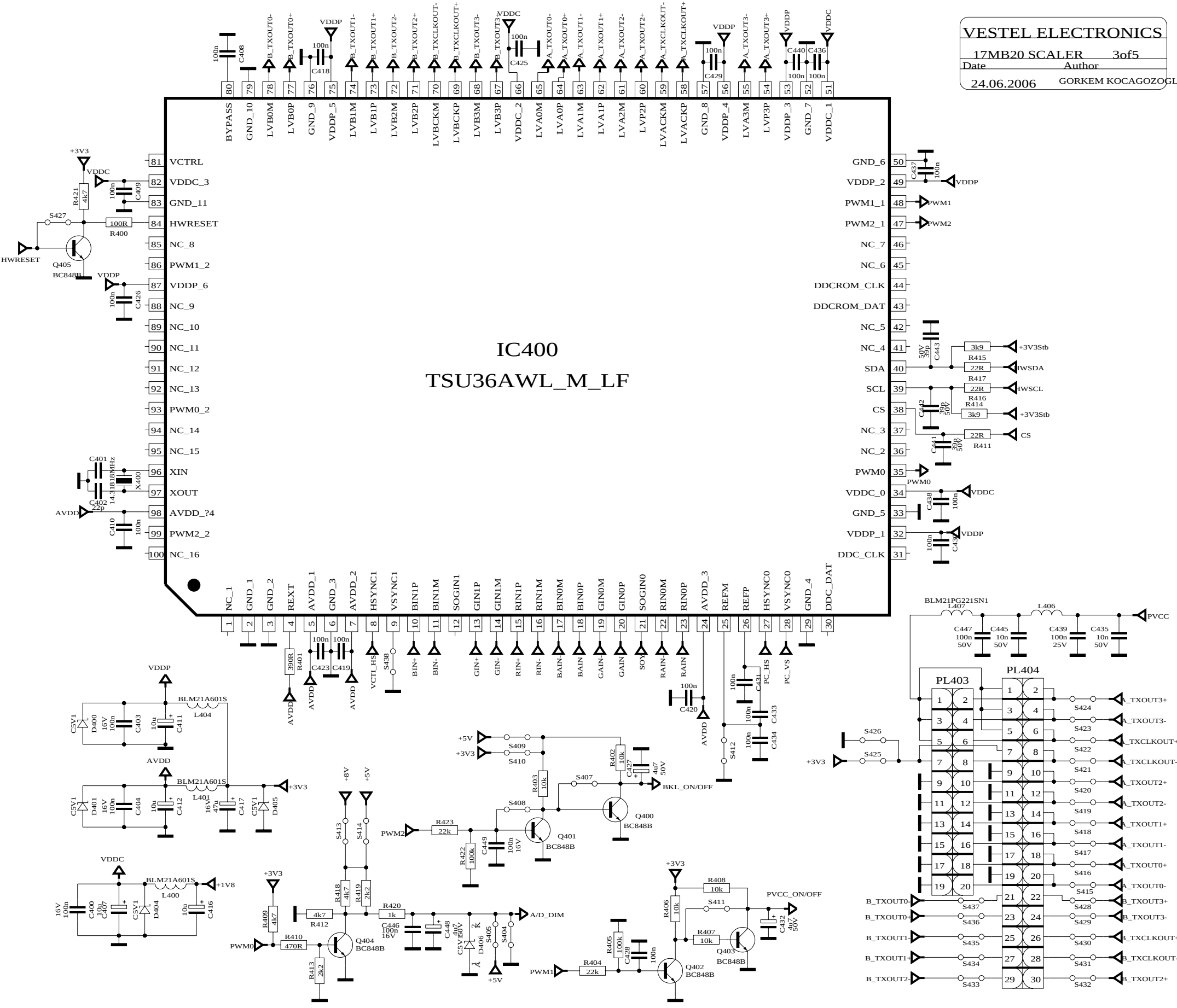


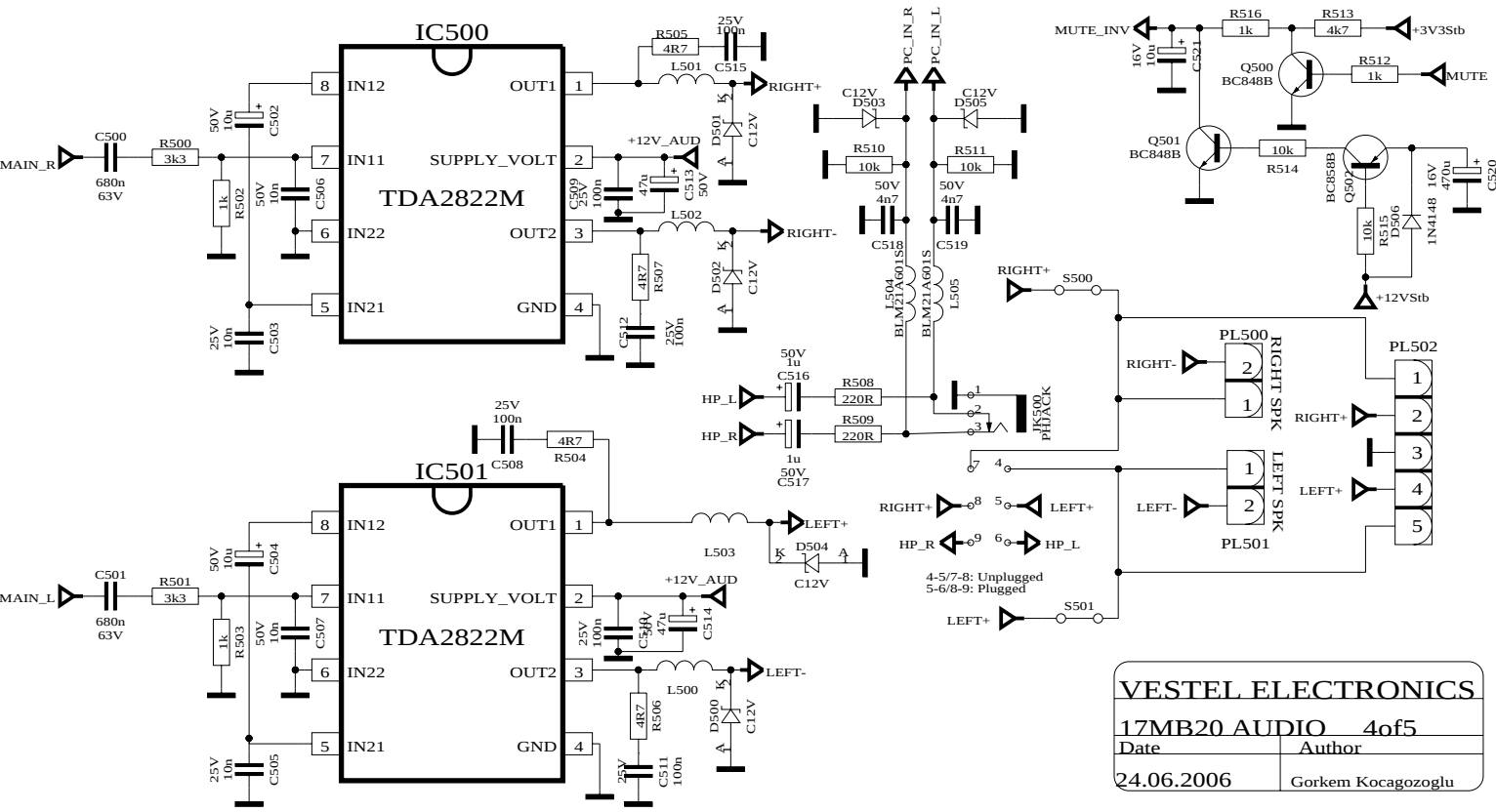


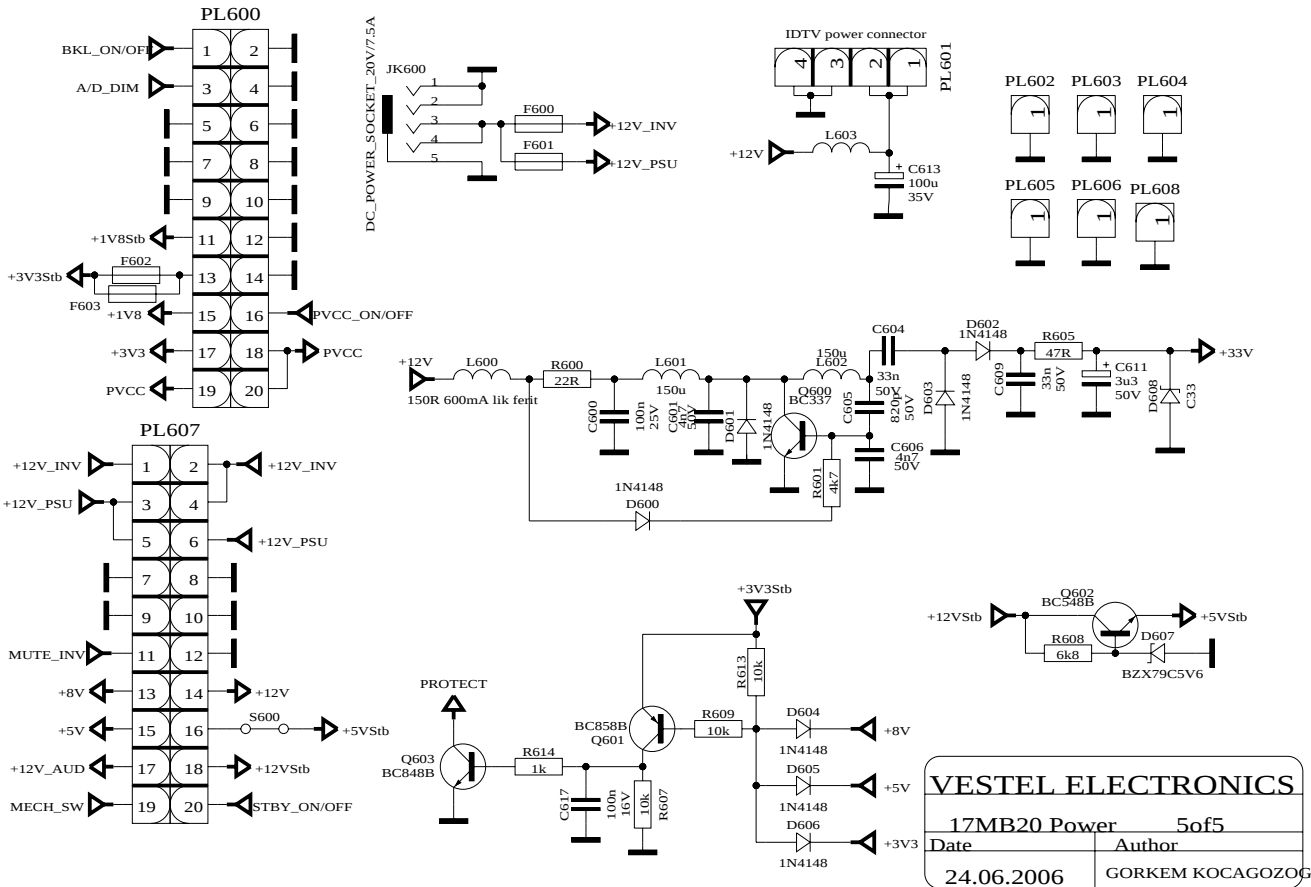
Main Board Requirements	
Voltage	Max Current
+33V	5mA
+12V_AUD	200mA
+8V	12mA
+5V	160mA
+3V3	370mA
+1V8	220mA
+12VStb	30mA
+ 5VStb	30mA
+3V3Stb	205mA
+1V8Stb	400mA
Panel Logic Cct Requirements	
Voltage	Max Current
+3V3	1100mA
+5V	1200mA

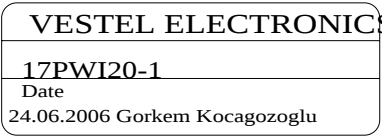


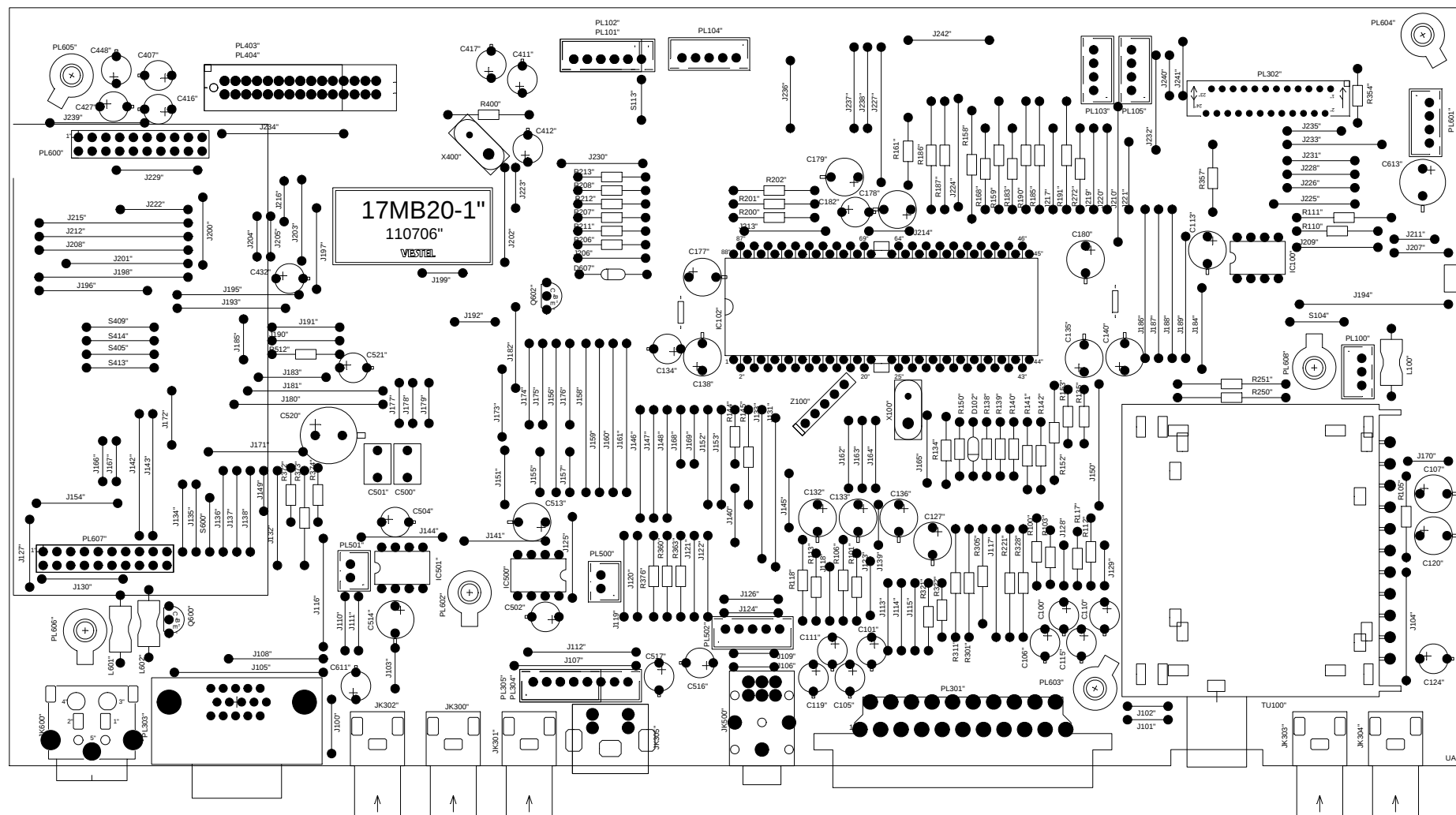


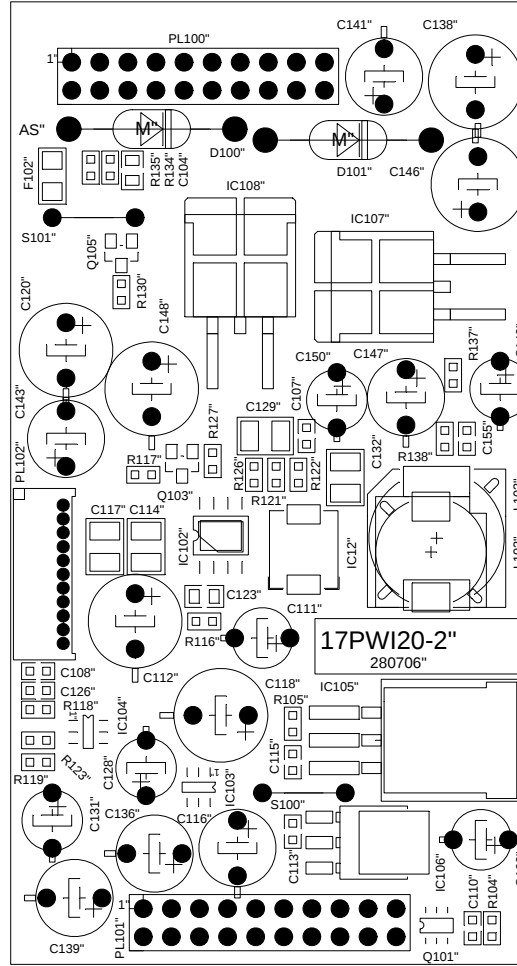


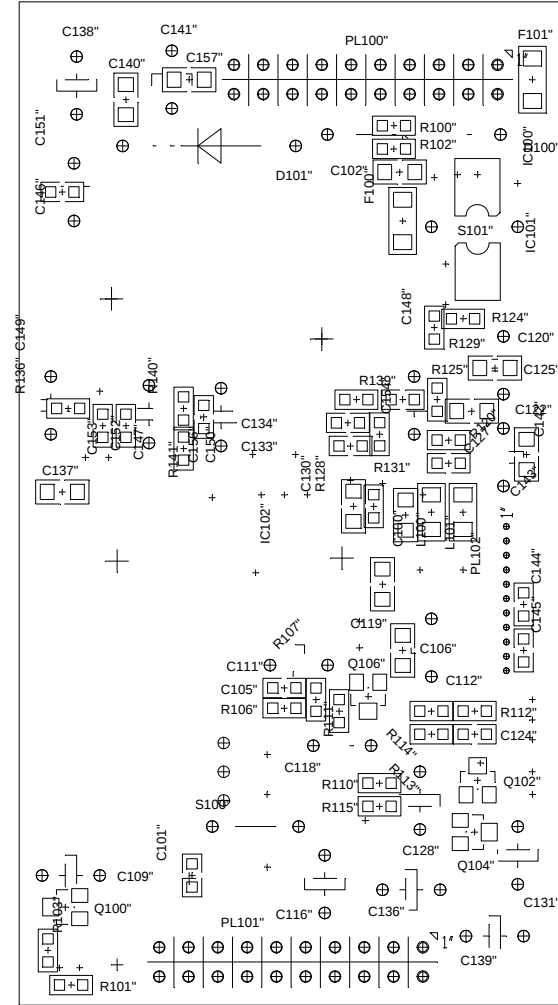












NO	LEVEL	CODE	NAME	QUANTITY	POSITION
1	1	20181872	SNOW BOX ASSY TFT(F/B) 1510/11	1	
2	2	20166591	SNOW BOX FRONT LCD 1510/11	1	
4	2	20166683	SNOW BOX BACK LCD 1510/11	1	
21	2	20188267	BUTTON FUNC.TFT XX10-11 (SILVER/P)	1	
22	3	20174894	BUTTON FUNC.TFT XX10-11 (EKO.GRAY/I)	1	
25	2	20188268	BUT.ON/OFF TFT XX10-11 (SILVER/P)(SM BAS	1	
26	3	20174895	BUT.ON/OFF TFT XX10/11 (EKO.GRAY)(SM BAS	1	
31	2	20188269	FOOT ASSY 1510/11 (SILVER/P)	1	
37	3	35000180	SCREW C ZN YSMB M3*6 ROHS	5	
38	3	35004316	SCREW P C ZN YSMB 3*6.5 RoHS	5	
41	3	45004526	HINGE TFT 1510-11 ROHS	1	
45	2	35015033	SCREW C ZN YSMB M3x12 (ST) ROHS	4	
46	1	20264518	POWER CORD ASSY.SAFE(EUR.WAL PLG)-PKG	1	
47	2	30002376	POWER CORDSAFE MON.(EUR.WAL PLG)PKG RoHS	1	
49	1	20278423	BRACKET CHS.MB20(VER 4)15"EKO.GRAY(I)	1	
51	2	20188317	MD.ASY.17LD12-LED BOARD 1510/11(ROHS	1	
53	4	30010688	LED RED/GREEN VDC30354 3MM RoHS	1	D10
54	4	30031033	PREAMPLIFIER TFMS5360 RoHS	1	IC10
55	4	30037373	CNAS 5P-6/560 FLT W/C UL2468AWG24 RoHS	1	PL2
61	7	30000459	RES CF 1/4W 100R J. ROHS	1	R1
63	5	30000371	CAP EL 22UF 50V M ROHS	1	C10
64	2	20262601	MD.ASY.17TK36-6SW 2010/11TFT (MB24)(ROHS	1	
67	4	30027440	PUSH SWITCH ON/OFF 0.1A/12RoHS	1	SW6
68	4	30032684	SWITCH TACT(4) 1N ROHS	6	SW1 SW2 SW3 SW4 SW5
69	4	30043389	CNAS 4P/600 FLT W/C UL2468 AWG24 RoHS	1	PL1
78	2	20273526	MD.ASY.17HP20-1510/11 (MB20) ROHS	1	
81	4	30031582	CONN HEADER 5P 2.5MM TOP WHT SD RoHS	1	PL100
85	6	30000371	CAP EL 22UF 50V M ROHS	2	C100 C101
93	4	30034322	SPEAKER 16R 5W 33x105MM ROHS	1	
94	4	40024101	BUSH RUBBER BRACKET TFT2000/1 (I)	2	
96	4	30034322	SPEAKER 16R 5W 33x105MM ROHS	1	
97	4	30040688	CNAS 2P/450&500 SI SPK.NELTW/FER TFTRoHS	1	
98	4	40024101	BUSH RUBBER BRACKET TFT2000/1 (I)	2	
100	2	30032581	CNAS 5P/500 TUB SIS W/DC UL1007 ROHS	1	
108	2	20283463	M.ASSY.MB20-MAN-1XX212213X1X	1	
110	4	30000649	RES CF 1/2W 33R J. ROHS	1	C417
111	4	30001612	IC AAMP TDA2822M 2*1W PDIP8 RoHS	2	IC500 IC501
112	4	30008778	XTAL 20.250 13p HC49U ROHS	1	X100
113	4	30012385	CONN HEADER 4P 2.5MM TOP RED ROHS	1	PL105
114	4	30017946	XTAL 14.318 MHZ ROHS	1	X400
115	4	30018089	SOCET SCART BLACK TFT RoHS	1	PL301
116	4	30027932	DC POWER SOCKET 7.5ARoHS	1	JK600
117	4	30031051	CONN HEADER 2P 2.5MM TOP WHT SD RoHS	1	PL500
118	4	30031054	CONN HEADER 2P 2.5MM TOP BLUE SD RoHS	1	PL501
119	4	30032779	SOCKET IC 8P (DIP) ROHS	1	IC100
120	4	30033112	CONN HEADER 4P 2.5MM TOP WHT SD RoHS	1	PL103
121	4	30033113	CONN HEADER 5P 2.5MM TOP BLK SD RoHS	1	PL104
122	4	30040264	TUNER WSP (PLL)38.9 MK4-HRZ (ASYM) RoHS	1	TU100
123	4	30047160	IC VCT4913G PZ (PSSDIP88) 512K ROHS	1	IC102
126	4	30032639	JACK RCA 1P YELLOW 28 FAV ROHS	1	JK302
128	4	30032636	JACK RCA 1P WHITE 28 FAV ROHS	1	JK300
129	4	30032638	JACK RCA 1P RED 28 FAV ROHS	1	JK301
131	4	30032636	JACK RCA 1P WHITE 28 FAV ROHS	1	JK303
132	4	30032638	JACK RCA 1P RED 28 FAV ROHS	1	JK304
134	4	30032635	CONN HEADER 6P 2.5MM TOP WHT SD. ROHS	1	PL101
136	4	30032640	JACK 4P DIN TYPE FOR SVHS ROHS	1	JK305
137	3	20263046	MD.ASY.17PW120-3,3V (MB20) ROHS	1	
140	6	30018047	CONN HEADER 11P 1.25MM SIDE RoHS	1	PL102
148	9	30001329	DIODE 1N4007 1A/1000V 30A	2	D100 D101
150	7	30000352	CAP EL 100UF 16V MROHS	6	C116 C136 C139 C143 C146
151	7	30000362	CAP EL 1UF 50V M. ROHS	1	C149
152	7	30000375	CAP EL 220UF 16V M ROHS	2	C118 C138
153	7	30000376	CAP EL 220UF 25V M. ROHS	1	C120
154	7	30000387	CAP EL 33UF 50V M ROHS	1	C147
155	7	30000407	CAP EL 470UF 16V M. ROHS	1	C112
157	6	30000312	CAP SMD 22NF 50V K (0805) ROHS	1	C123
159	6	30007739	IC REG LM317T ADJ/1.5A D2PAK RoHS	2	IC107 IC108
173	6	30018574	DIODE SCH SS33 3A/30V DO214AB ROHS	1	IC12
174	6	30020606	IC LDO LM1117 1.8V/800mA DPAK ROHS	1	IC106

177	6	30042561	IC MP1593 SO8 RoHS	1	IC102
179	6	30050466	FUSE SAFE SMD 1A/63VDC 1206 ROHS	1	F102
210	6	30035282	FUSE SAFE SMD 5A/32VDC (33A/1MSINR)ROHS	1	F100
212	6	30012593	CAP SMD 8.2NF 50V K (0603) ROHS	1	C133
215	4	30031582	CONN HEADER 5P 2.5MM TOP WHT SD RoHS	1	PL502
217	2	30021752	IC EEPROM M24C64WBN6 64Kbx8 DIP8 RoHS	1	
219	2	35000180	SCREW C ZN YSMB M3*6 ROHS	6	
220	2	35000231	SCREW SK C NI YFMB 2.9*6.5 ROHS	6	
221	2	35008081	SCREW P C ZN YFMB 3*9.5 RoHS	11	
222	2	35008191	SCREW P C ZN YSMB 3*12 RoHS	7	
223	2	35008812	SCREW P C ZN RYSB 3x10 RoHS	4	
224	2	35012594	SCREW M 3*8 YSB TAPTITE (ROHS)	1	
225	1	20293862	BACK CVR.TFT 1510/11(EKO.GRAY/P)(MB20)	1	
232	3	50043776	LABEL LOT W/BARCODE (100X280) SHARP	1,05	
235	2	50066573	CARTON BOX 1510/11 TFT NOBRAND HAM4LÚ(2)	0,25	
236	2	50094917	CARTON BOX VE.ITA.INNO HIT IH1510	1	
237	1	20293947	LBL.BCK.CVR.VE.IT.INNO HIT IH1510 (MB20)	1	
238	2	20117442	LBL.BCK.CVR.ASSY (TFT) (WO/UL)	1	
239	3	50029093	LABEL LOT W/BARCODE (54X201)	1,05	
241	1	20293948	ARTWORK INNO HIT IH1510 (MB20)	1	
242	2	30002391	BATTERY AAA UM4 1.5V GREEN RoHS	2	
243	2	30025312	R/C 1243 SILVER RoHS	1	
244	2	50029633	WARRANTY CARD VES.ITA. (ITL)	1	
245	2	50062966	SERVICE SHEET VESTEL ITALYA	1	
246	2	50094918	I/B INNO HIT IH1510 MB20/1243/ITA/ENG	1	
247	1	30043224	PSU 12VDC 3A C14 4PO WOPFC SAFE-PKG RoHS	1	
248	1	40013492	LOGO INNO HIT (W/P-SILVER-BRUSH-HST)ROHS	1	
249	1	45004396	TFT WALL MOUNT 17"/20"23" -PKG RoHS	1	
250	1	50018337	NYLON SHIELD 50*90 (15+15) HDPE 14"	24,5	
251	1	50071156	LBL.CARTON BOX VES.ITA.EURO.DIR.WEEE M.	1	