

# FORTECSTAR STB

## SERVICE MANUAL

Model

Lifetime-ULTRA



**FORTECSTAR**  
*SATELLITE SYSTEM*

# MODEL

## Fortecstar Lifetime ULTRA

### CONTENTS

- 1 ) TROUBLESHOOTING
- 2 ) CIRCUIT DIAGRAM
- 3 ) PARTS LIST



***FORTECSTAR***  
*SATELLITE SYSTEM*

**Component and Function list of Circuit Page**

Page	Component	Function	Remark
1	RS232 Driver	SP232ACN :Support UART protocol	
2	TUNER	BS2F7VZ0614 or BSF7VZ0194 :Channel Tuning	0194 TUNER:R152 NC 0614 TUENR:R209 NC
	REGULATOR	LM7805 :Convert '+7V to '+5V	
	SWITCHING POWER TR	TIP 42C :LNB ON/OFF control	
3	Sti 5518	Main chip_set	
	VCXO IC	KA5SDKAS01TSN :Sti 5518 Clock	
	SDRAM	HY57V641620HG :64M main system memory	
4	FLASH	39VF800A :Main Code & Channel Data	
	AUDIO DAC	WM8725 :Digital Audio to Analog Conversion	
	EEPROM	24LC32	
	INVERTER IC	74HC14 : system reset	
5	OP AMP	TL074CDR2 :Analog Audio Amplifier	
	RF Modulator	RF-V3412AVS	
	CINCH	SY-0603 :Video(CVBS)&Audio(L & R)	
6	DISPLAY	LFD5522-10/SP10 :LED FOR DISPLAY	
	IR SENSOR	FRP 4052 : Received RCU' signal.	
	LOGIC IC	74HC164 : CONVERT SERIAL TO PARALLEL	



Information

Recommendation of Checking Flow



**Highly recommended follow service flow**

1. Appearance (Exterior) Test

- Check the condition of assembling(between main and sub) ,bend of PCB, cold soldering or short of component and problem of parts. etc.

2. Power Test

- After power is on , Check the output power P1 connector.  
+3.3V,+7V,+12V,+14/18V,+30V

3. System Test

- Check whether sti5518 works normally or not.  
It includes following item  
Reset, Clock,Memory access,and the other essential items.

4. MPEG and AV Test

- Check the whole process from sti5518 to several output terminal)  
(VCR,Phone jack )

5. Channel TEST

- Tuner is receiving, tuning and locking of I/F frequency, which be generated from LNB.  
Check whether is generated 22Khz tone signal .

- The form of wave in Service manual can be varied depending on system condition, input signal,etc

**SECTION**
**POWER TEST**

SYMPTON : System not working

**Check Point**
**SMPS & CONNECTOR OF SMPS**

Explanation :

- ▶ In this case, Refer to circuit Diagram **page 1**
- ▶ Item : SMPS connector  
 Checking Point : P1 connector

NO	OUTPUT VOLTAGE	MINI LOAD	NOR LOAD	MAX LOAD	PROTECTION	REMARK
1 pin	+14V	0.2A	0.4A	0.6A	14.05V~15.5V	H/V CON: LOW
	+18V	0.2A	0.4A	0.6A	18V~21V	H/V CON: HIGH
2 pin	+30V	10mA	10mA	10mA	27V~33V	
3 pin	+7.5V	0.1A	0.4A	0.7A	7.3V~7.9V	
6,7pin	+3.3V	0.4A	1.5A	2.0A	3.3V	
9 pin	+12V	0.1A	0.1A	0.2A	11.75V~12.50	
8 pin	H/V control					

※ All tolerance of those output power should be within 5%~10%.

Key Point : if H/V control(P1,8pin) have any problem, the set can scan only Horizontal or Vertical polarization signal

- ▶ Action Note for failure

Check the connection of power supply connector  
 If continued failure after checking, replace the SMPS



SECTION

Basic Test

SYMPTON : System not working

Check Point

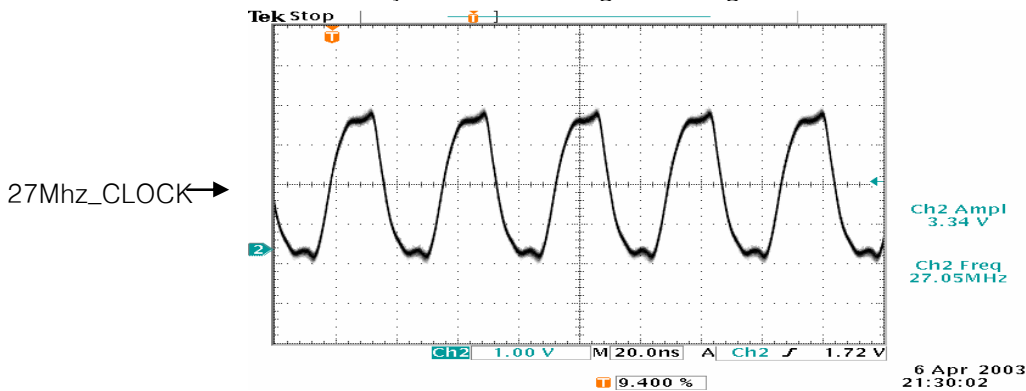
VCXO & RESET

Explanation :

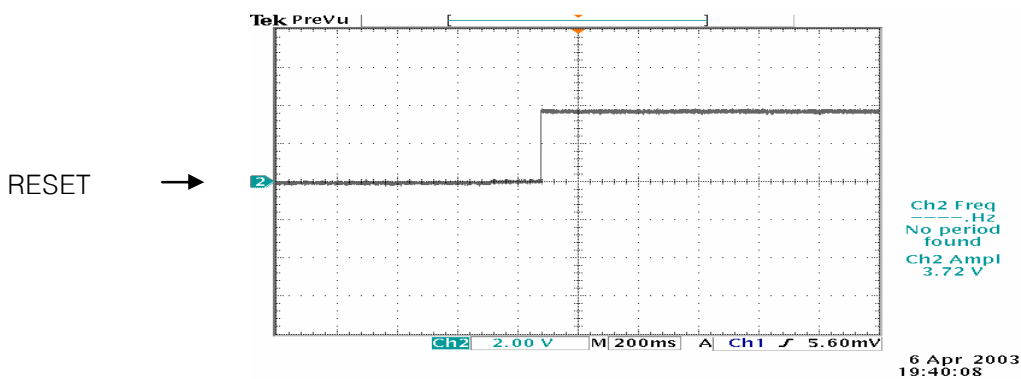
Item : VCXO IC & SYSTEM RESET IC

Check Point : U12

- ▶ sti5518 uses VCXO as system clock(27Mhz)
- ▶ VCXO generate directly 27Mhz frequency, sti5518 and cimac use this clock for system clock  
Check whether 27Mhz system clock is generating in the same following waveform



Measurement Point: Circuit Diagram Page 3/6, R31



Measurement Point: Circuit Diagram Page 4/6, U7/pin4

System clock 27Mhz should be in the stable condition when the System Reset

- ▶ Action Note for failure

In this case, Most of cause is poor VCXO. Replace parts.

Otherwise, check the install and soldering condition, etc.

SECTION	System Test
---------	-------------

SYMPTON : Not acting although no Failure on basic test.

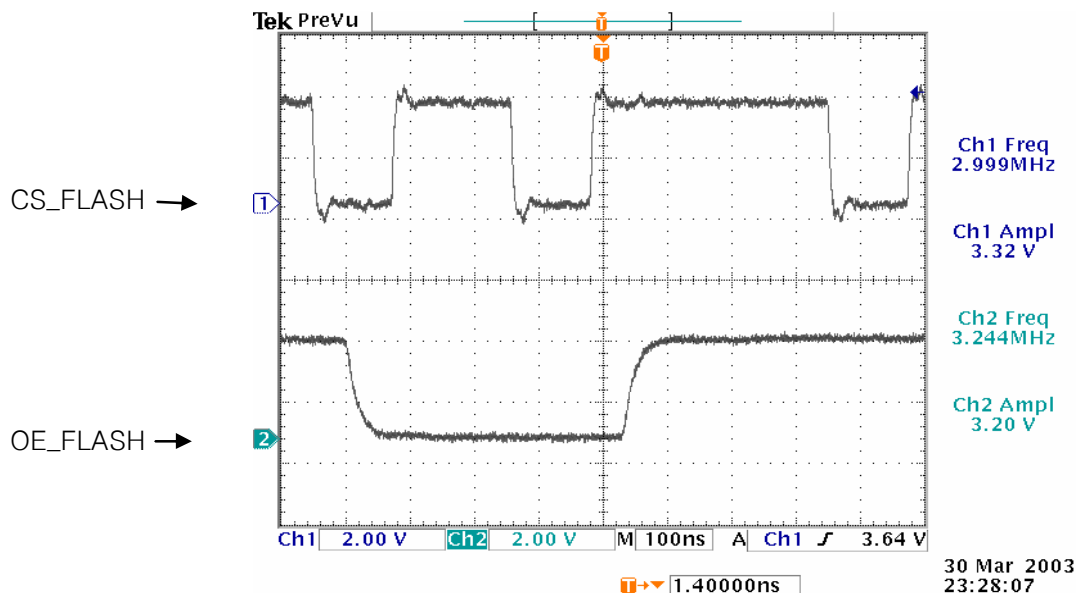
Check Point	Flash Memory
-------------	--------------

**Explanation :**

Item : Flash Memory

Check Point : U5

- In advance ,Check flash memory containng program code,  
if Basic test have no failure and system is not working  
In normal case, Flash show control signal continuously as below



► Measurement Point

CS : Circuit Diagram Page 4/6,U5,pin26

OE : Clrcuit Diagram Page 4/6,U5,pin28

► Action Note for failure

If the above waveform is not measured, first check whether program code is normally installed in flash memory, Examine the short of soldering error, cold-soldering,etc.

When soldering has no error,check the basic test items, Date Bus and address Bus  
If the above problem occured after downloading, should be replaced flash memory  
Be careful On downloading.



SECTION	System Test
---------	-------------

SYMPTON : Not acting although no Failure on basic test.

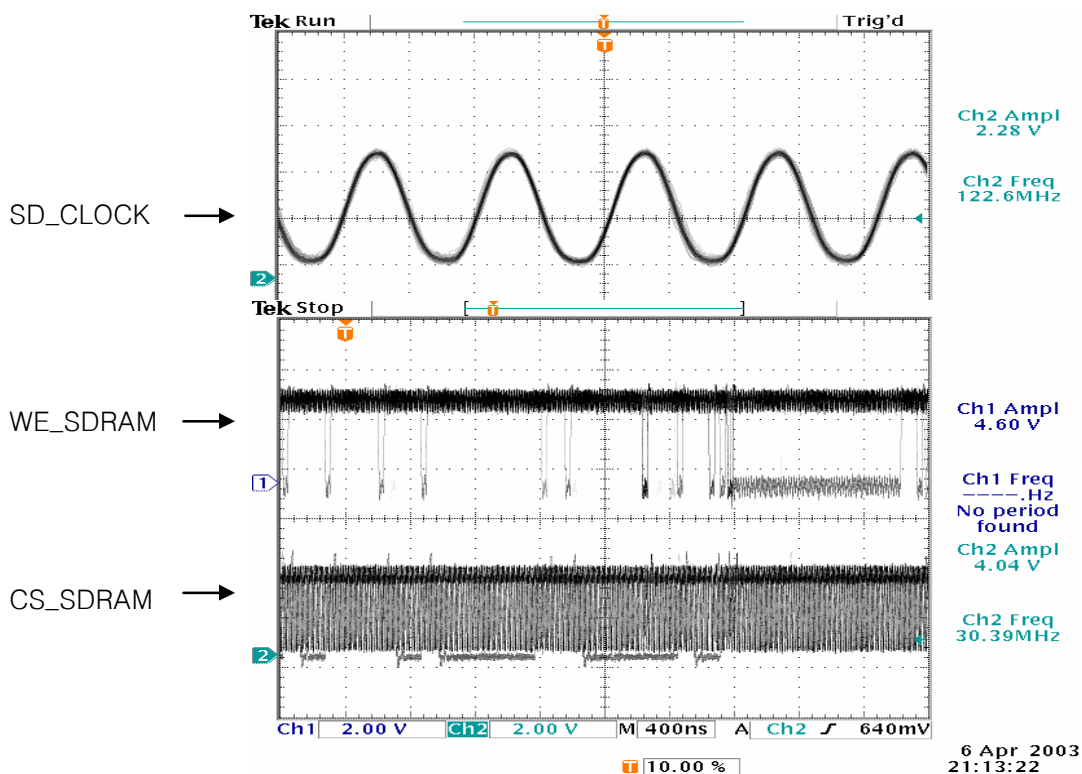
Check Point	SDRAM
-------------	-------

### Explanation :

Item : SDRAM

Check Point : U4

- ▶ When no errors are found after basic test and system si not acting,  
It is necessary to check SDRAM as Main Data and MPEG Graphic domain.
- ▶ When the CS signal is low, SDRAM is selected.  
Those two waveform show continuously as below



### ▶ Measurement Point

SD\_CLOCK : Circuit Diagram Page 3/6, U4/pin38  
WE\_SDRAM : Circuit Diagram Page 3/6, U4/pin16  
CS\_ SDRAM : Circuit Diagram Page 3/6, U4/pin19

### ▶ Action Note for failure

If the above waveform is not acting, examine the short fo soldering error,  
cold-soldering,etc.

When soldering has no error,check the basic test items, Date Bus and address Bus

The last option is replacing.



SECTION	Channel Test
SYMPTON : Locking fail	
Check Point	Totally checking item for Tuning parts
<p>Explanation :</p> <p>Item : tuner Check Point : T1 (page 2)</p> <p>► Tuner is receiving, Tuning and Locking of RF signal</p> <p>1. Test POINT (Circuit Diagram Page 2)</p> <ol style="list-style-type: none"> <li>1) Tuner: check internal power +3.3V (+3.25~+3.35V)</li> <li>2) Check whether 22Khz Tone signal is generated (400~800mV , duty cycle: 45~50%)</li> <li>3) Check whether LNB POWER control signal and LNB POWER is generated LNB POWER CONTROL SIGNAL --&gt; LNB_PWR_ON/OFF</li> <li>4) Check TUNER OUTPUT'S DATA &amp; CLOCK voltage and wave</li> <li>5) When power is on, check I2C BUS LINE which generates signal by initialization of TUNER. (NIM_SDA, NIM_SCL)</li> <li>6) Check whether TUNER _RESET is properly generated</li> </ol>	

SECTION Channel Test

SYMPTON : Locking fail

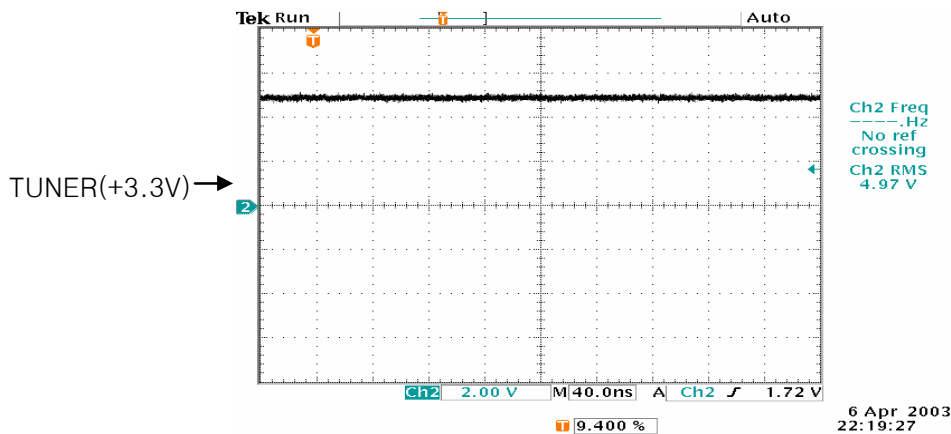
Check Point tuner

Explanation :

Item : tuner

Check Point : T1

- ▶ Tuner Internal Working Voltage is +3.3V. It is one of the cause of Tuner Internal Frequency Change when the RIPPLE or the voltage is shaking.



Measurement Point :Circuit Diagram Page 2/6, T1/pin5

- ▶ Action Note for failure  
After checking the soldering condition and Input voltage. Replace 7805 and SMPS.



**Explanation :**

Item : tuner

Check Point : LNB power control

► +13/18V, which is carried to LNB through a Tuner loop, is LNB internal voltage power. It is used as input voltage of LNB internal REG.  
In case of LNB DUAL POLA, +13/18V is also used during the polarization conversion of Horizontal/ Vertical.

► LNB POWER CONTROL SIGNAL

Measurement Point: Curcuit Diagram Page 1 (P1 pin8) & LNB\_PWR\_ON/OFF(Q6)

18V → H/V (High) , LNB\_PWR\_ON/OFF(High)  
13V → H/V (Low) , LNB\_PWR\_ON/OFF(High)

The figure displays two oscilloscope captures of LNB power control signals. The top capture, labeled 'LNB POWER(+18V)', shows a high-level signal with a measured RMS voltage of 19.4 V. The bottom capture, labeled 'LNB POWER(+13V)', shows a low-level signal with a measured RMS voltage of 13.9 V. Both waveforms are captured on a Tektronix scope with a 10.0 V vertical scale and 40.0 ns horizontal scale. The top trace is at 19.4 V RMS and the bottom trace is at 13.9 V RMS.

Measurement Point :Circuit Diagram Page 2/6, T1/pin 4

► Action Note for failure  
After checking the soldering condition and Input voltage. Replace SMPS



SECTION

Channel Test

SYMPTON : 22Khz TONE controll

Check Point

LNB power control parts

Explanation :

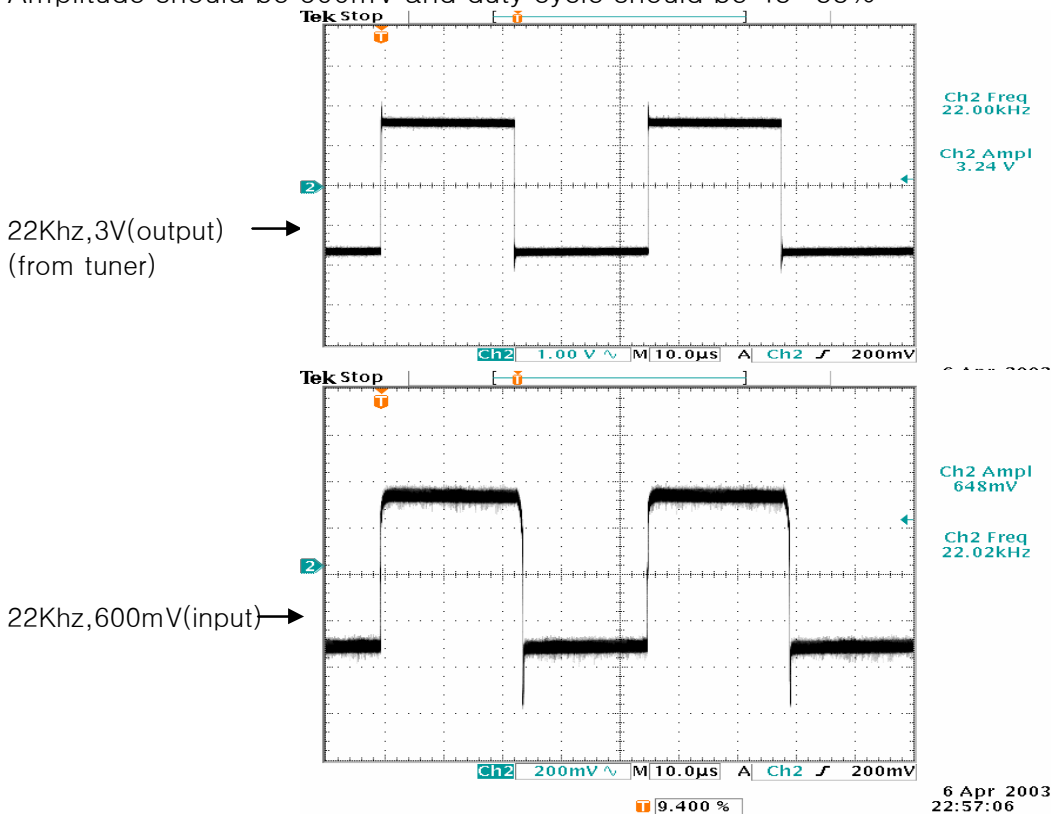
Item : 22Khz TONE

Check Point : total Circuit Diagram

- ▶ 22Khz TONE that is generated from Tuner is used for selecting Low Band(10.7~11.7GHz)and High Band (11.7~12.75GHz )

The below picture shows 22Khz waveform.

Amplitude should be 600mV and duty cycle should be 45~55%



▶ Measurement Point

22Khz(output) : Circuit Diagram page 2/6, T1,pin12

22Khz(input) : Circuit Diagram page 2/6, T1,pin2

22Khz(On) : 22Khz\_off/on( Low) /page 2/6.Q5

22Khz(Off) : 22Khz\_off/on( High) /page 2/6.Q5

▶ Action Note for failure

After checking the soldering condition and wrong inserting.(Q2,Q3,Q4,Q5,Q6)

SECTION

Channel Test

SYMPTON : Locking failure

Check Point

LNB power control parts

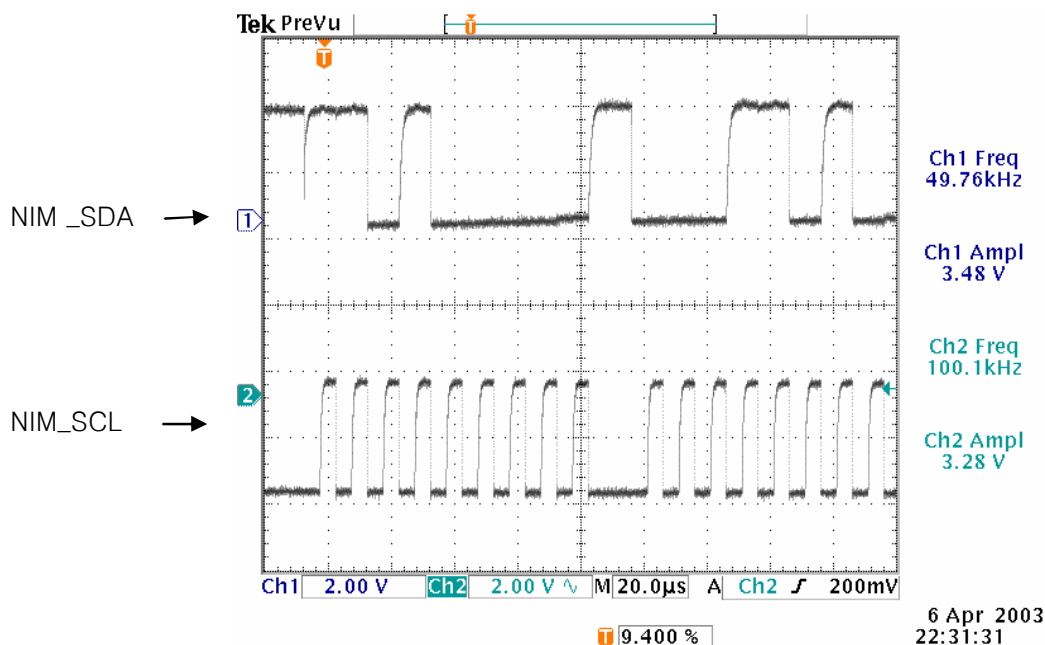
Explanation :

Item : I2C BUS LINE

Check Point : total Circuit Diagram

- I2C BUS is generated by st5518 are controlling TUNER and etc...

It is usually used to set the required data during CHANNEL LOCKING and also used to read their STATUS



► Measurement Point:

SDA : Circuit Diagram page 2/6, T1/pin8

SCL : Circuit Diagram page 2/6, T1/pin9

- Action Note for failure

If the wave is different from above, cold-soldering or wrong insertion of TUNER is the main cause.  
If there is no signal in I2C BUS LINE, mostly Pins are short or system down.  
Resoldering is necessary.



SECTION

Channel Test

SYMPTON : Locking failure

Check Point

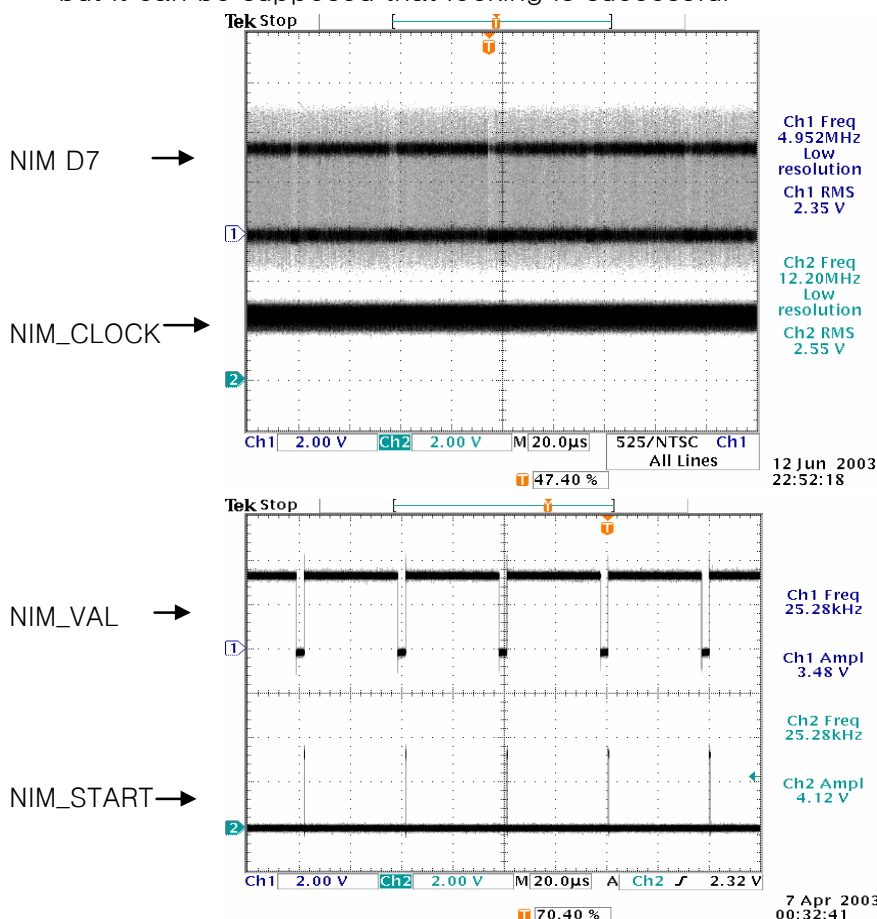
Tuner output

Explanation :

Item : tuner output

Check Point : Tuner

- ▶ Tuner outputs are TS DATA(serial 1bit),CLOCK,NIM\_VAL,NIM\_START,ERROR.  
It varies according to the setting fo symbol Rate.  
Each signal is generated after Tuner can normally lock.
- ▶ If Tuner normally are working ,Each signal is measured as below.  
but it can be supposed that locking is successful



Measurement point:

Circuit Diagram page 2/6,  
0614 TUNER : T1,PIN14  
0194 TUNER : T1,PIN21

Circuit Diagram page 2/6,T1,pin24

Circuit Diagram page 2/6,T1,pin25

Circuit Diagram page 2/6,T1,pin26

- ▶ Action Note for failure  
First of all, check the LNB power and signal condition.  
If Clock and Serial TS DATA are not coming, Check the items mentioned above and replace the Tuner.  
If all signal is correct but searching is fail,Mostly the reason is not tuner but also by PCB pattern or cold\_ soldering or short.

SECTION

A/V TEST

SYMPTON : No Audio output

Check Point

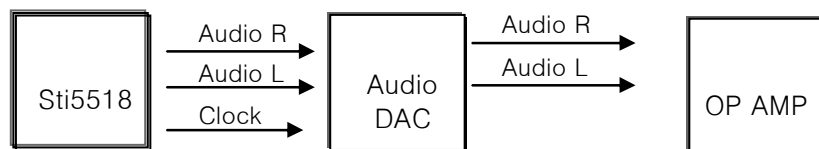
Audio

Explanation :

Item : Audio DAC

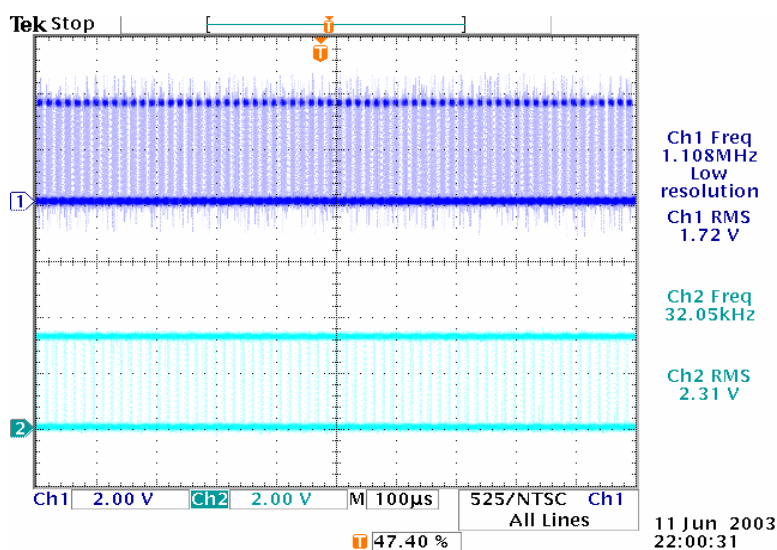
Check Point : Audio signal wave from Sti5518

- If not generating Audio signal at final output terminal,  
First of all ,Check in where parts have errors  
Trace Audio signal in each circuit.



DA\_DATA →  
(from Sti5518)

DA\_CLOCK →  
(from Sti5518)



► Measurement Point

DA\_DATA : Circuit Diagram Page 4/6, U6,pin2

DA\_CLOCK : Circuit Diagram Page 4/6, U6,pin1

► Action Note for Audio failure

If the output of Digital Audio signal from Sti5518 is normal,Trace each circuit  
To find the problem spot.

Trace each circuit to find the problem spot. Last option is replacing Sti5518.

SECTION A/V TEST

SYMPTON : Audio signal not generating

Check Point Audio DAC

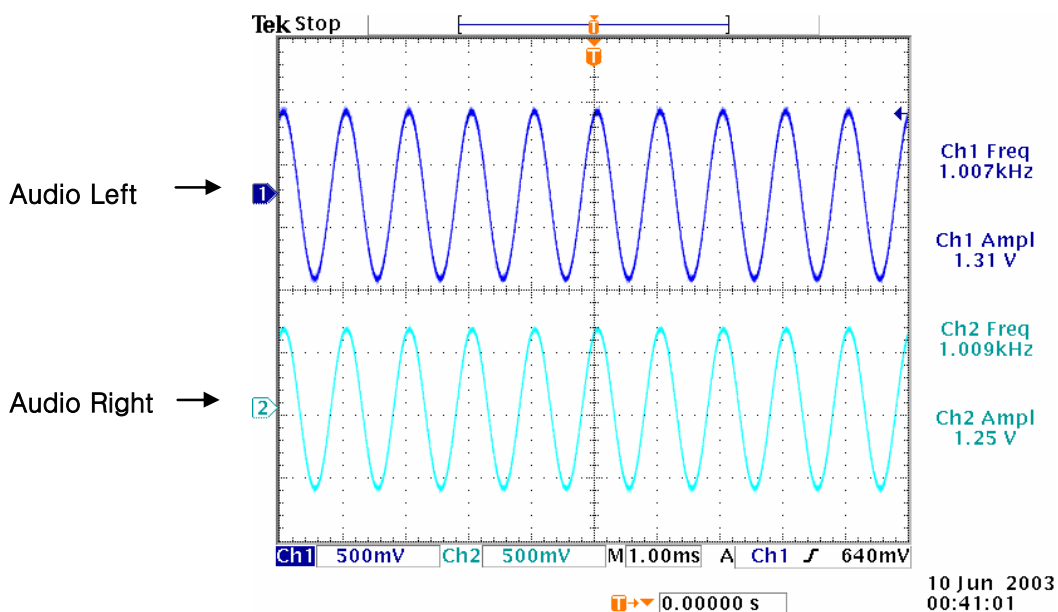
Explanation :

Item : Audio DAC

Check Point : Audio DAC & related lcs

- ▶ If Audio signal is not generating RCA jack,  
Check on Audio DAC IC. Audio DAC is converting Digital Audio to Analog Audio.  
and check OP AMP(U6) ,A/V switch IC(U10)
- ▶ The output level and characteristic is sensitive to R and C values.  
Check the soldering condition or their values.

The picture down shows the output wave using 1Khz Tone signal.



▶ Measurement Point

Vout\_L : Circuit Diagram Page 4/6, U6/pin9

Vout\_R : Circuit Diagram Page 4/6, U6/pin6

- ▶ Action Note for Audio failure  
If the output of Audio DAC is normal, Trace each circuit to find the problem spot.  
Audio is a part of Analog, most of all failure are probably found in soldering  
and poor components.



SECTION

A/V TEST

SYMPTON : NO Video output

Check Point

Video wave signal

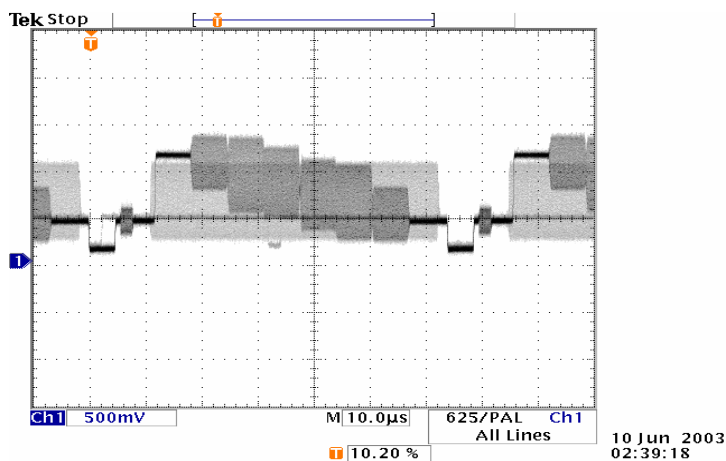
Explanation :

Item : Trace Analog video signal in each circuit.

Check Point : From Video filter to each output terminal.

- ▶ Although the system's working is normal, but Video signal does not appear output terminals.
- ▶ The picture shown down below is the output pattern by using color bar signal

CVBS →



▶ Measurement Point

CVBS : Circuit Diagram Page 5/6, U10/pin4

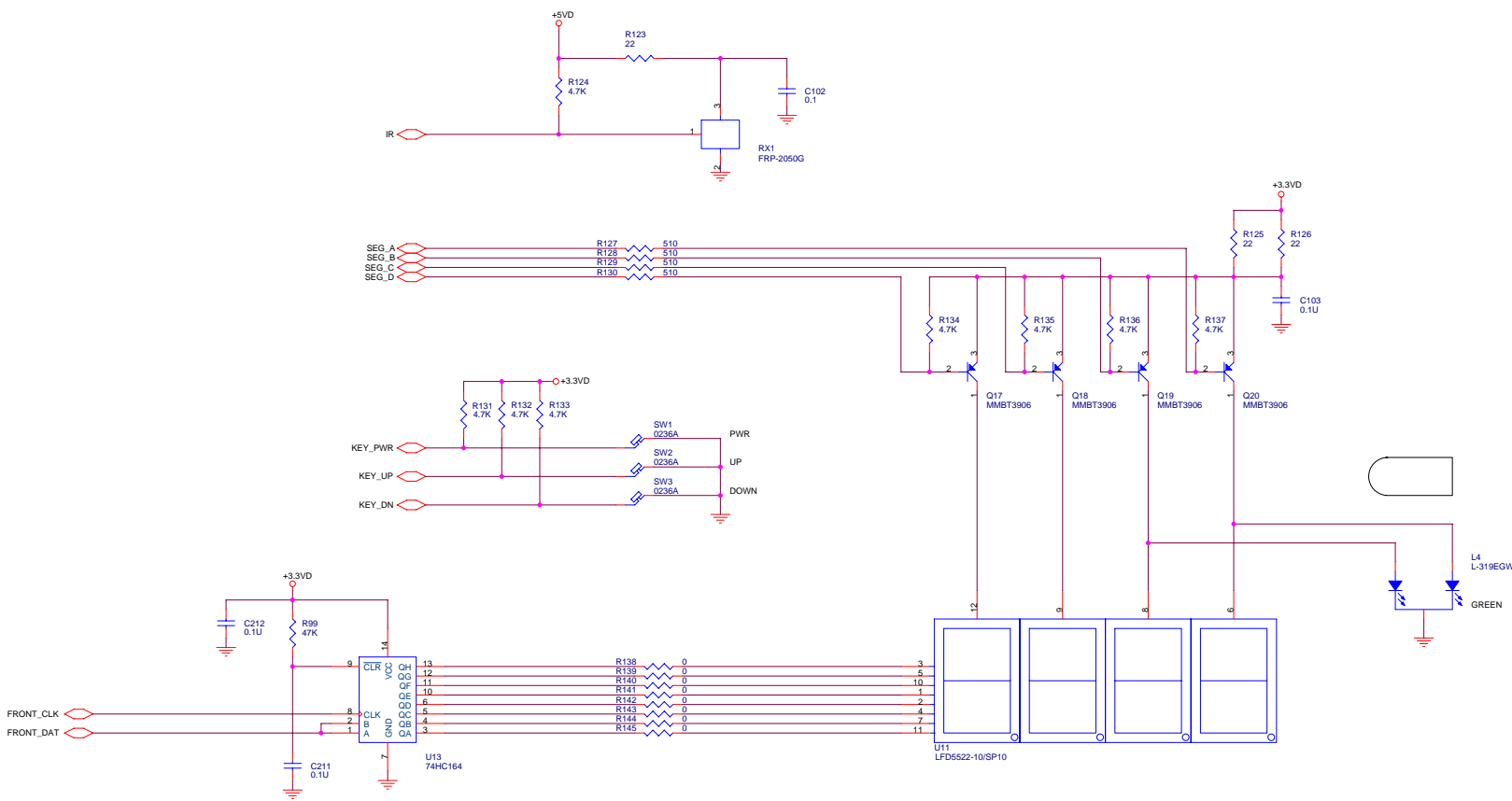
- ▶ Action Note for Video failure

**Black screen**

Although system is working well, the reason of error can be find related circuit. To find out the error, trace the circuit related Video line, and check the waveform. Video is a part of Analog, most of all failure are probably found in soldering and poor components.

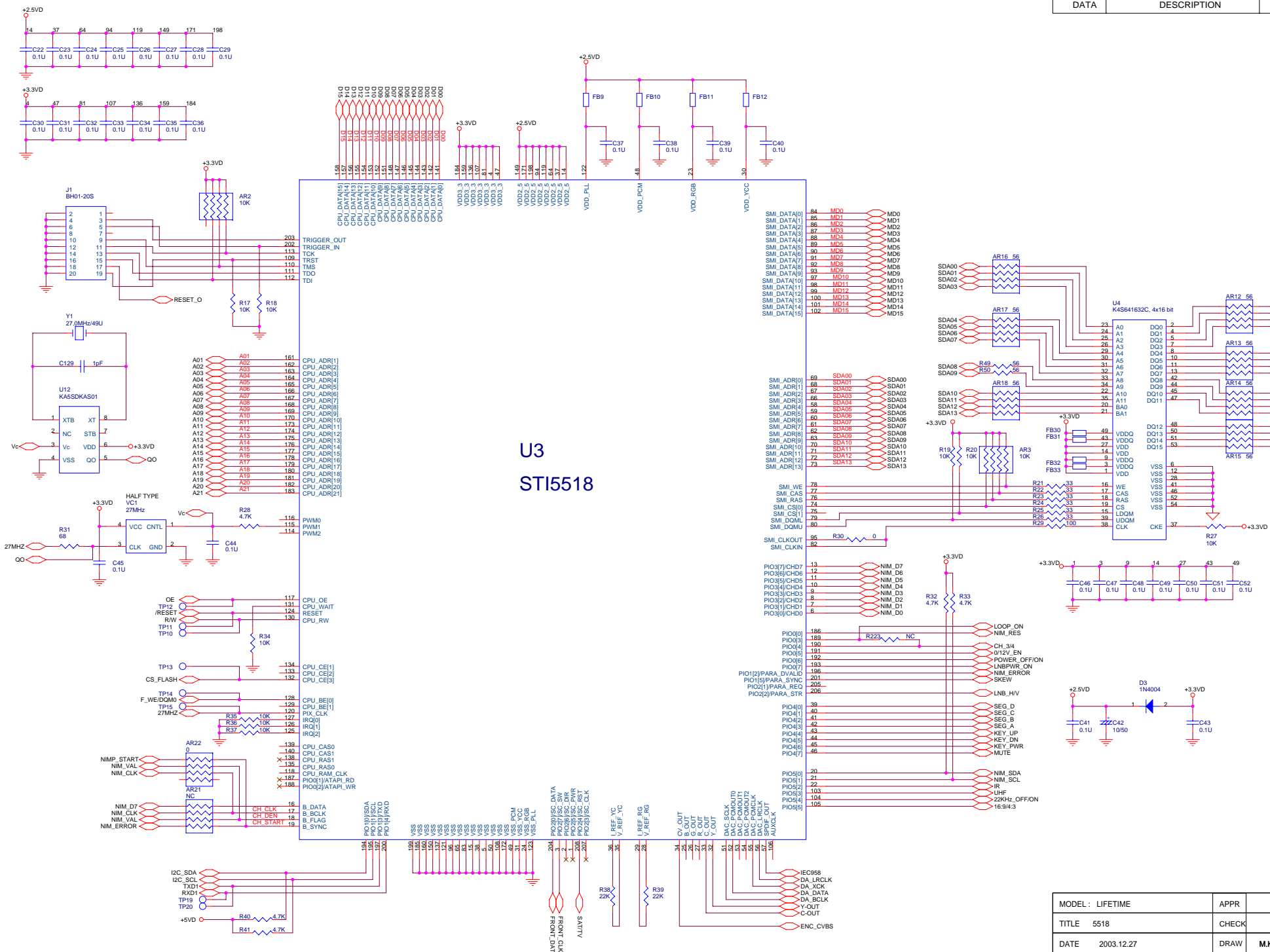
SECTION	Front parts
SYMPTON : LED DISPLAY	
Check Point	7 SEGMENT FOR 4 DIGITS
<p>Explanation :</p> <p>Item : LED DISPLAY Check Point : display and related circuit.</p> <ul style="list-style-type: none"> <li>▶ LED DISPLAY is controlled by Sti 5518.</li> <li>▶ LED DISPLAY is black continuously, Although Power on First of all, Check whether system is working well. For example, Case of dead flash, it can't display as "on" Most of cause is this case. As above mention, Check the basic test items, Date Bus and address Bus. If the above problem occurred after downloading, should be replaced flash memory</li> <li>▶ If one or two digit of 4 digits have any error, Check circuit diagram page 6/6 and last option is replacing U11.U13</li> <li>▶ If can't be controlled by RCU, Check whether was downloaded correct main program. Check RX1's soldering condition and +5V line.</li> </ul>	

REVISIONS		
DATA	DESCRIPTION	APP

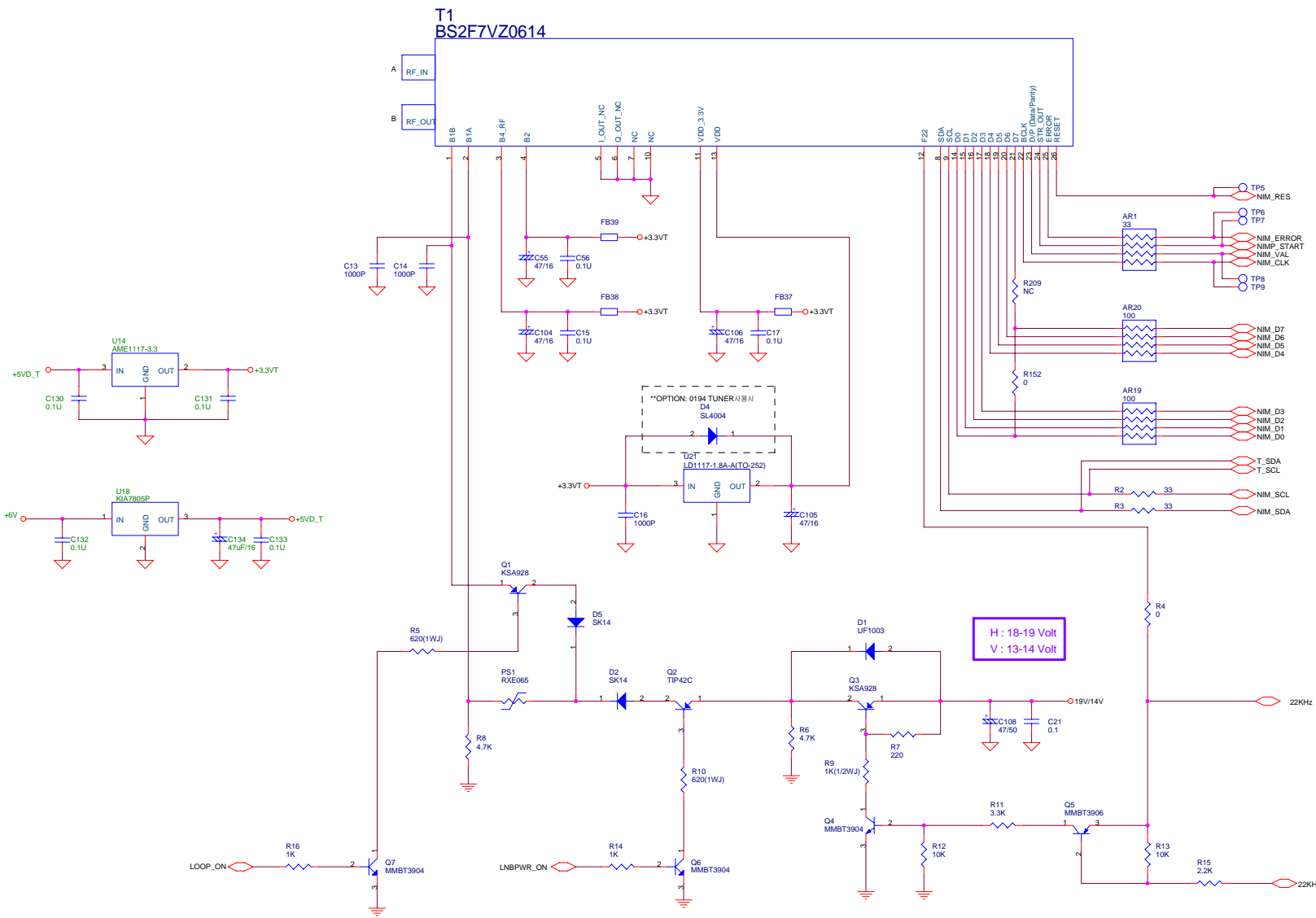


MODEL : LIFETIME	APPR	
TITLE FRONT	CHECK	
DATE 2003.12.27	DRAW	M.K.JEON
FORTECSTAR	REV.D	SHEET 6 / 6

MODEL : LIFETIME		APPR	
TITLE 5518		CHECK	
DATE 2003.12.27		DRAW	M.K.JEON
FORTECSTAR	REV.D	SHEET	3 / 6

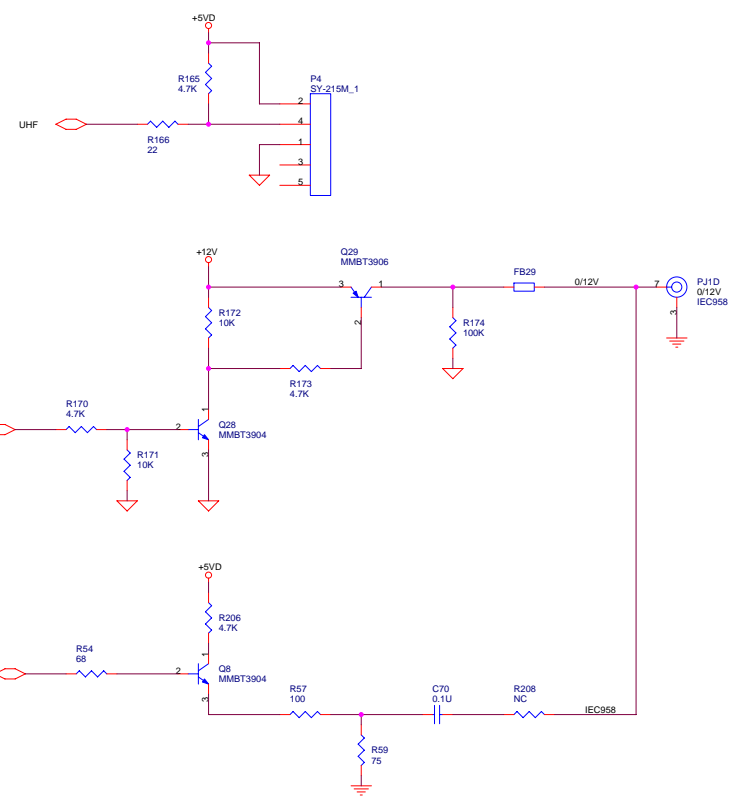
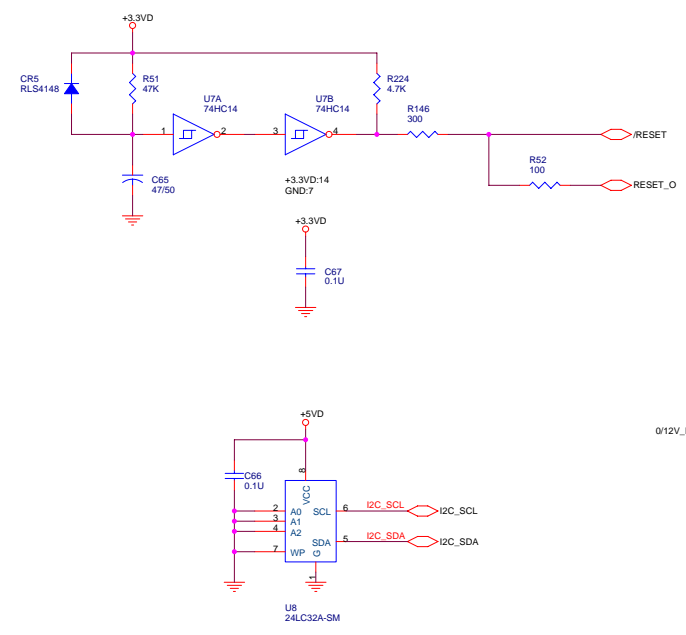
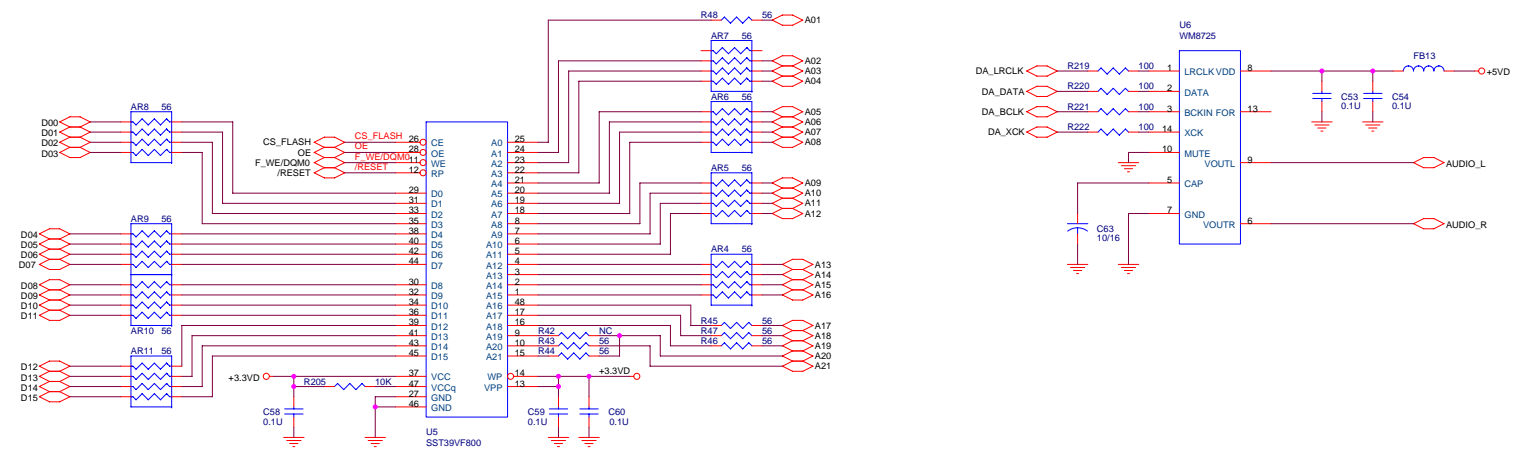


REVISIONS		
DATA	DESCRIPTION	APP



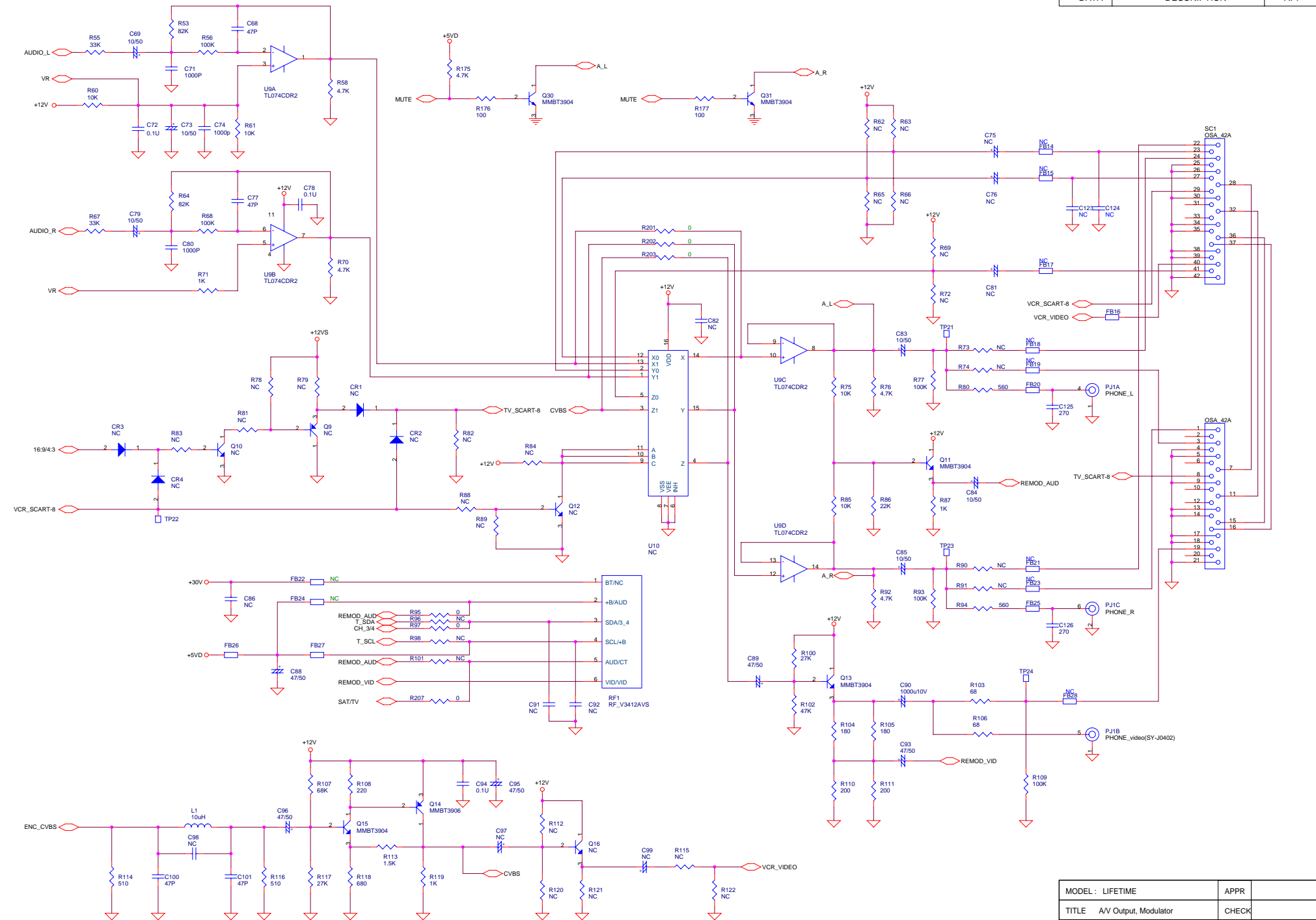
MODEL : LIFETIME	APPR	
TITLE QPSK TUNER MODULE	CHECK	
DATE 2003.12.27	DRAW	M.K.JEON
FORTECSTAR	REV.D	SHEET 2 / 6

REVISIONS		
DATA	DESCRIPTION	APP



MODEL : LIFETIME	APPR	
TITLE 5518	CHECK	
DATE 2003.12.27	DRAW	M.K.JEON
FORTECSTAR	REV.D	SHEET 4 / 6

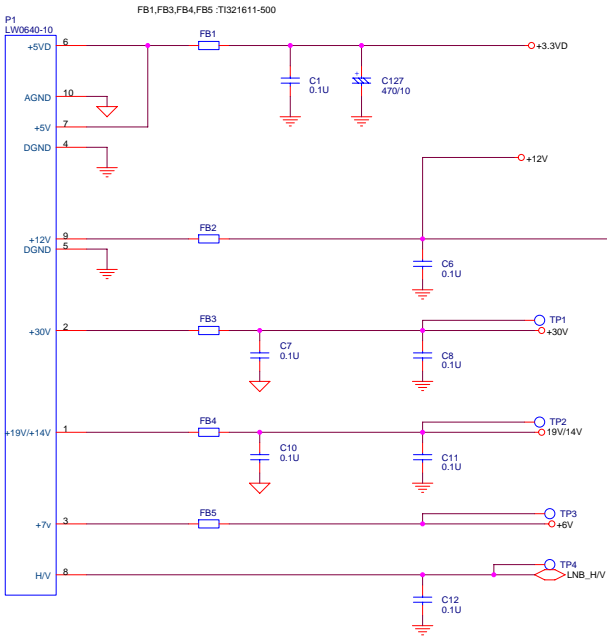
REVISONS		
DATA	DESCRIPTION	APP



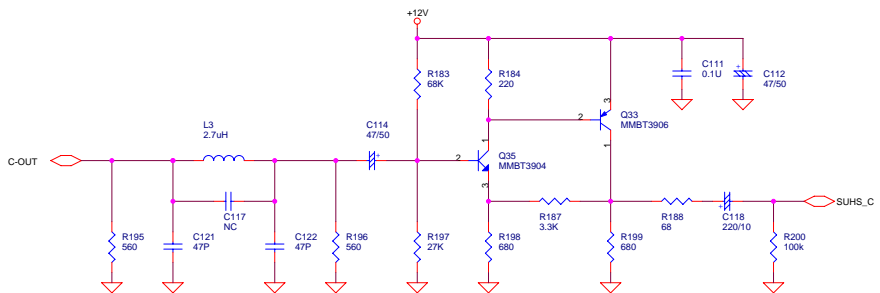
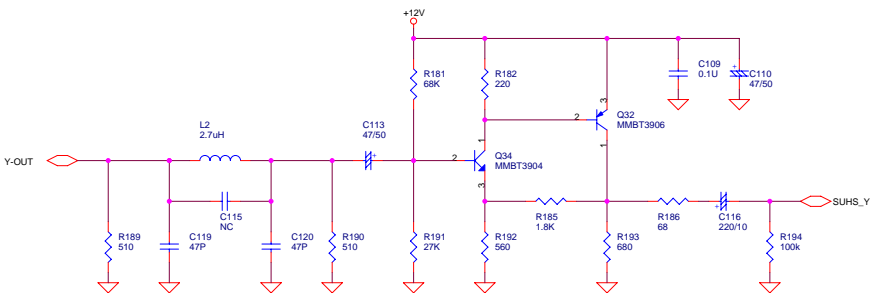
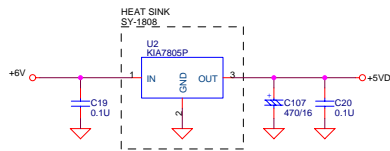
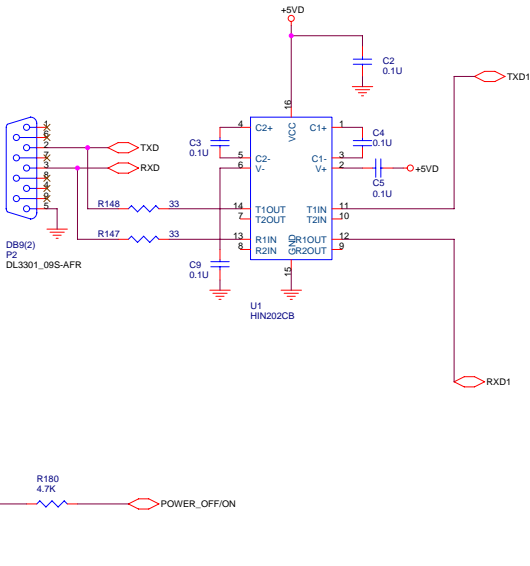
MODEL : LIFETIME	APPR	
TITLE A/V Output, Modulator	CHECK	
DATE 2003.11.12	DRAW	M.K.JEON
FORTECSTAR	REV.D	SHEET 5 / 6

REVISIONS		
DATA	DESCRIPTION	APP

H : 18-19 Volt  
V : 13-14 Volt



\*SUHS : OPTION (NTSC ONLY)



MODEL : LIFETIME		APPR	
TITLE	POWER/SMART CARD I/F	CHECK	
DATE	2003.12.27	DRAW	M.K.JEON
FORTESTAR	REV D	SHEET	1 / 6



BASIC MODEL : LIFETIME ULTRA

DATE : 2004-03-17

PARTS LIST								
NO	ITEM	DWG NO.	WORK	Q'TY	TYPE	VENDOR		REMARK
						PART NO.	VENDOR	
MAIN ASS'Y								
1	MAIN_PCB	GSR 3020 REV.D		1	DS, 1.6T	REV.D	JAC	
2	CPU IC	U3	S	1	QFP	ST15518BVB	SGS	
			S	0	QFP	ST15518BVC	SGS	
3	FLASH IC	U5	S	1	TSSOP	SST39VF800A	SST	
4	SDRAM IC	U4	S	1	SOP	K4S641632C	SAMSUNG	
			S	0	SOP	HY57V641620HG	HYNIX	
			S	0	SOP	IC42S16400-7T	ICSI	
			S	0	SOP	IS42S16400-7T	ICSI	
			S	0	SOP	ARC4*16S4K3VF-55	ARC	
			S	0	SOP	VDS6616A4A	A/V-DATA	
			S	0	SOP	CS56A64163N-7	CHIPLUS	
			S	0	SOP	TBS6416B4E6E	MTEC	
5	EEPROM	U8	S	1	S08	24WC32	CSI	
				0	S08	24LC32	Microchip	
6	AUDIO DAC	U6	S	1	S014	WM8725ED	WOLFSON	
			S	0	S014	PCM1725U	BB	
7	OP AMP IC	U9	S	1	S014	TL074CDR2	ST	
8	REGULATOR	U21	S	1	T0-252	LD1117-1.8A	UTC	
9	REGULATOR	U2,U18	H	2	T0-220	K1A7805P	KEC/MOTO/KIA	
			H	0	T0-220	7805CT	Onsemi	
10	REGULATOR	U14	H	1	T0-252	AME1117-3.3V	AME	
11	LOGIC IC	U13	S	1	S014	74HC164	PHILIPS/FAIRCHILD	
12	INVERTER IC	U7	S	1	S014	74HC14A	PILIPS/ST/FAIRCHILD	
13	TUNER	T1	H	1	DIP	BS2F7VZ0614	SHARP	
13	TUNER	T1	H	0	DIP	BS2F7VZ0604	SHARP	
VCX0								
14	VXCO	VC1	H	1	DIP	2.7MHz(3.3V HALF)	SUNNY/BU BANG	
VCX0 IC								
14	VCX0 IC	U12	H	1	DIP	KA5SDKAS01TSN	KAWASAKI	
14-1	CRYSTAL	Y1	H	1	DIP	27MHz 8.5pf(K96-001)	Siward	
14-2	CHIP CAPACITOR	C129	S	1	SMD_1608	X7R 010 K 50V(1P)	MURATA	
15	RS232 IC	U1	S	1	S016	ST232CW	ST	
			S	0	S016	SP232ACT	SIPEX	
			S	0	S016	HIN202CBN	INTERGRAL	
16	CHIP CAPACITOR	C13,C14,C16,C71,C74,C80	S	6	SMD_1608	X7R 102 K 50V(1000P)	MURATA	

17	CHIP CAPACITOR	C1, C2, C3, C4, C5, C6 ,C7, C8, C9 ,C10,C11,C12,C15,C17, C19,C20,C21,C22,C23,C24,C25, C26,C27,C28,C29,C30,C31,C32, C33,C34,C35,C36,C37,C38,C39, C40,C41,C43,C44,C45,C46,C47, C48,C49,C50,C51,C52,C53,C54, C56,C58,C59,C60,C66,C67,C70, C72,C78,C94,C102,C103,C109,C111,C130,C131,C132,C133,C211,C21	S	69	SMD_1608	Y5V 104 Z 50V(0.1u)	MURATA	
18	CHIP CAPACITOR	C68,C77,C100,C101,C119, C120,C121,C122	S	8	SMD_1608	NP0 470 J 50 V(47p)	MURATA	
19	CHIP CAPACITOR	C125,C126	S	2	SMD_1608	X7R 271 K 50 V(270p)	MURATA	
20	ELECT CAP	C63	S	1	RADIAL	SG 10u16V	SAMWHA	
21	ELECT CAP	C42,C69,C73,C79,C83,C84,C85	R	7	RADIAL	SG 10u50V	SAMWHA	
21	ELECT CAP	C118,C116	R	2	RADIAL	SG 220u10V	SAMWHA	
22	ELECT CAP	C55,C104,C105,C106,C134	R	5	RADIAL	SG 47u16V	SAMWHA	
23	ELECT CAP	C65,C88,C89,C93,C95,C96,C108, C110,C112,C113,C114	R	11	RADIAL	SG 47u50V	SAMWHA	
24	ELECT CAP	C127,C128	R	2	RADIAL	SG 470u10V	SAMWHA	
25	ELECT CAP	C107	R	1	RADIAL	SG 470u16V	SAMWHA	
26	ELECT CAP	C90	R	1	RADIAL	SG 1000u10V	SAMWHA	
28	DIODE	D3	S	1	RADIAL	1N4004	PYUNGCHANG ELEC	
29	DIODE	CR5,CR6,CR7	S	3	SMD	RLS4148	PYUNGCHANG ELEC	
30	DIODE SCHOTTKY	D2,D5	S	2	SMD	SK14	PYUNGCHANG ELEC	
31	DIODE RETIFIER	D1	S	1	DIP	UF1003	PYUNGCHANG ELEC	
32	TR	Q4,Q6,Q7,Q8,Q11,Q13, Q15,Q22,Q27,Q28, Q30,Q31,Q34,Q35	S	14	SMD	MMBT3904LT1	MOTO	
33	TR	Q5,Q14,Q17,Q18,Q19,Q20,Q21, Q29,Q32,Q33,	S	10	SMD	MMBT3906LT1	MOTO	
34	POWER TR	Q1,Q3	S	2	DIP	KSA928	FAIRCHILD	
35	POWER TR	Q2	S	1	DIP	TIP42C	FAIRCHILD	
36	AXIAL INDUCTOR	L1	A	1	AXIAL	04T 100K(10uH)	K.T.Y	
36	AXIAL INDUCTOR	L2,L3	A	2	AXIAL	04T 2R7K(2.7uH)	K.T.Y	
37	CHIP RESISTOR	R4,R30,R95,R97,R138, R139,R140,R141,R142,R143, R144,R145,R201,R202, R203,R207,R208,R209	S	18	SMD_1608	1/16WJ,0 OHM	HANROUCK	
38	CHIP RESISTOR	R29,R52,R57,R168,R169,R176, R177,R219,R220,R221,R222,	S	11	SMD_1608	1/16WJ,100 OHM	HANROUCK	
39	CHIP RESISTOR	R14,R16,R71,R87,R119	S	5	SMD_1608	1/16WJ,1K OHM	HANROUCK	
40	CHIP RESISTOR	R12,R13,R17,R18,R19,R20,R27, R34,R35,R36,R37,R60,R61,R75,R85, R171,R172,R205	S	18	SMD_1608	1/16WJ,10K OHM	HANROUCK	
41	CHIP RESISTOR	R56,R68,R77,R93,R109,R174, R194,R200	S	8	SMD_1608	1/16WJ,100K OHM	HANROUCK	
42	CHIP RESISTOR	R113	S	1	SMD_1608	1/16WJ,1.5K OHM	HANROUCK	
43	CHIP RESISTOR	R104,R105	S	2	SMD_1608	1/16WJ,180 OHM	HANROUCK	
43	CHIP RESISTOR	R185	S	1	SMD_1608	1/16WJ,1.8K OHM	HANROUCK	
44	CHIP RESISTOR	R110,R111	S	2	SMD_1608	1/16WJ,200 OHM	HANROUCK	

45	CHIP RESISTOR	R123,R125,R126,R166	S	4	SMD_1608	1/16WJ,22 OHM	HANROUCK	
46	CHIP RESISTOR	R7,R108,R182,R184	S	4	SMD_1608	1/16WJ,220 OHM	HANROUCK	
47	CHIP RESISTOR	R15,R179	S	2	SMD_1608	1/16WJ,2.2K OHM	HANROUCK	
48	CHIP RESISTOR	R38,R39,R86	S	3	SMD_1608	1/16WJ,22K OHM	HANROUCK	
49	CHIP RESISTOR	R100,R117,R191,R197	S	4	SMD_1608	1/16WJ,27K OHM	HANROUCK	
50	CHIP RESISTOR	R146	S	1	SMD_1608	1/16WJ,300 OHM	HANROUCK	
51	CHIP RESISTOR	R2,R3,R21,R22,R23,R24, R25,R26,R147,R148	S	10	SMD_1608	1/16WJ,33 OHM	HANROUCK	
52	CHIP RESISTOR	R11,R187	S	2	SMD_1608	1/16WJ,3.3K OHM	HANROUCK	
53	CHIP RESISTOR	R55,R67	S	2	SMD_1608	1/16WJ,33K OHM	HANROUCK	
54	CHIP RESISTOR	R167	S	1	SMD_1608	1/16WJ,470 OHM	HANROUCK	
55	CHIP RESISTOR	R6,R8,R28,R32,R33,R40,R41, R58,R70,R76,R92,R124,R131,R132 , R133,R134,R135,R136,R137,R165, R170,R173,R175,R178,R180,R206,	S	27	SMD_1608	1/16WJ,4.7K OHM	HANROUCK	
56	CHIP RESISTOR	R51,R99,R102	S	3	SMD_1608	1/16WJ,47K OHM	HANROUCK	
57	CHIP RESISTOR	R114,R116,R127,R128,R129, R130,R189,R190	S	8	SMD_1608	1/16WJ,510 OHM	HANROUCK	
58	CHIP RESISTOR	R43,R44,R45,R46,R47,R48, R49,R50	S	8	SMD_1608	1/16WJ,56 OHM	HANROUCK	
59	CHIP RESISTOR	R80,R94,R192,R195,R196	S	5	SMD_1608	1/16WJ,560 OHM	HANROUCK	
60	CHIP RESISTOR	R31,R54,R103,R106,R186,R188	S	6	SMD_1608	1/16WJ,68 OHM	HANROUCK	
61	CHIP RESISTOR	R118,R193,R198,R199	S	4	SMD_1608	1/16WJ,680 OHM	HANROUCK	
62	CHIP RESISTOR	R107,R181,R183	S	3	SMD_1608	1/16WJ,68K OHM	HANROUCK	
63	CHIP RESISTOR	R59	S	1	SMD_1608	1/16WJ,75 OHM	HANROUCK	
64	CHIP RESISTOR	R53,R64	S	2	SMD_1608	1/16WJ,82K OHM	HANROUCK	
65	CHIP RESISTOR	R9	S	1	SMD_5025	1K 1/2W	HANROUCK	
66	CHIP RESISTOR	R5,R10	S	2	SMD_6432	620R 1WJ	HANROUCK	
67	ARRAY RESISTOR	AR22	S	1	SMD	RKA04AN000J-T	K.D.Y	
68	ARRAY RESISTOR	AR19,AR20	S	2	SMD	RKA04AN101J-T(100)	K.D.Y	
69	ARRAY RESISTOR	AR4, AR5,AR6,AR7,AR8,AR9, AR10,AR11,AR12,AR13,AR14, AR15, AR16,AR17,AR18	S	15	SMD	RKA04AN560J-T	K.D.Y	
70	ARRAY RESISTOR	AR1	S	1	SMD	RKA04AN330J-T	K.D.Y	
71	ARRAY RESISTOR	AR2,AR3	S	2	SMD	RKA04AN103J-T	K.D.Y	
72	POLY SWITCH	PS1	S	1	RADIAL	RXE065	SAM JU LITTLE FUSE	
73	FERRITE BEAD	FB1,FB2,FB3,FB4,FB5	S	5	SMD-3216	TI321611-500	SAMHWA ELEC	
74	FERRITE BEAD	FB9, FB10,FB11,FB12,FB13, FB20,FB25,FB26,FB27,FB30, FB31,FB32,FB33,FB37,FB38,FB39	S	16	SMD_2012	MLB201209-0400A-N2	SAMHWA ELEC	
75	DISLPAY	U11	H	1	VERTICAL	LFD5522-10/SP10	LIGITEC	
			H	0	VERTICAL	A-574G	PARA-LIGHT	
76	TACT SWITCH	SW1,SW2,SW3	H	3	VERTICAL	0236A	JINSUNG ELEC	
				0	VERTICAL	KTL-1105V	KOREANA	
78	DSUB-9PIN-MALE	P2	H	1	DIP	DL3302-09S-AFR	WELL POINT	
79	RCA PHONE JACK	PJ1	H	1	DIP	SY-J0402-1	SE YOUNG ELEC	
80	HEAT SINK		H	1	DIP	SY-1808	SE IN ELEC	
82	MODULATOR	RF1	H	1	DIP	RF-V3412AVS	WITTIS	
83	SMPS		H	1		GRP-GL0242	GRANTEK	
84	HEADER	P1		1		LW0640-10(SMPS)	DAESHIN ELEC	

85	HEADER	P5		1		LW0640-07	DAESHIN ELEC	
86	WAFER	RX1	H	1		SMH 250-03	DAESHIN ELEC	
87	AC POWER CABLE			1		GSR1110SW	POWER ELEC	
88	BATTERY	AAA		2		BATTERY	SUTHONG	
89	RCU			1		FORTECSTAR	SEOBI	
90	20 PIN BOX HEADER			1		BH01-20S	WELL POINT	
IR SUB_ASS'Y								
1	SUB_PCB	GSR 3010/20SUB REV.2		1		REV.2	SUNG WOO ELEC	
2	3P CON ASSY		H	1	DIP	150mm SMH250 R/A type	DAESHIN ELEC	
3	IR SENSOR	RX1	H	1	DIP	FRP-4052H	FOCUS	
SUB_ASS'Y								
1	SUB_PCB	(56 X 20mm)		1	REV.B	GSR1100 REV.B	SUNG WOO ELEC	
2	Conn. Ass'y (7P)	7P(100mm)/LW0640-7	H	1		GSR1100-CN1	DAESHIN ELEC	
3	S-VIDEO JACK	P7	H	1	1	-		
PACKING								
1	TOP COVER	GSR 3020	1			TAESUNG METAL		
2	BOTTOM CHISSIS	GSR 3020	1			TAESUNG METAL		
3	WINDOW	GSR 3020	1			TAESUNG METAL		
4	FRONT PANEL	GSR 3020	1			TAESUNG METAL		
4-1	BADGE	FORTECSTAR(SMALL)	1			TAESUNG METAL		
5	KNOB	GSR 3020(cr )	1			TAESUNG METAL		
6	LOCKER S/W		1		-	SUNG GI		
7	FOOT RUBBER		2		SJ-5012	SE IN		
8	GIFT BOX		1			ART BOX		
9	MANUAL		1			ART BOX		
10	POLY BAG		1			INTECH		
11	CARTON BOX		0.125			ART BOX		
12	T-SCREW	TTS W/H 3*6 ZN (MAIN3,SMPS2 FRONT2)	7			ASUNG		
13	T-SCREW	T/S-3 B/H 3*6	2			ASUNG		
14	T-SCREW	T/S-2 PH 3*8 BK (PHONE JACK1,TERMINAL2)	3			ASUNG		
15	T-SCREW	TTS TH 4*6 BK (TOP)	2			ASUNG		
16	T-SCREW	TTS TH 2*6 BK(KNOB 4)	4			ASUNG		
17	SNOW PAD	-	2			ASUNG		
18	SUPPORT	for SMPS	2			ASUNG		
19	TUNER NUT		4			ASUNG		
20	PLANE WASHER	FOR MODULATOR	2			ASUNG		
21	TUNER WASHER		4			ASUNG		