Service
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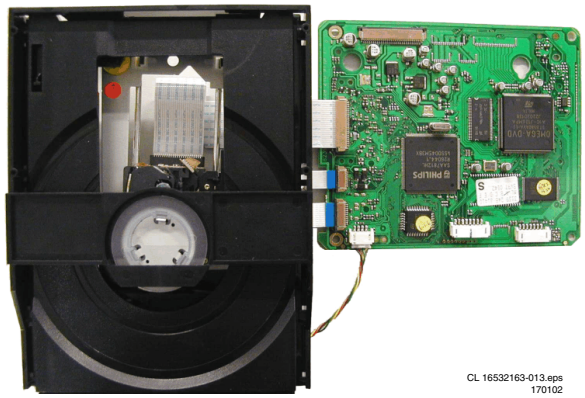

Service Manual

CLASS 1
LASER PRODUCT

DVD VIDEO

COMPACT disc DIGITAL VIDEO

COMPACT disc DIGITAL AUDIO

Contents

			Page	
1	Technical Specifications		2	
2	Safety Instructions, Warnings, and Notes		4	
3	Directions for Use (not available)		5	
4	Mechanical Instructions		5	
5	Test Instructions Mono Board DVD-SD4.00		9	
	Diagnostic Software Description		20	
6	Block Diagram		29	
7	*Electrical Diagrams & Pwb's*		*Diagr.*	*PWB*
	Front-End Processor and Laser Supply - DVDalas2	(Diagram M1)	30	37-42
	Front-End Processor Iguana	(Diagram M2)	31	37-42
	Front-End Loader Interface	(Diagram M3)	32	37-42
	Back-End Memory	(Diagram M4)	33	37-42
	Back-End SDRAM and Service Interface	(Diagram M5)	34	37-42
	Back-End Host Processor	(Diagram M6)	35	37-42
	Back-End Module Interface	(Diagram M7)	36	37-42
	Testpoint Overview		43	
8	Alignments (not available)		45	
9	Circuit Description, List of Abbreviation and IC Data		45	
10	Spare Part List		56	

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1. Technical Specifications

1.1 Connections

1.1.1 Connector 1701: Basic Connector

1. I2CSCL/SIOCLK
2. I2CSDA/SIODATA
3. SCART1
4. SCART0
5. AGND
6. B_VID(U)
7. AGND
8. G_VID(Y)
9. AGND
10. R_VID(V)
11. AGND
12. Y_VID
13. AGND
14. C_VID
15. AGND
16. CVS_VID
17. +3V3
18. +3V3
19. +5V
20. +12V
21. +12V
22. MUTE
23. GND
24. PCMSCLK
25. PCMDATA0
26. GND
27. PCMCLK
28. PCMLRCLK
29. GND
30. SPDIFOUT

1.1.2 Connector 1702: Extension Connector 1.

1. GND
2. P6
3. P7
4. GND
5. PCMDATA3
6. PCMDATA2
7. GND
8. PCMDATA1

1.1.3 Connector 1705: Extension Connector 2.

1. P0
2. P1 / I2CSCL
3. GND
4. P2 / I2CSDA
5. P3
6. GND
7. P4
8. P5

1.1.4 Connector 1703: Digital Video Connector.

1. GND
2. YC0
3. GND
4. YC1
5. GND
6. YC2
7. GND
8. YC3
9. GND
10. YC4
11. GND
12. YC5
13. GND
14. YC6
15. GND
16. YC7
17. GND
18. HSYNC
19. GND
20. VSYNC
21. GND
22. 27MHZ CLOCK SIGNAL

1.1.5 Connector 1501: Service Connector.

1. TXD_SER
2. SERVICE
3. RXD_SER
4. RTS_SER (not used)
5. GND
6. CTS_SER (not used)
7. +5V_SER

1.1.6 Connector 1704: Karaoke Connector.

1. KOKSCLK
2. +12V
3. KOKLRCLK
4. GND
5. KOKDATA
6. GND
7. KOKPCMCLK
8. KOKVOCDET

1.2 Signal Specifications

This the specification of all signals as described under "Connections"
H = +5V ±0.5V
h = 3V3 ±0.3V
L = 0V ±0.5V
l = 0V ±0.3V

Stby	:	There is no standby mode at module level. The module operate in power-off and power-on only.
Standby control line	:	Not available on module level.
P50	:	Connection between front and A/V board, and can be used as P50 signal line.
	:	The signal is not connected to the module electronics.
Slow blanking scart	:	This signal has three levels which depend on the level of the output ports SCART0 and SCART1. It will be converted by the external board to 0/6/12 voltage level use for scart function switching.
Audio mute	:	Can be used for audio mute transistors during stop or power On/Off.

: Mute on : 3V3 ±0V3
: Mute off: 0V ±0V3

I2S data0 out : I2S front data output.
: Level - h / l

I2S wordselect / I2S bitclock : I2S timing signals
: Level - h / l

I2S systemclock : 256xFS audio systemclock.
: Level - h / l

LFE_SEL : Low frequency effect selection for the A/V board.
: LFE_SEL_low - l
: LFE_SEL_high - h

Center_on : Switches the center audio to the scart output.
: Center to scart - h
: L/R to scart - l

Karaoke : I2S input - h / l
: PCMCLK output - h / l

SPDIF out : Digital audio output level - H / L

Hor. Sync : Video Horizontal synchronisation
: Level - h / l

I2S data1 out : I2S surround data output.
: Level - h / l.

I2S data2 out : I2S center/sub data output.
: Level - h / l.

I2C clock / I2C data : I2C databus
: Level - h / l

TXD / RXD / RTS / CTS : Service UART to be connected direct to PC serial input.
: Output levels - H / L
: Input levels RS232 compliant

Service activation : Signal open Normal module start-up
: Signal tied to GND Module start-up in service mode.

1.3 Performance:

1.3.1 Digital Output

CDDA/LPCM : according IEC60958
MPEG1 is converted to LPCM :
MPEG2, AC3 audio.MP3 : according IEC1937
DTS. : according IEC61937 amendment 1.
: Digital output level is 0V / 5V with GND as reference. To meet the standards a decouple circuit is necessary.

1.3.2 I2S Output

Accuracy : Up to 24bit.
Sample rate : 32kHz / 44.1kHz / 48kHz / 64kHz / 88.2kHz / 96kHz / 128kHz / 176.4kHz / 192kHz.
Standard : Philips I2S output

Number of I2S outputs : Basic 6 channels: Front / Surround / Center-LFE.
: Additional 2 channels: downmix stereo

Deemphasis : Internally processed by the module.

Audio source streams : PCM / LPCM / MPEG1 / MPEG2 / AC3 / MP3 / DTS / MLP.
: No DTS decoding.

Audio processing : Dolby ProLogic decoder / Dolby surround downmix / SRS TruSurround / Circle Surround / TruBass.

1.3.3 Analog Output

The module has no analog audio ouput. : The analog audio specification will be determined by the external DAC circuit.

1.3.4 Video.

Standards : The video output standard will follow the source material.
: The OSD standard is switchable between PAL or NTSC.

Outputs : The module has 6 analog outputs in 4 formats: Y/C ; CVBS ; RGB / YUV.

Specification. : The output comply fully according PQR-IMS.
: DC level - sync bottom at 0.43V ±10% (100% white) and 0.9V ±10% (black).
: Output impedance - 75Ohm.
: The following specification points are significantly better then [PQR_IMS]
: SNR on all video outputs is better then 65dB.
: Video bandwidth - 8MHz (±3dB) / 16MHz (±3dB) for STi5588 progressive scan.

2. Safety Instructions, Warnings, and Notes

2.1 Safety Instructions

2.1.1 General Safety

Safety regulations require that during a repair:
- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:
- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
  1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
  2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
  3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
  4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
  5. Verify this, before you return the unit to the customer/ user (ref. UL-standard no. 1492).
  6. Switch the unit 'off', and remove the wire between the two pins of the mains plug.

2.1.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type	:	Semiconductor laser GaAlAs
Wavelength	:	650 nm (DVD)
	:	780 nm (VCD/CD)
Output Power	:	20 mW (DVD+RW writing)
	:	0.8 mW (DVD reading)
	:	0.3 mW (VCD/CD reading)
Beam divergence	:	60 degree

Figure 2-1

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.2 Warnings

2.2.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential.
  Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off'!). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

2.2.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
VARNING SYNLIG OCH OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD BETRAKTA EJ STRÅLEN
VARO! AVATT AESSA OLET ALTTIINA NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASER SÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN
VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETSEN
DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM
ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2

2.2.3 Notes

Dolby
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DOLBY SURROUND
PRO • LOGIC

Figure 2-3

Trusurround
TRUSURROUND, **SRS** and symbol (fig 2-4) are trademarks of SRS Labs, Inc. TRUSURROUND technology is manufactured under licence frm SRS labs, Inc.

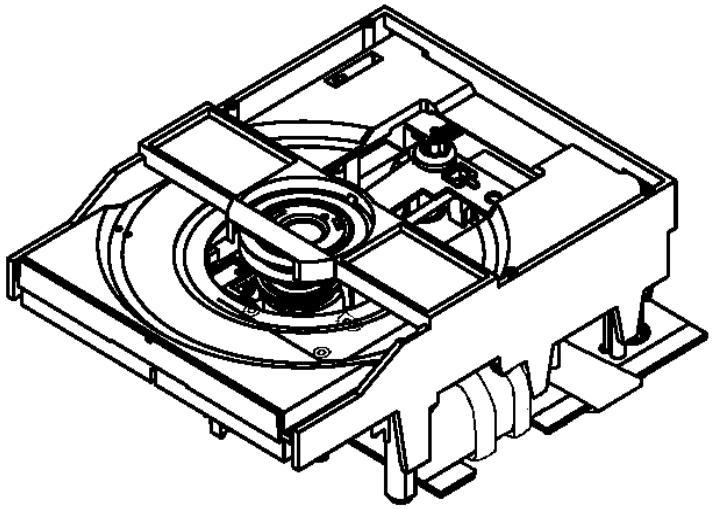
Figure 2-4

3. Directions for Use

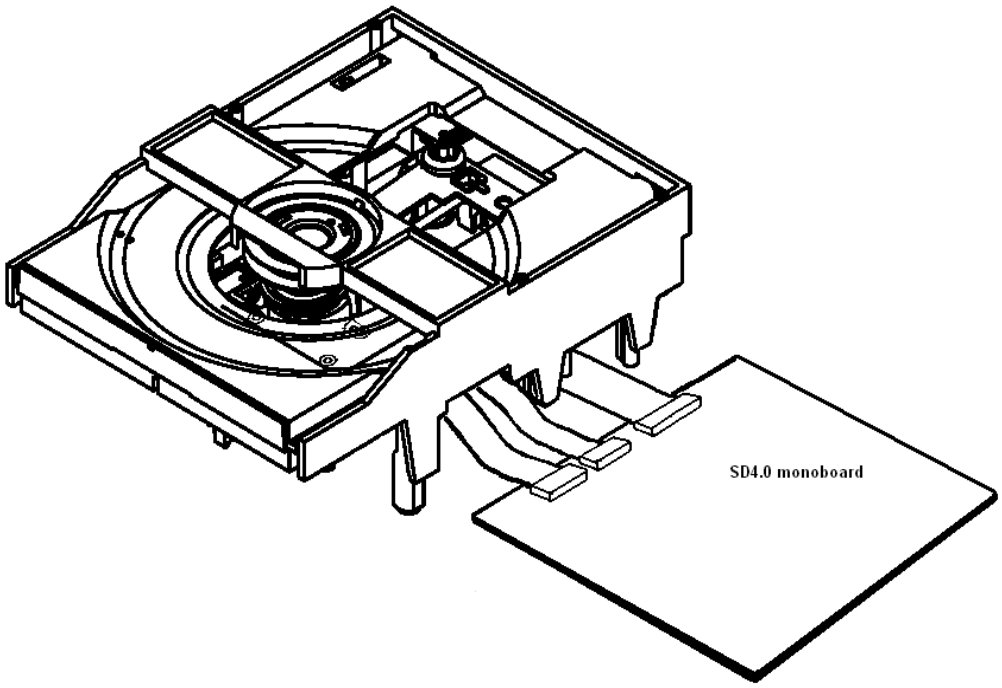
There is no DFU available

4. Mechanical Instructions

The SD4.0 module can be configurate into 2 options as shown :



Option 1 with monoboard below loader similar



Option 2 with monoboard beside loader to allows for a lower total height of module

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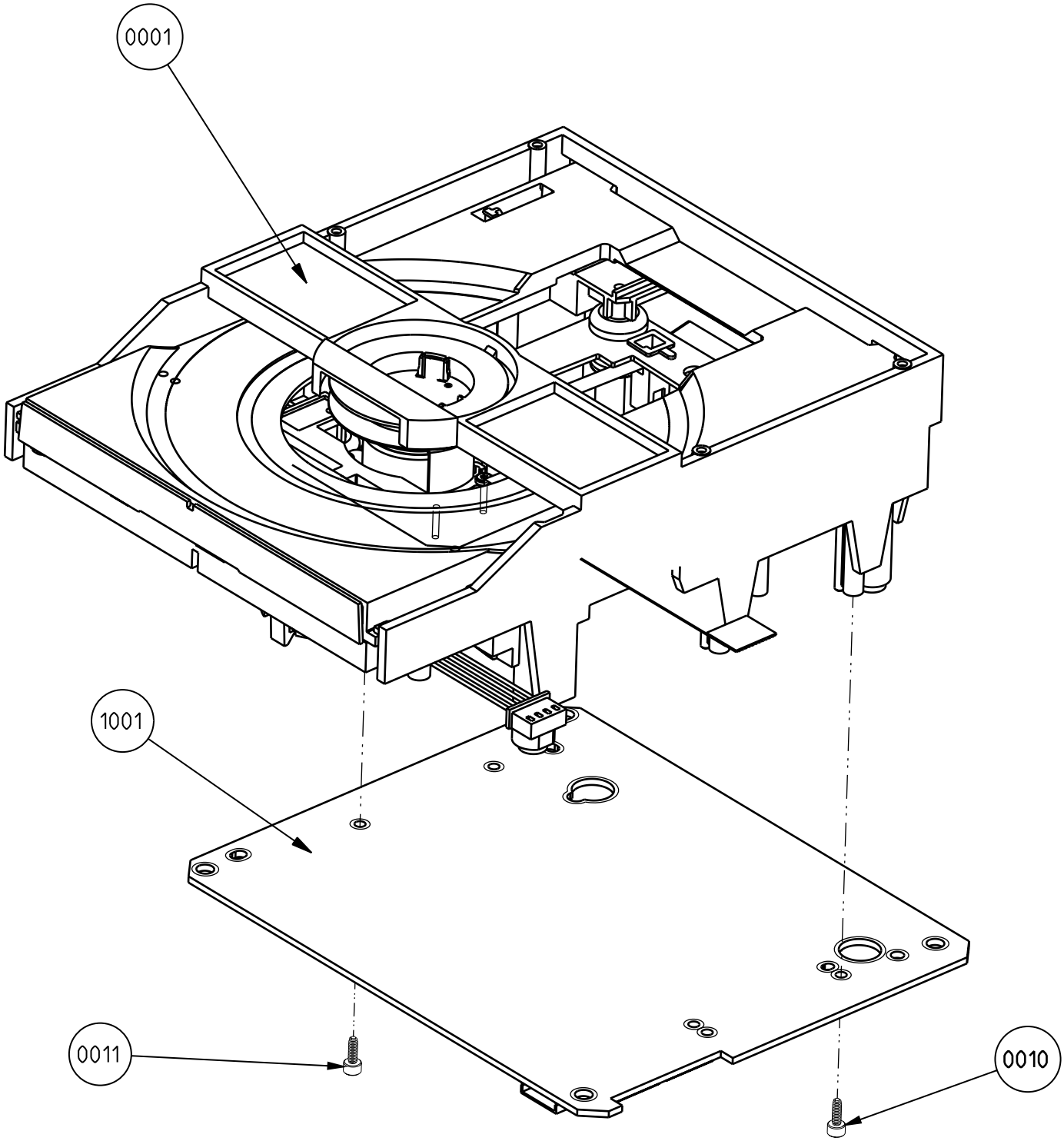
290102

4.1 Dismantling Instruction



CL 16532163_012.eps
030102

Figure 4-1

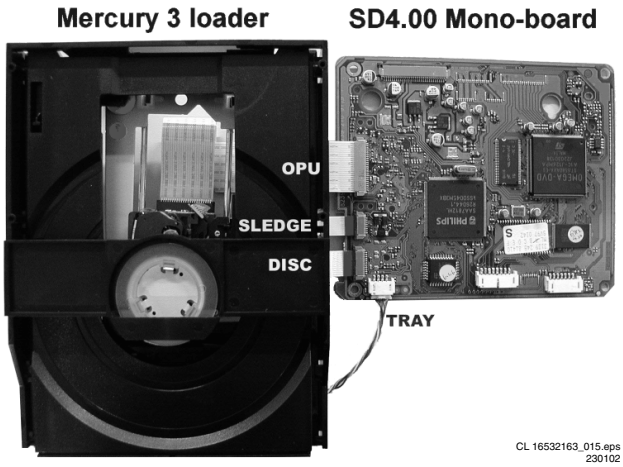


Figure 4-2

4.1.1 Dismantling of DVD Mono Board

1. See Figure 4-1 and 4-2 for dismantling of DVD module.

2. Unlock the OPU conn 1100, Sledge motor conn 1300 and disc motor conn 1301 and remove the Flex connections.

3. Remove the wire connection to Tray motor conn 1303.

4. Remove the Mono Board.

5. If SD4.00 mechanical construction is as in Figure 4-1, remove screw 0010 and 0011 before executing from step 2 and 4.

Note: Flex cables are very fragile,care should be taken during dismounting and when mounting,ensure that Flex cables are inserted properly into the Flex socket and locked.

4.1.2 Opening of Tray Manually

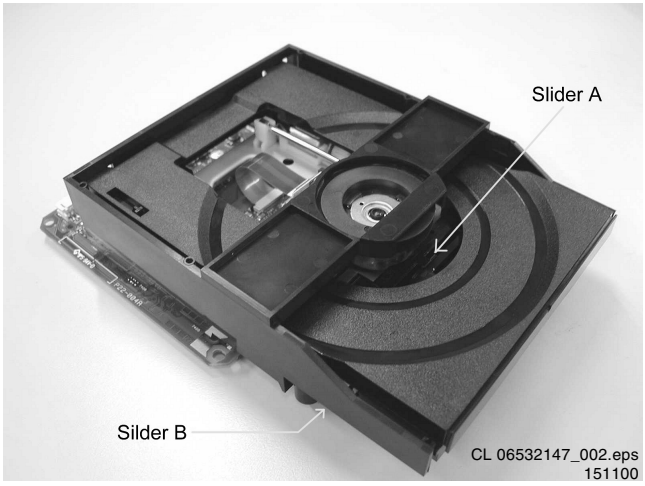


Figure 4-3

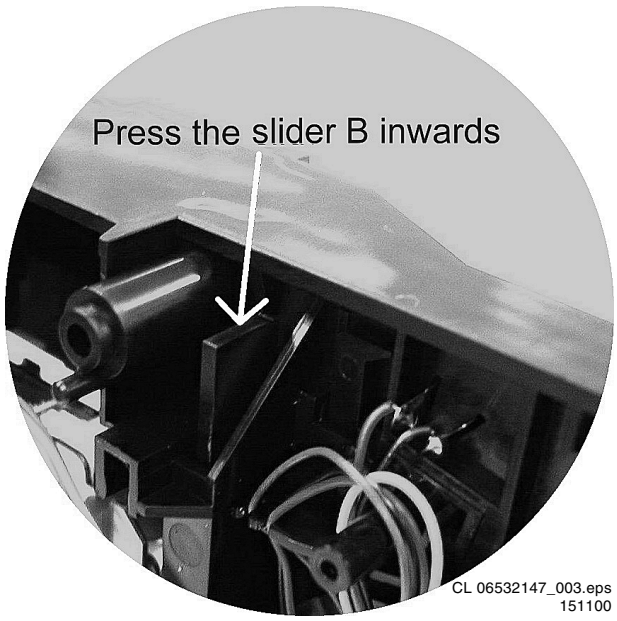


Figure 4-4

It is possible to open the tray manually by moving the Slider in the position as shown in Figure 4-4
When the slider A is not accessible when a disc is loaded, unlock the tray by pressing the slider B inward as shown in Figure 4-5.The Tray is now disengaged and can be pulled outwards.

When no disc is loaded, unlocking the Tray can also be done by moving the Slider A in the direction as shown in Figure 4-6 and pull the Tray outwards.

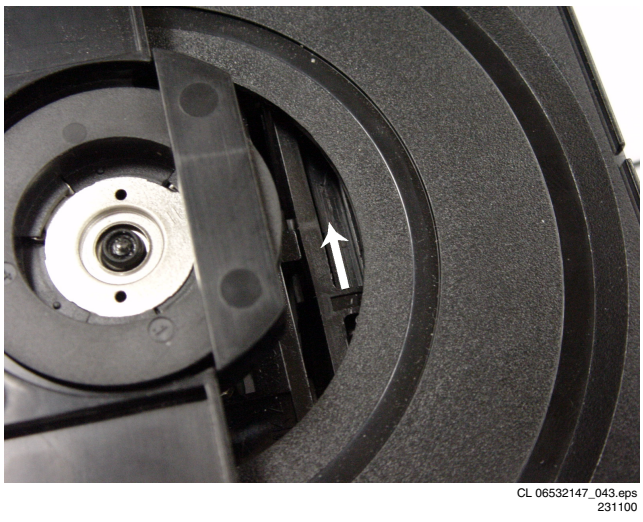


Figure 4-5

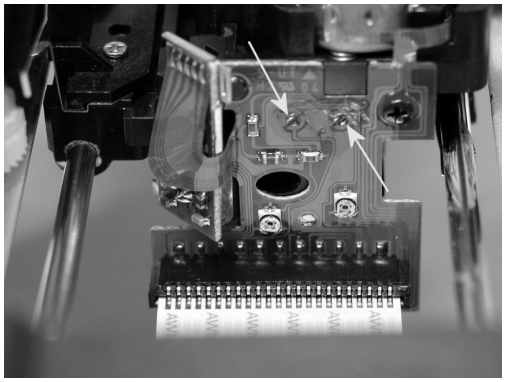
4.2 Service Hints

4.2.1 DVD Module

This module can be repaired as follows:

1. The VAL6013/01 is a combination of loading mechanism and DVD-mechanism. Both the mechanism is not a repairable unit and in case of failure it has to be replaced with a new loader VAL6013/01.

   Note: When replacing with a new VAL6013/01 two solder joints have to be removed after connecting the OPU flex foil to the board.
   The solder joints which shortcircuits the laser diodes to ground are for protection against ESD. Refer to Figure 4-6 and Figure 4-7 for location of solder points.



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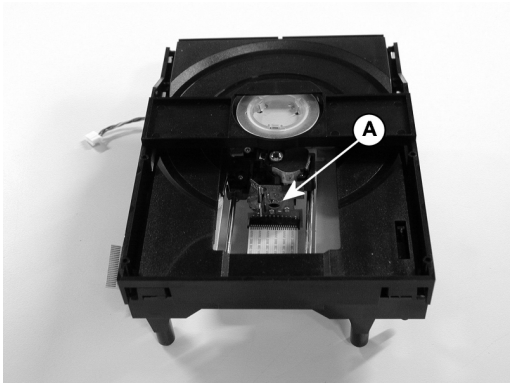
170102

Figure 4-6



CL 16532163_018.eps
170102

Figure 4-7

2. The mono board has to be repaired down to component level. Repair handling of the monoboard requires a workshop with sophisticated desoldering tools.

5. Test Instructions Mono Board DVD-SD4.00

5.1 General

- Impedance of measuring-equipment should be > 1MΩ.
- Most tests have to be done by software commands. Together with the software command you will find a Ref.# nbr. This is the number of the diagnostic nulceus used for this test. More detailed information can be find in the chapter “Diagnostic Nuclei”.
- Levels: Most measurements are digital measurements. The signal levels specification in this document are defined as follows:
  low: < 0.3V
  high: > 3.0V
  LOW: < 0.4V
  HIGH: > 4.5V
- All the waveforms measurement carried out in these test instruction will be base on the testpoint indicated in the Monoboard schematic diagram in the service manual.

5.2 General Start-up Measurements

5.2.1 Supply Check:

Testpoint	Supply	Remark
F785	+3V3 ± 5%	Main supply voltage
F708	+5V ± 5%	Main supply voltage
F703	+12V ± 10%	Main supply voltage
F111	+2.5V ± 10%	Front-end 2.5V reference circuit
F726	+2.5V ± 5%	STi55xx power supply (VDDSTA/VDDSTD)
F728	+2.5V ± 5%	STi55xx power supply (VDDSTC)

The module operates in power-off and power-on only. There is no standby mode at module level. In power-off, the module does not response to any communication or signals.
Before starting the measurement, ensure that all power supply are connected to the monoboard via connector 1701 and that the PC interface cable is connected to the Service interface connector 1501 of the monoboard.

5.2.2 Reset Check:

To ensure a proper start-up of the monoboard, the back-end reset signal RTNB is required at the STi5580 input (testpoint F906) after power-on.
To check the reset timing, measure the RSTNB (testpoint F906) and the +3V3 supply (testpoint F724), reset circuit trigger signal.

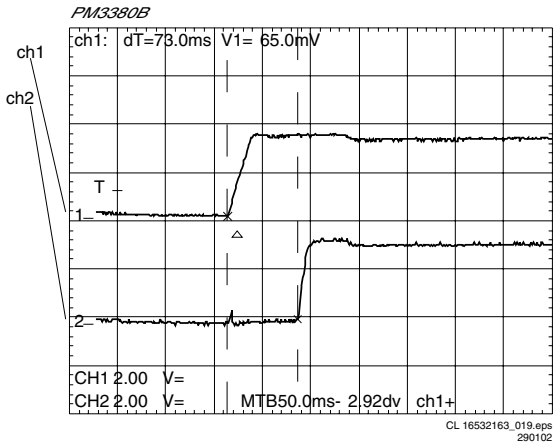


Figure 5-1 Reset

NB rising edge should be at least 50msec after the +3V3DB (refer to Figure 5-1).
If the reset input does not go high then check the reset circuit around transistor 7605.

5.2.3 Clock Check

To check the correct functioning of the STI5580, we first have to check the presence of all clocks.
All clocks to be measured with 0.02% tolerance.

Name	Testpoint	Frequency	Waveform
27M_CLK	T725	27MHz	Refer to Fig 5-2
PCM_CLK	T716	11.2896MHz	Refer to Fig 5-3

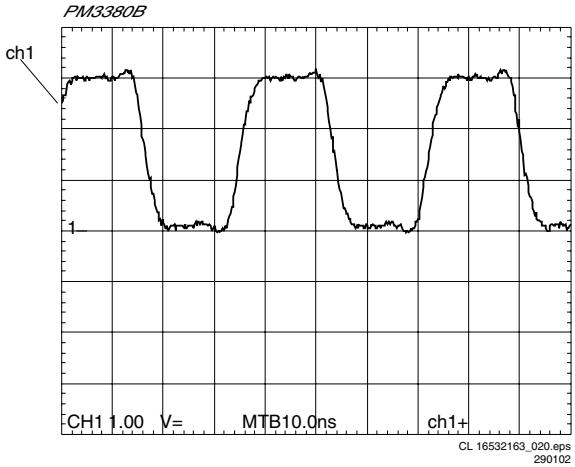


Figure 5-2 27M_CLK

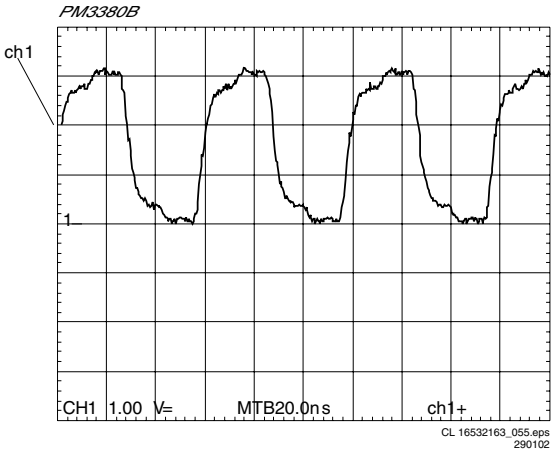


Figure 5-3 PCM_CLK

5.3 µP Environment:

5.3.1 General:

All the tests are carried out by software tests. To start the software tests, connect a PC to the serial bus of the STI5580. Use connector 1501 for this connection:

Connector pin	Signal
1501-1	TXT_SER (STi5580 out)
1501-2	SERVICE-mode select
1501-3	RXD_SER (STi5580 in)
1501-4	RTS_SER (Not in use)
1501-5	GND
1501-6	CTS_SER (Not in use)
1501-7	+5V_SER

Now start the terminal program. Make sure that the service-pin (pin 1501-2) of the µP is pulled low.
The terminal program of your PC should now display: “DVDv4 Diagnostic software version ...”. This message already means that the µP is running. The first 5 commands from the diagnostic software will be carried out automatically during diagnostic start-up. The other commands can be carried out by selecting the “command input” and simply type the reference nbr. to do the test or select the “Menu - driven” test.
To be sure that the µP is able to run the diagnostic software, serial port will be checked during start-up.

Ref. #	Reference Name	Remark
(1)	BasicSpAcc	Serial port Access test/ initialisation
(2b)	BasicInterconSdram	Check SDRAM interconnection with CPU
(4)	BasicSdramWrR	Check Basic SDRAM memory

With this test, the serial communication is checked in both directions.

5.3.2 Memory Check:

The µP has a data bus that is connected to a Flash and also internal link to the MPEG SDRAM inteface.
At start-up,the SDRAM bus is checked

Ref. #	Command Name	Remark
(2b)	BasicInterconSDRAM	Data and address bus Interconnection
6	PapChksFl	Checksum FLASH
16	CompSdramWrR	SDRAM Write Read

CompSdramWrR checks the complete SDRAM for failures inside the IC.The BasicInterconSDRAM check is done by writing & reading some well chosen patterns to all address and data interconnections of the SDRAM.
The PapChksFl calculate and verify checksum of the FLASH. This includes the binary file checksum and the four modules.

5.4 General I/O Port & Peripherals Check

5.4.1 I^2C Bus / EEprom Check

To access the EEprom, the I2C bus is used. So by writing and reading to the EEprom the chip and the bus is checked. With next commands a certain byte is written to the EEprom. The original information will always be written back into the EEprom.

Ref. #	Command Name	Remark
11	PapI2cNvram	I2C NVRAM access

The complete Eeprom can also be checked on failures by writing to all addresses and reading back. This test takes a long time (110 sec).

Ref. #	Command Name	Remark
15	PapNvramWrR	NVRAM Write Read

5.4.2 Audio Clock Switch Check

The internally generated Audio clock can be set to either 44.1 kHz (CD_DA), 48 kHz (DVD) or 96 kHZ (DVD). To check the different mode, use the following commands and measure the waveform as correct operation cannot be detected by the Diagnostic Software.

Ref #	Command Name	Remark	Test point	Frequency
7a	PapUclkAclkCdda	µClock A_CLK in 44.1kHz mode(Fig 5-4)	T716	11.2896MHz ± 0.02%
7b	PapUclkAclkDvd	µClockA_CLK in 48kHz mode (Fig 5-5)	T716	12.288MHz ± 0.02%
7c	PapUclkAclkDvd96	µClock A_CLK in 96kHz mode (Fig 5-6)	T716	24.576MHz ± 0.02%

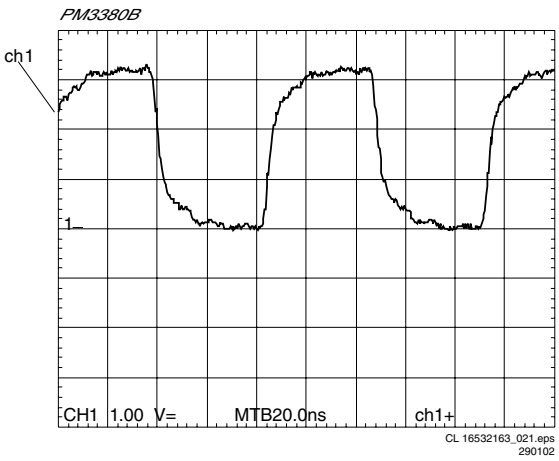


Figure 5-4 µClock A_CLK in 44.1kHz mode

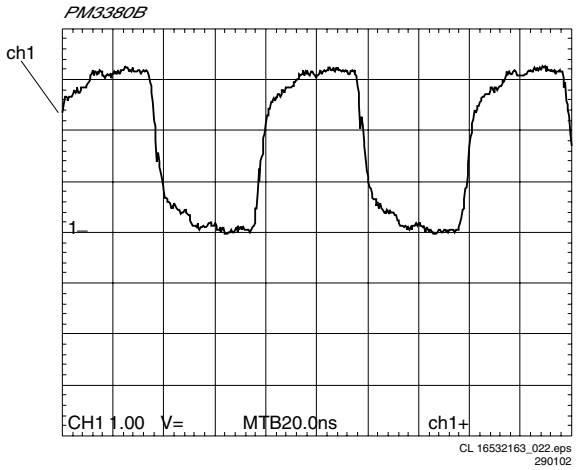


Figure 5-5 µClockA_CLK in 48kHz mode

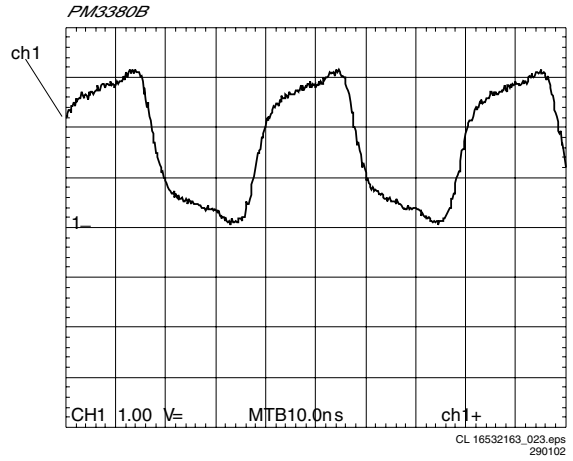


Figure 5-6 µClock A_CLK in 96kHz mode

5.4.3 Audio LFE_SEL Check

Some models digital board provide a LFE_SEL (Low frequency effect selection) signal for the AV-board. The signal is an output pin on PORT 0, bit 7 (pin 193) of the back-end processor. The PIO-pin can be toggle with the following command sequence.

Ref. #	Command Name	Remark	Testpoint	Value
56a	AudioLfePortHigh	PIO-0/7 On	F778	high
56b	AudioLfePortLow	PIO-0/7 Off	F778	low

Note: The actual usage of this general purpose IO is dependant on the back-end software.

5.4.4 Audio Mute Check

Switch on the Mute circuit by sending next command:

Ref. #	Command Name	Remark
19a	AudioMuteOn	AudioMuteOn

Check the Mute output again at testpoint T798: 3V3 ±10%
Switch off the Mute circuit by sending next command

Ref. #	Command Name	Remark
19a	AudioMuteOff	AudioMuteOff

Check the Mute output at testpoint T798: 0V ±0.3V

5.4.5 Audio I2S Check

To check the audio output, connect a audio DAC (on the A/V board) to the I2S output and start-up the audio test. Look at the audio outputs from the A/V board for both sine and pink noise.

Ref. #	Command Name	Remark	Audio outputs
21a	AudioSineOn	Audio Sine signal Off	Audio Sine signal On Sine, 1kHz on stereo Press stop button
20a	AudioPinkNoiseOn	Audio Pinknoise On	Pink Noise on 6 channels
20b	AudioPinkNoiseOff	Audio Pinknoise Off	

The audio signal (sine or pink noise) will also be present on the digital ouput (SPDif). This can be checked by connecting an amplifier with digital input.
Check the I2S output.

NameTestpointWaveform

Name	Testpoint	Waveform
PCMLRCLK	T718	Refer to Figure 5-7
PCMSCLK	T712	Refer to Figure 5-8
PCMDATA0	T714	Refer to Figure 5-9
PCMDATA1	F775	Refer to Figure 5-9
PCMDATA2	F776	Refer to Figure 5-9
PCMDATA3	F777	Refer to Figure 5-9
PCMCLK	T716	Refer to Figure 5-10
SPDIF	F719	Refer to Figure 5-11

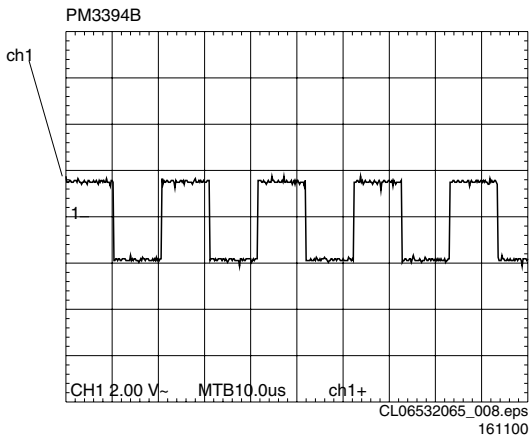


Figure 5-7 PCMLRCLK

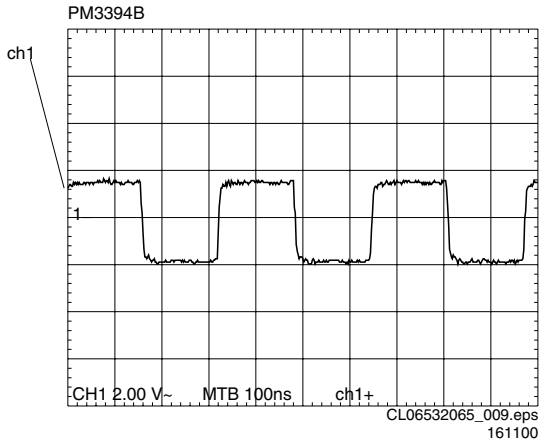


Figure 5-8 PCMSCLK

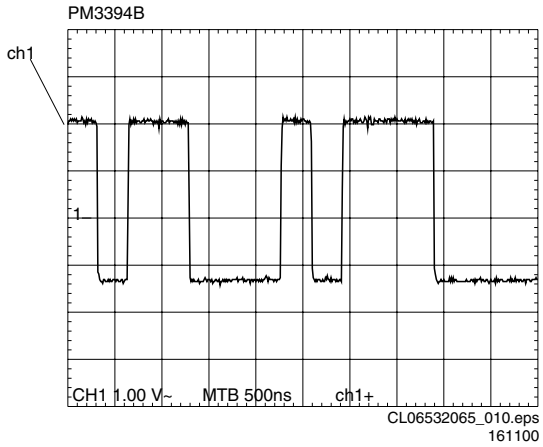


Figure 5-9 PCMDATA0-3

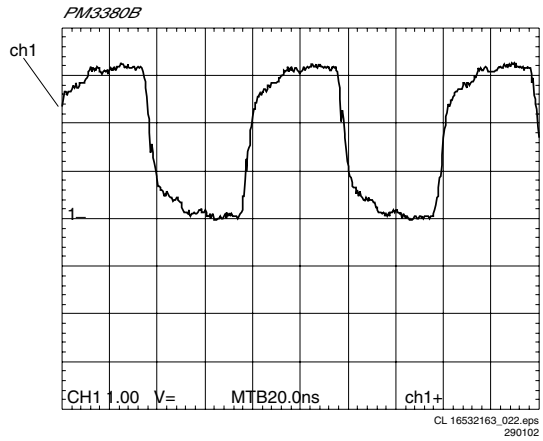


Figure 5-10 PCMCLK

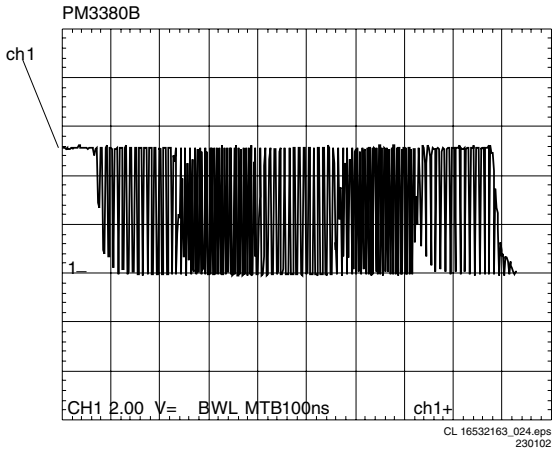


Figure 5-11 SPDIF

To switch the audio signal OFF, press the STOP button on the front.
Without A/V board, the switching levels are as follows:

- PCMDATA1 to PCMDATA3 only between low and high for pink noise. For sine, this is low.
- PCMDATA0, PCMLRCLK, PCMCLK and PCMSCLK switches between low and high for both pink noise and sine.
- SPDIF switches between LOW and HIGH

Alternatively, there is a check that can be done without A/V board.
First, let the decoder generate pink noise on the audio outputs.

Ref. #	Command Name	Remark
20a	AudioPinkNoiseOn	Audio Pinknoise On

Measure then these signals on level and frequency.

Signal	Level between	Frequency
PCMLRCLK	low/high	48kHz ± 0.02%
PCMSCLK	low/high	3.072MHz ± 0.02%
PCMCLK	low/high	12.288MHz ± 0.02%
PCMDATA0-3	low/high	N/A
SPDIF	low/high	N/A

Put the pink noise off:

Ref. #	Command Name	Remark
20b	AudioPinkNoiseOff	Audio Pinknoise Off

5.5 VIDEO

5.5.1 Video Output Check

Measure the DC voltages at all video-outputs at conn 1701 while the video signal is turned off: 1V ± 10%
Generate a color-bar via next software commands:

Ref. #	Command Name	Remark
23a	VideoColDencOn	Colourbar DENC ON
61a	VideoColOutRGB	RGB Colourbar
61b	VideoColOutYUV	YUV Colourbar
23b	VideoColDencOff	Colourbar DENC OFF

Check video output at the next testpoints:

Name	Testpoint	Waveform
R_VID	T795	Refer to Figure 5-12
G_VID	T796	Refer to Figure 5-13
B_VID	T799	Refer to Figure 5-14
CVBS	F788	Refer to Figure 5-15
C_VID	F791	Refer to Figure 5-16
Y_VID	F792/F796	Refer to Figure 5-17
V_VID	T795	Refer to Figure 5-18
U_VID	F799	Refer to Figure 5-20

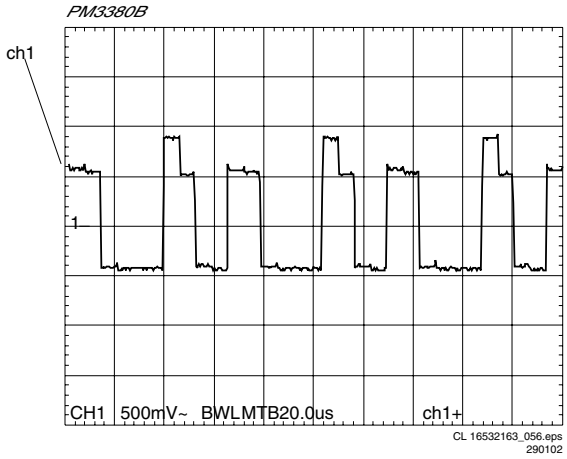


Figure 5-12 R_VID

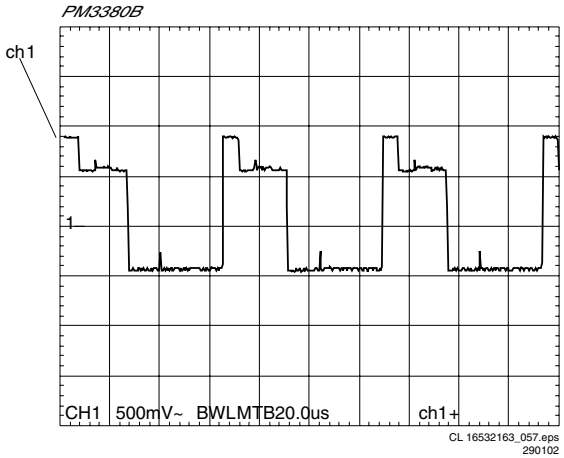


Figure 5-13 G_VID

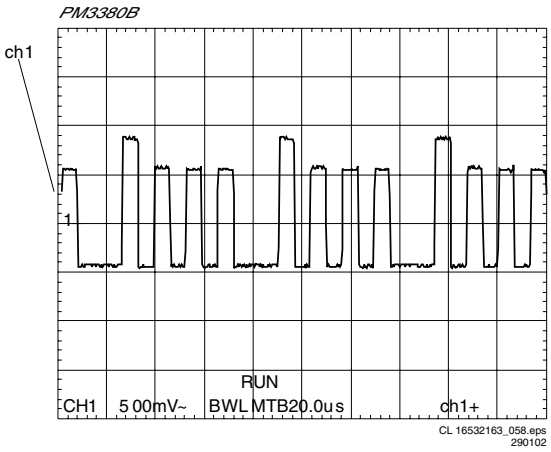


Figure 5-14 B_VID

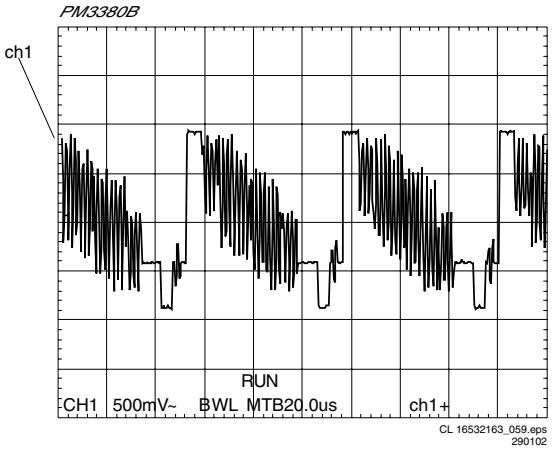


Figure 5-15 CVBS

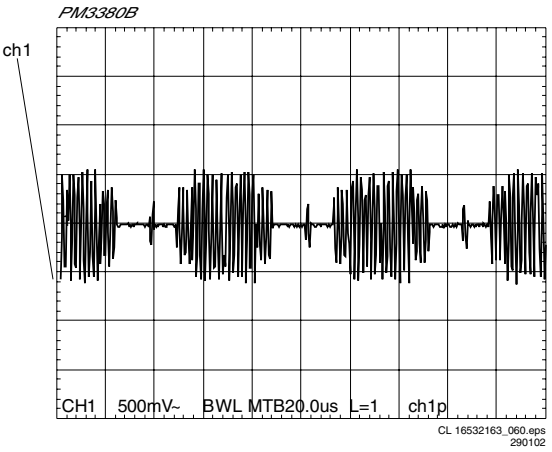


Figure 5-16 C_VID

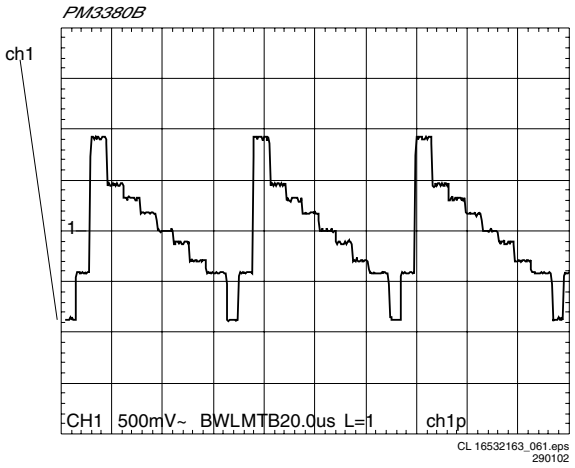


Figure 5-17 Y_VID

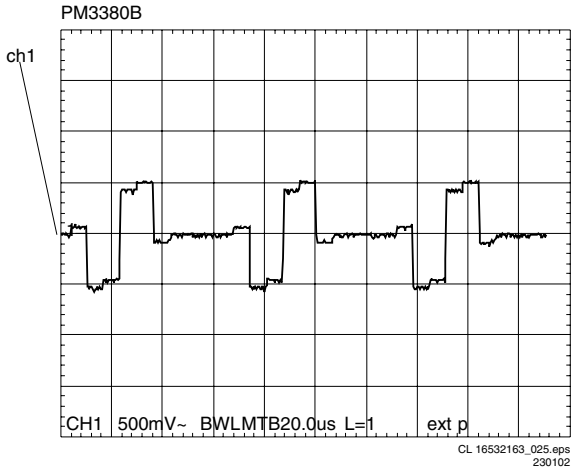


Figure 5-18 V_VID

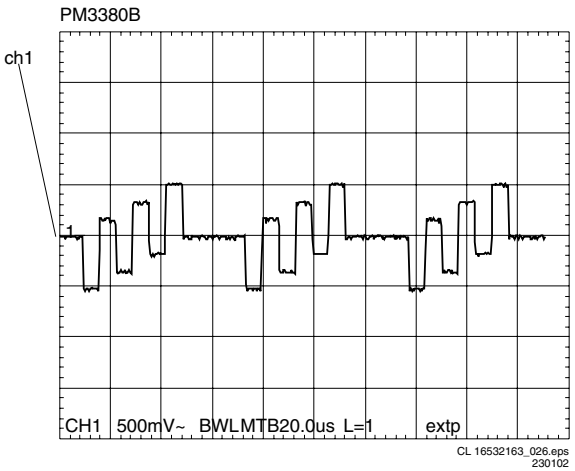


Figure 5-19 U_VID

5.5.2 Slow Blanking Scart

An aditional part of the video-path is the scart function-switching test. The scart function-switching pin has three levels which depend on the level of the output ports SCART0 and SCART1. These latter two signals are driven by the output pins PIO3.6 and PIO3.7 of the STi5580.

Check the level of SCART0 and SCART1 with the following commands:

Ref. #	Command Name	Scart0 (PIO3.6)	Scart1 (PIO3.7)	Level on Pin 8 of scart
25a	VideoScartLo	1	1	0-2V
25b	VideoScartMi	0	1	4.5-7V
25c	VideoScartHi	0	0	9.5-12V

5.5.3 Video Hsync Check.

To measure the Video Hsync, the connector 1703 must be connected to the external video processing device such as high quality progressive scan codex and high quality Video DAC, else there will not be any waveform. To check for the Hsync, the following commands can be used:

Ref. #	Command Name	Remark	Value	Waveform
23a	VideoColDencOn	ColourbarDENC ON	15.625 kHz 0.02% Vpeak-peak > 3V	Refer to Fig 5-20
61a	VideoColOutRGB	RGB Colourbar ON	15.625 kHz 0.02% Vpeak-peak > 3V	Refer to Fig 5-20
23b	VideoColDencOff	Colourbar DENC OFF	No measurements needed	

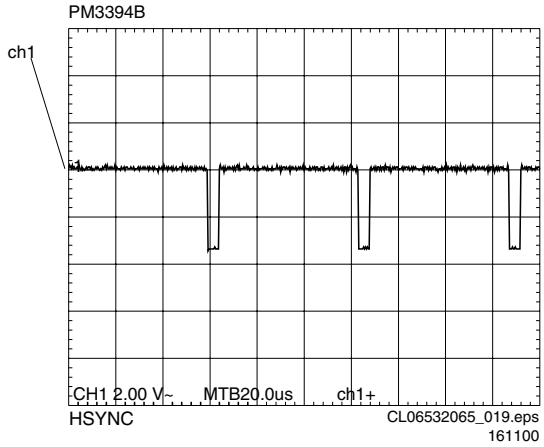


Figure 5-20 Video H Sync

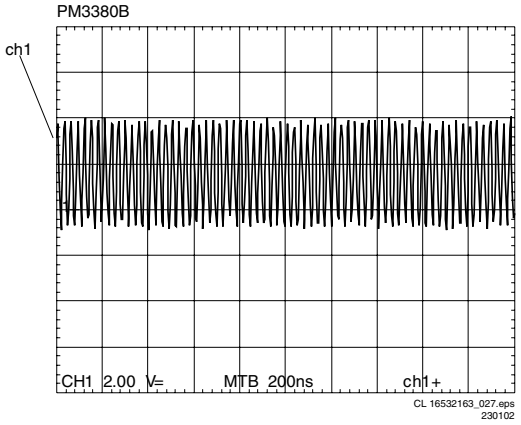


Figure 5-21 BCLKF

5.6 Servo

5.6.1 General Start-up Measurements:

Reset the Basic Engine part

Ref. #	Command Name	Remark
44	BeReset	Reset the Basic Engine

Check if the Servo Reset (RSTNF) at testpoint F258 goes from low to high after executing BeReset commands.

Check Vref

Name	Testpoint	Value
Vref	F178	2.5V ± 0.3V

Play DVD test Disc and check I2S interface

Name	Testpoint	Value	Value
BCLKF	F200	6.0 MHz ± 0.1	Refer to Figure 5-21
WCLKF	F201	high	Refer to Figure 5-23
DATAF	F202	low	Refer to Figure 5-22
FLAGF	F203	low	No waveform
V4F	F255	low	No waveform
SYNCF	F256	low	No waveform

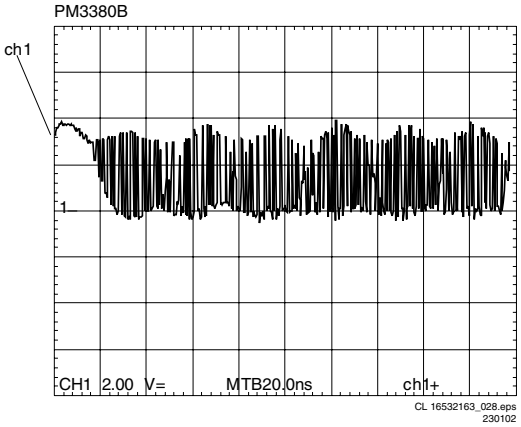


Figure 5-22 DATAF

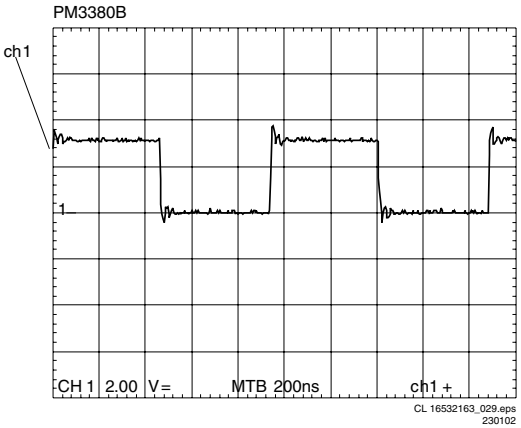


Figure 5-23 WCLKF

5.6.2 Spindle Motor:

Before switching on the discmotor, check the following testpoints:

Name	Testpoint	Value
STDBY_MOTOR	F308	low
MOTO1	F206	1V5 ±0.3

Switch the Discmotor ON/OFF with the following commands:

Ref. #	Command Name	Remark
39a	BeDiscmotorOn	Discmotor on
39b	BeDiscmotorOff	Discmotor off

Check the following signals with the discmotor switched ON and without DVD Disc inserted.

Name	Testpoint	Frequency
STDBY_MOTOR	F308	high
MOTO1	I351	4Vpp ±0.5V (sinewave) Refer to Figure 5-24
A3	F301	Refer to Figure 5-25
A2	F302	Refer to Figure 5-25
A1	F303	Refer to Figure 5-25
T1	F210	Refer to Figure 5-26
T2	F211	Refer to Figure 5-26
T3	F212	Refer to Figure 5-26
H1+	F306	Refer to Figure 5-27
H1-	F304	Refer to Figure 5-27
H2+	F309	Refer to Figure 5-27
H2-	F305	Refer to Figure 5-27
H3+	F311	Refer to Figure 5-27
H3-	F313	Refer to Figure 5-27

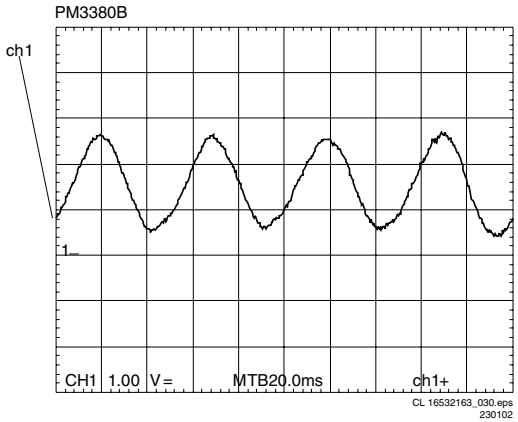


Figure 5-24 Motor 1

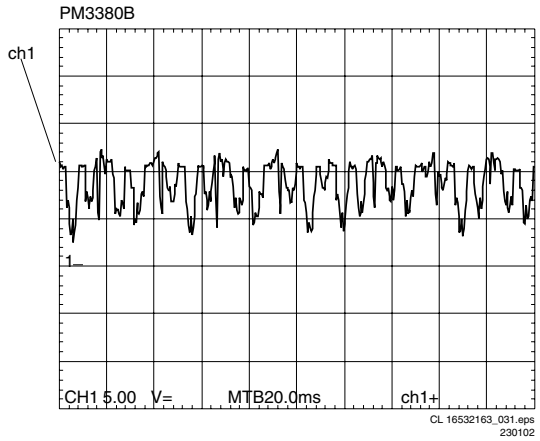


Figure 5-25 A1-A2-A3

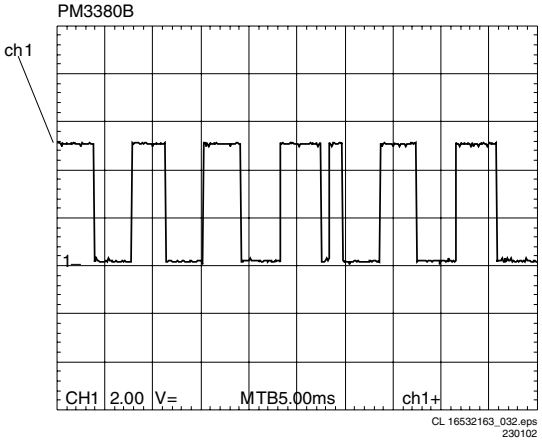


Figure 5-26 T1-T2-T3

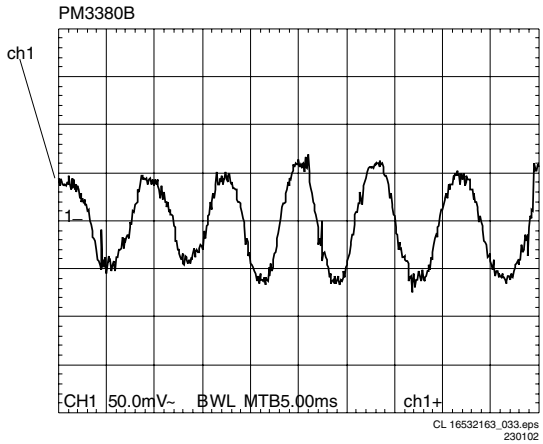


Figure 5-27 H1+ ; H1- ; H2+ ; H2- ; H3+ ; H3-

When measurement is completed, switch the discmotor OFF before executing next command

5.6.3 Radial

Radial ON will only work when the PCB is connected to a CDM and DVD Disc is inserted.
Switch the Radial control ON/OFF with the following commands:

Ref. #	Command Name	Remark
40a	BeRadialOn	Radial control on
40b	BeRadialOff	Radial control off

Check the following signals before Radial control ON/OFF

Name	Testpoint	Value (Radial ON)
Rad -	F132	4.3V ±0.5V
Rad +	F133	4.3V ±0.5V
RA	F218	Refer to Figure 5-29 and 5-30

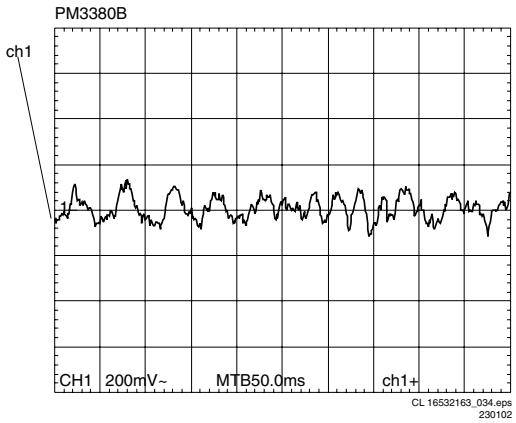


Figure 5-28 RAD+ / RAD- (BeRadialOn)

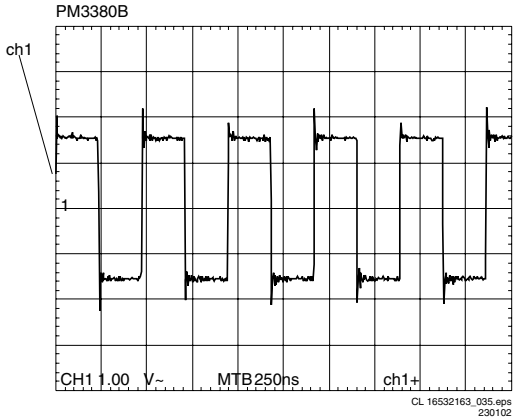


Figure 5-29 RA (BeRadialOff)

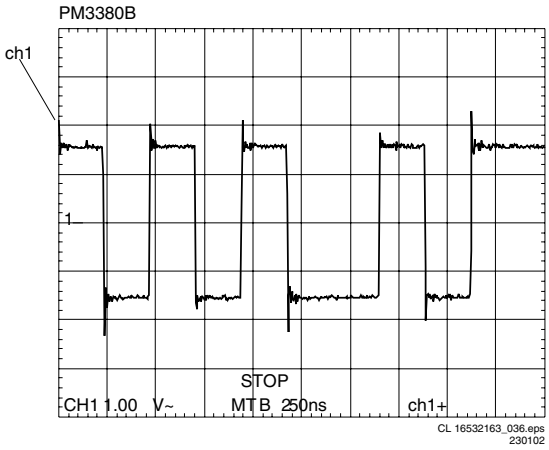


Figure 5-30 RA (BeRadialOn)

Visual check on the laser,when Radial control ON, if the laserlight is visible.
Once the check is completed,switch the Radial control OFF before executing next command

5.6.4 Sledge

Test need a DVD disc in the DVD player to operate properly.
Use the following commands to move the sledge:

Ref. #	Command Name	Remark
41a	BeSledgeIn	Sledge inwards
41b	BeSledgeOut	Sledge outwards

Check for the waveform (Figure 5-31) of SL at testpoint F219

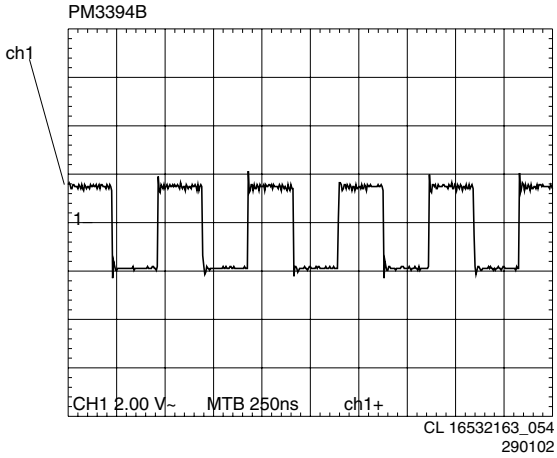


Figure 5-31 SL

Check DC vtg on the following testpoint when Sledge at Inward / Outward position

Name	Testpoint	Value
VOL -	F327	4.5V ±0.5V
VOL +	F326	4.5V ±0.5V

Measure peak to peak signal on VOL- and VOL+ while moving sledge outwards.
Signal will only appear momentary during command BeSledgeOut

Name	Testpoint	Value	Waveform
VOL -	F327	10Vpp ±0.5V	Refer to Figure 5-32
VOL +	F326	10Vpp ±0.5V	Refer to Figure 5-32

Measure input sledge control (sledge in HOME position)

Name	Testpoint	Value
SINPHI	F216	1.5V ±0.5V
COSPHI	F217	0.5V ±0.5V

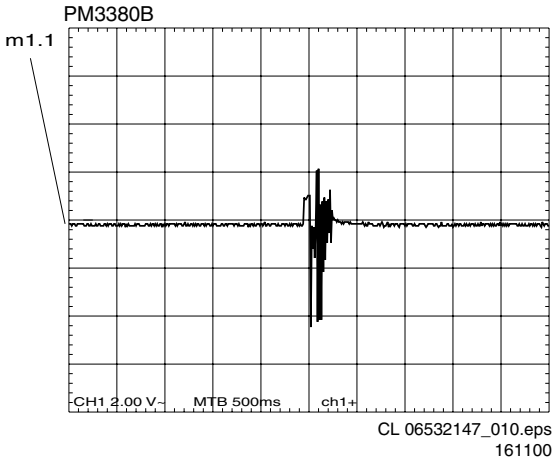


Figure 5-32 VOL+ / VOL- (SLEDGE OUTWARDS)

5.6.5 Tray:

To open and close the tray use the following commands:

Ref. #	Command Name	Remark
43a	BeTrayIn	Tray in
43b	BeTrayOut	Tray out

Measure voltage at the driver outputs of the BA5938FM for the tray closed.

Name	Testpoint	Value (Tray closed)
VO2 -	F340	4.3V ±2.0V
VO2 +	F338	4.3V ±2.0V

Measure voltage and waveform at driver outputs while the tray is opening.

Name	Testpoint	Value (Tray opening)
VO2 -	F340	2.0V ±1.0V
VO2 +	F338	6.0V ±1.0V

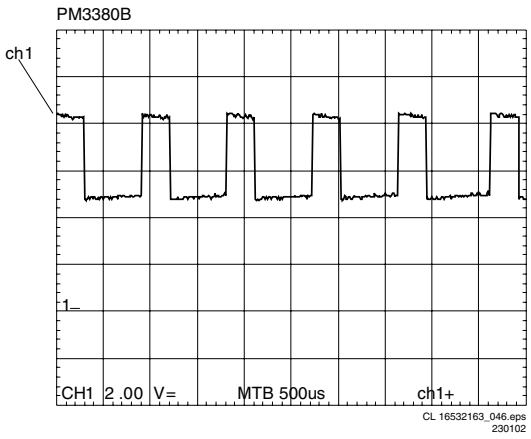


Figure 5-33 VO2-

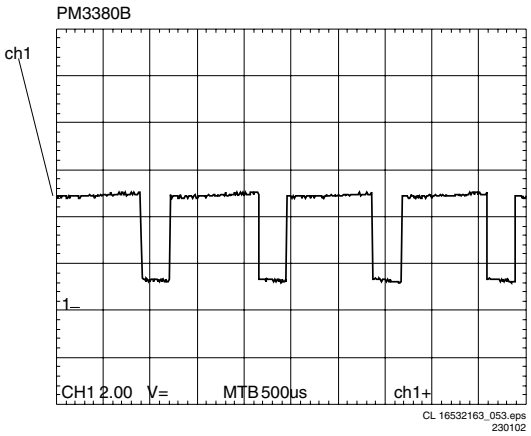


Figure 5-34 VO2+

5.6.6 Focus

Test need a DVD disc in the DVD player to operate properly.
To switch the Focus motor on/off, use the following commands:

Ref. #	Command Name	Remark
38a	BeFocusOn	Focus on
38b	BefocusOff	Focus off

Measure the driver outputs of the BA5938FM for the Focus OFF.

Name	Testpoint	Value (Focus OFF)
FOC -	F134	5V ±0.5V
FOC +	F130	5V ±0.5V
FO	F220	1.5V ±0.3V

Switch the focus ON and measure again the driver outputs

Name	Testpoint	Value	Waveform
FOC -	F134	1Vpp ±0.2V	Refer to Figure 5-35
FOC +	F130	1Vpp ±0.2V	Refer to Figure 5-35
FO	F220		Refer to Figure 5-37

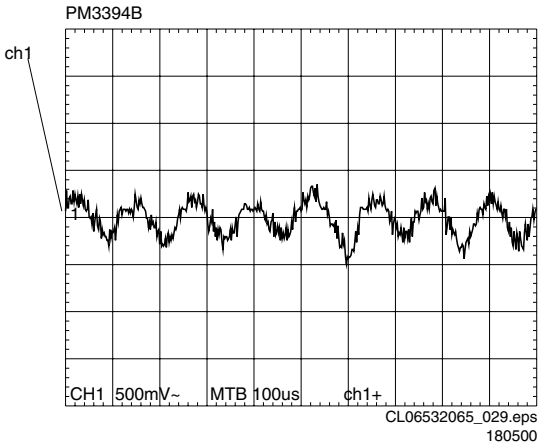


Figure 5-35 FOC+ (BefocusOn)

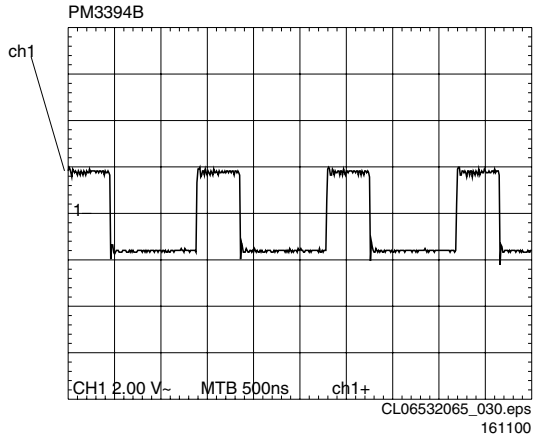


Figure 5-36 FO (BefocusOff)

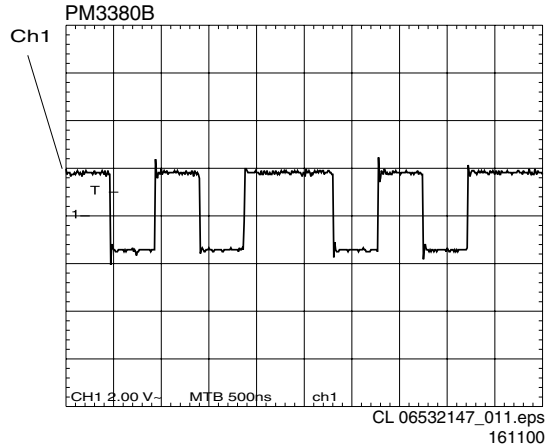


Figure 5-37 FO (BefocusOn)

Visual check on the laser,when Focus control ON, if the laserlight is visible.
Once the check is completed,switch the focus control OFF before executing next command.

5.6.7 Hf Path

Play DVD Test Disc.
Measure outputs of diodes Ax, B, C, D, E, F.

Name	Testpoint	Value
Ax	F119	2.6V ±0.2%
B	F127	2.6V ±0.2%
C	F124	2.6V ±0.2%
D	F122	2.6V ±0.2%
E	F115	2.6V ±0.2%
F	F117	2.6V ±0.2%

At outputs of diodes A, B, C, D the following waveform can be measured : Refer to Figure 5-38

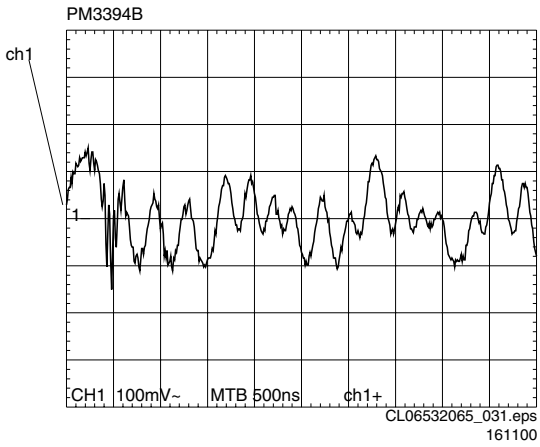


Figure 5-38 Output of diodes A,B,C,D

Measure DVDALAS outputs

Name	Testpoint	Value
OA	F104	1V ±10%
OB	F107	1V ±10%
OC	F108	1V ±10%
OD	F110	1V ±10%
S1	F113	1V ±10%
S2	F112	1V ±10%

At output HFN, the following waveform can be measured : Refer to Figure 5-39

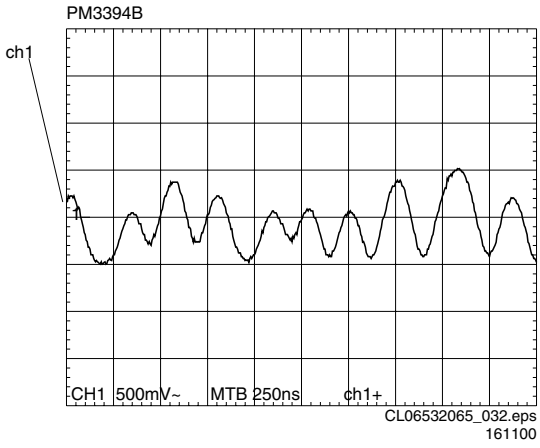


Figure 5-39 HFN / HFP

5.7 Diagnostic Software Description

5.7.1 Introduction

Purpose
This document describes all interfaces from the outside world to the diagnostic software, what is needed to use these interfaces and how to access them.

Scope
This document has been realised within the framework of the product development of the second generation DVD video player. This player forms the basis for future DVD developments as described in the DVDv2 Overall Project Management Plan.

5.7.2 Definitions and Abbreviations

Definitions

Control PC	Automatic test equipment, part of the production control system in the factory, to control the execution of Diagnostic Nuclei in the DVD player.
Diagnostic Nucleus	Part of the Diagnostic Software. Each nucleus contains an atomic and software independent diagnostic test, testing a functional part of the DVD player hardware on component level.
Script	Part of the Diagnostic Software. Each script contains a sequence of Diagnostic Nuclei to be executed.
Service PC	PC used by a service- or repair-person to communicate with the Diagnostic Software in the DVD player.

Abbreviations

FDS	Full Diagnostic Software

5.8 Overview of Interfaces

The table below shows an overview of the user interfaces of the Diagnostic Software. The table is based on logical interface, interfaces as seen from user perspective. A logical interface can use one or more physical interface components. The DVD has only a single RS232 port, implying that all interfaces using this port are mutually exclusive.

Logical Interface	Description	Physical interface components
Menu Interface	Menu-driven activation of individual nuclei, used for Level 2/ Second Line diagnostic mode. Users are service or repair people	Service PC running a terminal emulation program, connected to the RS232 port of the DVD player Test pin
Command Line Interface	Used during Level 1 diagnostic mode. Used to send commands from the Control PC into the DVD hardware.	Control PC, running a control program (e.g. Asterix), connected to RS232 port of the DVD player Test pin
Script Interface	Used to execute Player Test Script (including reading the error log) and Dealer Test Script.	Local keyboard Local display
S2B interface	Used for S2B communication with the Basic Engine	Service PC, running a S2B monitor program, connected to the RS232 port of DVD player Test pin
Download Interface	Used to download diagnostic software into the DVD player	Service PC running a terminal emulation program, connected to the RS232 port of the DVD player Test pin

In the next chapters the logical user interfaces are described in more detail including the exact use of the physical interface components.

5.9 Description of Interfaces

5.9.1 Menu Interface

The menu interface is part of the Level 2 / Second Line diagnostic mode. Via the menu interface it is possible to control the execution of the Diagnostic Nuclei.

Set-up Physical Interface Components
Hardware required:
- Service PC
- one free COM port on the Service PC
- special cable to connect DVD player to Service PC

The service PC must have a terminal emulation program (e.g. OS2 WarpTerminal or Procomm /Windows Hyperterminal) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD player. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).

Activation
Switch the player on and the following text will appear on the screen of the terminal (program):

```
DVDv4 Diagnostic Software version 4.03


SDRAM Interconnection test passed
Basic SDRAM test passed
Front Panel Processor: SLAVE4

(M)enu, (C)ommand, (F)lash Iguana or (S)2B interface ? [M]:@ m

Press ENTER to go to Main Menu

CC: >
MAIN MENU
Select>
```

CL 16532163_037.eps
230102

1. The first line indicates that the Diagnostic software has been activated and contains the version number of the diagnostic; this is also an indication that the first basic nucleus (nucleus number 1) has been executed succesfully.
2. The second line indicates the results of the shared SDRAM Interconnection test.
3. The third line indicates the results ofthe shared SDRAM read/write test.
4. The fourth line indicates what front panel processor was connected to the monoboard. It could be one of the following: SLAVE 2, SLAVE 3, SLAVE 4, or Not Detected.
5. The last line is the prompt asking the user to choose the interface format. If the menu interface is chosen, the main

menu will then appear. For the layout of the menus, see chapter “Layout of Menu and Submenu”.

To switch between interfaces, the DVD player needs to be switched off and on again.

Note1: For player that has no Mechanical power switch, it can be turned on/off by connecting the power-cable.

Note2: The Dram tests are no longer executed because the player has no DRAM .

Usage
To select, type the number of the chosen menu-item at the prompt. Each entry must be terminated with a <RETURN>. Invalid selections will cause an error message by the Menu Handler.
Example:

```
Select > 99
Invalid menu choice, number out of range ER @
Press RETURN to continue … @
```

CL 16532163_038.eps
230102

Result and output of an activated (and terminated) nucleus will be sent back to the service terminal. **Example:**

```
Select > 3
1601 Data line X is not connected to the SDRAM ER @
Press RETURN to continue … @
```

CL 16532163_039.eps
230102

After the user presses a key, the current menu is rebuilt on screen.
Pressing “RETURN” at the prompt without any further input at the terminal will always rebuild the main menu.

Termination
The menu interface is terminated by switching off the DVD player.

5.9.2 Command Line Interface

The command line interface is part of level 1 diagnostic mode. Via a command line interface the execution of Diagnostic Nuclei can be controlled.

Set-up Physical Interface Components
Hardware required:
- Control PC
- one free COM port on the Control PC
- special cable to connect DVD player to the Control PC

The control PC must use the following port settings for the used COM port: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The control PC is connected with a special cable to the RS232 port of the DVD player. Via the same connection the test pin will be connected to ground.

Activation
After power on the next text will sent to the control PC

```
DVDv4 Diagnostic Software version 4.03


SDRAM Interconnection test passed
Basic SDRAM test passed
Front Panel Processor: SLAVE4

(M)enu, (C)ommand, (F)lash Iguana or (S)2B interface ? [M]:@ C
DD: >
```

CL 16532163_040.eps
230102

The first line indicates that the Diagnostic software has been activated and contains the version number; this is also an indication that the first basic nucleus (nucleus number 1) has been executed succesfully. The next three lines are the succesful result of two subsequent basic tests (nuclei 2, 3, 4 and karaoke initialisation respectively);see [SDD_DN] for an explanation of these nuclei. If not all these messages appear on the terminal screen, then the related nucleus found an error. The fifth line lets the user choose between the two possible interface forms. The last line is the prompt ("DD>"). The diagnostic software is now ready to receive commands.

Note1: The DVDv2B player has no power-ON key, but should be turned on by connecting the power-cable.

Note2: When it is a player without DRAM, the DRAM tests are left out.

Usage
The commands that can be given are the numbers of the nuclei. A command must be terminated with a <RETURN> character from the control PC. When typing commands, the backspace key can be used to make corrections.
In case of typing errors in the command, an error message is returned. **Example:**

```
DD: > CompSdarmWrR?       (Nuclei name cannot be accepted)
0001 Unknown command ER @
DD: >
```

CL 16532163_041.eps
230102

If the command (the nucleus number) is recognised, the nucleus is executed. Result and output of an activated (and terminated) nucleus will be sent back to the control PC according to the standard layout.

Example for a command without error:

```
DD: > 16       (Execute CompSdramWrR nuclei)
1600 OK @
DD: >
```

CL 16532163_042.eps
230102

Example for a command with error:

```
DD: > 16
1601 Address line X not connected to the SDRAM @
DD: >
```

CL 16532163_043.eps
230102

Termination
The command line interface is terminated by switching off the DVD player.

5.9.3 S2B Interface

Set-up Physical Interface Components
Hardware needed:
- Control PC
- one free COM port on the Control PC
- special cable to connect DVD player to Control PC
- S2B monitor tool running on the Control PC

Activation
To start the S2B interface, connect the RS232 cable to the Control PC in the correct manner. Then start the PC, start the monitor tool and start the DVD player; turn off the monitor tool, turn on S2B monitor tool. The S2B monitor tool now takes all communication.
The S2B interface is activated by sending the bit pattern 110x xxxx with the first character to the DVD player, when the user is asked to choose an interface type. The command handler will then activate the S2B pass-through nucleus. The character sent will be passed to this nucleus without loss.

Note: The DVDv2B player has no power-ON key, but should be turned on by connecting the power-cable.

Termination
To terminate S2B pass-through mode, switch off the DVD player.

5.10 Script Interfaces

This interface is used during execution of the Player Script and the Dealer Script to display output and error messages on the local display of the stand-alone DVD player.

The activation and the usage can refer to the respective stand-alone DVD player service manual

5.10.1 Layout of Menu and Submenu

Layout Of Menus And Submenus For The Service Terminal
NOTE: a symbol "--" in the menu layouts indicates that that specific menu choice will invoke the display of a submenu. This symbol will also be used in the implementation of the menus (i.e. the "--" will also appear in the user interface).

Menus

MAIN MENU
1 Audio...
2 Video...
3 Front Panel...
4 Basic Engine...
5 Processor Peripherals...
6 Error Log...
7 Miscellaneous...

First Level Submenus

MAIN > AUDIO MENU
1 Mute...
2 Pink Noise...
3 Sine Wave...
4 Digital Ports...

MAIN > VIDEO MENU
1 Colourbar...
2 Scart...
3 Digital Port...

MAIN > FRONT PANEL MENU
1 Slave Processor...
2 VFT Display [30a]
3 LCD Display [30b]
4 LCD BkLight [30c]
5 Keyboard [27]
6 LEDs [29]
7 Remote Control [28]
8 P50 Check [60]

MAIN > BASIC ENGINE MENU
1 Reset [44]
2 Version [37]
3 S2B...
4 Loader Mechanism...
5 Special Diagnostics...

MAIN > PROCESSOR PERIPHERALS MENU
1 Clock...
2 Flash...
3 NVRAM...
4 SDRAM Write/Read [16]

MAIN > ERROR LOG MENU
1 Read Last Errors [31]
2 Read Error Bits [32]
3 Reset Error Log [33]

MAIN > MISCELLANEOUS MENU
1 Statistics Info...
2 Read DVD Application version [46]

Second Level Submenus

MAIN > AUDIO > MUTE MENU
1 Mute On [19a]
2 Mute Off [19b]

MAIN > AUDIO > PINK NOISE MENU
1 Pink Noise On [20a]
2 Pink Noise Off [20b]

MAIN > AUDIO > SINE WAVE MENU
1 Audio Sine On [21a]
2 Audio Burst On [21b]

MAIN > AUDIO > DIGITAL PORTS MENU
1 LFE_SEL High [56a]
2 LFE_SEL Low [56b]

MAIN > VIDEO > COLOURBAR MENU
1 Colourbar DENC On (PAL) [23a]
2 Colourbar DENC On (NTSC) [23c]
3 Colourbar DENC/MPEG Off [23b]
4 ProgressiveScan MPEG On [24a]
5 Enhanced YUV MPEG On [24b]
6 Set Video Out To RGB [61a]
7 Set Video Out To YUV [61b]

MAIN > VIDEO > SCART MENU
1 I2C Scart IC Check [54]
2 Scart To DVD [55a]
3 Scart Pass Through [55b]
4 Scart Pin 8 Low (0 to 2)V [25a]
5 Scart Pin 8 Mid (4.5 to 7)V [25b]
6 Scart Pin 8 Hi(9.5 to 12)V [25c]

MAIN > VIDEO > DIGITAL PORT MENU
1 Video Port Out 0xAA [17a]
2 Video Port Out 0x55 [17b]

MAIN > FRONT PANEL > SLAVE PROCESSOR MENU
1 Bus Comms Check [12]
2 S/W Version [26]

MAIN > BASIC ENGINE > S2B MENU
1 S2B Echo [13]
2 S2B Pass-Through [14]

MAIN > BASIC ENGINE > MECHANISM MENU
1 Disc Motor...
2 Laser...
3 Tray...
4 Focus...
5 Radial...
6 Sledge...
7 Grooves...

MAIN > BASIC ENGINE > SPECIAL DIAGNOSTICS MENU
1 Read FlashID [70]
2 ROM Checksum [71]

MAIN > PROCESSOR PERIPHERALS > PCM CLOCK MENU
1 PCM_CLK In CDDA Mode (11.3MHz) [8a]
2 PCM_CLK In DVD Mode (12.3MHz) [8b]
3 PCM_CLK In DVD96kHz Mode (24.6MHz) [8c]

MAIN > PROCESSOR PERIPHERALS > FLASH MENU
1 Verify FLASH Checksum [6]
2 Show FLASH Checksum [62]
3 Flash Write Access [10]

MAIN > PROCESSOR PERIPHERALS > NVRAM MENU
1 NVRAM Config [34]
2 NVRAM Reset [35]
3 NVRAM Modify [36]
4 NVRAM Read/Wr Test [15]

MAIN > MISCELLANEOUS > STATISTICS INFO MENU
1 Total Nr Of Times Tray Open [47a]
2 Total Time Power On [47b]
3 Total Play-Time CDDA & VCD [47c]
4 Total Play-Time DVD [47d]

Third level submenus

MAIN > BASIC ENGINE > MECHANISM > DISC MOTOR MENU
1 Disc Motor On [39a]
2 Disc Motor Off [39b]

MAIN > BASIC ENGINE > MECHANISM > LASER MENU
1 CD Laser On [58a]
2 CD Laser Off [58b]
3 DVD Laser On [58c]
4 DVD Laser Off [58d]

MAIN > BASIC ENGINE > MECHANISM > TRAY MENU
1 Tray Open [43b]
2 Tray Close [43a]

MAIN > BASIC ENGINE > MECHANISM > FOCUS MENU
1 Focus On [38a] (load DVD first)
2 Focus Off [38b]

MAIN > BASIC ENGINE > MECHANISM > RADIAL MENU
1 Radial Control On [40a] (load DVD first)
2 Radial Control Off [40b]

MAIN > BASIC ENGINE > MECHANISM > SLEDGE MENU
1 Sledge Inwards [41a]
2 Sledge Outwards [41b]

MAIN > BASIC ENGINE > MECHANISM > GROOVES (Uses DVD) MENU
1 Jump ToInside Grooves [42a]
2 Jump ToMiddle Grooves [42b]
3 Jump To Outside Grooves [42c

Screen Layout With Menus
When menus are used, no specific screen layout can be given: menu information will not be in a special format, except for the layout as mentioned in the previous paragraphs.

A typical menu session can look as follows:

```
DVDv4 Diagnostic Software version 4.03


SDRAM Interconnection test passed
Basic SDRAM test passed
Slave Processor: SLAVE2

(M)enu, (C)ommand or (S)2B interface ? [M]:@ <enter>

Press ENTER to go to main menu

CC: > <enter>

MAIN MENU

1. Audio ...
2. Video ...
3. Front Panel ...
4. Basic Engine ...
5. Processor Peripherals ...
6. Error Log ...
7. Miscellaneous ...

Select > 4 <enter>

MAIN > BASIC ENGINE MENU

1. Reset [44]
2. Version [37]
3. S2B
4. Loader Mechanism ...
5. Special Diagnostics ...

Press Enter to go to Main Menu

Select > 4 <enter>

MAIN > BASIC ENGINE > LOADER MECHANISM MENU

1. Disc Motor ...
2. Laser ...
3. Tray ...
4. Focus ...
5. Radial ...
6. Sledge ...
7. Grooves ...

Press Enter to go to Main Menu
```

CL 16532163_044.eps 230102

Depending on the height of the screen, the text will start scrolling off the top of the screen.

Layout Of Results Diagnostic Nuclei On Control/service Pc
Results returned from a Diagnostic Nucleus to the control/ service PC will have a maximum length of 300 characters and are terminated by a CR character (included in the string length) The result has the following layout
< number >< string > [OK I ER] @< CR >
The use of the "@" enables the Asterix system on the Control PC to parse the output string of each nucleus into a database.

< number > is a 4-digit decimal number padded with leading zeros if its value is less than 4 digits. The first two digits identify the generating nucleus (or goup of nuclei), the latter two digits indicate the error number.

< string > is a text string containing information about the result of the Diagnostic Nucleus.

< number > and < string > are defined in [SDD_DN] in the output sections of each Nucleus.
Examples:

```
1. 0001 Unknown command ER @
2. 3100 OK @
3. 0901 Data line X is not connected to the DRAM ER @
4. Device ID: 0x01
Manufac ID: 0xC2
7000 OK @
```

CL 16532163_045.eps
230102

5.11 Diagnostic Nuclei

Each nucleus contains an atomic and independent diagnostic test, testing a functional part of the DVD player hardware on component level. Each Nucleus returns a result message to its caller. Some tests (e.g. generating a colour bar) can only return an "OK" result. Internal communication will be done via a uniform interface between the diagnostic Engine, Scripts and the Diagnostic Nuclei.
The diagnostic Engine can only operate if a certain (minimal) set of hardware is functioning properly. To test this set of hardware, a set of basic diagnostic nuclei is embedded in the DVD player. Each basic diagnostic nucleus will only test that part of the hardware which is required for execution of the diagnostic Engine, e.g. a RAM test will only test that part of RAM that is used by the diagnostic engine. After the Diagnostic Engine is operational it is possible to do a full RAM diagnostic.
All basic diagnostic nuclei start with prefix 'Basic'.
In the overview each Diagnostic Nucleus consists of a reference number, a reference name and remarks. Reference number and name are coupled and one of them is enough for unique identification.

5.11.1 Basic Diagnostic Nuclei

Ref. #	Reference Name	Remark
1	BasicSpAcc	Serial port Access test/ initialization
2a	BasicInterconDram	Data and address bus Interconnection (only for development)
2b	BasicInterconSdram	Data and address bus interconnection
3	BasicDramWrR	DRAM Write Read (only for development)
4	BasicSdramWrR	SDRAM Write Read

5.11.2 Processor and Peripherals

Ref. #	Reference Name	Remark
6	PapChksFl	Checksum FLASH
8a	PapSgsAclkCdda	Internal PLL CLK in CD-DA mode
8b	PapSgsAclkDvd	Internal PLL CLK in DVD mode
8c	PapSgsAclkDvd96	Internal PLL CLK in DVD (96kHz) mode
10	PapFlashWrAcc	FLASH Write Access (only for development)
11	PapI2cNvram	I2C NVRAM access
12	PapI2cDisp	I2C Display PWB
13	PapS2bEcho	S2B Echo
14	PapS2bPass	S2B Pass-through
15	PapNvramWrR	NVRAM Write Read
62	PapChksSum	Show checksums stored in flash

5.11.3 Components

Ref. #	Reference Name	Remark
16	CompSdramWrR	SDRAM Write Read

5.11.4 Audio

Ref. #	Reference Name	Remark
18a	AudioDeemp0On AudioDeempOn (DVD2B)	Audio De-emphasis 0 On Audio De-emphasis On (DVDv2B)
18b	AudioDeemp0Off AudioDeempOff (DVD2B)	Audio De-emphasis 0 Off Audio De-emphasis Off (DVDv2B)
19a	AudioMuteOn	Audio Mute On
19b	AudioMuteOff	Audio Mute Off
20a	AudioPinkNoiseOn	Audio Pinknoise On
20b	AudioPinkNoiseOff	Audio Pinknoise Off
21a	AudioSineOn	Audio Sine signal On/Off
21b	AudioSineBurst	Audio Sine signal Burst
56a	AudioLfePortHigh	Set the LFE_SEL port to HIGH
56b	AudioLfePortLow	Set the LFE_SEL port to LOW

5.11.5 Video

Ref. #	Reference Name	Remark
17a	VidPortOutAA	Output the value 0XAA at the Digital Video Interface Port
17b	VidPortOut55	Output the value 0X55 at the Digital Video Interface Port
23a	VideoColDencOnPAL	Colourbar (PAL) DENC On
23b	VideoColDencOff	Colourbar DENC Off
23c	VideoColDencOnNTSC	Colourbar (NTSC) DENC On
24a	VideoProgMPEGon	Progressive - DigitalVideo Colour Bar ON
24b	VideoYuvMPEGon	Enhanced YUV- DigitalVideo Colour Bar
25a	VideoScartLo	Scart Low
25b	VideoScartMi	Scart Medium
25c	VideoScartHi	Scart High
54	VideoScartSwComm	Scart Switch communication
55a	VideoScartSwDvd	Scart Switch Dvd
55b	VideoScartSwPass	Scart Switch Pass-through
57a	VideoScartPinLo	PIO-pins as used in 2A for Scart-switching
57b	VideoScartPinMi	PIO-pins as used in 2A for Scart-switching
57c	VideoScartPinHi	PIO-pins as used in 2A for Scart-switching
61a	VideoColOutRGB (ST5508)	Output RGB from ST5508
61b	VideoColOutYUV (ST5508)	Output YUV from ST5508

5.11.6 DisplayPWB (slave processor)

Ref. #	Reference Name	Remark
26	DispVer	Version number
27	DispKeyb	Keyboard
28	DispRc	Remote Control
29	DispLed	LEDs
30a	DispDisplay	VFT Display test
30b	DispLCDisplay	LCD Display test
30c	DispLCDBkLight	LCD Backlight test
60	DispP50	P50 loopback test

5.11.7 Log (Error Logging In Nvram)

Ref. #	Reference Name	Remark
31	LogReadErr	Read last Errors
32	LogReadBits	Read errors Bits
33	LogReset	Reset

5.11.8 Miscellaneous

Ref. #	Reference Name	Remark
34	MiscReadConfig	Read Configuration area from NVRAM
35	MiscNvramReset	NVRAM Reset
36	MiscNvramMod	Modify NVRAM contents
46	MiscApplVer	Read version of application software
47a	MiscTrayOpenNr	Read the number of times the tray opened
47b	MiscPowerOnTime	Read the total time the player's power has been on
47c	MiscPlayTimeCddaVcd	Read the Playtime of CDDA and VCD discs
47d	MiscPlayTimeDvd	Read the Playtime of DVD discs

5.11.9 Basic Engine

Ref. #	Reference Name	Remark
37	BeVer	Version number
38a	BeFocusOn	Focus On
38b	BeFocusOff	Focus Off
39a	BeDiscmotorOn	Discmotor On
39b	BeDiscmotorOff	Discmotor Off
40a	BeRadialOn	Radial control On
40b	BeRadialOff	Radial control Off
41a	BeSledgeIn	Sledge Inwards
41b	BeSledgeOut	Sledge Outwards
42a	BeGroovesIn	jump Grooves to Inside
42b	BeGroovesMid	jump Grooves to Middle
42c	BeGroovesOut	jump Grooves to Outside
43a	BeTrayIn	Tray In
43b	BeTrayOut	Tray Out
44	BeReset	Reset Basic Engine
58a	LaserCdOn	CD Laser on
58b	LaserCdOff	CD Laser off
58c	LaserDvdOn	DVD Laser on
58d	LaserDvdOff	DVD Laser off
59	AudioDtsCheckComm	Check I2C communication with Motorola DSP chip

5.11.10 Karaoke

Ref. #	Reference Name	Remark
48a	KaraokeModeOff	Switch Karaoke mode off
48b	KaraokeModeOn	Switch Karaoke mode on
49	KaraokeMicInput	Check path from the microphone input to audio output
50a	KaraokeKeyOn	Set Karaoke Key to the maximum level (1200 cent)
50b	KaraokeKeyOff	Set Karaoke Key to flat octave (0 cent)
51a	KaraokeEchoOn	Set Echo Control fuction on
51b	KaraokeEchoOff	Set Echo Control function off

Note: A new Compair version for repair of the MONO boards will be developed.

5.12 Nuclei Error Codes

In the following tables the error description of the error codes will be described.

5.12.1 Audio Nuclei

Error code	Error text
1880	Test successful
1800	Test successful
1900	Test successful
1920	Test successful
2000	Test successful
2020	Test successful
2100	Test successful
5600	Test successful
5620	Test successful

5.12.2 Basic Engine Nuclei

Error code	Error text
3900	Test successful
3901	“Parity error from Basic Engine to Serial”
3902	“Unexpected response from Basic Engine”
3903	“Communication time-out error”
3904	“Basic Engine returned error number 0xXX”
3921	“Parity error from Basic Engine to Serial”
3922	“Unexpected response from Basic Engine”
3923	“Communication time-out error”
3924	“Basic Engine returned error number 0xXX”
3800	Test successful
3801	“Parity error from Basic Engine to Serial”
3802	“Unexpected response from Basic Engine”
3803	“Communication time-out error”
3804	“Basic Engine returned error number 0xXX”
3805	“Focus loop could not be closed”
3820	Test successful
3821	“Parity error from Basic Engine to Serial”
3822	“Unexpected response from Basic Engine”
3823	“Communication time-out error”
3824	“Basic Engine returned error number 0xXX”
4200	Test successful
4201	“Parity error from Basic Engine to Serial”
4202	“Unexpected response from Basic Engine”
4203	“Communication time-out error”
4204	“Basic Engine returned error number 0xXX”
4205	“Sledge could not be moved to home position”
4206	“Focus loop could not be closed”
4207	“Motor not on speed within time-out”
4208	“Radial loop could not be closed”
4209	“PLL could not lock in accessing or tracking state”
4210	“Subcode or sector information could not be read”
4211	“Requested subcode item could not be found”
4212	“TOC could not be read in time”
4213	“Seek could not be performed”
4220	Test successful
4221	“Parity error from Basic Engine to Serial”
4222	“Unexpected response from Basic Engine”
4223	“Communication time-out error”
4224	“Basic Engine returned error number 0xXX”
4225	“Sledge could not be moved to home position”
4226	“Focus loop could not be closed”
4227	“Motor not on speed within time-out”
4228	“Radial loop could not be closed”
4229	“PLL could not lock in accessing or tracking state”
4230	“Subcode or sector information could not be read”
4231	“Requested subcode item could not be found”
4232	“TOC could not be read in time”
4233	“Seek could not be performed”
4240	Test successful
4241	“Parity error from Basic Engine to Serial”
4242	“Unexpected response from Basic Engine”
4243	“Communication time-out error”
4244	“Basic Engine returned error number 0xXX”
4245	“Sledge could not be moved to home position”
4246	“Focus loop could not be closed”
4247	“Motor not on speed within time-out”
4248	“Radial loop could not be closed”
4249	“PLL could not lock in accessing or tracking state”
4250	“Subcode or sector information could not be read”
4251	“Requested subcode item could not be found”
4252	“TOC could not be read in time”
4253	“Seek could not be performed”
4000	Test successful
4001	“Parity error from Basic Engine to Serial”
4002	“Unexpected response from Basic Engine”
4003	“Communication time-out error”
4004	“Basic Engine returned error number 0xXX”
4005	“Radial loop could not be closed”
4020	Test successful
4021	“Parity error from Basic Engine to Serial”
4022	“Unexpected response from Basic Engine”
4023	“Communication time-out error”
4024	“Basic Engine returned error number 0xXX”
4400	Test successful
4401	Test successful
4100	Test successful
4101	“Parity error from Basic Engine to Serial”
4102	“Unexpected response from Basic Engine”
4103	“Communication time-out error”
4104	“Basic Engine returned error number XX”
4120	Test successful
4121	“Parity error from Basic Engine to Serial”
4122	“Unexpected response from Basic Engine”
4123	“Communication time-out error”
4124	“Basic Engine returned error number XX”
4300	Test successful
4301	“Parity error from Basic Engine to Serial”
4302	“Unexpected response from Basic Engine”
4303	“Communication time-out error”
4304	“Basic Engine returned error number 0xXX”
4320	Test successful
4321	“Parity error from Basic Engine to Serial”
4322	“Unexpected response from Basic Engine”
4323	“Communication time-out error”
4324	“Basic Engine returned error number 0xXX”
3700	“Version: X.Y.Z”
3701	“Parity error from Basic Engine to Serial”
3702	“Unexpected response from Basic Engine”
3703	“Communication time-out error”
3704	“Basic Engine returned error number 0xXX”
5800	Test successful

Error code	Error text
5820	Test successful
5840	Test successful
5860	Test successful
5801	"Unexpected response from Basic Engine"
7000	"Manuf. ID: <XX>" "Device ID: <YY>"
7001	"Comm Test Failed"
7002	"Load Cmd Failed"
7003	"Load Dat Failed"
7004	"Run Cmd Failed"
7100	"ROM Checksum: XXXX"
7101	"Comm Test Failed"
7102	"Load Cmd Failed"
7103	"Load Dat Failed"
7104	"Run Cmd Failed"

5.12.3 Display PWB Nuclei

Error code	Error text
3000	“Test successful”
3001	“Disp not responding”
3002	“Disp key no response”
3003	“One or more patterns not correct”
3004	“Disp type invalid”
3020	“Test successful”
3021	“Disp not responding”
3022	“Disp key no response”
3023	“One or more patterns not correct”
3040	“Test successful”
3041	“Disp not responding”
3042	“Disp key no response”
3043	“One or more patterns not correct”
2700	“Model name in wich the test is running”
2701	“Disp key no response”
2702	“Disp not responding”
2707	“Stop key not pressed”
2708	“Pause key not pressed”
2709	“Play key not pressed”
2710	“Open/close key not pressed”
2713	“Previous key not pressed”
2714	“Next key not pressed”
2715	“More than one key not pressed”
2716	" Audio key not pressed"
2900	“Test successful”
2901	“Slave not responding”
2902	“Slave keyboard not responding”
2903	“Standby led not working”
2800	“Test successful”
2801	“Slave display controller not responding”
2802	“Slave keyboard not responding”
2803	“No key press received from remote control”
2600	“The ROM version of the slave processor = 0xXX, and the internal ID = 0xYY”
2601	“I2c bus busy”
2602	“I2c bus not working“
6000	P50 test
6001	“No readback on P50”
6002	“Disp not responding “
6003	“P50 readback error”

5.12.4 Processor & Peripherals Nuclei

Error code	Error text
700	Test successful
720	Test successful
740	Test successful
600	"All checksums are correct"
601	“Following checksum is faulty: BootCode1 Checksum is 0xY2 and is not correct (must be 0xZ2)”
601	“This test is not available when stand-alone compiled”
6200	"Checksums = 0xA1, 0xB1, 0xC1, 0xD1"
6201	“This test is not available when stand-alone compiled”
1000	Test successful
1001	Test successful
1020	Test successful
1021	Test successful
1100	Test successful
1104	“NVRAM reply time-out”
1200	Test successful
1202	“Slave bus not working”
1203	“Slave controller not responding”
1204	“Slave response is not correct”
5900	Test successful
5901	“I2c bus busy”
5902	“I2c bus not working“
5904	“DTS chip response not correct”
1300	Test successful
1301	“Parity error from basic engine to serial”
1302	“Parity error from serial to basic engine”
1303	“No communication between serial and basic engine”
1304	“Communication time-out error”
1600	Test successful
1601	“The DVD SDRAM is faulty”

5.12.5 Log Nuclei

Error code	Error text
3100	"Show error log"
3101	"Error log is invalid"
3102	"Error log could not be read from NVRAM"
3103	"I2C bus busy before start"
3200	"Show error bit"
3201	"Error log is invalid"
3202	"I2C bus busy before start"

Error code	Error text
3203	"Error log could not be read from NVRAM"
3300	"Error log is cleared"
3301	"Error log could not be cleared"
3302	"I2C bus busy before start"

5.12.6 Miscellaneous Nuclei

Error code	Error text
3400	Test successful
3401	"The configuration data could not be read from NVRAM"
3402	"I2C bus busy before start"
3500	"NVRAM is cleared"
3501	"The NVRAM could not be reset."
3502	"I2C bus busy before start"
3600	"NVRAM contents updated."
	"NVRAM contents and configuration checksum updated."
3601	"NVRAM contents could not be updated."
3602	"I2C bus busy before start"
3603	"NVRAM contents could not be read"
3604	"NVRAM not accessible."
3605	"NVRAM checksum could not be updated."
1500	Test successful
1502	"NVRAM access time-out"
1504	"NVRAM fails"
5400	Test successful
5401	"I2c bus busy"
5402	"I2c bus not working"
5403	"Scart switch controller not responding"
5404	"Scart switch controller response not correct"
5500	Test successful
5501	"I2c bus busy"
5502	"I2c bus not working"
5520	Test successful
5521	"I2c bus busy"
5522	"I2c bus not working"
5523	"Scart switch controller not responding"
5200	Test successful
5201	"I2c bus busy"
5202	"I2c bus not working"
5300	Test successful
5301	"I2c bus busy"
5302	"I2c bus not working"
5320	Test successful
5321	"I2c bus busy"
5322	"I2c bus not working"
4700	"Number of times Tray went Open : XX"
4701	The total number of times tray went open could not be read from NVRAM.
4702	I2C bus busy before start

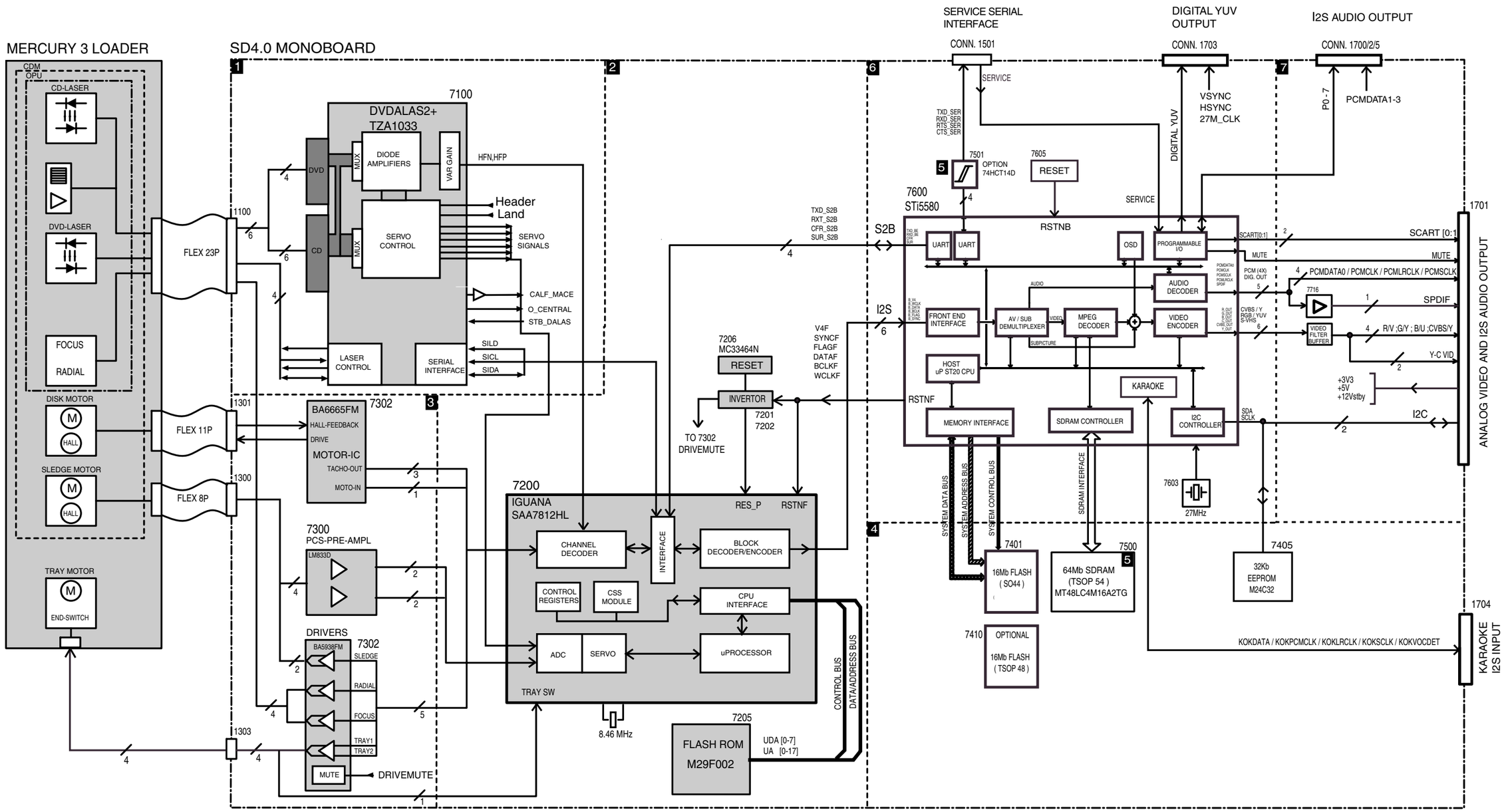
Error code	Error text
4720	"Total Power On time (minutes) : XX"
4721	The total power-on time could not be read from NVRAM.
4722	I2C bus busy before start
4740	"Total CDDA & VCD disks Play-time (minutes) : XX"
4741	The playtime of CDDA & VCD disks could not be read from NVRAM.
4742	I2C bus busy before start
4760	"Total DVD disks Play-time (minutes) : XX"
4761	The playtime of DVD disks could not be read from NVRAM.
4762	I2C bus busy before start
4600	"Version of Application Software : XX"
4601	"The application version could not be read from NVRAM."
4602	"I2C bus busy before start"

5.12.7 Video Nuclei

Error code	Error text
2300	Test successful
2320	Test successful
2340	Test successful
2400	Test successful
2401	"I2c bus busy"
2421	"I2c bus busy"
2441	"I2c bus busy"
2500	Test successful
2501	"I2c bus busy"
2502	"I2c bus not working"
2520	Test successful
2521	"I2c bus busy"
2522	"I2c bus not working"
2540	Test successful
2541	"I2c bus busy"
2542	"I2c bus not working"
6100	Test successful
6100	Test successful

6. Block Diagram

Block Diagram



CL 16532163_011.eps
030102

7. Electrical Diagrams and PWB's

Front-End Processor and Laser Supply - DVDalas2

M 1 Front-end processor and Laser supply - DVDalas 2

DVD-R OPTION

TO/FROM LOADER OPU

7100
TZA1033
DVDALAS2

THIS FUSIBLE RESISTOR IS NOT RELEASED AS A SAFETY COMPONENT.

* OPTION

V DC vtg measured in STOP-mode.

CL 16532163_001.eps
181201

1100 D1
2100 A10
2101 B9
2102 B2
2103 B5
2104 B9
2105 B11
2106 B3
2107 B3
2108 C9
2109 C10
2110 C8
2111 D11
2112 D2
2113 D3
2114 E8
2115 E12
2116 E8
2117 E12
2118 F8
2119 G11
2120 H6
2121 G9
2122 G10
2137 H7
3100 B3
3101 B2
3102 B4
3103 B6
3104 B10
3105 C2
3106 B4
3107 B9
3108 B10
3109 C2
3110 C6
3111 C4
3112 C6
3113 C3
3114 C3
3115 C5
3116 D12
3118 D12
3119 D12
3120 D12
3121 D3
3122 D12
3123 E12
3124 C6
3130 F7
3131 G7
3135 G11
3136 H7
3137 H7
3139 G10
3140 G10
3141 G3
3142 G2
3143 H3
3144 H4
3145 H2
3146 F12
3147 G4
5100 B12
5101 G9
5102 G11
6100 B3
6101 C3
7100 E9
7101-A B5
7103-A B2
7103-B C3
7104 B6
7107 C6
7109 G7
7111 G3
7112 H3
7113 H3
7208-A F12
F100 A13
F101 B13
F102 B13
F103 B11
F104 D13
F105 D1
F106 D2
F107 D13
F108 D13
F109 D2
F110 D13
F111 D2
F112 D13
F113 E13
F114 E2
F115 E2
F116 B10
F117 E2
F118 B10
F119 E2
F120 D11
F121 F12
F122 E2
F123 D11
F124 E2
F125 D11
F126 G6
F127 F2
F128 D11
F129 D11
F130 F2
F131 E11
F132 F2
F133 F2
F134 F2
F135 B9
F136 F9
F137 F9
F138 F9
F139 F10
F140 F10
F141 F10
F142 F10
F143 F10
F144 F11
F145 G2
F146 G13
F147 G2
F148 G3
F149 G3
F150 H4
F151 G2
F152 H2
F153 H3
F154 H3
F155 H4
F156 B3
F157 B2
F158 B3
F159 B2
F160 B4
F161 B6
F162 B6
F163 C4
F164 C4
F165 C5
F166 C3
F167 B6
F168 C6
F169 C3
F170 C6
F171 B7
F172 E11
F173 E11
F174 E11
F175 E11
F176 F11
F177 F11
F178 B8

Front-End Processor Iguana

M2 Front-end

PROCESSOR IGUANA

7200
SAA7812HL
IGUANA

FOR DEV EVALUATION

Decoupling Cap For 7200
(SAA7812HL IGUANA)

DC vtg measured in STOP-mode.

* OPTION

connection to ICE Interface

ICE Interface

SCRATCH DETECTOR OPTION

CL 16532163_002.eps
181201

1200 A2 3282 H3 T218 E14
1210 D1 5200 B2 T219 E13
2200 A7 5201 C2 T220 E14
2201 B7 5202 F1 T221 E13
2202 B3 5203 E11 T222 E14
2203 A7 5204 E11
2204 B7 7101-B G14
2205 C14 7200 E6
2206 C14 7201 B12
2207 D1 7202-A C13
2208 C2 7202-B B14
2209 B8 7203-A B10
2210 D1 7203-B C11
2211 D2 7204 B11
2212 B9 7205 E11
2213 E2 7206 A11
2214 E12 7208-B I14
2215 F1 7209 H13
2216 F2 F200 B4 T226 F14
2217 B8 F201 B4 T227 F13
2218 B9 F202 B4 T228 F14
2219 B7 F203 B3 T229 F13
2220 F2 F204 E3 T230 F14
2221 G2 F206 B3
2222 B8 F207 D2
2223 A7 F208 B2
2224 B7 F209 C2
2225 A7 F210 C3
2226 B8 F211 D3
2227 I1 F212 D3
2228 I2 F213 D2
2229 I2 F214 G3
2230 I2 F215 F2
2231 I2 F216 E3
2232 B9 F217 E3
2233 G9 F218 H4
2234 G9 F219 H4
2235 G9 F220 H4
2236 G8 F221 H4
2246 F9 F222 I4
2272 H13 F223 I6
3200 A4 F224 F8
3201 A5 F225 F8
3202 A4 F226 F3
3203 A5 F227 G1
3204 A4 F229 H2
3205 A5 F230 H2
3206 A4 F231 H2
3207 A5 F232 H2
3208 B4 F233 I2
3209 B5 F234 D8
3210 A6 F235 C8
3211 A6 F236 C4
3212 A6 F237 B4
3213 A6 F238 C4
3214 A6 F239 C4
3215 A6 F240 F9
3216 A6 F241 B3
3217 A6 F242 C11
3218 B6 F243 F9
3219 B4 F244 F9
3220 B6 F245 F8
3221 B6 F246 F8
3222 B13 F247 E11
3223 C9 F248 I11
3224 D9 F250 A11
3225 B4 F252 B10
3226-B E9 F253 C10
3227-D F8 F254 C11
3230 H3 F255 C9
3231 H3 F256 D9
3232 H3 F258 F9
3233 H3 F259 F9
3234 I6 F260 B12
3235 I4 F261 B14
3236 I6 F263 B11
3237 I7 F264 B12
3238 I4 F265 C12
3239 I4 F266 C14
3240 A11 F267 C13
3241 B3 F270 F1
3242-A B3 F271 G13
3243 D2 F272 G12
3244 E3 F273 H14
3245 H6 F274 H13
3246 F9 F275 H13
3247 F1 F276 H14
3249 I3 F277 I13
3250 A12 F278 H4
3251 B12 F279 H4
3252 B10 F280 B5
3253 B11 F281 B5
3254 B12 F282 B5
3255 C10 F283 B5
3256 C11 F284 B5
3257 C12 F285 B5
3258 C11 F286 B5
3259 C11 F287 B5
3260 H11 F288 B5
3261 B13 F289 B5
3262 B13 F290 B5
3263 C13 F291 I5
3264 C14 F292 I5
3265 C14 T201 D13
3268 H10 T202 D14
3269 H2 T203 D13
3271 H5 T204 D14
3272 H13 T205 D13
3273 H13 T206 D14
3274 I13 T207 D13
3275 I14 T208 D14
3276 I13 T209 E13
3277 I13 T210 E14
3278 G13 T211 E13
3279 G13 T212 E14
3280 I6 T213 E13
3281 H3 T214 E14
T215 E13 T223 F13
T216 E14 T224 F14
T217 E13 T225 F13

Front-End Loader Interface

M3 Front-end Loader Interface

TO/FROM LOADER DISC MOTOR CTRL

TO/FROM LOADER SLEDGE MOTOR CTRL

TO/FROM LOADER TRAY MOTOR

7301 BA6665FM

7302 BA5938FM

7300-A LM833D

7300-B LM833D

* OPTION

V. DC vtg measured in STOP-mode.

CL 16532163_003.eps
181201

1300 D1
1301 A1
1303 H1
2300 A8
2301 C3
2302 B10
2303 C11
2304 C10
2305 E7
2306 E7
2308 H9
2309 H12
2311 I2
2312 I2
2313 I2
3300 A11
3301 A9
3302 A9
3303 A9
3304 C3
3305 D2
3306 C4
3307 D2
3308 B2
3309 E4
3310 B12
3311 C11
3312 D3
3313 C2
3314 C10
3315 H10
3316 E3
3317 C12
3318 F3
3319 G10
3320 F9
3321 H10
3322 G9
3323 G9
3324 G5
3325 G6
3327 G10
3328 H10
3329 E12
3330 H2
3331 H9
3333 H10
3334 H12
3335 H9
3336 H12
3337 H9
3338 A9
6300 A11
6301 A11
6302 A11
6303 F11
6304 F11
6305 F12
7300-A D3
7300-B E3
7301 A7
7302 F7
F300 G6
F301 A1
F302 A1
F303 A1
F304 B1
F305 B1
F306 B1
F307 B1
F308 B9
F309 B1
F310 G5
F311 B1
F312 B9
F313 B1
F314 H9
F315 G9
F316 B9
F317 H9
F318 H11
F319 D1
F320 D1
F321 E1
F322 E1
F323 E1
F325 A9
F326 E1
F327 E1
F329 E10
F331 F9
F332 G9
F334 G9
F335 A10
F337 H1
F338 H1
F339 H9
F340 H1
F341 H9
F342 I7
F343 I7
F344 C1

Back-End Memory

M 4 Back end - MEMORY

2401 B7
2402 B4
2410 B10
2411 B12
2412 C10
2413 C12
2414 C10
2415 C12
2416 C12
2417 H14
3402 F1
3420 C12
3425 G13
3426 G13
3427 F8
3428 E1
3429 F1
5401 B2
7401 B3
7402 C10
7405 H13
7410 B7
F400 B3
F401 E3
F402 F3
F410 G13
F411 H14
F412 I14

SO44 OPTION

TSOP48 OPTION

SDM OPTION

TO M6 Back end - HOST PROCESSOR

Enhanced Memory Interface (EMI) Bus

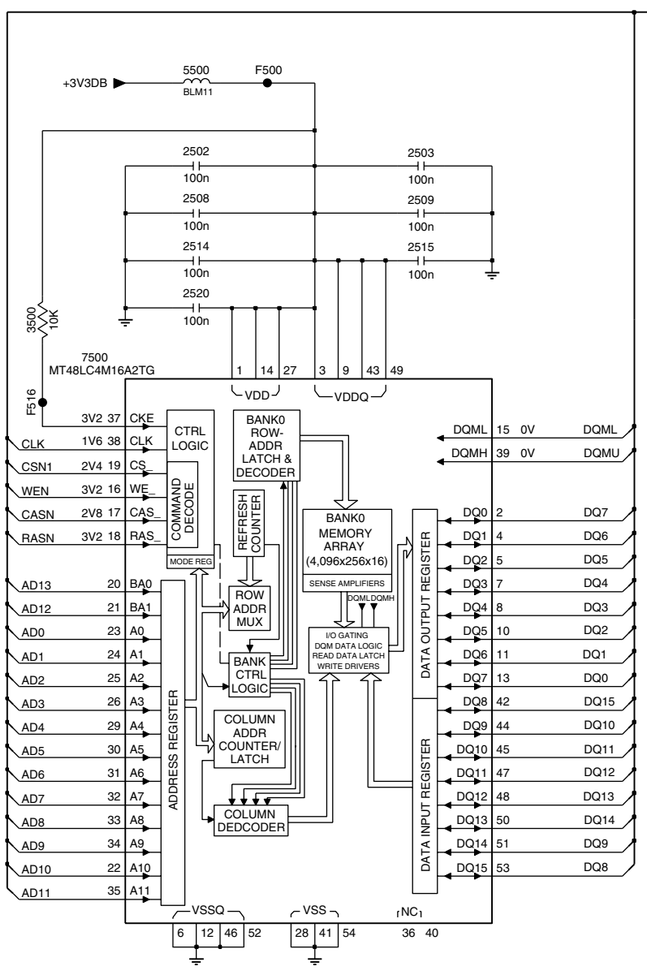
* OPTION

V DC vtg measured in STOP-mode.

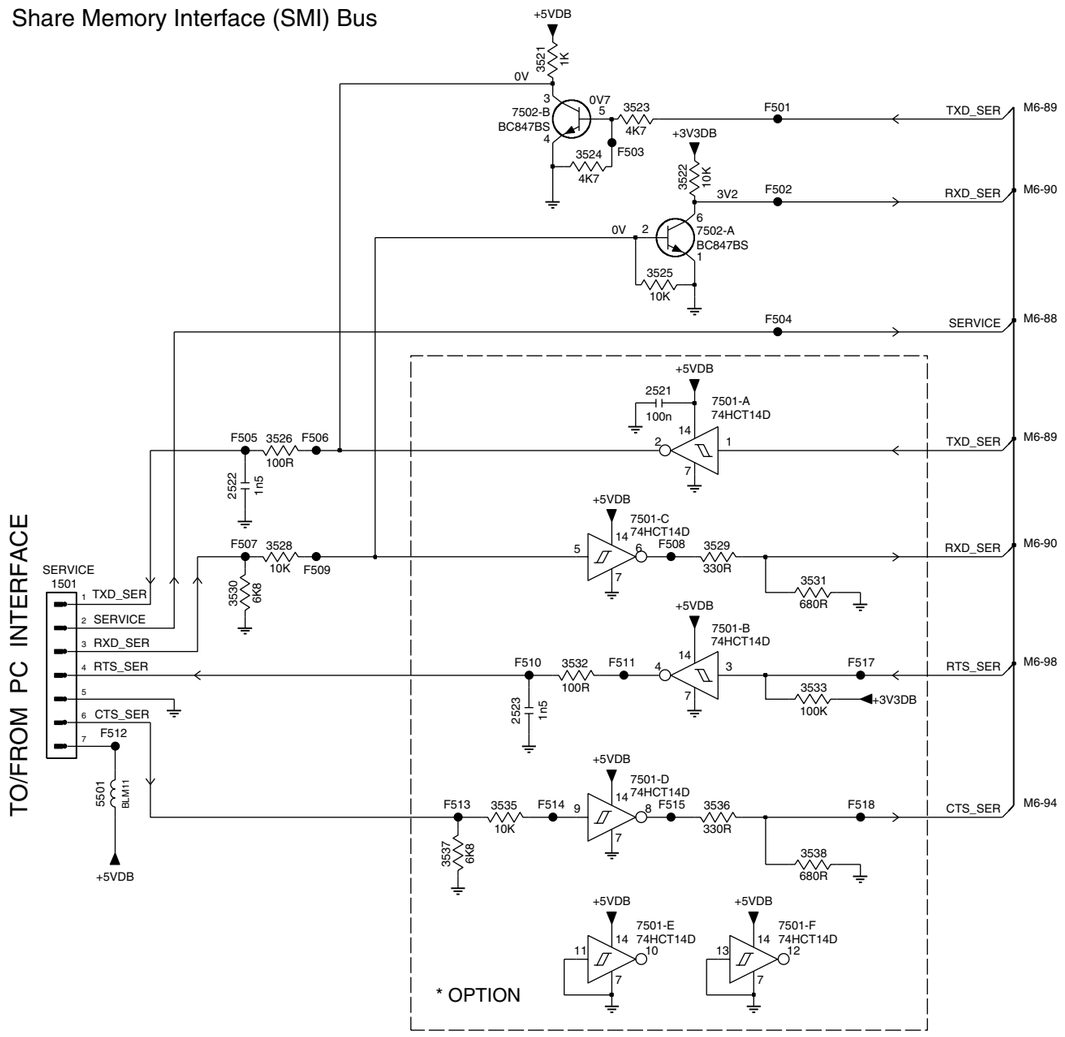
CL 16532163_004.eps
181201

Back-End SDRAM and Service Interface

M5 Back-end SDRAM and SERVICE INTERFACE



TO M6 Back-end HOST PROCESSOR
Share Memory Interface (SMI) Bus



* OPTION

V̲ DC vtg measured in STOP-mode.

CL 16532163_005.eps
181201

1501 E6
2502 B2
2503 B3
2508 B2
2509 B3
2514 C2
2515 C3
2520 C2
2521 D9
2522 D7
2523 F8
3500 C1
3521 B9
3522 B9
3523 B9
3524 B9
3525 C9
3526 D7
3528 E7
3529 E10
3530 E7
3531 E10
3532 E9
3533 E10
3535 F8
3536 F10
3537 F8
3538 F10
5500 A2
5501 F6
7500 C1
7501-A D10
7501-B E10
7501-C D9
7501-D F9
7501-E G9
7501-F G10
7502-A C9
7502-B B9
F500 A2
F501 B10
F502 B10
F503 B9
F504 C10
F505 D7
F506 D7
F507 E7
F508 E9
F509 E7
F510 E8
F511 E9
F512 F6
F513 F8
F514 F9
F515 F9
F516 C1
F517 E10
F518 F10

Back-End Host Processor

M6 Back end HOST PROCESSOR

TO M4 Backend Memory

EMI BUS

7600 STi5580

MEMORY interface

SYSTEM USE

PORT 0 I/O

PORT 1 I/O

PORT 2 I/O

PORT 3 I/O

PORT 4 I/O

JTAG

IRQ

uP ST20cpu

A/V/Sub demultiplexer

Audio

Video

Subpicture

MPEG DECODER

Subpicture decoder

FRONT-END Interface

I²S

SDRAM CONTROLLER

ADDRESS

DATA

AUDIO DECODER

AC3 LPCM MPEG1/2 DTS

KARAOKE

VIDEO ENCODER

OPTION

FOR DEV EVALUTION

DCU TESTLANDS

RES ARRAY

V DC vtg measured in STOP-mode.

* OPTION

To M5 Backend SDRAM and SERVICE INTERFACE

SMI BUS

CL 16532163_006.eps 181201

1600 C10
2603 B3
2604 B4
2605 B9
2606 C12
2607 C12
2608 C13
2609 C13
2610 B11
2611 F14
2612 F14
2613 E14
2614 F14
2616 I2
2617 I2
2618 I3
2619 I3
2620 I3
2621 I3
2622 I4
2623 I8
2624 I8
2625 I8
2626 I9
2627 I9
2628 I9
2629 I9
2630 I10
2631 I13
2632 I10
2633 I10
2634 I10
2635 I10
2636 D14
2637 D14
2638 G13
2639 G14
2640 H13
2641 H14
2642 B8
3600-D A9
3601 C11
3602 B6
3603 B6
3604 B4
3606 B9
3607-D B9
3608 A6
3609 A6
3611 B3
3614 B4
3615 C3
3618 B8
3619 A9
3620 B10
3621 A10
3622 D5
3625 B7
3627 C8
3628 C11
3629 C5
3630 B10
3631 C11
3632 D11
3633-A E13
3634 F1
3635 I7
3637 D13
3638 D13
3639 D13
3640-A F13
3641 B8
3644 I11
3645 I11
3646 I11
3647 I11
3648 I13
3657 C8
5601 C12
5602 C12
5603 H13
5604 I2
5605 H10
5606 I10
7600 D1
7603 I12
7605-A B3
7605-B B2
F600 B3
F601 C11
F602 C6
F603 C6
F604 C11
F605 D11
F606 D12
F607 D12
F608 I3
F610 H11
F611 H11
F612 H11
F613 H11
F614 I10
F615 I10
F616 I2
F617 C8
F618 B4
F619 B3
F621 E12
F622 E12
F623 E12
F624 F13
F625 F13
F626 F13
F627 F13
F628 F13
F629 F13
F630 F13
F631 F13
F637 C8
F641 G14
F642 G14
F643 G14
F644 G14
F645 G14
F646 G14
F647 D9
F648 D9
F649 D9
F650 D9
F651 D9
F652 D9
F653 D9
F654 D9
F655 B9
F656 B9
F900 B10
F901 B10
F902 B10
F903 B10
F904 B10
F905 B10
F906 B10
F907 B10

Back-End Module Interface

M 7 Back-end Module Interface

ANALOG VIDEO & I2S AUDIO OUTPUT

I2S AUDIO OUTPUT

I2S KARAOKE INPUT

DIGITAL VIDEO OUTPUT

OPTION

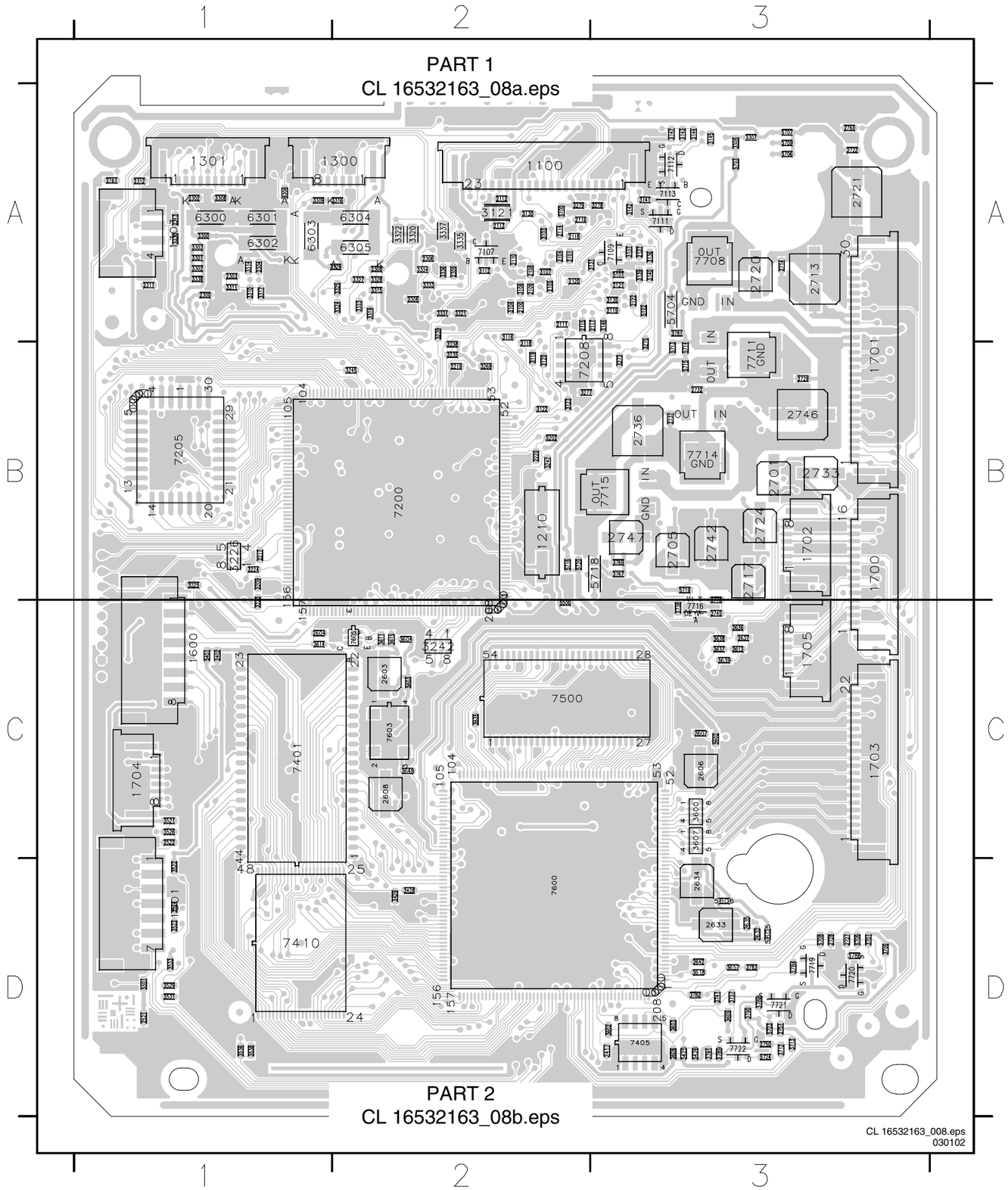
* OPTION

V DC vtg measured in STOP-mode.

CL 16532163_007.eps
181201

C58 H5	3753 I9	F736 F10
C59 H5	3755 D8	F737 F12
C60 H5	3756 D9	F738 F8
C61 H5	3757 D9	F739 F9
C63 H5	3758 D9	F740 A9
C64 H5	3759 D10	F741 A10
C65 H5	3760 E7	F742 F12
C66 H5	3761 E8	F743 A8
C67 H5	3762 E8	F744 B9
C68 I5	3763 E9	F745 I9
C70 H6	3765 G8	F746 I10
C71 H6	3766 G9	F748 I8
C72 H6	3767 E5	F749 I9
C73 H6	3768 G9	F750 D9
C74 H6	3769 E4	F751 D10
C75 H6	3770 G9	F752 E2
C76 H6	3771 G10	F753 D8
C77 H6	3772 H7	F754 E9
C78 H6	3773 H8	F755 G9
C79 I6	3774 H8	F756 G10
1700 A13	3775 H9	F758 G8
1701 C1	3776 H2	F759 H9
1702 A13	3781 F4	F760 H3
1703 F13	3782 A6	F761 A3
1704 E13	3783 A6	F762 F1
1705 C13	3784 A4	F763 G1
2700 C8	3785 A4	F764 C10
2701 C8	3788 D11	F766 F10
2702 C7	3789 D11	F768 A10
2703 C7	3790 C12	F770 I10
2704 F8	3791 D12	F772 D10
2705 F8	5700 C7	F774 G10
2706 F7	5701 F7	F775 A12
2707 F7	5702 A7	F776 A12
2708 D2	5703 F5	F777 A12
2711 D2	5704 F5	F778 B12
2713 G4	5705 B3	F779 B12
2714 G4	5706 G5	F780 A12
2716 A8	5707 G5	F781 C12
2717 A8	5708 A3	F782 C12
2718 B7	5709 G5	F783 B12
2719 B7	5710 I7	F784 B12
2720 F4	5711 G5	F785 F2
2721 G4	5713 B5	F786 F2
2722 G4	5714 C5	F787 F2
2723 I8	5715 C5	F788 E2
2724 I8	5716 C5	F790 H2
2725 I7	5717 D7	F791 E2
2726 I7	5718 D5	F792 E2
2727 B2	5719 H2	F795 E2
2728 A2	5720 E5	F796 D2
2729 C4	5722 G7	F798 F2
2731 D8	5723 D12	F799 D2
2732 C4	5724 D12	T701 A3
2733 D8	7701-A C9	T702 A5
2734 E7	7701-B C10	T703 B3
2735 E7	7705-A F9	T704 B5
2736 D4	7705-B F10	T711 F12
2737 D5	7707-A A9	T712 G2
2738 H2	7707-B A10	T713 G12
2739 G8	7708 F4	T714 G2
2742 G8	7710-A I9	T715 G12
2743 H7	7710-B I10	T716 G2
2744 H7	7711 C4	T717 G12
2745 H1	7713-A D9	T718 G2
2746 C4	7713-B D10	T719 G12
2747 E4	7714 D4	T720 H12
2750 D13	7715 D4	T721 H12
2751 D13	7716 H2	T722 H12
2760 H4	7718-A G9	T723 I12
2761 H4	7718-B G10	T724 I12
2762 H4	7719 A5	T725 I12
2763 I4	7720 B5	T726 C12
3701 A4	7721 C12	T727 D12
3702 B8	7722 D12	
3703 B9	C700 H4	
3704 C9	C701 H4	
3705 A4	C702 H4	
3706 C9	C703 I4	
3707 C10	F700 A8	
3708 C7	F701 C8	
3709 C8	F702 D8	
3710 C8	F703 F2	
3711 C9	F704 F8	
3712 B12	F705 G8	
3713 C12	F706 D2	
3715 E8	F707 E4	
3716 E9	F708 F2	
3718 F9	F709 F5	
3722 F9	F710 F6	
3723 F10	F711 F6	
3724 F7	F712 B3	
3725 F8	F713 I8	
3726 F8	F714 E12	
3727 F9	F715 G6	
3728 A8	F716 G1	
3729 A9	F717 G6	
3730 A9	F718 G6	
3731 A9	F719 G1	
3732 A10	F720 H2	
3733 B7	F721 G6	
3734 B8	F723 E12	
3735 B8	F724 B5	
3736 B9	F725 C5	
3737 B6	F726 C5	
3738 H8	F727 C5	
3739 H9	F728 D5	
3740 I9	F729 D5	
3741 A6	F730 C9	
3742 I9	F731 C10	
3743 I10	F732 E12	
3750 I7	F733 C8	
3751 I8	F734 C9	
3752 I8	F735 F9	

Top View (Overview)



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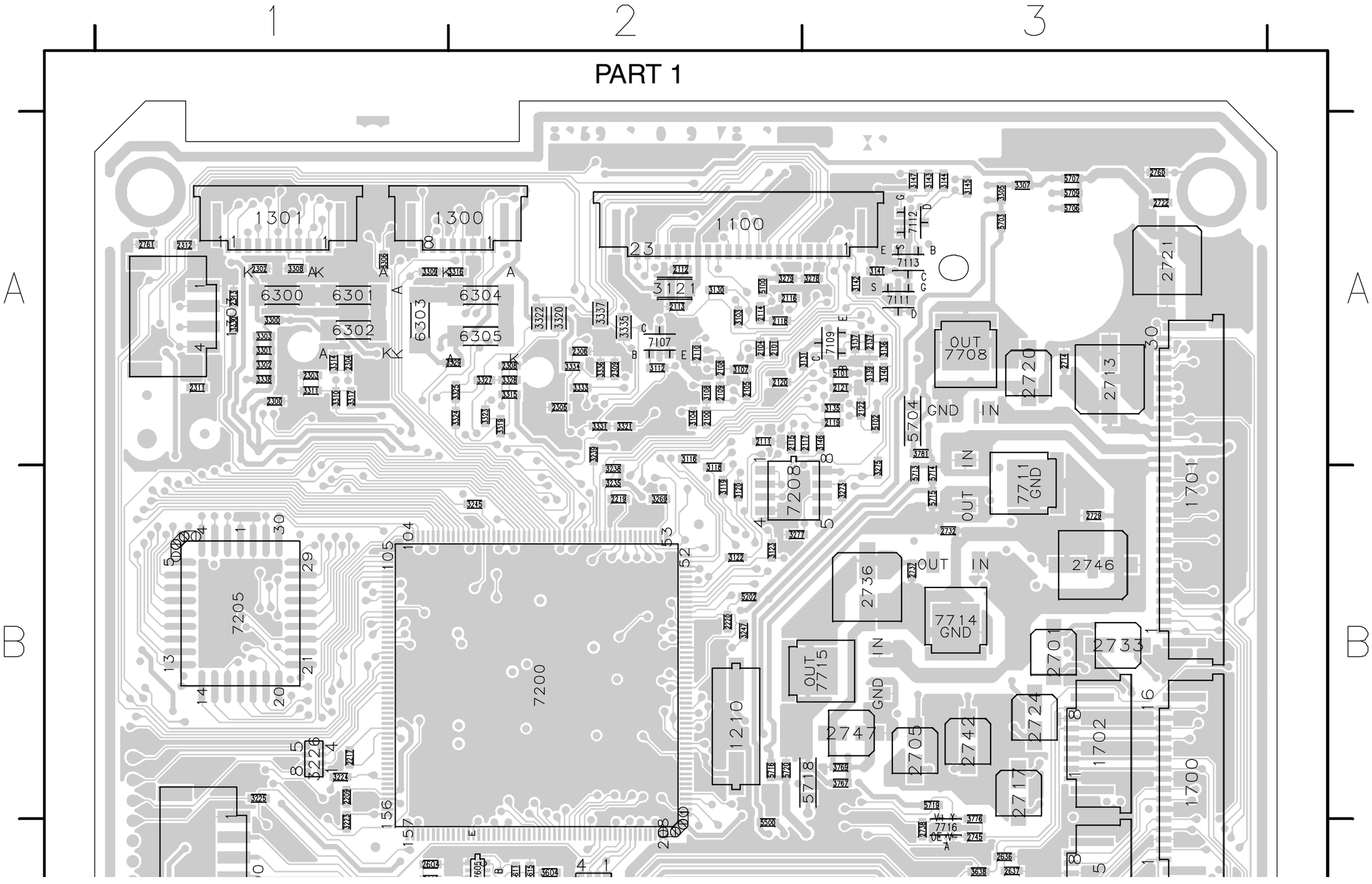
1210	B2	2721	A3	3310	A1	3789	D3
1300	A2	2722	A3	3311	A1	3790	D3
1301	A1	2724	B3	3314	A1	3791	D3
1303	A1	2727	D3	3315	A2	5100	A2
1501	D1	2728	D3	3316	A2	5101	A3
1600	C1	2729	B3	3317	A1	5102	A3
1700	B3	2732	B3	3319	A2	5202	B2
1701	B3	2733	B3	3320	A2	5401	C1
1702	B3	2736	B3	3321	A2	5500	C2
1703	C3	2737	B3	3322	A2	5501	D1
1704	C1	2738	C3	3323	A2	5602	C3
1705	C3	2742	B3	3324	A2	5603	C2
2100	A2	2745	C3	3325	A2	5605	D3
2101	A2	2746	B3	3327	A2	5606	D3
2104	A2	2747	B3	3328	A2	5703	A3
2105	A2	2750	D3	3329	A2	5704	A3
2108	A2	2751	D3	3330	A1	5705	D3
2109	A2	2760	A3	3331	A2	5706	A3
2110	A2	2761	A1	3333	A2	5707	A3
2111	A2	3103	A2	3334	A2	5708	D3
2112	A2	3104	A2	3335	A2	5709	A3
2113	A2	3107	A2	3336	A2	5713	B3
2114	A2	3108	A2	3337	A2	5714	B3
2115	A2	3112	A2	3338	A1	5715	B3
2116	A2	3116	A2	3425	D3	5716	B2
2117	A3	3118	B2	3426	D3	5718	B3
2118	A2	3119	B2	3428	D2	5719	B3
2119	A3	3120	B2	3429	D2	5720	B2
2120	A2	3121	A2	3521	C1	5723	D3
2121	A3	3122	B2	3522	D1	5724	D3
2122	A3	3123	B2	3523	D1	6300	A1
2137	A3	3130	A2	3524	D1	6301	A1
2209	B1	3131	A3	3526	C1	6302	A1
2217	B1	3135	A3	3529	D1	6303	A1
2219	B2	3136	A3	3531	D1	6304	A2
2220	B2	3137	A3	3533	D1	6305	A2
2300	A1	3139	A3	3536	D1	7107	A2
2302	A1	3140	A3	3538	D1	7109	A3
2303	A1	3141	A3	3600	C3	7111	A3
2304	A1	3142	A3	3602	D3	7112	A3
2305	A2	3143	A3	3603	D3	7113	A3
2306	A2	3144	A3	3604	C2	7200	B2
2308	A2	3145	A3	3607	C3	7205	B1
2309	A2	3146	A3	3608	D3	7208	B2
2311	A1	3147	A3	3609	D3	7401	C1
2312	A1	3223	C1	3611	C2	7405	D3
2313	A1	3224	B1	3614	C1	7410	D1
2402	C1	3225	B1	3615	C2	7500	C2
2417	D3	3226	B1	3618	D3	7600	D2
2521	D1	3235	B2	3635	C2	7603	C2
2522	C1	3238	B2	3637	C3	7605	C2
2603	C2	3239	A2	3638	C3	7708	A3
2604	C1	3242	C2	3639	C3	7711	B3
2606	C3	3245	B2	3648	C2	7714	B3
2607	C3	3247	B2	3657	D3	7715	B3
2608	C2	3269	B2	3701	D3	7716	C3
2613	C3	3273	B3	3705	D3	7719	D3
2632	D3	3275	B3	3712	D3	7720	D3
2633	D3	3277	B2	3713	D3	7721	D3
2634	D3	3278	A3	3737	D3	7722	D3
2635	D3	3279	A2	3741	D3		
2636	C3	3300	A1	3767	B3		
2637	C3	3301	A1	3769	B3		
2642	D3	3302	A1	3776	C3		
2701	B3	3303	A1	3781	A3		
2705	B3	3305	A3	3782	D3		
2713	A3	3306	A1	3783	D3		
2714	A3	3307	A3	3784	D3		
2717	B3	3308	A1	3785	D3		

Detailed Top View Part 1



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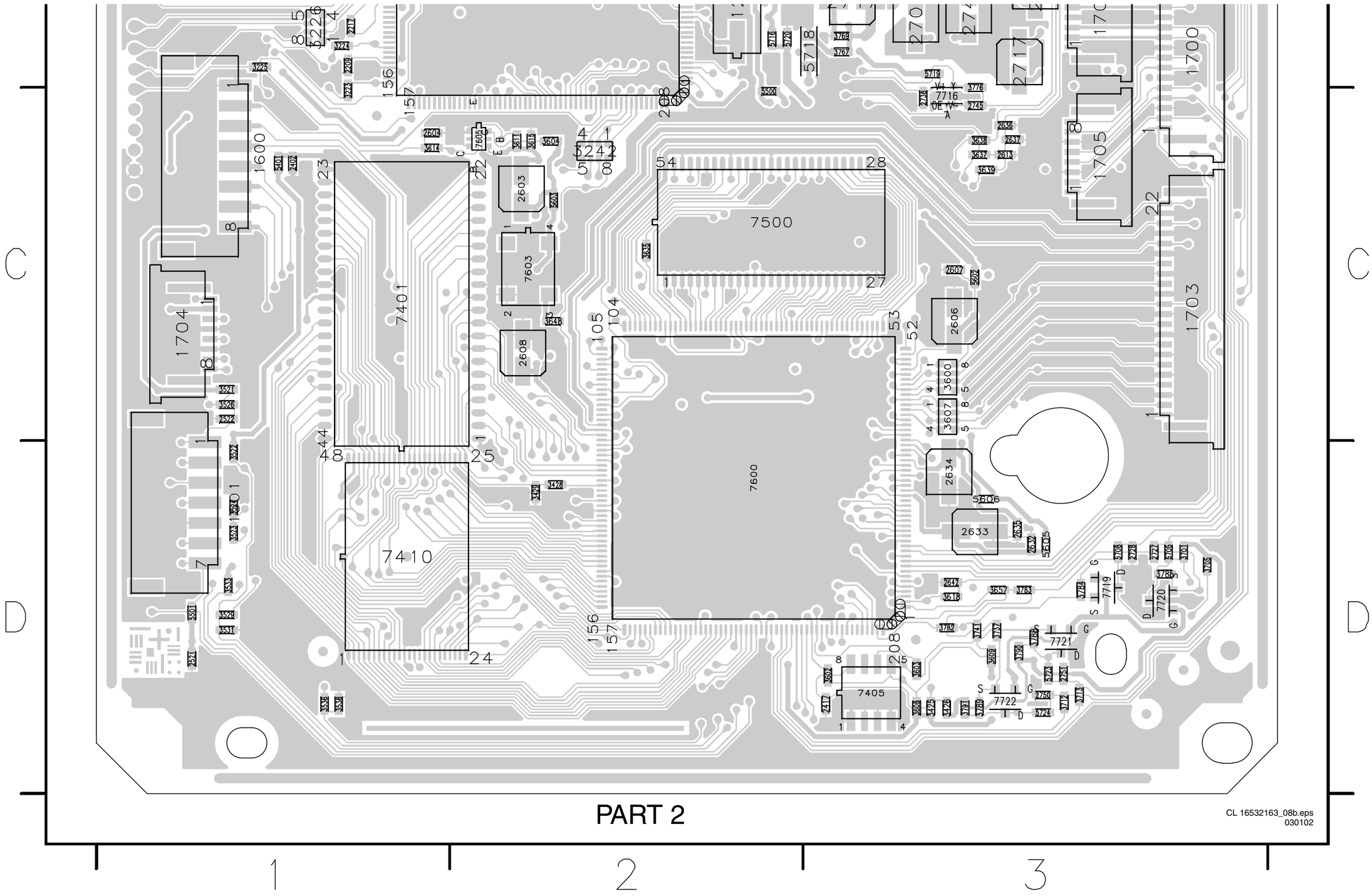
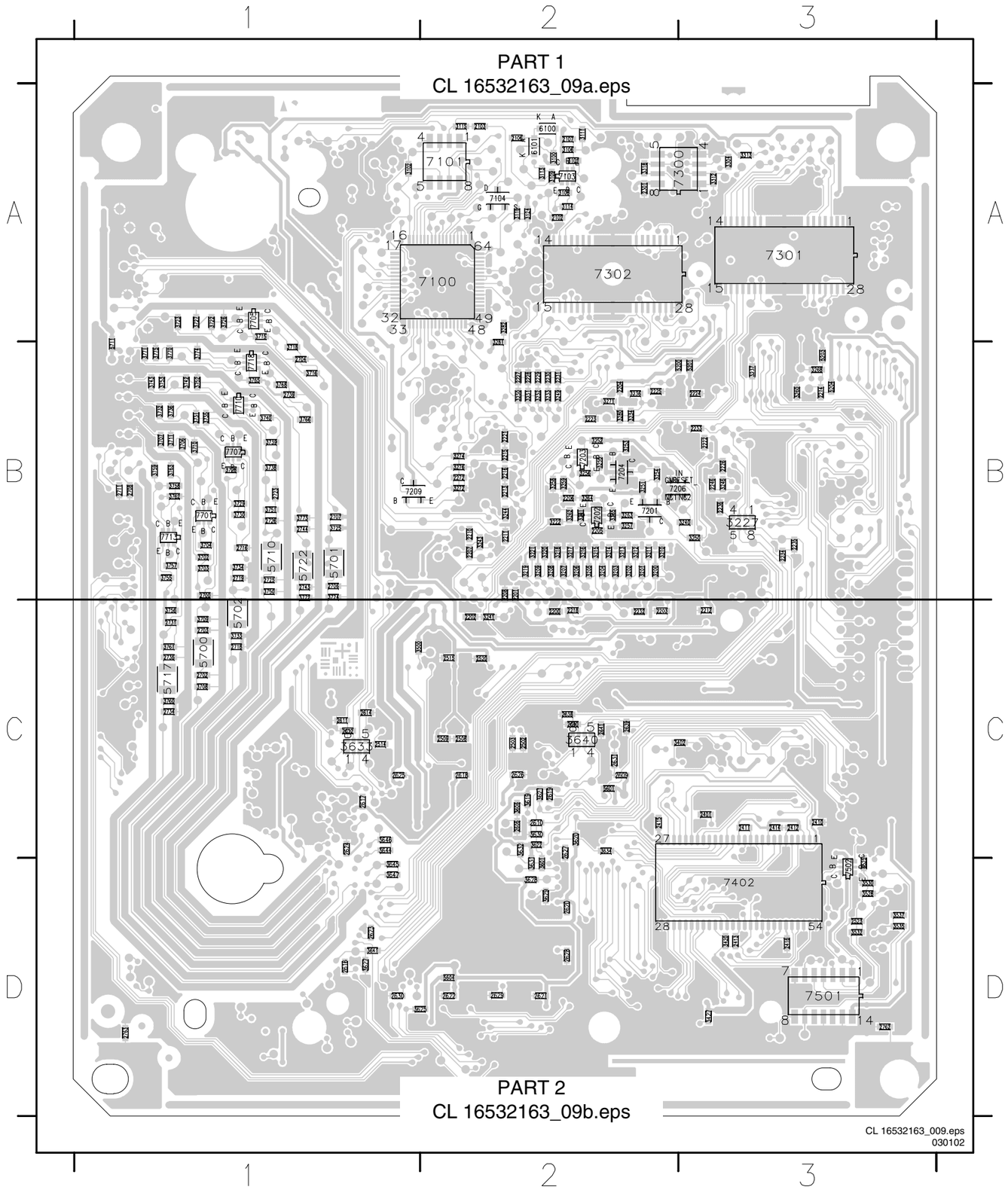
030102

Detailed Top View Part 2



Bottom View (Overview)



2102 A2
2103 A2
2106 A2
2107 A2
2200 C2
2201 B2
2202 C2
2203 C2
2204 B2
2205 B2
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2207 B2
2208 B2
2210 B2
2211 B2
2212 C3
2213 B2
2214 B3
2215 B2
2216 B2
2218 C2
2221 B2
2222 B3
2223 B2
2224 B3
2225 B2
2226 B3
2227 B2
2228 B2
2229 B2
2230 B2
2231 B2
2232 C2
2233 B3
2234 B3
2235 B3
2236 B3
2246 B3
2272 B2
2301 A2
2401 C3
2410 C3
2411 C3
2412 C3
2413 D3
2414 C3
2415 C2
2416 D3
2502 C2
2503 C2
2508 C2
2509 C2
2514 C1
2515 C2
2520 C2
2523 D3
2605 C2
2609 C2
2610 C2
2611 C1
2612 C1
2614 C1
2616 D1
2617 C1
2618 C2
2619 C2
2620 D2
2621 D2
2622 D2
2623 D1
2624 C1
2625 C1
2626 C2
2627 C2
2628 D2
2629 D2
2630 D1
2631 C2
2638 C2
2639 C2
2640 C2
2641 C2
2700 B1
2702 C1
2703 C1
2704 B1
2706 B1
2707 B1
2708 B1
2711 B1
2716 B1
2718 C1
2719 B1
2723 B1
2725 B1
2726 B1
2731 C1
2734 C1
2735 C1
2739 B1
2743 B1
2744 B1
2762 D3
2763 D1
3100 A2
3101 A2
3102 A1
3105 A2
3106 A2
3109 A2
3110 A2
3111 A2
3113 A2
3114 A2
3115 A2
3124 A2
3200 B2
3201 B2
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7104 A2
7201 B2
7202 B2
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7204 B2
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7209 B1
7300 A3
7301 A3
7302 A2
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7502 D3
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7705 A1
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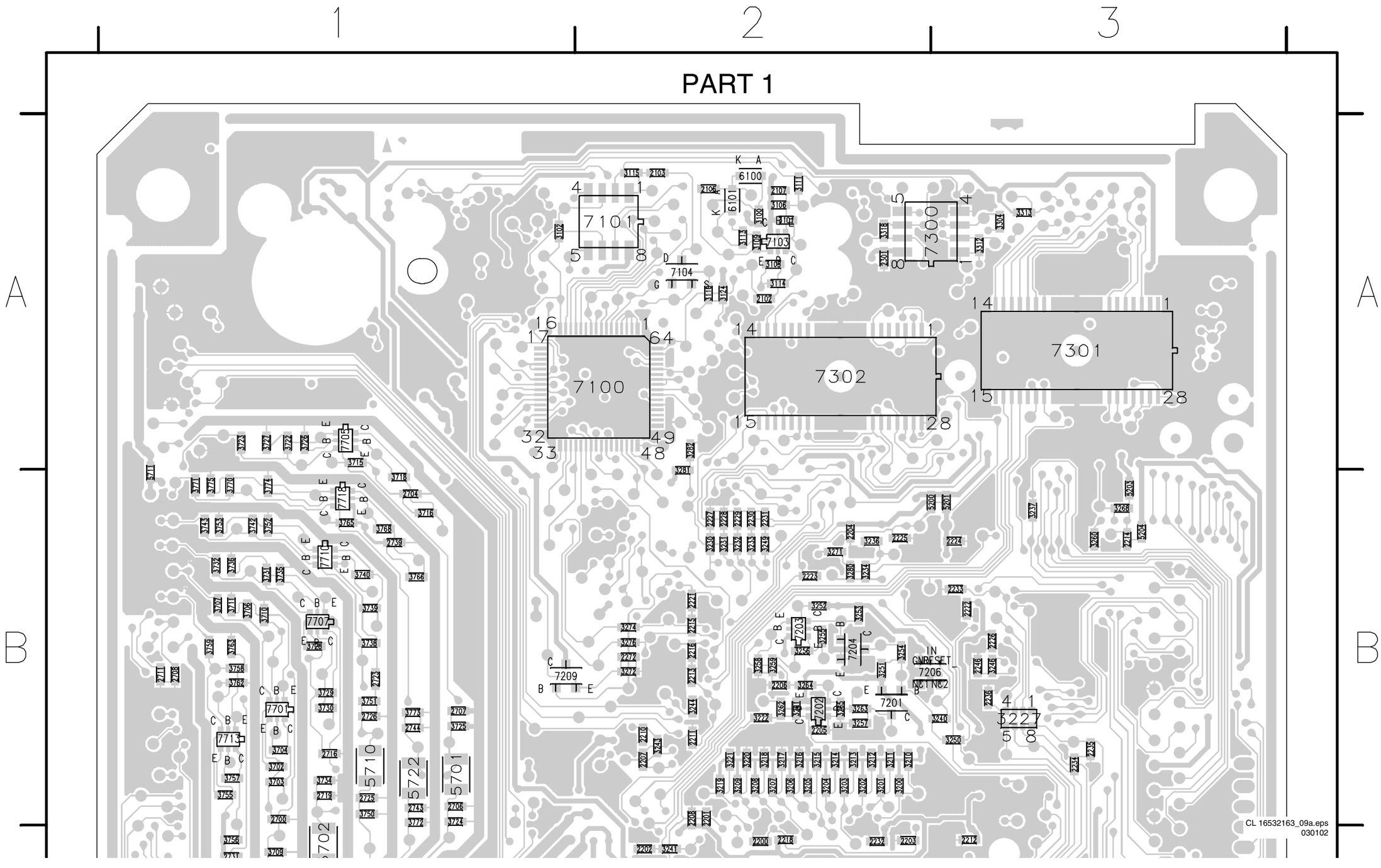
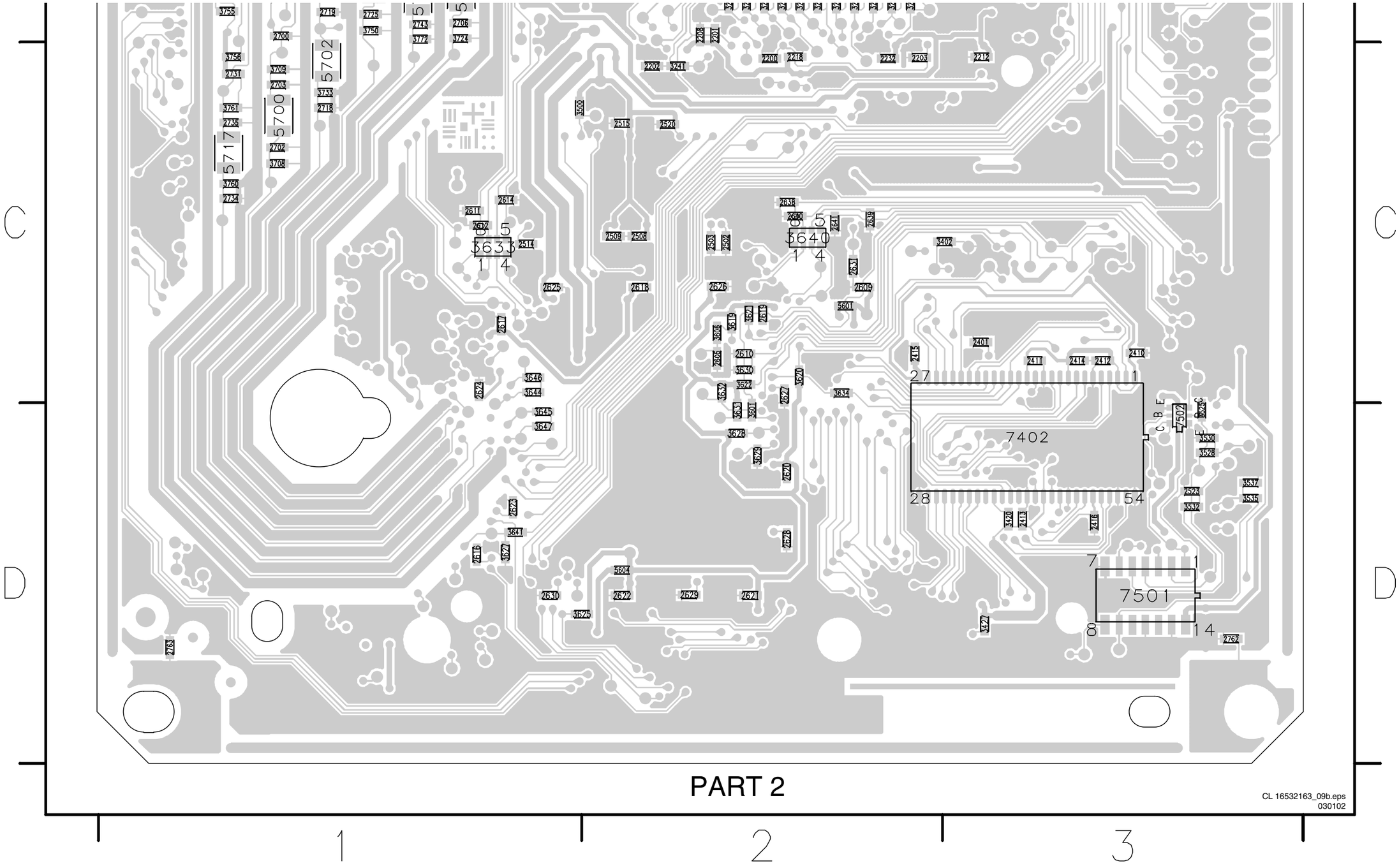
7710 B1
7713 B1
7718 B1

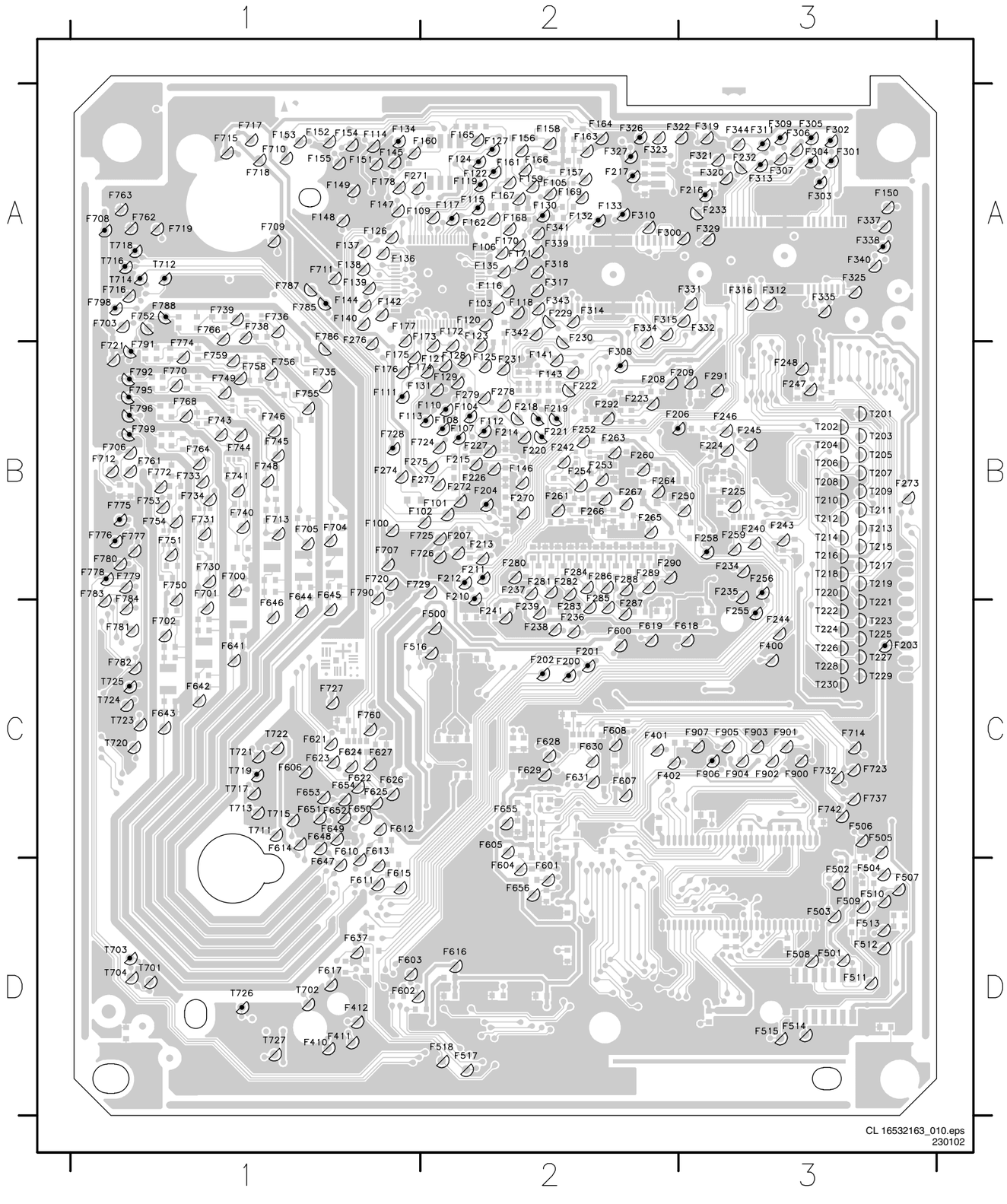
Detailed Bottom View Part 1



Detailed Bottom View Part 2



Testpoint Overview



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F102	B2	F173	B2	F273	B3	F505	C3	F710	A1	F790	B1
F103	A2	F174	B2	F274	B1	F506	C3	F711	A1	F791	B1
F104	B2	F175	B1	F275	B2	F507	D3	F712	B1	F792	B1
F105	A2	F176	B1	F276	B1	F508	D3	F713	B1	F795	B1
F106	A2	F177	A1	F277	B2	F509	D3	F714	C3	F796	B1
F107	B2	F178	A1	F278	B2	F510	D3	F715	A1	F798	A1
F108	B2	F200	C2	F279	B2	F511	D3	F716	A1	F799	B1
F109	A2	F201	C2	F280	B2	F512	D3	F717	A1	F900	C3
F110	B2	F202	C2	F281	B2	F513	D3	F718	A1	F901	C3
F111	B1	F203	C3	F282	B2	F514	D3	F719	A1	F902	C3
F112	B2	F204	B2	F283	C2	F515	D3	F720	B1	F903	C3
F113	B2	F206	B2	F284	B2	F516	C2	F721	B1	F904	C3
F114	A1	F207	B2	F285	C2	F517	D2	F723	C3	F905	C3
F115	A2	F208	B2	F286	B2	F518	D2	F724	B2	F906	C3
F116	A2	F209	B3	F287	C2	F600	C2	F725	B2	F907	C3
F117	A2	F210	B2	F288	B2	F601	D2	F726	B2	T201	B3
F118	A2	F211	B2	F289	B2	F602	D1	F727	C1	T202	B3
F119	A2	F212	B2	F290	B2	F603	D1	F728	B1	T203	B3
F120	A2	F213	B2	F291	B3	F604	D2	F729	B2	T204	B3
F121	B2	F214	B2	F292	B2	F605	C2	F730	B1	T205	B3
F122	A2	F215	B2	F300	A3	F606	C1	F731	B1	T206	B3
F123	B2	F216	A3	F301	A3	F607	C2	F732	C3	T207	B3
F124	A2	F217	A2	F302	A3	F608	C2	F733	B1	T208	B3
F125	B2	F218	B2	F303	A3	F610	D1	F734	B1	T209	B3
F126	A1	F219	B2	F304	A3	F611	D1	F735	B1	T210	B3
F127	A2	F220	B2	F305	A3	F612	C1	F736	A1	T211	B3
F128	B2	F221	B2	F306	A3	F613	D1	F737	C3	T212	B3
F129	B2	F222	B2	F307	A3	F614	C1	F738	A1	T213	B3
F130	A2	F223	B2	F308	B2	F615	D1	F739	A1	T214	B3
F131	B2	F224	B3	F309	A3	F616	D2	F740	B1	T215	B3
F132	A2	F225	B3	F310	A2	F617	D1	F741	B1	T216	B3
F133	A2	F226	B2	F311	A3	F618	C3	F742	C3	T217	B3
F134	A1	F227	B2	F312	A3	F619	C2	F743	B1	T218	B3
F135	A2	F229	A2	F313	A3	F621	C1	F744	B1	T219	B3
F136	A1	F230	A2	F314	A2	F622	C1	F745	B1	T220	B3
F137	A1	F231	B2	F315	A2	F623	C1	F746	B1	T221	C3
F138	A1	F232	A3	F316	A3	F624	C1	F748	B1	T222	C3
F139	A1	F233	A3	F317	A2	F625	C1	F749	B1	T223	C3
F140	A1	F234	B3	F318	A2	F626	C1	F750	B1	T224	C3
F141	B2	F235	B3	F319	A3	F627	C1	F751	B1	T225	C3
F142	A1	F236	C2	F320	A3	F628	C2	F752	A1	T226	C3
F143	B2	F237	B2	F321	A3	F629	C2	F753	B1	T227	C3
F144	A1	F238	C2	F322	A3	F630	C2	F754	B1	T228	C3
F145	A1	F239	C2	F323	A2	F631	C2	F755	B1	T229	C3
F146	B2	F240	B3	F325	A3	F637	D1	F756	B1	T230	C3
F147	A1	F241	C2	F326	A2	F641	C1	F758	B1	T701	D1
F148	A1	F242	B2	F327	A2	F642	C1	F759	B1	T702	D1
F149	A1	F243	B3	F329	A3	F643	C1	F760	C1	T703	D1
F150	A3	F244	C3	F331	A3	F644	C1	F761	B1	T704	D1
F151	A1	F245	B3	F332	A3	F645	C1	F762	A1	T711	C1
F152	A1	F246	B3	F334	A2	F646	C1	F763	A1	T712	A1
F153	A1	F247	B3	F335	A3	F647	D1	F764	B1	T713	C1
F154	A1	F248	B3	F337	A3	F648	C1	F766	A1	T714	A1
F155	A1	F250	B3	F338	A3	F649	C1	F768	B1	T715	C1
F156	A2	F252	B2	F339	A2	F650	C1	F770	B1	T716	A1
F157	A2	F253	B2	F340	A3	F651	C1	F772	B1	T717	C1
F158	A2	F254	B2	F341	A2	F652	C1	F774	B1	T718	A1
F159	A2	F255	C3	F342	A2	F653	C1	F775	B1	T719	C1
F160	A1	F256	B3	F343	A2	F654	C1	F776	B1	T720	C1
F161	A2	F258	B3	F344	A3	F655	C2	F777	B1	T721	C1
F162	A2	F259	B3	F400	C3	F656	D2	F778	B1	T722	C1
F163	A2	F260	B2	F401	C2	F700	B1	F779	B1	T723	C1
F164	A2	F261	B2	F402	C2	F701	C1	F780	B1	T724	C1
F165	A2	F263	B2	F410	D1	F702	C1	F781	C1	T725	C1
F166	A2	F264	B2	F411	D1	F703	A1	F782	C1	T726	D1
F167	A2	F265	B2	F412	D1	F704	B1	F783	C1	T727	D1
F168	A2	F266	B2	F500	C2	F705	B1	F784	C1		
F169	A2	F267	B2	F501	D3	F706	B1	F785	A1		
F170	A2	F270	B2	F502	D3	F707	B1	F786	B1		

Personal notes:

Personal notes:

8. Alignments

Not applicable.

9. Circuit Descriptions, List of Abbreviations and IC Data

Index of this chapter:
1. Introduction
2. Loader
3. Mono Board
4. Abbreviations
5. IC Data

Notes:
- Only the new circuit parts are described. For the other descriptions, see the SD3.0 Service Manual (3122 785 11010).
- For a good understanding of the following circuit descriptions, please also check the diagrams in chapter 6 and 7.

9.1 Introduction

9.1.1 Features

The SD4.0 modules consist of the Mercury 3 Loader VAL6013/01 (from Philips Optical Storage), and a Mono Board. The module is capable of analogue video (with option for digital YUV video) and digital audio.

9.1.2 Differences

The DVD-module SD4.0 is based on its predecessor the SD3.0, with similar functional block partitioning. However, the implementation of most functional blocks has been redesigned due to a new:
- Front-end (Basic Engine) processor.
- Mercury 3 Loader.
- Module interface.
- Mechanical construction.

9.1.3 Modules

The main modules are:
- Mercury 3 Loader - VAL6013/01.
- Mono Board.

9.2 Loader

The Mercury 3 Loader has an optical unit consisting of two lasers, one for CD with a wavelength of 780 nm, and one for DVD with a wavelength of 650 nm. The TZA1033 (item 7100) controls the data from these lasers, and the supply to them.

9.3 Mono Board

SD4.0 Block Diagram

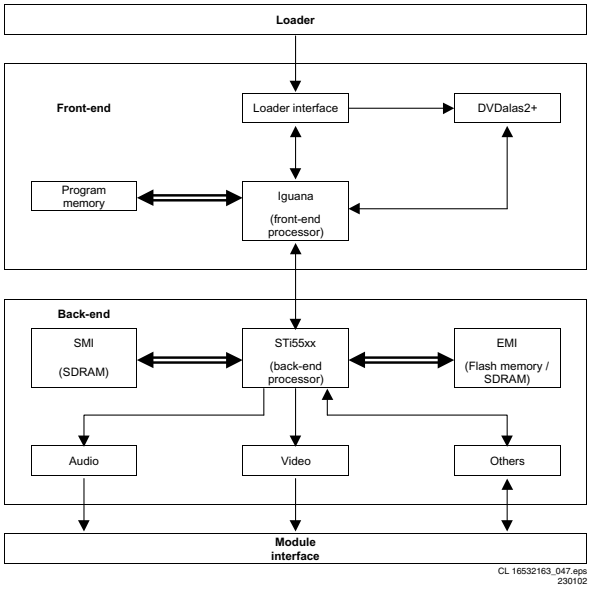

Figure 9-1

9.3.1 Front-end: the Servo Part

The front-end consists of:
- The loader interface.
- The analogue DVD signal processor and laser supply.
- DVD front-end processor.
- Program memory.

The Signal Processor TZA1033

The TZA1033 (or DVDALAS2plus) is an analogue pre-processor and laser supply circuit. It contains data amplifiers and several options for radial tracking and focus control.
It is possible to optimise the dynamic range of this pre-amp/ processor combination for the LF servo and RF data paths. The gain in both channels is separately programmable. This will guarantee an optimal playability for all kind of discs.
Also, a dual laser supply is implemented, with fully automatic laser control including stabilisation and an ON/OFF switch, plus a separate supply pin for power efficiency.
In the SD3.0 module, the servo signals were fed to the MACE2 servo processor, while the HF output signal was fed to the SAA7335 decoder. In the new SD4.0 module, these ICs are combined into one chip: the SAA7812 Iguana.
This chip contains the following blocks: channel decoder, block decoder, servo processor, and microcontroller.

The Servo Processor/Decoder SAA7812

The servo circuit in the SAA7812 (item 7200) takes care of the servo controls.
In a CD system, there are some 12 control loops active. About six of them are needed to adjust the servo error signals, that is once per disc rotation. It also adjusts offsets, signal amplitudes, and loop gains (AGCs), to enlarge system robustness and to avoid expensive potentiometer adjustments in production.
The other six loops determine the laser spot position on the disc in the radial, axial (focus), and tangential directions.
It also has to take care that the spot accesses a required position as fast as possible. This access system consists of two parts, namely the actuator and the sled, which are (within a certain range) mechanically and electrically independent. Therefore, during an access, the servo has to control as well the actuator as the sled.
The analogue signals, from the diode pre-processor, are converted into a digital representation using A/D converters.
For the communication between the host processor (STi5580) and the servo processor, the S2B bus is used. This bus supports full-duplex asynchronous communication.

The SAA7812 is also a combined CD/DVD compatible decoding device. The device operates with built in hardware for CD/DVD error correction and de-interleaving operations. It decodes EFM or EFM+HF signals directly from the laser pre-amplifier, including analogue front-end, PLL data recovery, demodulation, and error correction.

Its analogue front-end input (the channel decoder), converts the HF input signal to the digital domain via an 8-bit ADC, preceded by an AGC circuit to obtain the optimum performance from the converter. An external resonator clocks this block.
This subsystem recovers the data from the channel stream. It corrects asymmetry, performs noise filtering and equalisation, and finally recovers the bit clock and data from the channel using a digital PLL.
The demodulator part detects the frame synchronisation signals and decodes the EFM (14 bit) and EFM+ (16 bit) data and sub-code words into 8-bit symbols. Via the serial output interface, the I^2S data (audio and video) go to the DVD decoder STi5580.

The spindle-motor interface provides both motor control signals from the demodulator and, in addition, contains a tachometer loop that accepts tachometer pulses from the motor unit. They drive the motor IC (BA6665FM, item 7301).

The SAA7812 has two independent microcontroller interfaces. The first is a serial I^2C-bus and the second is a standard 8-bit multiplexed parallel interface. Both of these interfaces provide access to 32 8-bit registers for control and status.

9.3.2 Interface

The interface between front-end (SAA7812) and back-end (Sti55xx) is via:
- I2S bus (BCLK, DATA, WCLK, FLAG, SYNC and V4).
- S2B bus (RXD_S2B, TXD_S2B, CPR_S2B and SUR_S2B).
- Miscellaneous I/O ports (RSTNF= front-end reset, EANF= front-end processor boot select).

Note: These lines contain series resistors (47 or 100 Ω) for easy hardware debugging, and for EMC/noise reduction of the high-speed I2S lines.

The front-end processor SAA7812 (Iguana) has two boot modes: normal boot from flash memory, or serial mode.
The boot selection is via the EANF pin. The Iguana samples the EANF signal level once during boot-up. Once boot-up is completed, this pin is no longer used for this purpose.
However, in the SD4.0 circuit, the EANF is also connected to the flash memory. Therefore, when this pin is LOW, the lower 1Mbits of the memory is accessible. Conversely, when this pin is HIGH, the upper 1Mbits is accessible.
Under front-end normal operation, the program memory (less than 1Mbits in size) should reside in the lower bank. Therefore, the EANF pin should be LOW at all times. Since the actual flash memory used is 2Mbits, the upper 1Mbits is unused. This area is reserved for possible use by the front-end self-diagnostic software, or flash download application.

9.3.3 Back-End: the Digital Part

The back-end consists of:
- DVD back-end processor.
- External memory.
- Audio output.
- Video output.
- Miscellaneous.

DVD Back-End Processor

The SD4.0 is designed for the Sti55xx family. Some of the DVD related features of these ICs are:

Processor Overview

Processor overview

Function	STi5580	STi5588	STi5519
Basic CD/VCD/DVD decoding	X	X	X
Extra 2-channel of I2S output (PCMDATA3)	X	X	
Karaoke	X	X	
DTS	X	X	
Audio post processing (equalizer, level meter, etc)		X	
DVD audio		X	
Progressive scan at analog video output		X	

CL 16532163_048.eps 240102

Figure 9-2

The Sti5580 has the same architecture as the Sti5508 (used in earlier DVD generations), and is pin-to-pin compatible.
It works on 3.3 V (VDD), and comprises the following functions:
- Video decoder which supports MPEG1 and MPEG2
- Audio decoder which supports AC-3, MPEG1, MPEG2, DTS, PCM, S/PDIF, MP3.
- PAL/NTSC video encoder with simultaneously Y/C, CVBS and RGB/YUV outputs
- The video encoder supports Closed Caption and allows MacroVision 7.0/6.1
- Full screen On Screen Display (OSD) generator
- Three on-chip PLLs to generate all necessary clocks (as reference the 27 MHz video clock is used).

Input

Input data comes from the I2S-bus. The front-end interface of this device, accepts DVD, CD and CD-DA information.

Signal Processing

For video, the input data stream is decoded to the appropriate MPEG, Sub Picture, and OSD data streams, after which they are fed to the PAL/NTSC encoder. This cell will convert the digital MPEG/Sub Picture/OSD stream into a standard base band signal and into RGB components. It handles interlaced and non-interlaced data, can perform CC/TXT encoding, and allows MacroVision copy protection.

For audio, the processing cell is a fully compatible DTS, Dolby Digital (AC-3), MPEG1, MPEG2, and PCM decoder, capable of decoding 5.1 and 2 channel streams.

Output

For video, six analogue output pins are available on which CVBS, S-VHS (Y/C), and RGB/YUV signals are present. They go directly to output connector 1701.

External Memory

The STi55xx family is capable of accessing external memory via three buses:

- **The enhanced memory interface (EMI).** This interface is configurable and can be used to access Flash, ROM, and various flavours of DRAM. The EMI is connected to:
  - Flash/ROM in Bank 3 (item 7410 and 7401 optional). This memory holds the DVD firmware, and is controlled by pin 186 (FLASH_OE) of the STi5580. It must be able to perform a download (by disk or DCU) in a Flash-only system.
  - SDRAM in Bank 0 (item 7402, optional). A 64Mbits (4M x 16bits) 7.5ns SDRAM can be connected to the EMI when the module is used as a Software Development Module (SDM).
- **The shared memory interface (SMI).** The SMI is only capable of accessing SDRAM. The SMI is connected to a 64Mbits (4M x 16bit) 7.5ns SDRAM (item 7500). There is no longer the option to use two pieces of 16Mbits SDRAM. The SDRAM has the following functions:
  - It is used by the MPEG video decoder as a frame buffer.
  - It holds the software and the variables used by it.
- **The I2C bus.** Via this bus, the NVRAM (or EEPROM) is accessible. This memory is used to store user settings, player settings, and region code.

Note: The I2C controller PCF8584T is not longer used in the SD4.0.

Audio Output

The audio interfaces available in SD4.0 are I2S and S/PDIF for digital audio output, and I2S karaoke microphone input.

I2S audio

The STi55xx is capable of 6-channel I2S output. These channels can be configured to output 5.1 Dolby Digital, DTS, etc.

- PCM_OUT0: left and right.
- PCM_OUT1: centre and LFE.
- PCM_OUT2: left and right surround.

Two additional channels (available in STi5580 and STi5588) are capable of providing down-mixed stereo.

S/PDIF

The S/PDIF signal level (item 7600, pin 57, SPDIF_OUT) is 5V TTL at module interface. To meet the complete S/PDIF specifications, an external de-coupling circuit (item 7716, diagram M7) is implemented.

I2S karaoke (optional)

The STi5580 and STi5588 have built-in karaoke processing. The internal karaoke block accepts I2S signal, acting as the master by generating the required KOKPCMCLK frequency. This frequency is always 1/4 the music sampling frequency. An external analogue-to-digital converter (ADC), acting as slave, is required to convert the microphone signals to I2S signals.

Video Output

Digital video (optional)

Digital YUV output is routed directly from STi55xx ports to a 22-pin connector (item 1703). From the same connector, the HSYNC, VSYNC and 27MHZ_CLK signals are available. The digital YUV connector is the interface to external video processing devices, such as high quality progressive scan codex and high quality video DAC.

Analogue video

The STi55xx is capable of 6-channel analogue video. Three channels (pins 25, 26 and 27) are RGB or YUV format, while the other three channels (pins 32, 33 and 34) are Y, C, and CVBS.

A new video output buffer (see diagram M7, e.g. item 7707 for R) is implemented: an 8MHz/16MHz selectable filter stage and a 75Ω drive stage.

Miscellaneous I/O Signals

Most general IO ports are connected directly to the module interface. Compared with the SD3.0 module, some on-board circuits are removed, as it made more sense (and more cost effective) to implement these circuits externally.

SCART

Previously, an on-board circuit switches the 0|6|12V signal to the correct voltage level. This circuit is removed, and instead, the SCART0 and SCART1 signals are now directly available at the module interface.

Mute

Previously, an on-board circuit provides the driving current for the muting transistors, as well as maintains the correct time delay (to prevent switching noise). This circuit is removed. Instead, the MUTE signal is now directly available at the module interface.

Service

Service Port Buffer

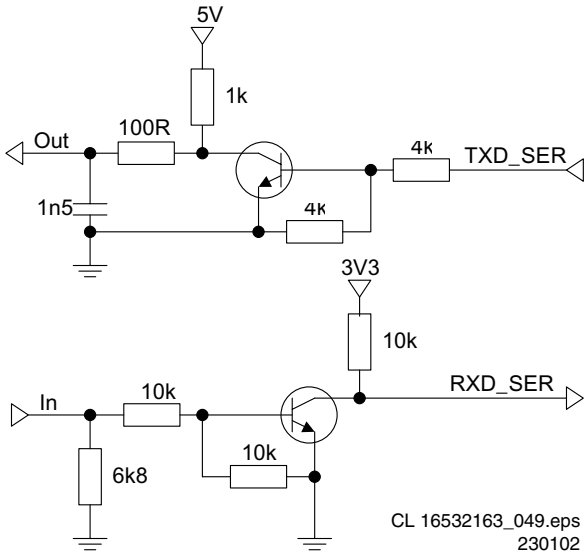

Figure 9-3

The service port (see diagram M5) is simplified to reduce cost. The unused RTS and CTS lines are no longer connected. A transistor buffer (item 7502) is used instead of the Schmitt Trigger buffer.

The overall loading and driving capability of the RS-232 emulator port is not greatly changed. However, as a precaution, the Schmitt Trigger circuit remains in the layout as an optional implementation.

5V buffers

Previously, some IO lines (centre_on and kar_bypass) are buffered from 3.3V to 5V. These buffers are removed. Therefore, the signal levels at the module interface are 3.3V only.

Note: Care must be taken that the external circuitry does not force any IO line from the module to more than 3.8V.

External DAC

In the fourth DVD player generation (VFM2002), a new external audio DAC from AKM (AK4382) is used.

New FTD

In the fourth DVD player generation (VFM2002), a new FTD is used, which requires a new serial bus (SIO instead of I2C bus). For this bus, the following pins are used: pin 207 for the clock signal of the bus (SIOCLK), and pin 208 for the data signal of the bus (SIODATA).

The same voltage translator circuit (items7719 and 7720) as for the I2C bus is used for the SIO bus:

Serial Bus Voltage Translator

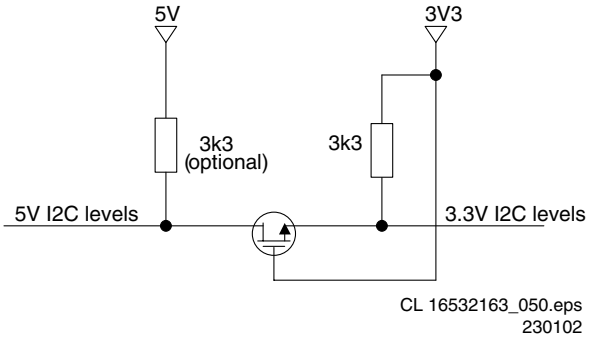

Figure 9-4

Since the 5V in the module is turned 'off' during the DVD player's standby mode, the pull-up to 5V on the module is not used. Instead, pull-up resistors to a +5V standby voltage are added outside the module.

9.3.4 Power Supply (Diagram M7)

SD4.0 Power Supply Block Diagram

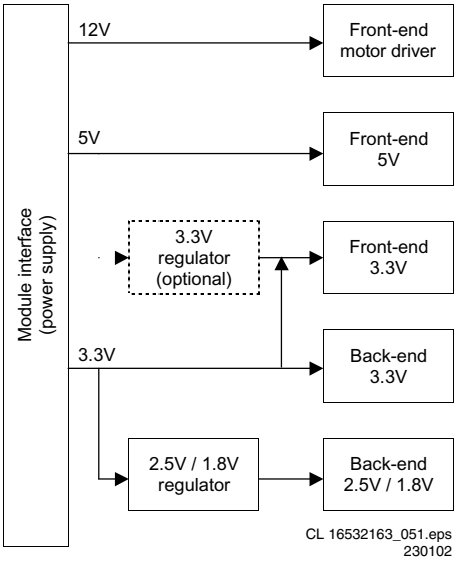

Figure 9-5

The main power supplies to the module are 3.3V, 5V, and 12V (input via connector 1701).

The back-end section mainly uses the 3.3V. On-board linear regulators are used to generate the 2.5V or 1.8V required by the STi55xx.

The front-end section mainly uses the 5V and 12V. An optional on-board linear regulator can be used to generate the 3.3V required by the front-end. The motor and servo drivers use the 12V.

9.3.5 Top Side Connectors

All mono board interfaces are located on the topside of the board, as shown below:

SD4.0 Connections

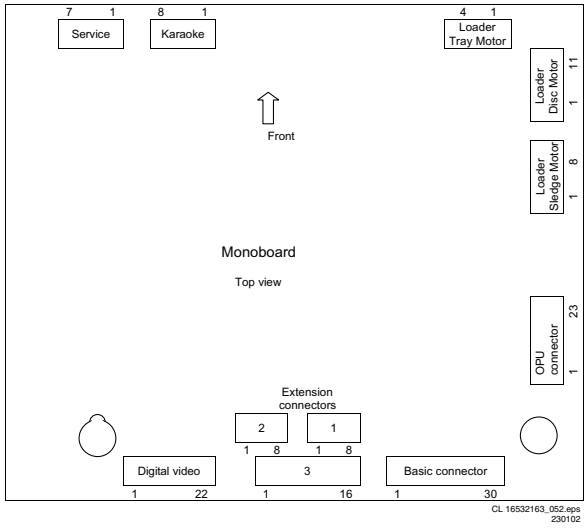

Figure 9-6

9.4 Abbreviation List

ADC	Analogue to Digital Converter
AM	Amplitude Modulation
BE	Basic Engine
ComPair	Computer aided rePair
CD-DA	CD Digital Audio
CS	Chip Select
DAC	Digital to Analogue Converter
DAIO	Digital Audio Input Output
DENC	Digital Encoder
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DRAM	Dynamic RAM
DSD	Direct Stream Digital
DSP	Digital Signal Processing
DTS	Digital Theatre Sound
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EFM	Eight to Fourteen bit Modulation
EMI	External Memory Interface (STi55xx)
FFC	Flat Foil Cable
FLASH	Flash memory
HPF	High Pass Filter
HW	Hardware
I2C	Integrated IC bus (signals at 5V level)
I2S	Integrated IC Sound bus (signals at 3.3V level)
IC	Integrated Circuit
IF	Intermediate Frequency
IRQ	Interrupt Request
LLD	Loss Less Decoder
LPCM	Linear Pulse Code Modulation
LRCLK	Left/Right clock
LVTTL	Low Voltage Transistor Transistor Logic (3.3V logic)
MACE	Mini All Compact Disc Engine
MPEG	Motion Pictures Experts Group
NC	Not Connected
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OC	Open Circuit
OPU	Optical Pick-up Unit
PCB	Printed Circuit Board (see PWB)
PCM	Pulse Code Modulation
PCM_CLK	Audio system clock for DAC
PCM_OUTx	Audio serial output data
PSU	Power Supply Unit
PWB	Printed Wiring Board (see PCB)
RAM	Random Access Memory
RGB	Red, Green and Blue colour space
ROM	Read Only Memory
S2B	Serial to Basic Engine, communication bus between host- and servo processor
SCL	Serial Clock I2C
SCLK	Audio serial bit clock
SDA	Serial Data I2C
SDRAM	Synchronous DRAM
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
STBY	Standby
SVCD	Super Video CD
SW	Software
THD	Total Harmonic Distortion
TTL	Transistor Transistor Logic (5V logic)
uP	Microprocessor
VCD	Video CD
Y/C	Luminance (Y) and Chrominance (C) signal
YUV	Component video

9.5 IC Data

In this paragraph, the internal blockdiagrams and pinning are given of ICs that are drawn as 'black box' in the electrical diagrams (with exception of 'memory' and 'logic' ICs).

9.5.1 Diagram M1

TZA1033 Device Block Diagram (item 7100)

DVDALAS2plus Advanced Analogue DVD Signal Processor and Laser Supply — TZA1033

DEVICE BLOCK DIAGRAM

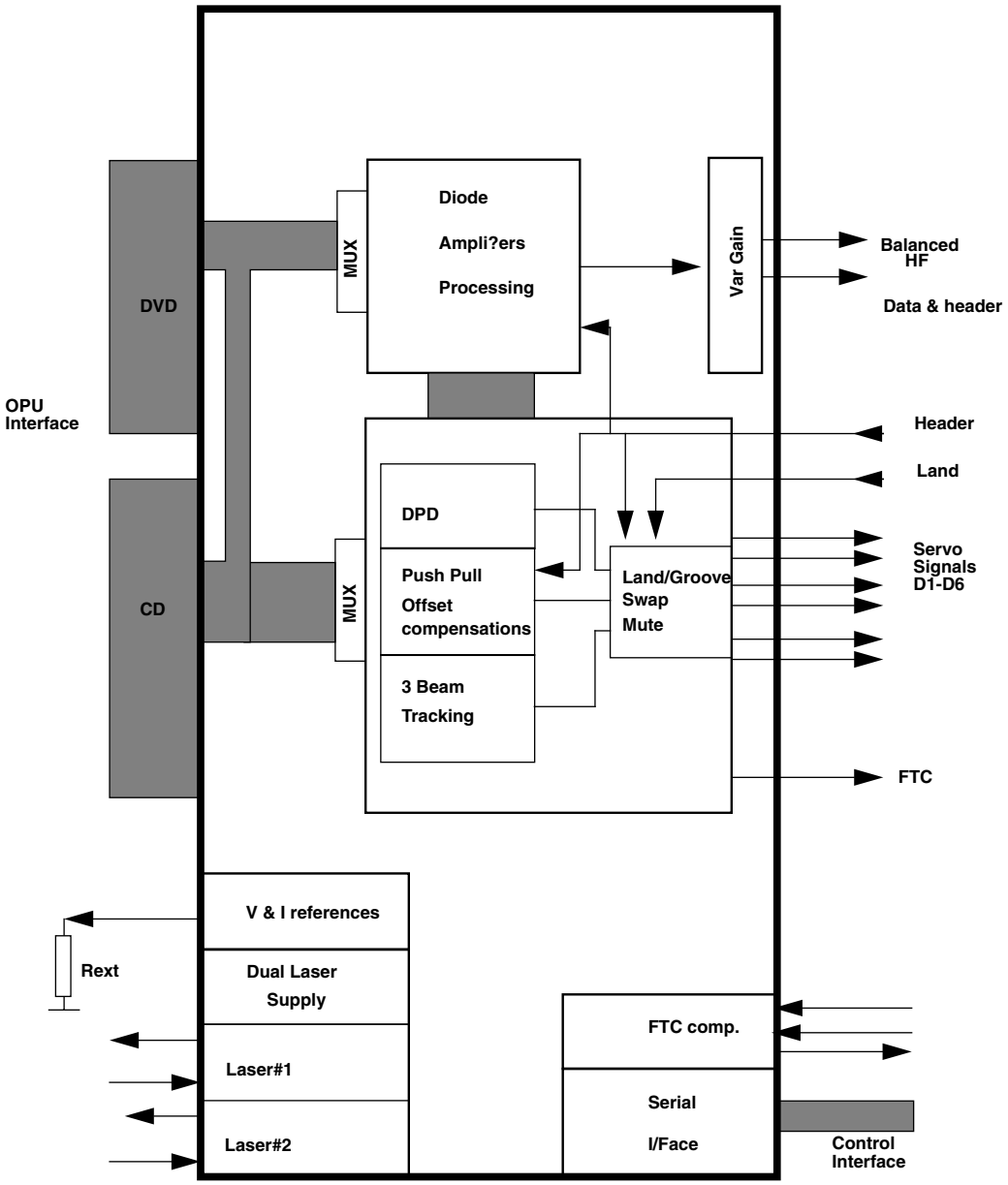

Figure 9-7

TZA1033 Pinning (item 7100)

DVDALAS2plus Advanced Analogue DVD Signal Processor and Laser Supply

TZA1033

PINNING

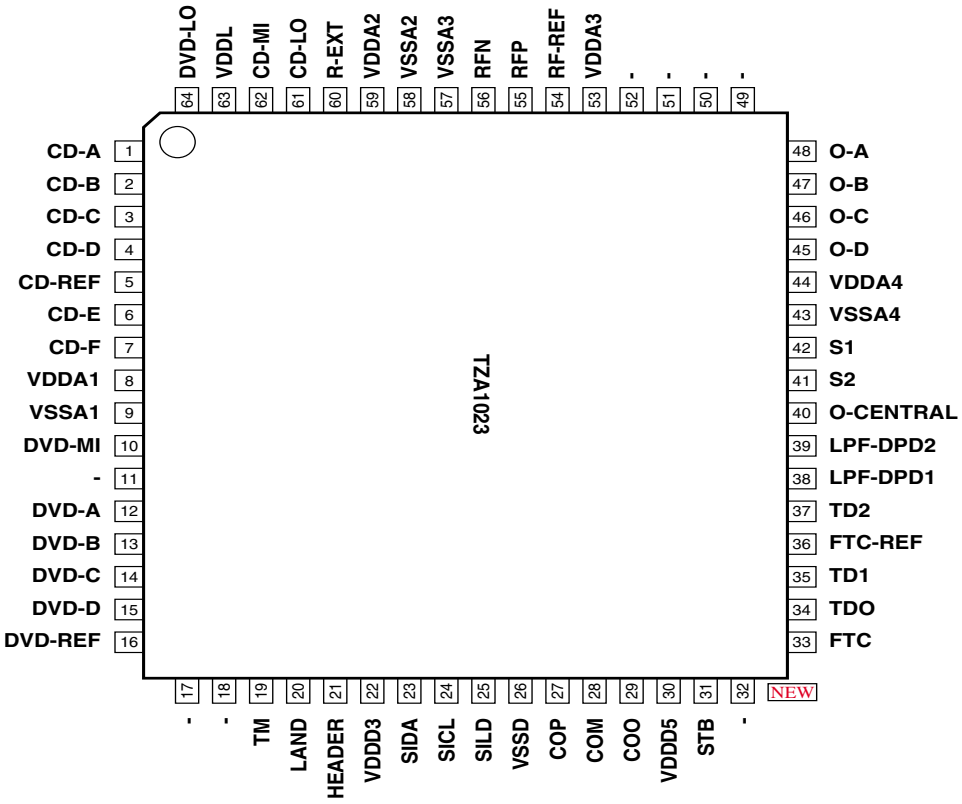

Fig.2 Pin configuration.

Figure 9-8

9.5.2 Diagram M2

SAA7812HL Block Diagram (item 7200)

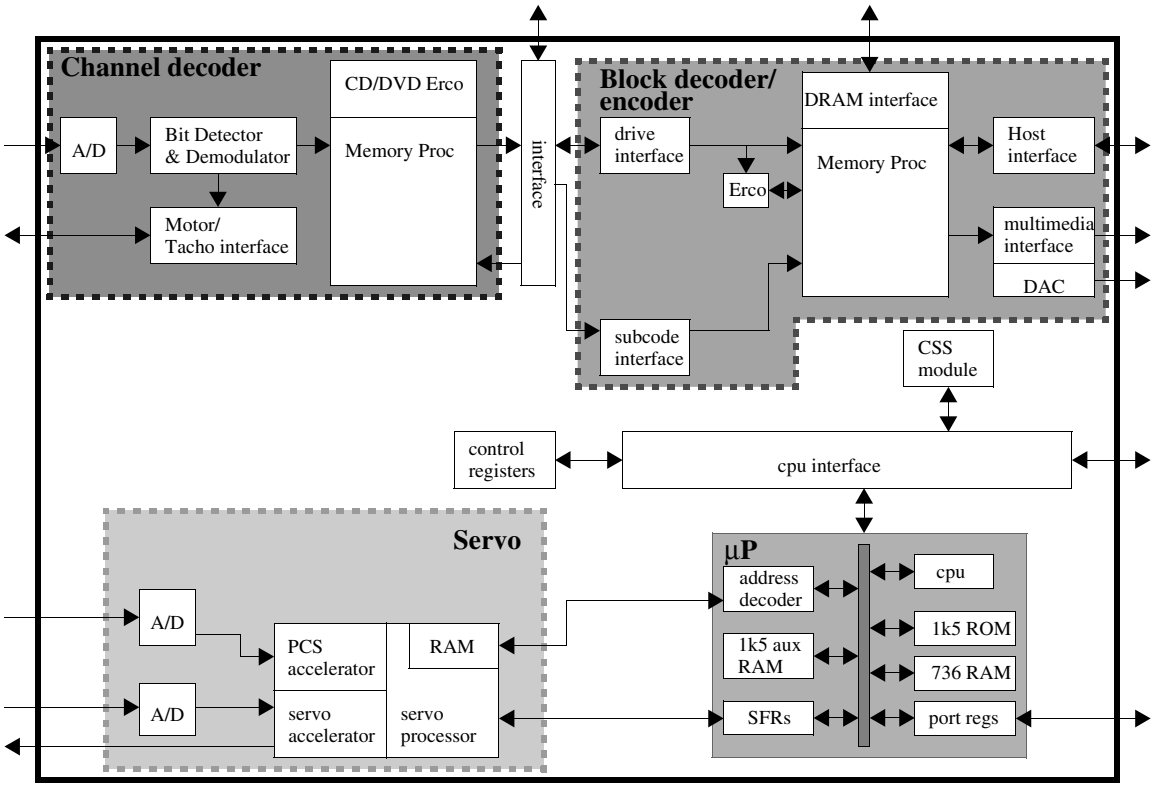

Figure 9-9

SAA7812HL Pinning (item 7200)

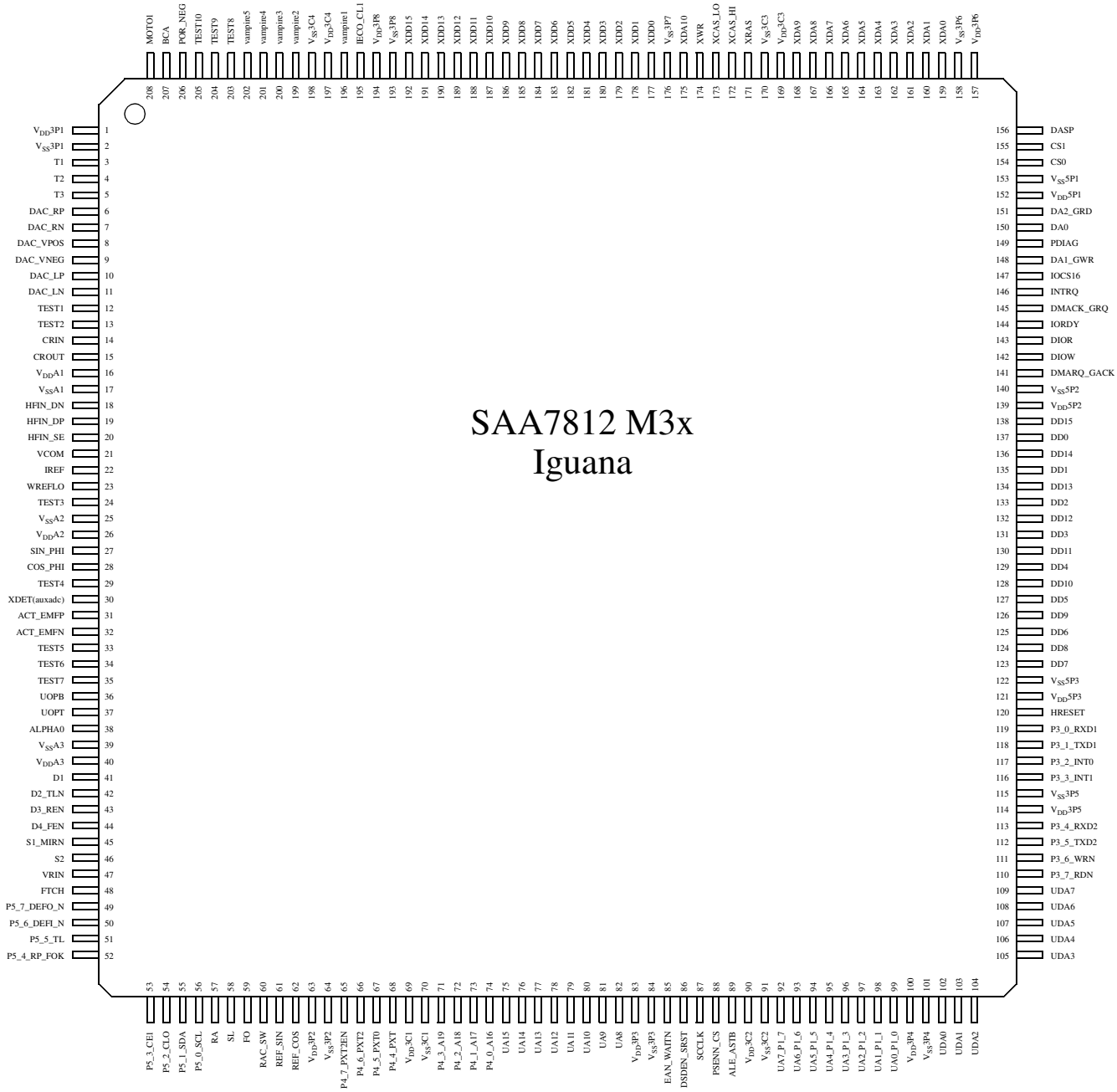

Figure 9-10

9.5.3 Diagram M6

STi5580 Block Diagram (item 7600)

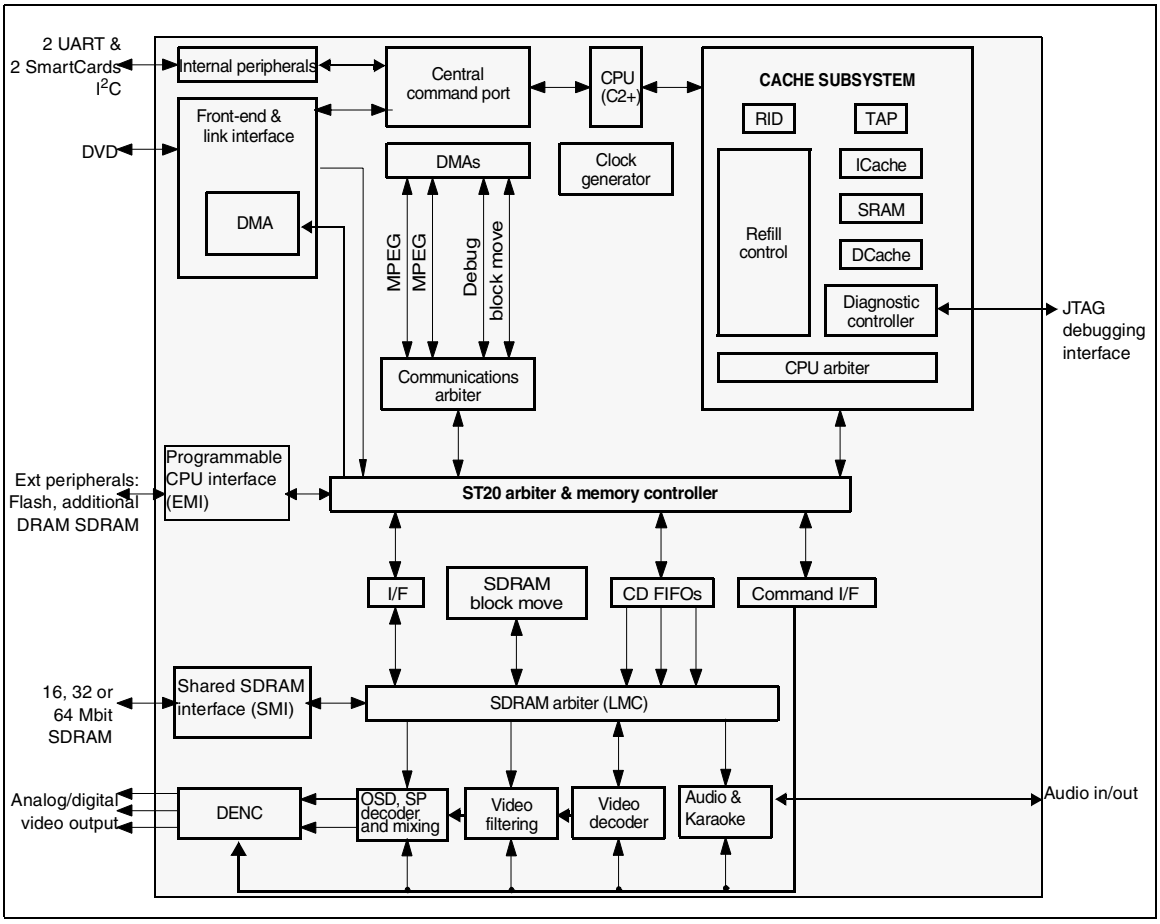

Figure 9-11

STi5580 Pinning (item 7600)

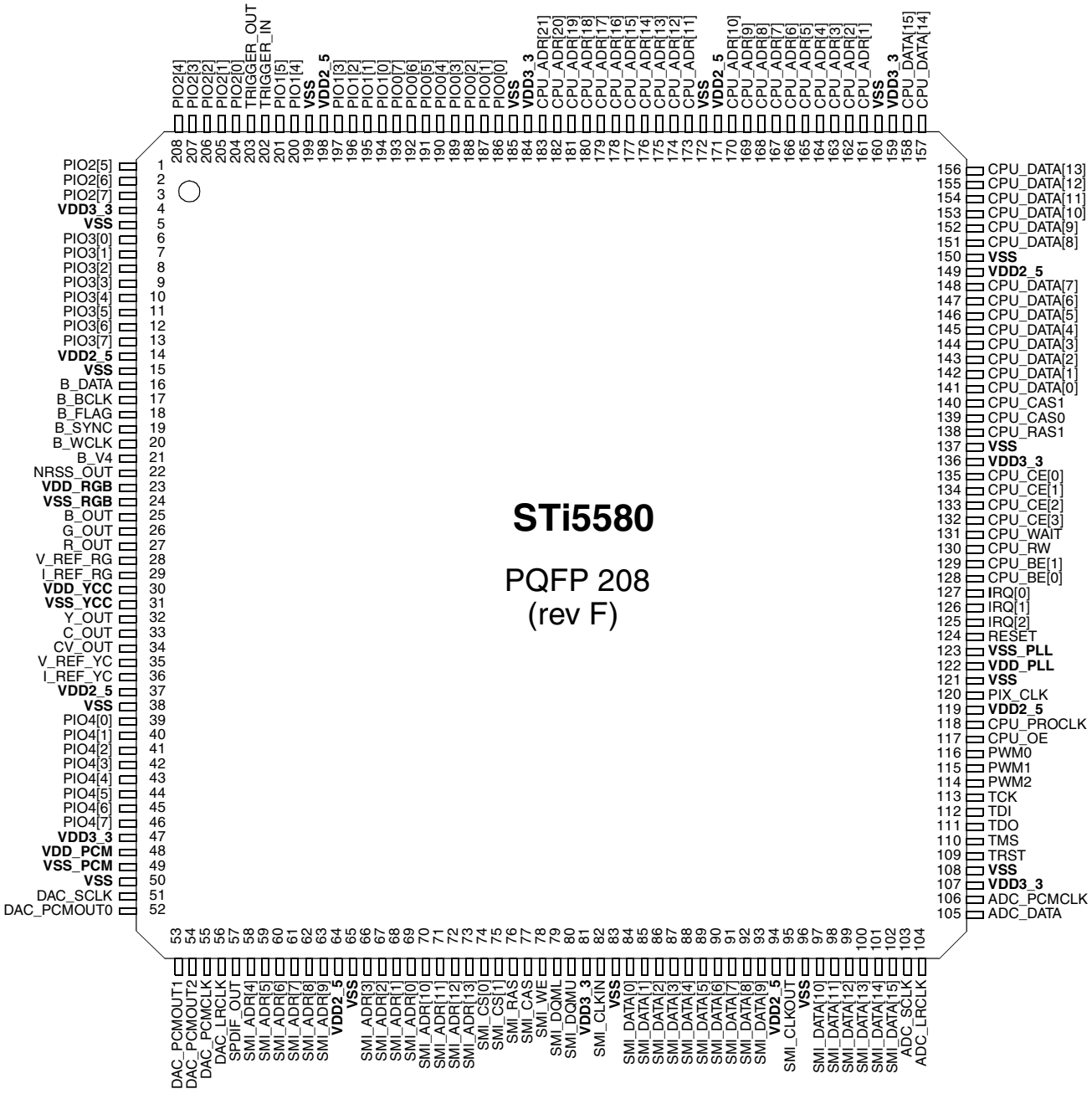

Figure 9-12

10. Spare Parts List

SD4 EU

Various

0001	9305 023 61301	VAL6013/01 (PHOS) B
1301	3139 241 00131	FFC FOIL 23P/158/23P 1MMP FOLD

Mono PWB

Various

1100	2422 025 17458	CON BM H 23P F 1.00 FFC 0.3 R
1210	2422 543 01242	RES XTL SM 8MHz 4672 30P AT-51
1300	2422 025 17272	CON BM H 8P F 1.00 FFC 0.3 R
1301	2422 025 17273	CON BM H 11P F 1.00 FFC 0.3 R
1303	2422 025 16543	CON BM H 4P M 2.00 PH SMD R
1501	2422 025 16703	CON H 7P M 2.00 PH SMD R
1701	2422 025 17451	CON BM H 30P F 1.00 FFC 0.3 R

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2100	4822 122 33777	47pF 5% 63V
2101	4822 126 13193	4.7nF 10% 63V
2104	3198 016 31020	0603 25V 1nF
2105	4822 126 14305	100nF 10% 16V 0603
2108	4822 126 14305	100nF 10% 16V 0603
2109	4822 126 14305	100nF 10% 16V 0603
2110	3198 016 31020	0603 25V 1nF
2111	4822 126 14305	100nF 10% 16V 0603
2112	4822 126 14305	100nF 10% 16V 0603
2113	4822 126 14305	100nF 10% 16V 0603
2114	4822 126 14305	100nF 10% 16V 0603
2115	4822 126 14226	82pF 5% 50V 0603
2116	4822 126 13193	4.7nF 10% 63V
2117	4822 126 14226	82pF 5% 50V 0603
2118	4822 126 14305	100nF 10% 16V 0603
2119	4822 126 14507	18pF 5% 50V 0603
2120	4822 126 14305	100nF 10% 16V 0603
2121	4822 126 14305	100nF 10% 16V 0603
2122	4822 126 14305	100nF 10% 16V 0603
2137	4822 126 14305	100nF 10% 16V 0603
2200	4822 126 14305	100nF 10% 16V 0603
2201	4822 126 14305	100nF 10% 16V 0603
2202	5322 126 11583	10nF 10% 50V 0603
2203	4822 126 14305	100nF 10% 16V 0603
2204	4822 126 14305	100nF 10% 16V 0603
2205	3198 017 41050	0603 10V 1µF COL R
2206	3198 017 41050	0603 10V 1µF COL R
2207	4822 122 33761	22pF 5% 50V
2208	4822 126 14305	100nF 10% 16V 0603
2209	4822 126 14305	100nF 10% 16V 0603
2210	4822 122 33761	22pF 5% 50V
2211	4822 126 14305	100nF 10% 16V 0603
2212	4822 126 14305	100nF 10% 16V 0603
2213	4822 126 14305	100nF 10% 16V 0603
2214	4822 126 14305	100nF 10% 16V 0603
2215	4822 126 14305	100nF 10% 16V 0603
2216	4822 126 14305	100nF 10% 16V 0603
2217	4822 126 14305	100nF 10% 16V 0603
2218	4822 126 14305	100nF 10% 16V 0603
2219	4822 126 14305	100nF 10% 16V 0603
2220	4822 126 14305	100nF 10% 16V 0603
2221	4822 126 13879	220nF 20% 16V
2222	4822 126 14305	100nF 10% 16V 0603
2223	4822 126 14305	100nF 10% 16V 0603
2224	4822 126 14305	100nF 10% 16V 0603
2225	4822 126 14305	100nF 10% 16V 0603
2226	4822 126 14305	100nF 10% 16V 0603
2227	4822 126 13617	1.8nF 10% 50V
2228	4822 126 14549	33nF 16V O6O3
2229	4822 126 13617	1.8nF 10% 50V
2230	4822 126 14305	100nF 10% 16V 0603
2231	4822 126 14305	100nF 10% 16V 0603
2232	4822 126 14305	100nF 10% 16V 0603
2233	4822 122 31765	100pF 2% 63V 1206
2234	4822 122 31765	100pF 2% 63V 1206
2235	4822 122 31765	100pF 2% 63V 1206
2236	4822 122 31765	100pF 2% 63V 1206
2300	4822 126 14305	100nF 10% 16V 0603
2301	4822 126 14305	100nF 10% 16V 0603
2302	4822 126 14305	100nF 10% 16V 0603
2303	4822 126 14305	100nF 10% 16V 0603
2304	4822 126 14305	100nF 10% 16V 0603
2305	4822 126 14305	100nF 10% 16V 0603
2306	4822 126 14305	100nF 10% 16V 0603
2308	4822 126 14305	100nF 10% 16V 0603
2309	4822 126 14305	100nF 10% 16V 0603
2401	4822 126 14305	100nF 10% 16V 0603
2417	4822 126 14305	100nF 10% 16V 0603
2502	4822 126 14305	100nF 10% 16V 0603
2503	4822 126 14305	100nF 10% 16V 0603
2508	4822 126 14305	100nF 10% 16V 0603
2509	4822 126 14305	100nF 10% 16V 0603
2514	4822 126 14305	100nF 10% 16V 0603
2515	4822 126 14305	100nF 10% 16V 0603
2520	4822 126 14305	100nF 10% 16V 0603
2522	4822 126 14247	0603 50V 1N5 COL R
2603	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2604	4822 126 14305	100nF 10% 16V 0603
2605	4822 122 31765	100pF 2% 63V 1206
2606	4822 124 23002	10µF 16V
2607	4822 126 14305	100nF 10% 16V 0603
2608	4822 124 23002	10µF 16V
2609	4822 126 14305	100nF 10% 16V 0603
2610	4822 126 14494	22nF 10% 25V 0603
2612	4822 122 33761	22pF 5% 50V
2613	4822 122 33761	22pF 5% 50V
2614	4822 122 33761	22pF 5% 50V
2616	4822 126 14305	100nF 10% 16V 0603
2617	4822 126 14305	100nF 10% 16V 0603
2618	4822 126 14305	100nF 10% 16V 0603
2619	4822 126 14305	100nF 10% 16V 0603
2620	4822 126 14305	100nF 10% 16V 0603
2621	4822 126 14305	100nF 10% 16V 0603
2622	4822 126 14305	100nF 10% 16V 0603
2623	4822 126 14305	100nF 10% 16V 0603
2624	4822 126 14305	100nF 10% 16V 0603
2625	4822 126 14305	100nF 10% 16V 0603
2626	4822 126 14305	100nF 10% 16V 0603
2627	4822 126 14305	100nF 10% 16V 0603
2628	4822 126 14305	100nF 10% 16V 0603
2629	4822 126 14305	100nF 10% 16V 0603
2630	4822 126 14305	100nF 10% 16V 0603
2631	4822 126 14305	100nF 10% 16V 0603
2632	4822 126 14305	100nF 10% 16V 0603
2633	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2634	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2635	4822 126 14305	100nF 10% 16V 0603
2636	4822 122 33761	22pF 5% 50V
2637	4822 122 33761	22pF 5% 50V
2700	4822 126 14305	100nF 10% 16V 0603
2701	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2702	4822 122 33777	47pF 5% 63V
2703	4822 122 33777	47pF 5% 63V
2704	4822 126 14305	100nF 10% 16V 0603
2705	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2706	4822 122 33777	47pF 5% 63V
2707	4822 122 33777	47pF 5% 63V
2708	3198 016 31020	0603 25V 1nF
2711	3198 016 31020	0603 25V 1nF
2713	4822 124 12095	100µF 20% 16V
2714	4822 126 14305	100nF 10% 16V 0603
2716	4822 126 14305	100nF 10% 16V 0603
2717	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2718	4822 122 33777	47pF 5% 63V
2719	4822 122 33777	47pF 5% 63V
2721	4822 124 12095	100µF 20% 16V
2722	4822 126 14305	100nF 10% 16V 0603
2723	4822 126 14305	100nF 10% 16V 0603
2724	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2725	4822 122 33777	47pF 5% 63V
2726	4822 122 33777	47pF 5% 63V
2727	4822 122 33777	47pF 5% 63V
2728	4822 122 33777	47pF 5% 63V
2729	4822 126 14305	100nF 10% 16V 0603
2731	4822 126 14305	100nF 10% 16V 0603
2732	4822 126 14305	100nF 10% 16V 0603
2733	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2734	4822 122 33777	47pF 5% 63V
2735	4822 122 33777	47pF 5% 63V
2736	4822 124 12095	100µF 20% 16V
2737	4822 126 14305	100nF 10% 16V 0603
2738	4822 126 14305	100nF 10% 16V 0603
2739	4822 126 14305	100nF 10% 16V 0603
2742	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2743	4822 122 33777	47pF 5% 63V
2744	4822 122 33777	47pF 5% 63V
2745	4822 122 33761	22pF 5% 50V
2746	4822 124 12095	100µF 20% 16V
2760	4822 126 14305	100nF 10% 16V 0603
2761	4822 126 14305	100nF 10% 16V 0603
2762	4822 126 14305	100nF 10% 16V 0603
2763	4822 126 14305	100nF 10% 16V 0603

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3104	4822 117 13501	82Ω 5% 0.62W 0603
3107	5322 117 13028	12k 1% 0.063W 0603 RC22H
3108	4822 117 13501	82Ω 5% 0.62W 0603
3116	4822 051 30103	10k 5% 0.062W
3118	4822 051 30103	10k 5% 0.062W
3119	4822 051 30103	10k 5% 0.062W
3120	4822 051 30103	10k 5% 0.062W
3121	4822 117 11152	4Ω7 5%
3122	4822 051 30103	10k 5% 0.062W
3123	4822 051 30103	10k 5% 0.062W
3130	4822 117 12139	22Ω 5% 0.062W
3131	4822 051 30222	2k2 5% 0.062W
3135	4822 051 30474	470k 5% 0.062W
3136	4822 051 30392	3k9 5% 0.063W 0603
3137	4822 051 30152	1k5 5% 0.062W
3139	4822 051 30221	220Ω 5% 0.062W
3140	4822 051 30103	10k 5% 0.062W
3141	4822 051 30103	10k 5% 0.062W
3142	4822 051 30101	100Ω 5% 0.062W
3143	4822 051 30103	10k 5% 0.062W
3144	4822 051 30103	10k 5% 0.062W
3145	4822 051 30101	100Ω 5% 0.062W
3147	4822 051 30472	4k7 5% 0.062W
3200	4822 051 30223	22k 5% 0.062W
3202	4822 051 30223	22k 5% 0.062W
3204	4822 051 30223	22k 5% 0.062W
3205	4822 051 30223	22k 5% 0.062W
3209	4822 051 30223	22k 5% 0.062W
3211	4822 051 30223	22k 5% 0.062W
3213	4822 051 30223	22k 5% 0.062W
3216	4822 051 30223	22k 5% 0.062W
3217	4822 051 30223	22k 5% 0.062W
3218	4822 051 30223	22k 5% 0.062W
3219	4822 051 30223	22k 5% 0.062W
3222	4822 051 30008	0Ω jumper
3223	4822 051 30101	100Ω 5% 0.062W
3224	4822 051 30101	100Ω 5% 0.062W
3227	4822 117 13573	NETW 4 X 47Ω 5% MNR14
3230	4822 051 30392	3k9 5% 0.063W 0603
3231	4822 051 30272	2k7 5% 0.062W
3232	4822 051 30392	3k9 5% 0.063W 0603
3233	4822 051 30472	4k7 5% 0.062W
3234	4822 051 30479	47Ω 5% 0.062W
3235	4822 051 30472	4k7 5% 0.062W
3236	4822 051 30103	10k 5% 0.062W
3237	4822 051 30008	0Ω jumper
3238	4822 051 30472	4k7 5% 0.062W
3239	4822 051 30472	4k7 5% 0.062W
3240	4822 051 30102	1k 5% 0.062W
3241	4822 051 30223	22k 5% 0.062W
3242	3198 031 11010	RST NETW 1206 4X100Ω PM5 COL R
3243	4822 051 30331	330Ω 5% 0.062W
3244	4822 117 13525	24k 1% 0.62W RC22H 0603
3246	4822 051 30101	100Ω 5% 0.062W
3247	4822 051 30151	150Ω 5% 0.062W
3249	4822 051 30472	4k7 5% 0.062W
3250	4822 051 30102	1k 5% 0.062W
3251	4822 051 30472	4k7 5% 0.062W
3257	4822 051 30472	4k7 5% 0.062W
3260	4822 051 30103	10k 5% 0.062W
3261	4822 051 30472	4k7 5% 0.062W
3262	4822 051 30102	1k 5% 0.062W
3263	4822 051 30102	1k 5% 0.062W
3264	4822 051 30102	1k 5% 0.062W
3265	4822 117 12891	220k 1% ERJ3Ω
3268	4822 051 30103	10k 5% 0.062W
3269	4822 051 30103	10k 5% 0.062W
3280	4822 051 30479	47Ω 5% 0.062W
3281	4822 051 30472	4k7 5% 0.062W
3300	4822 051 30008	0Ω jumper
3301	4822 117 12917	1Ω 5% 0.062W CASE0603

3302	4822 117 12917	1Ω 5% 0.062W CASE0603
3304	4822 051 30682	6k8 5% 0.062W
3306	4822 051 30681	680Ω 5% 0.062W
3307	4822 051 30008	0Ω jumper
3308	4822 117 13501	82Ω 5% 0.62W 0603
3309	4822 051 30681	680Ω 5% 0.062W
3310	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3311	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3312	4822 051 30333	33k 5% 0.062W
3313	4822 117 13501	82Ω 5% 0.62W 0603
3314	4822 117 13632	100k 1% 0603 0.62W
3316	4822 051 30682	6k8 5% 0.062W
3318	4822 051 30333	33k 5% 0.062W
3319	4822 051 30681	680Ω 5% 0.062W
3320	4822 051 20228	2Ω2 5% 0.1W
3321	4822 051 30008	0Ω jumper
3322	4822 051 20228	2Ω2 5% 0.1W
3323	4822 051 30682	6k8 5% 0.062W
3324	4822 051 30008	0Ω jumper
3325	4822 051 30008	0Ω jumper
3327	5322 117 13049	470Ω 1% 0.063W 0603 RC22H
3328	5322 117 13049	470Ω 1% 0.063W 0603 RC22H
3330	4822 051 30103	10k 5% 0.062W
3331	4822 051 30183	18k 5% 0.062W
3333	4822 051 30008	0Ω jumper
3334	4822 051 30103	10k 5% 0.062W
3335	4822 051 20228	2Ω2 5% 0.1W
3336	4822 051 30682	6k8 5% 0.062W
3337	4822 051 20228	2Ω2 5% 0.1W
3402	4822 051 30103	10k 5% 0.062W
3426	4822 051 30008	0Ω jumper
3428	4822 051 30008	0Ω jumper
3500	4822 051 30103	10k 5% 0.062W
3521	4822 051 30102	1k 5% 0.062W
3522	4822 051 30103	10k 5% 0.062W
3523	4822 051 30472	4k7 5% 0.062W
3524	4822 051 30472	4k7 5% 0.062W
3525	4822 051 30103	10k 5% 0.062W
3526	4822 051 30101	100Ω 5% 0.062W
3528	4822 051 30103	10k 5% 0.062W
3530	4822 051 30682	6k8 5% 0.062W
3602	4822 051 30479	47Ω 5% 0.062W
3603	4822 051 30479	47Ω 5% 0.062W
3604	4822 051 30472	4k7 5% 0.062W
3606	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3608	4822 051 30332	3k3 5% 0.062W
3609	4822 051 30332	3k3 5% 0.062W
3611	4822 051 30103	10k 5% 0.062W
3614	4822 051 30102	1k 5% 0.062W
3615	4822 051 30103	10k 5% 0.062W
3619	4822 051 30103	10k 5% 0.062W
3620	4822 051 30103	10k 5% 0.062W
3621	4822 051 30103	10k 5% 0.062W
3622	4822 051 30332	3k3 5% 0.062W
3625	4822 051 30103	10k 5% 0.062W
3627	4822 051 30103	10k 5% 0.062W
3628	4822 051 30332	3k3 5% 0.062W
3629	4822 051 30103	10k 5% 0.062W
3630	4822 051 30103	10k 5% 0.062W
3631	4822 051 30332	3k3 5% 0.062W
3632	4822 051 30332	3k3 5% 0.062W
3633	3198 031 11010	RST NETW 1206 4X100Ω PM5 COL R
3635	4822 051 30479	47Ω 5% 0.062W
3637	4822 051 30101	100Ω 5% 0.062W
3638	4822 051 30101	100Ω 5% 0.062W
3639	4822 051 30101	100Ω 5% 0.062W
3641	4822 051 30479	47Ω 5% 0.062W
3644	2322 704 61303	RST SM 0603 RC22H 13k PM1 R
3645	2322 704 61303	RST SM 0603 RC22H 13k PM1 R
3646	5322 117 13042	3k9 1% 0.063W 0603 RC22H
3647	5322 117 13042	3k9 1% 0.063W 0603 RC22H
3648	4822 051 30101	100Ω 5% 0.062W
3702	4822 051 30683	68k 5% 0.062W
3703	4822 051 30471	470Ω 5% 0.062W
3704	4822 051 30101	100Ω 5% 0.062W
3706	4822 051 30221	220Ω 5% 0.062W
3707	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3708	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3709	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3710	4822 117 12925	47k 1% 0.063W 0603
3711	4822 051 30221	220Ω 5% 0.062W
3715	4822 051 30683	68k 5% 0.062W
3716	4822 051 30471	470Ω 5% 0.062W
3718	4822 051 30101	100Ω 5% 0.062W
3722	4822 051 30221	220Ω 5% 0.062W
3723	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3724	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3725	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3726	4822 117 12925	47k 1% 0.063W 0603
3727	4822 051 30221	220Ω 5% 0.062W
3728	4822 051 30683	68k 5% 0.062W
3729	4822 051 30471	470Ω 5% 0.062W
3730	4822 051 30101	100Ω 5% 0.062W
3731	4822 051 30221	220Ω 5% 0.062W
3732	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3733	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3734	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3735	4822 117 12925	47k 1% 0.063W 0603
3736	4822 051 30221	220Ω 5% 0.062W
3738	4822 051 30683	68k 5% 0.062W
3739	4822 051 30471	470Ω 5% 0.062W
3740	4822 051 30101	100Ω 5% 0.062W
3742	4822 051 30221	220Ω 5% 0.062W
3743	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3750	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3751	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3752	4822 117 12925	47k 1% 0.063W 0603
3753	4822 051 30221	220Ω 5% 0.062W
3755	4822 051 30683	68k 5% 0.062W
3756	4822 051 30471	470Ω 5% 0.062W
3757	4822 051 30101	100Ω 5% 0.062W
3758	4822 051 30221	220Ω 5% 0.062W
3759	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3760	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3761	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3762	4822 117 12925	47k 1% 0.063W 0603
3763	4822 051 30221	220Ω 5% 0.062W
3765	4822 051 30683	68k 5% 0.062W
3766	4822 051 30471	470Ω 5% 0.062W
3768	4822 051 30101	100Ω 5% 0.062W
3770	4822 051 30221	220Ω 5% 0.062W
3771	4822 051 30689	68Ω 5% 0.063W 0603 RC21 RST SM
3772	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3773	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3774	4822 117 12925	47k 1% 0.063W 0603
3775	4822 051 30221	220Ω 5% 0.062W
3776	4822 117 12139	22Ω 5% 0.062W
3781	4822 051 30008	0Ω jumper
3782	4822 051 30101	100Ω 5% 0.062W
3783	4822 051 30101	100Ω 5% 0.062W

5100	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5101	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5102	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5200	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5201	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5202	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5203	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5401	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5500	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5501	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5601	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5602	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5603	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5604	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5605	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5606	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5700	4822 157 70651	12µH (NL322522T-120J)
5701	4822 157 70651	12µH (NL322522T-120J)
5702	4822 157 70651	12µH (NL322522T-120J)
5703	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5704	4822 157 11717	BLM31P500SPT
5705	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5706	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5707	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5708	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5709	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5710	4822 157 70651	12µH (NL322522T-120J)
5711	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5713	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5715	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5716	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5717	4822 157 70651	12µH (NL322522T-120J)
5718	4822 157 11717	BLM31P500SPT
5719	2422 549 45153	IND FXD SM EMI 100mH z 60R R
5722	4822 157 70651	12µH (NL322522T-120J)

6303	9322 128 69685	S1D
6304	9322 128 69685	S1D
6305	9322 128 69685	S1D

7100	9352 637 37518	TZA1033HL
7109	4822 130 60511	BC847B
7111	9337 331 10215	FET SIG SM BST82 (PHSE) R
7112	9337 331 10215	FET SIG SM BST82 (PHSE) R
7113	4822 130 60511	BC847B
7200	9352 681 05557	IC SM SAA7812HL/M3B (PHSE) Y
7201	4822 130 60373	BC856B
7202	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7206	9322 163 27685	IC SM NCP301LSN45 (ONSE) R
7300	4822 209 30095	LM833D
7301	9322 139 85668	BA6665FM
7302	4822 209 17229	BA5938FM
7405	9322 156 81668	M24C32-WMN6TNKSA
7500	9322 166 67668	IC SM MT48LC4M16A2TG-7E(MRN0)R
7502	9340 425 20115	TRA SIG SM BC847BS (PHSE) R
7600	9322 170 24671	IC SM STI5580EVA (ST00) Y
7603	2722 171 08763	OSC XTL SM 27MHZ 2560TK-27M R
7605	9340 425 20115	TRA SIG SM BC847BS (PHSE) R
7701	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7705	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7707	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7710	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7711	9322 142 88668	IC SM LF25CDT (ST00) R
7713	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7714	9322 142 88668	IC SM LF25CDT (ST00) R
7716	9352 456 80115	74HCT1G125GW
7718	9340 425 30115	TRA SIG SM BC847BPN (PHSE) R
7719	9965 000 04199	BSN20
7720	9965 000 04199	BSN20