TF4000Fi

Service Manual

15 March, 2004

Topfield Co., Ltd

IMPORTANT

Note : The design of the satellite receiver is subject to continuous development and improvement. Consequently, this receiver may incorporate minor changes in detail from the information contained in this manual.

Warning : These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are fully qualified to do so.

TABLE OF CONTENTS **Page**

1. Safety Instructions

Read this chapter carefully before servicing the IRD.

1.1 The IRD must be disconnected from the mains plug before it is opened.

1.2 The capacitor inside the SMPS (power supply) can hold charge even if the IRD has been disconnected from the mains plug. To handle SMPS, wait until the capacitor is discharged.

1.3 Only the same screw should be used to assemble the IRD.

2. List and Description of The Major Parts

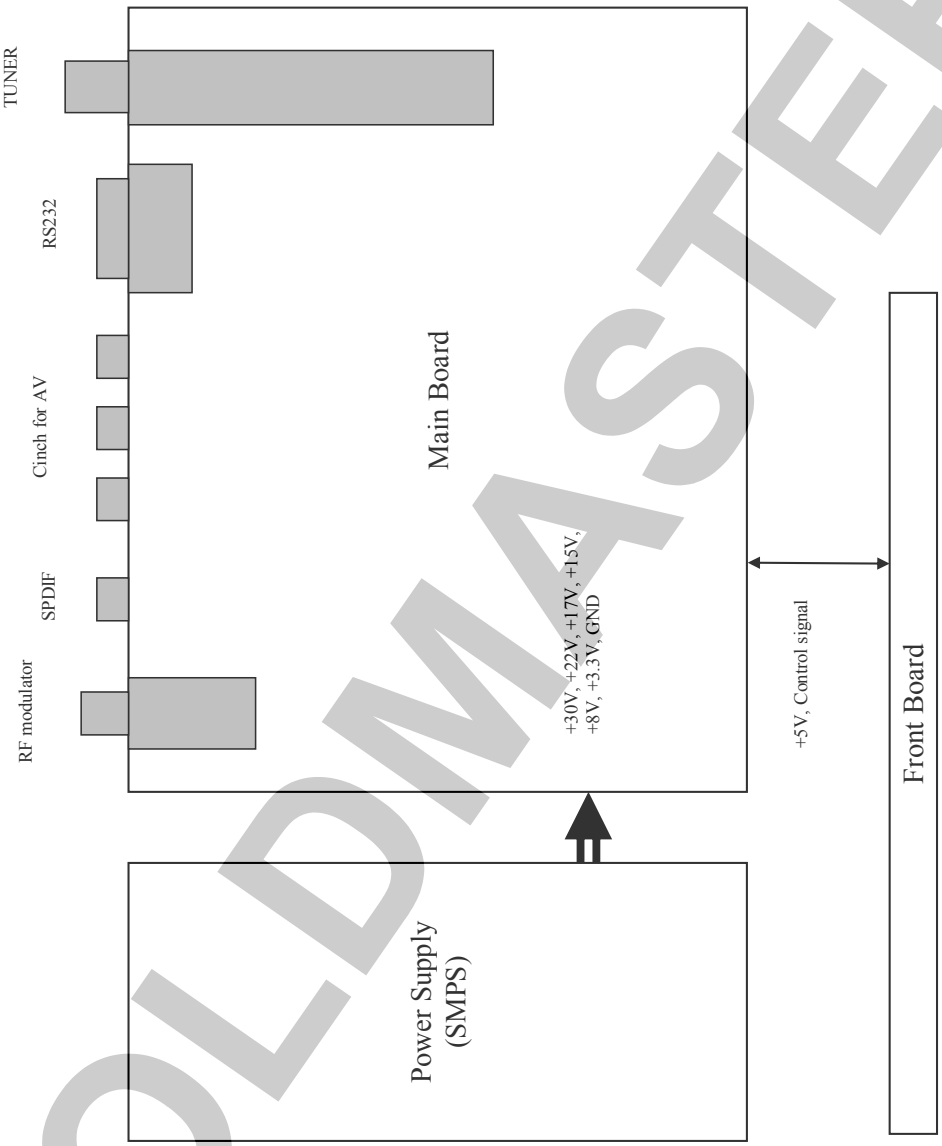
2.1. Main Board

page	Part Name	Location Number	Part number	Function	Comment
1	Tuner module	U1	TBMU24311IPP	Channel tuning. Analog to Digital Conversion. QPSK demodulation.	Or, equivalent part
	Regulator	U2	LM7805 (with Heat Sink)	Regulates Tuner 5V	Or, equivalent part
	LNB Power Switching IC	U3	LNBP20PD	Regulates and switching LNB power (Horizontal 18V, Vertical 13V) 22KHz tone On/Off	
	Poly switch	U4	RXE065	Over current protection of LNB power.	
3	CPU, Demux and Decoder	U5	IBM39STB02500	Main CPU of IRD(PowerPC401B3) MPEG Demux and Decoder	
4	ASIC	U7	TF301SC15	CI interface, System control	
	Reset IC	U8	ELM9727NBA	Power level detection, Resets the system.	Only one IC is used
5	Flash memory	U10	SST39VF800A	Saves program and constant	Or, equivalent part
	EEPROM	U11	24LC02B-SN	Saves some parameters	Or, equivalent part
6	SDRAM	U12	K4S641632D	Main system memory	Or, equivalent part
7	Rs232 Driver	U13	MAX232	Rs232 level conversion	Or, equivalent part
	Connector	P1	D-SUB	Connector for RS232	
	Connector	JP2	TOTX178A	S/PDIF Connector	S/PDIF, Optional
	Connector	JP3	5267-10A	Smart Card Sub board Connector	Embedded CAS, Optional
8	Regulator	U14	LD1117ADT18	Regulates internal 1.8V	
	Regulator	U15	MIC39100-2.5BS	Regulates internal 2.5V.	
	Regulator	U16	78L12	Regulates internal 12V	
	Connector	JP4	5267-12A	Power input connector	
9	Audio DAC	U18	UDA1334TS	Audio Digital to Analog Converter	
	OP Amp	U17	TL072	Audio amplifier	
10	Cinch	J1	RCA-3Pin	Cinch Connector for A / V	
11	RF modulator	U20	RMUP74055AB	RF modulator	
	Regulator	U21	LM7805	Regulates 5V for RF-modulator.	Or, equivalent part
12	Connector	JP5	5267-7A	Front Board interface	
	TTL	U22	74LVC14	Front Board interface	

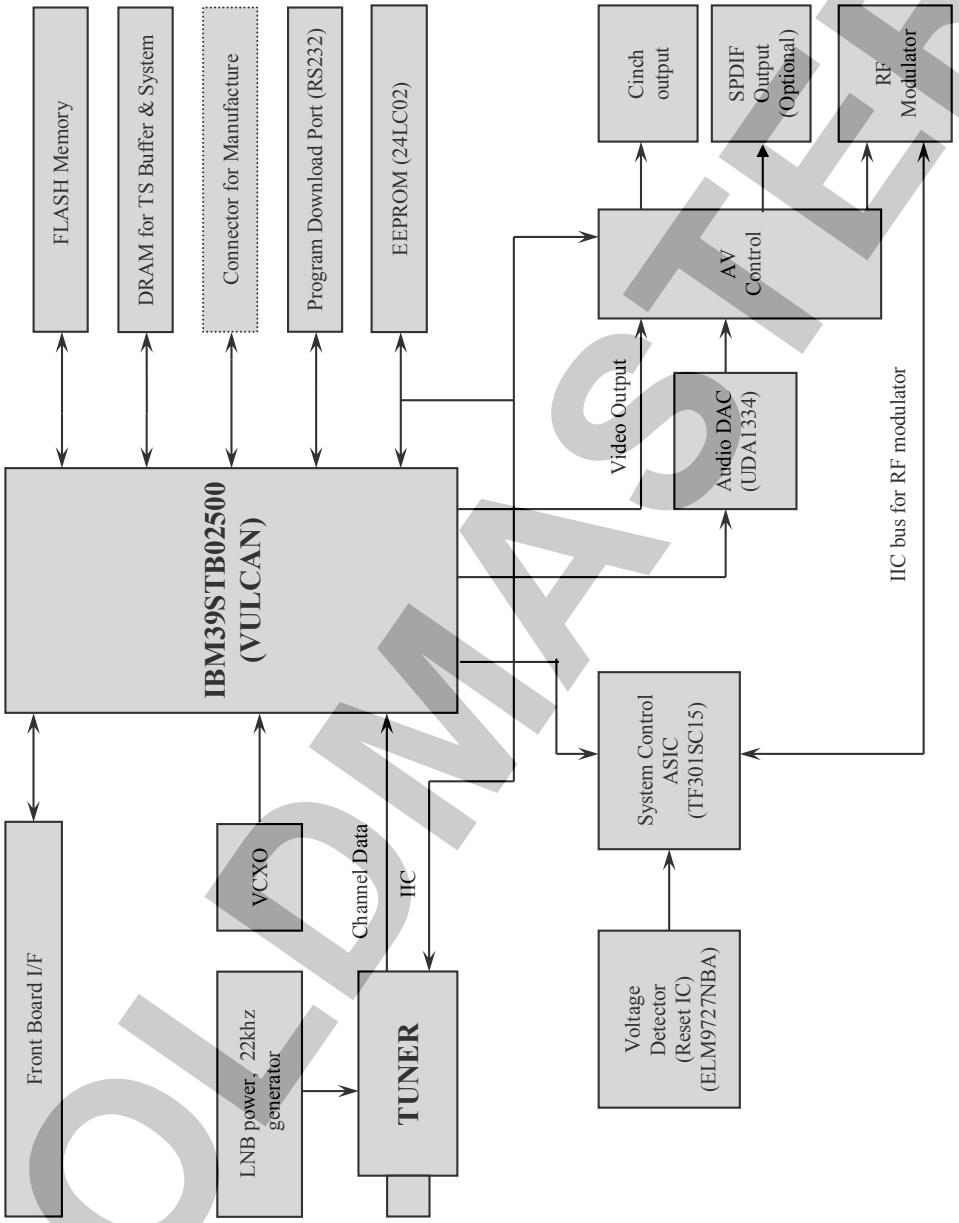
2.2. Front Board

page	Part Name	Location Number	Part number	Function	Comment
1	LED	D1,D2,D3	LED	Display status	Or, equivalent part
	Remocon sensor	U1	TSOP4838	Receives RCU signal	Or, equivalent part

3. Block Diagram of The IRD



4. Block Diagram of The Main Board



5. Test and Repair

5.1. Visual Test

- Check whether all the connectors are plugged well.
  'JP4' of Main Board : power connector.
  'JP5' of Main Board : connector for Front Board interface
  'JP3' of Main Board : Connector for SMART Card sub-Board interface (optional).
- Check whether the SMPS(power supply) has any damage.
- Check whether the Main Board has any damage.
- Check whether the Front Board has any damage.

5.2. Basic Function Test

5.2.1. No LED is turned on

	Possible Cause	How to Check	How to repair
1	Front Board Problem	Replace the Front Board with new one which works well in the other IRD	If it works, repair the Front Board. Otherwise, check the Main Board and SMPS.

5.2.2. Some LED have problems

	Possible Cause	How to Check	How to repair
1	Front Board or cable Problem	Replace the Front Board with new one.	Check the LED and the cable.

5.2.3. Remote Control Unit (RCU) does not work.

	Possible Cause	How to Check	How to repair
1	Remote Controller may have some problem.	If some keys of RCU do not work, it may be RCU problem.	Replace the RCU with new one.
2	Sensor of the Front Board may have problem	If key and LEDs work well, and only the Remote control does not work, it is sensor problem.	Check the PCB pattern of Front Board. Check the power of U1(sensor). Replace the sensor.

5.2.4. Key of the front panel have problems

	Possible Cause	How to Check	How to repair
1	If the power key does not work, it may be caused from either the Main Board or the Front Board problem.	Replace the Front Board with new one which works well in the other IRD	If it works, repair the Front Board. If it does not work, repair the Main Board.
2	If some of the key does not work, it is the Front Board problem. Pattern or broken tact switch can be a problem	If one of the key or RCU work, it is the problem of the switch or PCB pattern of the Front Board.	Check the switch and the PCB pattern of Front Board.

5.2.5. Receiver acts like the key of the Front Board or RCU is pressed.

	Possible Cause	How to Check	How to repair
1	The key of the Front Board is pressed always.	Replace the Front Board and check it.	Replace the broken key with new one. Check the Front PCB.

5.2.6. No picture but the OSD works.

	Possible Cause	How to Check	How to repair
1	Tuner problem	If the signal level of the tuner is very low, it may be a problem of the tuner, antenna cable or antenna.	Check the antenna signal. Check the tuner part.
2	No or bad LNB power No or bad 22khz signal.	Check the LNB power and 22khz signal on LNB in of the tuner.	See LNB section of this manual.
3	The power of the tuner has some problem.	If the signal level of the tuner is very low, check the voltage of the U1.7 (tuner). It should be about 30V.	If not, check the SMPS and the power path (include series bead (L5) and capacitors (C7, C8))
4	CPU (IBM39STB02500) problem	If all the other things work except the picture and sound, it may be the problem MPEG decoding. In this case, the signal level and signal quality of the information bar will be good.	
5	Channel Data path problem.	There is good RF signal level, and good signal quality, but no broadcasting is scanned. In this case, it may be a channel data path problem.	Check the channel data path of the Main Board.

5.2.7. No picture(and no OSD) and No sound

	Possible Cause	How to Check	How to repair
1	CPU (IBM39STB02500) problem.	In this case, the OSD have some problems.	
2	SMPS problem.	Check the all the power of power connector on Main Board.	Repair the power according to the advanced function test .

5.2.8. No sound and good picture

	Possible Cause	How to Check	How to repair
1	Audio DAC or OP Amp problem	Test the Main Board according to the advanced function test.	Repair the Main Board according to the advanced function test.

5.2.9. No picture(and no OSD) and good sound

	Possible Cause	How to Check	How to repair
1	CPU (IBM39STB02100) problem.	Test the Main Board according to the advanced function test.	

5.2.10. No sound and/or no picture on the RF modulator (Cinch works well)

	Possible Cause	How to Check	How to repair
1	RF channel is selected incorrectly.	Check the RF channel selection.	Select the correct channel.
2	RF modulator has problem.	Replace the RF modulator with new one. If it works well, it is the problem of RF modulator.	Replace it with new one.
3.	Problem of Audio or Video line on the board.	Replace the RF modulator with new one. It will have the same problem.	Repair the Main Board.

5.2.11. No LNB power at all of the vertical and horizontal.

	Possible Cause	How to Check	How to repair
1	'LNB power off ' is selected in the menu.	Check the LNB menu.	Set the LNB power to ON.
2	U3 (LNBP20PD) or related circuit has problem.	Test the Main Board according to the advanced function test.	Repair the Main Board according to the advanced function test.
3	SMPS has problem.	Check the SMPS	Replace the SMPS.

5.2.12. Incorrect LNB power

	Possible Cause	How to Check	How to repair
1	If only the 18V is very low, it can be a SMPS problem.	Check the SMPS(or JP4.2). It should be higher than 20V.	If not, replace SMPS.
2	Both the 18V and 13V are too low or too high.	Test the Main Board according to the advanced function test.	Repair the main board according to the advanced function test.

5.3. The Advanced Test of Main Board.

5.3.1. Voltages on important point

- Voltage at JP4 in page 8 (of schematic diagram)

Pin number	Minimum voltage	Nominal voltage	Maximum voltage	Comment
1	+28V	+30V	+32V	
2	+20V	+22V	+23V	
3	+16V	+17V	+18V	
5	+7.6V	+8V	+8.4V	
7	not used	not used	not used	not used
9	+3.15V	+3.3V	+3.4V	In standby mode, it can be higher than maximum voltage
11	+14V	+15V	+17V	
4,6,8, 10,12	GND	GND	GND	

* **important** : Be careful not to short the signals while checking the signals. It may damage the other part of Main Board.

- Check point 1 -

Replace the SMPS. And check it again.

5.3.2. Reset

After power on by the Front Board, reset circuit works.
U8 is a voltage detector. If the voltage of 3.3V is lower than 2.7V its output goes to low.
The 'nRESETIN' signal should go high after power up (when the IRD goes to Normal state from Standby state.)
The reset signal is delayed and reconstructed in U7(TF301SC15). The reset output of U7.39 is provided to all the system.

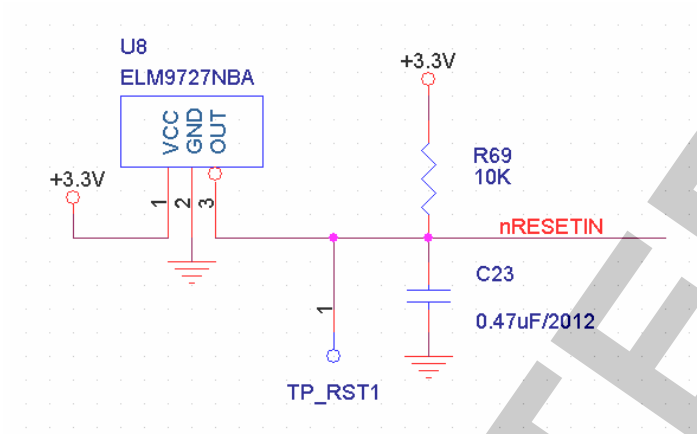
- Check point 1 -

In normal state, the 'nRESETIN' signal is about 3.3V. Check voltage at U8.1(VCC). If its value is over 2.7V, but U8.3(OUT) is about 0V, then U8 may have problem. If its voltage (U8.1) is lower than 2.7V, then check SMPS.

- Check point 2 -

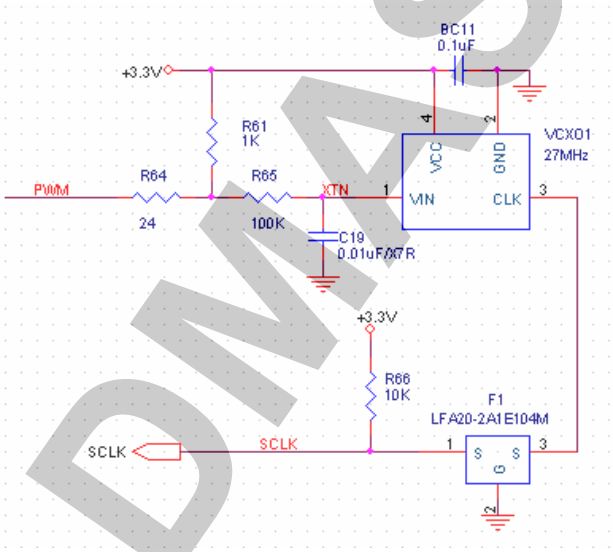
U7.39 and U7.44 should be about 3.3V. If only U7.39 is 3.3V, check the system clock.

Schematic page 4.



5.3.3. System Clock

Schematic page 3



VCXO1 generates the system clock.
The 'SCLK' signal is 27.000MHz clock signal .
If the color of the picture disappear , the 'SCLK' signal may be different from 27.000MHz or the VCXO1 have bad quality. In this case, replace VCXO1 with new one.

- Check point 1 -

Check the input and output of 'F1'. All of them should have 27Mhz clock signal.
If F1.3 have not 27Mhz clock signal, it may the problem of VCXO1.

- Check point 2 -

If the video output of receiver has not color, It may the problem of VCXO1.

5.3.4. RS232 Data Port (Program download port) and Program download

Connect a PC with a download cable (Female-Female Cross cable). If it fails program download and

nothing happens in the receiver, check the download cable and the PC. The pin2 and pin3 of the download cable should be crossed.

- Check point 1 -

Check the download cable and the PC with a new receiver.

- Check point 2 -

Check the error code on the display of the Front Board. Some message is displayed on the Front panel when the new program is downloaded. The message and error code is as follows.

Red	Green	Yellow	Description
ON	ON	OFF	Loader program is working.
OFF	ON	ON	Loader program is working.
OFF	BLINK	OFF	Operation of the loader program is finished successfully.
BLINK	BLINK	OFF	The CRC error of Header/Data block.
BLINK	OFF	BLINK	The CRC error of Application program.
OFF	BLINK	BLINK	UART communication error.
OFF	OFF	BLINK	Error while Flash/EEPROM writing or reading. Not supported Flash memory.
BLINK	BLINK	BLINK	Memory overflow. Not supported data type.
BLINK	OFF	OFF	Different system ID. -> The model of the receiver and the program(or data) to be downloaded is not matched.

5.3.5. LNB power

U3.5 is the control signal for selecting vertical or horizontal. At vertical, level of this pin is logical “LOW”, about 0. And at horizontal, logical “HIGH”, about 3V. U3.4 is the output voltage for tuner (LNB). At vertical, Voltage at this pin is about 13V and at horizontal about 18V.

- Check Point 1 -

If the voltage of U3.2 has below 15V, check the voltage of SMPS according to ‘ Voltages on important point’ section.

If the voltage of U3.3 has below 20V, check the voltage of SMPS according to ‘ Voltages on important point’ section.

Set the LNB voltage to Vertical.

- Check Point –

Check level of U3.5 whether logically ‘LOW’ (about 0V). If logically ‘HIGH’ (over 2V) then check the line from U5 (IBM39STB02500) and U3.5.

Check level of U3.6 whether logically ‘HIGH’ (about 3V). If logically ‘LOW’ (about 0V) then check the line from U5 (IBM39STB02500) and U3.6.

Check the voltage of U3.4. That value must be about 13V. Voltage of U3.4 is under 12V, then check soldering status of U3.

Set the LNB voltage to Horizontal

- Check Point –

Check level of U3.5 whether logically 'HIGH' (about 3V). If logically 'LOW' (about 0V) then check the line from U5 (IBM39STB02500) and U3.5.

Check level of U3.6 whether logically 'HIGH' (about 3V). If logically 'LOW' (about 0V) then check the line from U5 (IBM39STB02500) and U3.6.

Check the voltage of U3.4. That value must be over 20V. Voltage of U3.4 is under 20V, then check soldering status of U3.

5.3.6. RF modulator

- Check point 1 -

Check the power input of RF modulator (U21, Schematic page 11).

- Check point 2 -

Check the IIC line.(the signal name is SDA5V, SCL5V).

5.3.7. Video

- Check point 1 -

Check video output of Chinch, and RF modulator.

Check L13 and its related circuit (CVBS). At this point the signal should be work. If it does not work well, the IBM39STB02100 (U5) may have problem.

5.3.8. Audio

- Check point 1 -

Check audio output of Chinch and RF modulator. If only on of them has problem, check its related circuit.

- Check point 2 -

Check U17.1 and U17.7. If it does not have audio signal, the Audio DAC(U18) or OP AMP(U17) may have problem. To check audio DAC, check C44 and C47. If it has audio signal, the OP AMP(U17) is the problem.

5.4. The Advanced Test of Front Board.

5.4.1. Remote control

U1 is the sensor for remote control.

- Check point 1 –

Check the Remote control unit with other receiver. If it does not work, the Remote control unit may have problem.

If the key and display work and only the remote control does not work, U1(sensor) may have problem.

Check the power of the sensor (U1.3). It should have 5V. If not, check the R1 and the PCB.

- Check point 2 –

If you can not find any problem with the U1.3, replace it with new one.

5.5. The Advanced Test of SMPS.

---------- **Caution** ----------

I. The SMPS must be disconnected from the mains plug to test.
II. The capacitor inside the SMPS (power supply) can hold charge even if the IRD has been disconnected from the mains plug. To handle SMPS, wait until the capacitor is discharged.
III. Very high voltage is generated in SMPS.

5.5.1. Check the damaged parts.

- Check point 1 –

Check whether there is broken part by visual test.

5.5.2. Test the diodes.

Check point 1 –

Check whether the diodes has crack. If there is a crack, replace it with new one.

Same part should be replaced.

- Check point 2 –

Check the resistance of all the diodes. If the resistance is too low (lower than 10ohm), it is the problem.

Replace it with new one. Same part should be replaced. Diodes is named as Dxx or ZDxx.(ex: D1, ZD1)

To measure the resistance, you must remove the mains plug.

5.5.3. Check the Shunt regulator

- Check point 1 –

Check the voltage of U2.3(cathode). It should higher than 3V. If not, remove U2 and check it again.

- Check point 2 –

If U2.3 is higher than 3V, the voltage at U2.1(ref) should 2.5V. If not, replace U2 with new one.

5.5.4. Check the Pothocoupler IC

- Check point 1 –

Check the pothocoupler PC1. Check the resistance of diode part and potho Tr part.

If its resistance is about 0 or very low, replace it with new one.

Check if it has damages. And replace it with new one.

5.5.5. Check the Fuse.

- Check point 1 –

Check the fuse. Before replacing the fuse, check the other problem which can exist.

The same kind and rated fuse should be replaced.

6. PIN description of The Major Parts

6.1. Main Board

Tuner Module	U1	TBMU24311IPP
Regulator	U2	LM7805
LNB Power Switching IC	U3	LNBP20PD
CPU, Demux and Decoder	U5	IBM39STB02500
Flash Memory	U10	SST39VF800A
EEPROM	U11	24LC02B-SN
SDRAM	U12	K4S641632D
Reset IC	U8	ELM9727NBA
Regulator	U14	LD1117ADT18
Regulator	U15	MIC39100-2.5BS
Regulator	U16	78L12
RS232 Driver	U13	MAX232
Audio DAC	U18	UDA1334TS
RF Modulator	U21	RMUP74055AB

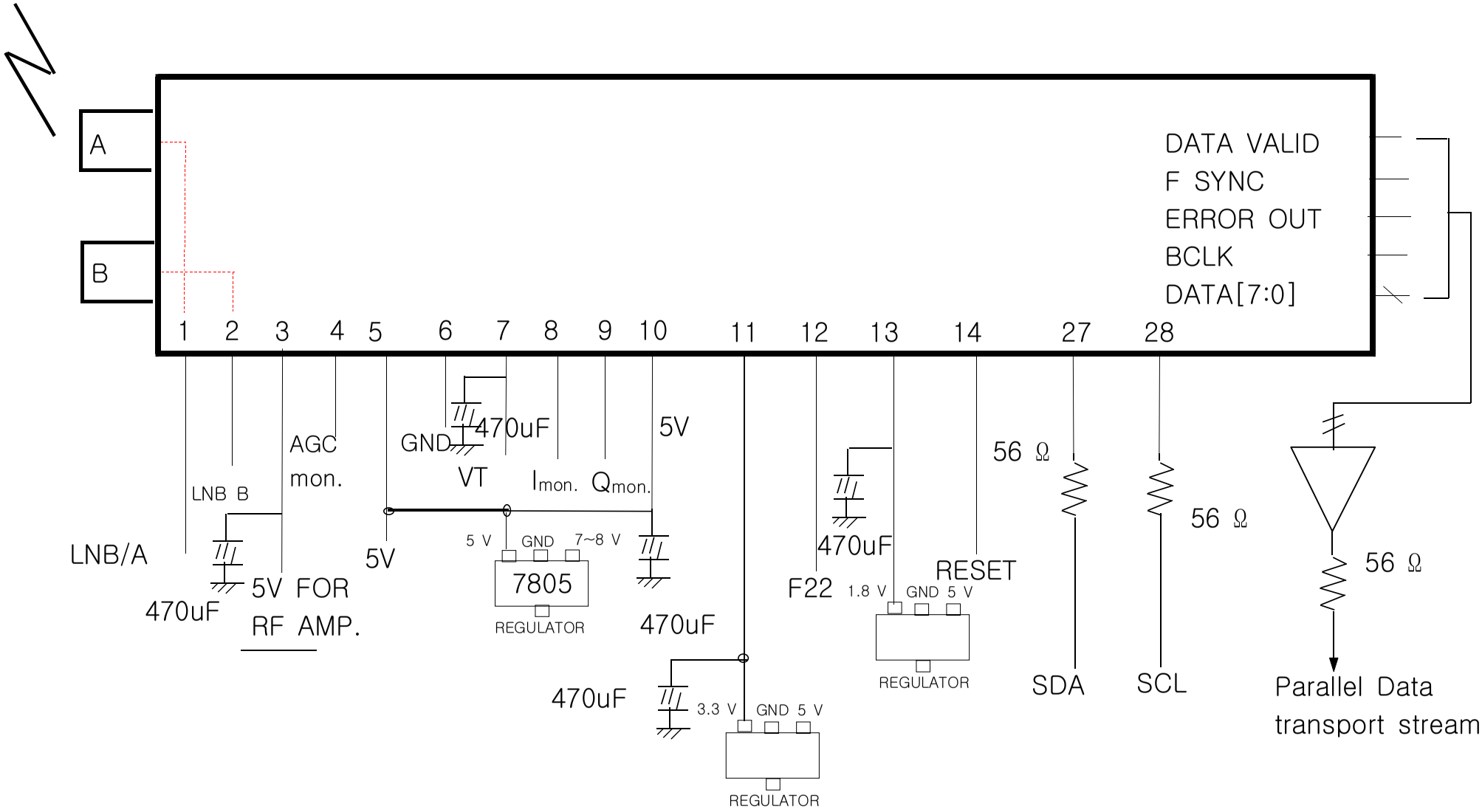
6.2. Front Board

Part Name	Location Number	Part number
Remocon sensor	U1	TSOP4838

6.3. SMPS

Part Name	Location Number	Part number
SPS	U1	KA1M0380R
Shunt regulator	U2	KA431A

9. APPLICATION CIRCUIT



National Semiconductor

February 1995

LM78XX Series Voltage Regulators

General Description

The LM78XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow these regulators to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators these devices can be used with external components to obtain adjustable voltages and currents.

The LM78XX series is available in an aluminum TO-3 package which will allow over 1.0A load current if adequate heat sinking is provided. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistor is provided to limit internal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit takes over preventing the IC from overheating.

Considerable effort was expanded to make the LM78XX series of regulators easy to use and mininize the number of external components. It is not necessary to bypass the output, although this does improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

For output voltage other than 5V, 12V and 15V the LM117 series provides an output voltage range from 1.2V to 57V.

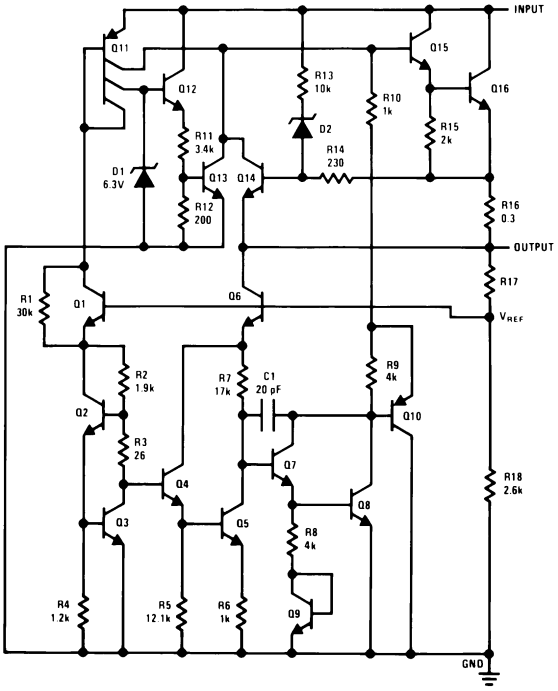
Features

- Output current in excess of 1A
- Internal thermal overload protection
- No external components required
- Output transistor safe area protection
- Internal short circuit current limit
- Available in the aluminum TO-3 package

Voltage Range

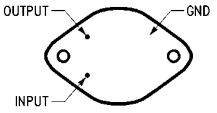
LM7805C	5V
LM7812C	12V
LM7815C	15V

Schematic and Connection Diagrams



TL/H/7746–1

Metal Can Package
TO-3 (K)
Aluminum

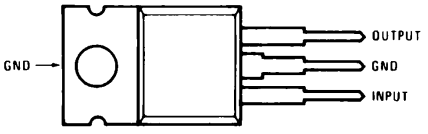


TL/H/7746–2

Bottom View

Order Number LM7805CK,
LM7812CK or LM7815CK
See NS Package Number KC02A

Plastic Package
TO-220 (T)



TL/H/7746–3

Top View

Order Number LM7805CT,
LM7812CT or LM7815CT
See NS Package Number T03B

RRD-B30M115/Printed in U. S. A.

input pin is available (EXTM). An appropriate DC blocking capacitor must be used to couple the modulating signal source to the EXTM pin. When external modulation is not used, the relevant pin can be left open.
Two pins are dedicated to the overcurrent protection/monitoring: CEXT and OLF. The overcurrent protection circuit works dynamically: as soon as an overload is detected in either LNB output, the output is shut-down for a time t_{off} determined by the capacitor connected between CEXT and GND. Simultaneously the OLF pin, that is an open collector diagnostic output flag, from HIGH IMPEDANCE state goes LOW.
After the time has elapsed, the output is resumed for a time $t_{on}=1/15t_{off}$ (typ.) and OLF goes in HIGH IMPEDANCE. If the overload is still present, the protection circuit will cycle again through t_{off} and ton until the overload is removed. Typical $t_{on}+t_{off}$ value is 1200ms when a 4.7µF external capacitor is used.
This dynamic operation can greatly reduce the power dissipation in short circuit condition, still ensuring excellent power-on start up even with highly capacitive loads on LNB outputs.
The device is packaged in Multiwatt15 for thru-holes mounting and in PowerSO-20 for surface mounting. When a limited functionality in a smaller package matches design needs, a range of cost-effective PowerSO-10 solutions is also offered. All versions have built-in thermal protection against overheating damage.

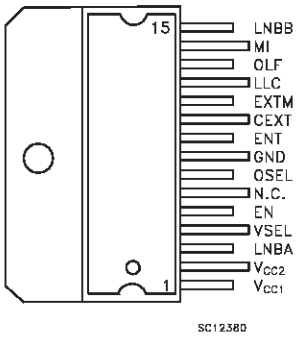
(*): External components are needed to comply to level 2.x and above (bidirectiona) DiSEqC™ bus hardware requirements. DiSEqC™ is a trademark or EUTELSAT.

ORDERING CODES

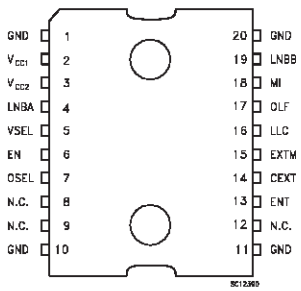
TYPE	Multiwatt-15	PowerSO-20	PowerSO-10
LNBP10			LNBP10SP-TR (*)
LNBP11			LNBP11SP-TR (*)
LNBP12			LNBP12SP-TR (*)
LNBP13			LNBP13SP-TR (*)
LNBP14			LNBP14SP-TR (*)
LNBP15			LNBP15SP-TR (*)
LNBP16			LNBP16SP-TR (*)
LNBP20	LNBP20CR	LNBP20PD-TR	

(*) Available on request

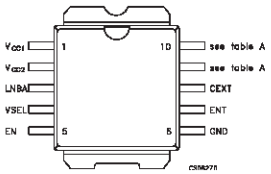
PIN CONFIGUARATION (top view)



Multiwatt-15



PowerSo-20



PowerSO-10

1.6.4.10 Real Time Clock / Front Panel Controller

The Real Time Clock (RTC) counts seconds, minutes, hours, and days. Programmable alarms can be set to interrupt the CPU, allowing the CPU to wake up when required to perform functions such as programming a VCR. The RTC also provides a 3-wire front panel control interface, to drive panel seven-segment displays with time information or program-generated data.

1.7 Signal and I/O Information

1.7.1 Signals Sorted by Signal Name

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
27MHZ_CLK	AA12
AUD_GNDA0	AA8
AUD_GNDA1	AC3
AUD_VDDA0	AC7
AUD_VDDA1	AA5
BI_ADDRESS11	W21
BI_ADDRESS12	Y23
BI_ADDRESS13	V20
BI_ADDRESS14	W22
BI_ADDRESS15	W23
BI_ADDRESS16	V21
BI_ADDRESS17	V22
BI_ADDRESS18	U21
BI_ADDRESS19	U22
BI_ADDRESS20	U23
BI_ADDRESS21	T21
BI_ADDRESS22	P20
BI_ADDRESS23	R23
BI_ADDRESS24	P21
BI_ADDRESS25	P22
BI_ADDRESS26	N21
BI_ADDRESS27	N22
BI_ADDRESS28	N23
BI_ADDRESS29	M21
BI_ADDRESS30	M22
BI_ADDRESS31_$\overline{\text{WBE1}}$	M23

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
$\overline{\text{BI\_CS0}}$	D21
$\overline{\text{BI\_CS1}}$	C22
$\overline{\text{BI\_CS2}}$	B23
$\overline{\text{BI\_CS3}}$	A22
BI_DATA0	L23
BI_DATA1	L22
BI_DATA10	G23
BI_DATA11	G22
BI_DATA12	G21
BI_DATA13	F22
BI_DATA14	E23
BI_DATA15	E22
BI_DATA2	L21
BI_DATA3	K21
BI_DATA4	K20
BI_DATA5	J23
BI_DATA6	J22
BI_DATA7	J21
BI_DATA8	H23
BI_DATA9	H22
$\overline{\text{BI\_OE}}$	B20
BI_READY	D23
BI_$\overline{\text{RW}}$	E21
$\overline{\text{BI\_WBE0}}$	C23
CI_CLOCK	B5
CI_DATA0	B19
CI_DATA1	B18
CI_DATA2	C16
CI_DATA3	A16
CI_DATA4	A12
CI_DATA5	D14
CI_DATA6	B14
CI_DATA7	B12
CI_DATA_ENABLE	C6
CLK_GNDA	AC9
CLK_VDDA	AA11
DAC1_AGND0	B7

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
DAC1_AGND1	A8
DAC1_AGND2	C10
DAC1_AVDD0	B6
DAC1_AVDD1	C8
DAC1_AVDD2	A9
DAC1_AVDD3	B11
DAC1_VOUT1	C7
DAC1_CREF_OUT	A5
DAC1_VOUT2	B8
DAC1_GREF_OUT	A11
DAC1_VOUT3	C11
DAC1_RREF_OUT	A7
DAC1_VREF_IN	C9
DAC2_AGND0	B17
DAC2_AGND1	B15
DAC2_AGND2	C13
DAC2_AVDD0	C18
DAC2_AVDD1	B16
DAC2_AVDD2	C14
DAC2_AVDD3	A13
DAC2_VOUT1	C17
DAC2_CREF_OUT	A19
DAC2_VOUT2	C15
DAC2_GREF_OUT	C12
DAC2_VOUT3	B13
DAC2_RREF_OUT	A17
DAC2_VREF_IN	A15
DA_BIT_CLOCK	AA1
DA_LR_CLOCK	AA2
DA_OS_CLOCK	AB1
DA_SERIAL_DATA	Y2
DA_SPDIF	F20
$\overline{\text{EDMAC3\_ACK}}$/DMACK	V3
$\overline{\text{EDMAC3\_REQ}}$/DMARQ	E3
GND	A01
GND	A06
GND	A10

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
GND	A14
GND	A18
GND	A23
GND	AA3
GND	AB2
GND	AC1
GND	AC6
GND	B02
GND	B22
GND	C03
GND	C21
GND	D04
GND	D08
GND	D12
GND	D16
GND	D20
GND	F01
GND	F23
GND	H04
GND	H20
GND	K01
GND	K23
GND	M04
GND	M20
GND	P01
GND	P23
GND	T04
GND	T20
GND	V01
GND	V23
GND	Y04
GND	Y08
GND	Y12
GND	Y16
GND	Y20
GND	AA21
GND	AA23

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
GND	AB22
GND	AC10
GND	AC14
GND	AC18
GND	AC23
GPIO0	AC2
GPIO1	Y6
GPIO10	R2
GPIO11	V4
GPIO12	W3
GPIO13	B10
GPIO14	D10
GPIO15	B9
GPIO16	D6
GPIO17	C5
GPIO18	A4
GPIO19	B4
GPIO2	AB5
GPIO20	A3
GPIO21	C4
GPIO22	B3
GPIO23	A2
GPIO24	K22
GPIO25	Y22
GPIO26	Y21
GPIO27	AA6
GPIO28	F21
GPIO29	R22
GPIO3	AC5
GPIO30	K4
GPIO31	AB15
GPIO4	C19
GPIO5	B21
GPIO6	A20
GPIO7	D18
GPIO8	M1
GPIO9	N3

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
I2C0_SCL	T3
I2C0_SDA	U3
$\overline{\text{INT0}}$	C1
$\overline{\text{INT1}}$	D2
$\overline{\text{INT2}}$	H21
$\overline{\text{RW\_HALT}}$	W2
RW_TCK	AB6
RW_TDI	AC4
RW_TDO	Y1
RW_TMS	AB3
$\overline{\text{RW\_TRST}}$	Y3
SC0_CLK	AA9
SC0_DETECT	AB4
SC0_IO	AB8
SC0_RESET	AC8
SC0_VCC	C20
SC1_CLK	R21
SC1_DETECT	T22
SC1_IO	D22
SC1_RESET	T23
SC1_VCC	A21
SD0_ADDRESS0	M3
SD0_ADDRESS1	M2
SD0_ADDRESS10	T2
SD0_ADDRESS11	U1
SD0_ADDRESS12	U2
SD0_ADDRESS13	V2
SD0_ADDRESS14	W1
SD0_ADDRESS2	N1
SD0_ADDRESS3	N2
SD0_ADDRESS4	P2
SD0_ADDRESS5	P3
SD0_ADDRESS6	P4
SD0_ADDRESS7	R1
SD0_ADDRESS8	R3
SD0_ADDRESS9	T1
$\overline{\text{SD0\_CAS}}$	L3

Table 1-1. Signals Sorted by Signal Name

I/O Signal Name	Ball Number
SD0_CLK	J1
$\overline{\text{SD0\_CS0}}$	J2
SD0_DATA0	B1
SD0_DATA1	C2
SD0_DATA10	G2
SD0_DATA11	G1
SD0_DATA12	H3
SD0_DATA13	H2
SD0_DATA14	H1
SD0_DATA15	J3
SD0_DATA2	D3
SD0_DATA3	D1
SD0_DATA4	F4
SD0_DATA5	E2
SD0_DATA6	E1
SD0_DATA7	F3
SD0_DATA8	F2
SD0_DATA9	G3
SD0_DQMH	L2
SD0_DQML	L1
$\overline{\text{SD0\_RAS}}$	K2
$\overline{\text{SD0\_WE}}$	K3
SD1_ADDRESS0	AA17
SD1_ADDRESS1	AB18
SD1_ADDRESS10	AA20
SD1_ADDRESS11	AB21
SD1_ADDRESS12	AC22
SD1_ADDRESS13	AB23
SD1_ADDRESS14	AA22
SD1_ADDRESS2	AA18
SD1_ADDRESS3	AC19
SD1_ADDRESS4	AB19
SD1_ADDRESS5	Y18
SD1_ADDRESS6	AA19
SD1_ADDRESS7	AC20
SD1_ADDRESS8	AB20
SD1_ADDRESS9	AC21

Table 1-1. Signals Sorted by Signal Name

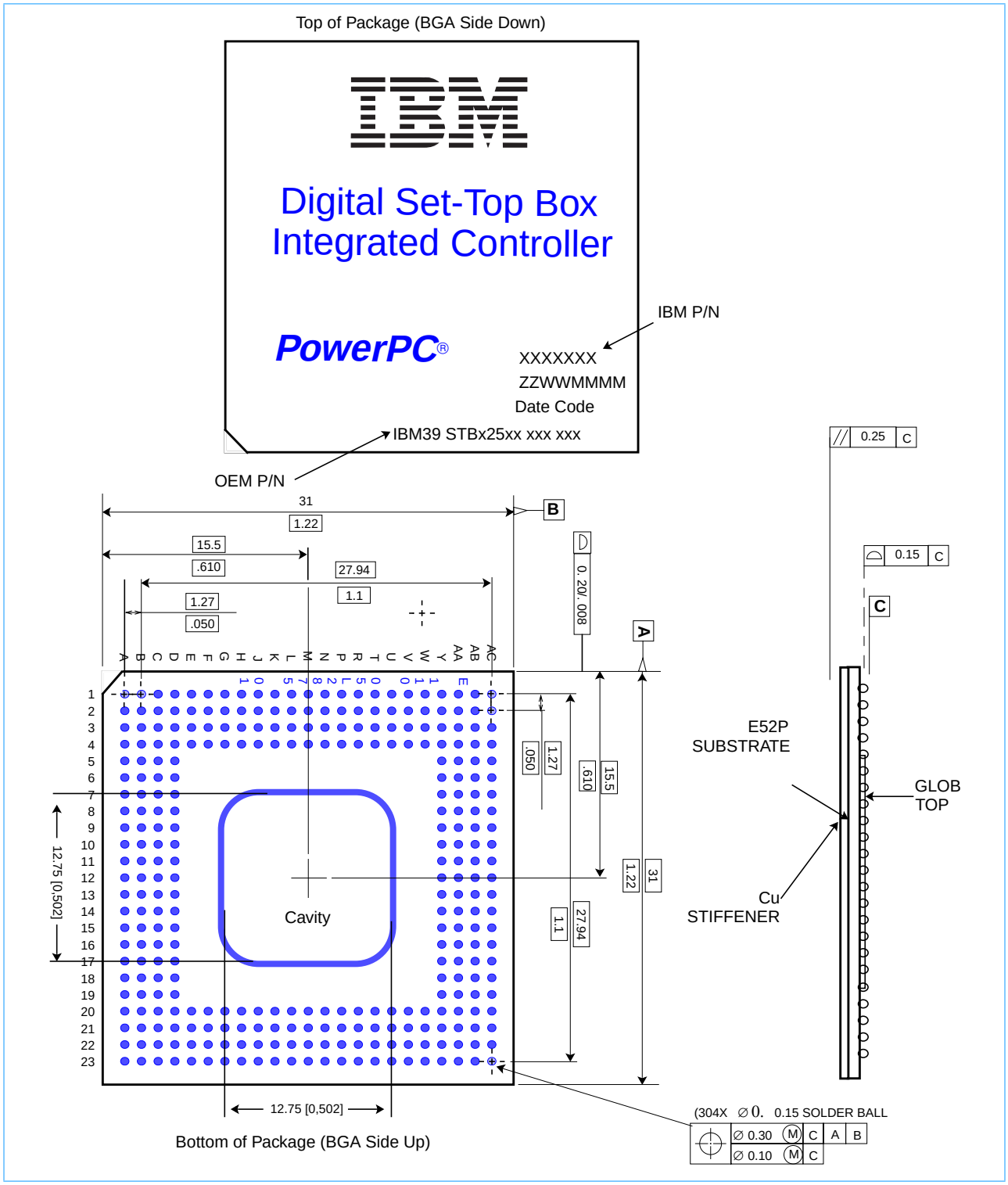
I/O Signal Name	Ball Number
SD1_CAS	AA16
SD1_CLK	AA15
SD1_CS0	AC15
SD1_DATA0	AA7
SD1_DATA1	AB7
SD1_DATA10	AC13
SD1_DATA11	AB13
SD1_DATA12	AA13
SD1_DATA13	AB14
SD1_DATA14	AA14
SD1_DATA15	Y14
SD1_DATA2	AB9
SD1_DATA3	Y10
SD1_DATA4	AA10
SD1_DATA5	AB10
SD1_DATA6	AB11
SD1_DATA7	AC11
SD1_DATA8	AB12
SD1_DATA9	AC12
SD1_DQMH	AC17
SD1_DQML	AB17
$\overline{\text{SD1\_RAS}}$	AB16
$\overline{\text{SD1\_WE}}$	AC16
$\overline{\text{SYSTEM\_RESET}}$	AA4
VDD	D09
VDD	D11
VDD	D13
VDD	D15
VDD	J04
VDD	J20
VDD	L04
VDD	L20
VDD	N04
VDD	N20
VDD	R04
VDD	R20
VDD	Y09

Table 1-1. Signals Sorted by Signal Name

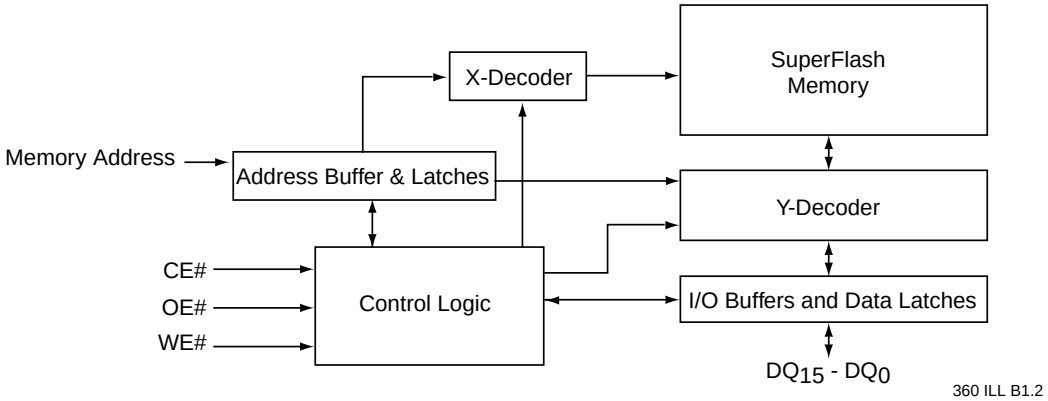
I/O Signal Name	Ball Number
VDD	Y11
VDD	Y13
VDD	Y15
VDD2	D05
VDD2	D07
VDD2	D17
VDD2	D19
VDD2	E04
VDD2	E20
VDD2	G04
VDD2	G20
VDD2	U04
VDD2	U20
VDD2	W04
VDD2	W20
VDD2	Y05
VDD2	Y07
VDD2	Y17
VDD2	Y19

1.10 Mechanical Information

Package Diagram



FUNCTIONAL BLOCK DIAGRAM



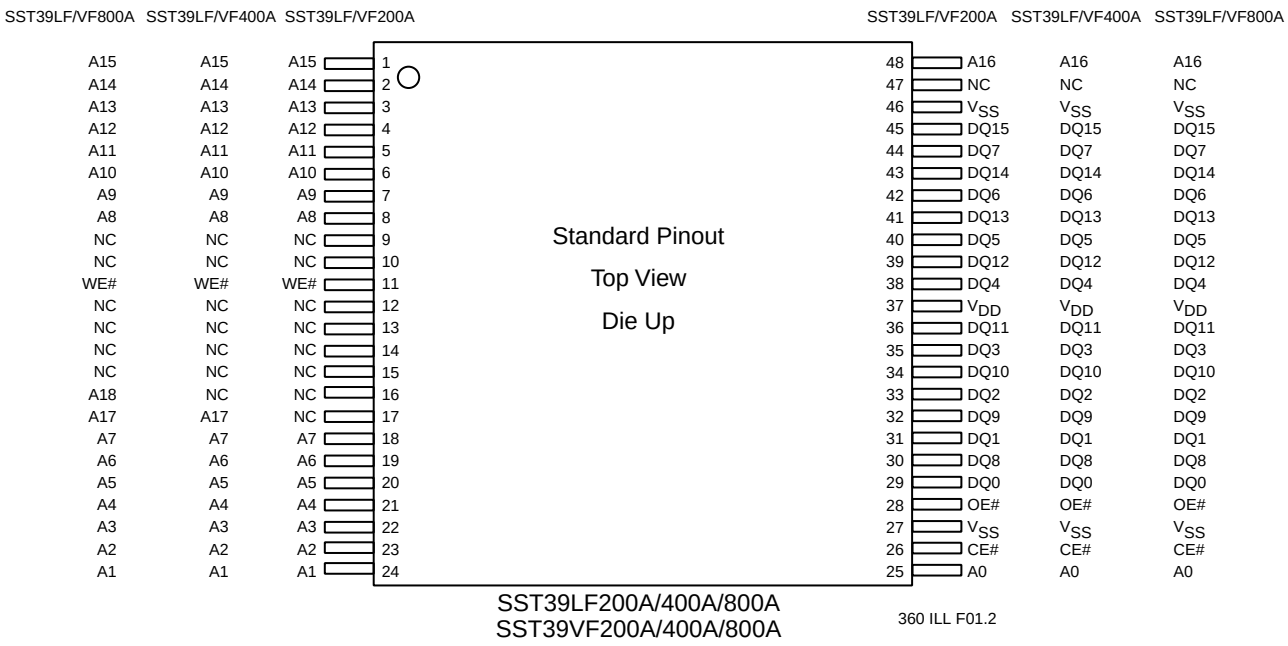


FIGURE 1: PIN ASSIGNMENTS FOR 48-LEAD TSOP

Features

- **Low-Voltage and Standard-Voltage Operation**
  - **5.0 (V_{CC} = 4.5V to 5.5V)**
  - **2.7 (V_{CC} = 2.7V to 5.5V)**
  - **2.5 (V_{CC} = 2.5V to 5.5V)**
  - **1.8 (V_{CC} = 1.8V to 5.5V)**
- **Internally Organized 128 x 8 (1K), 256 x 8 (2K), 512 x 8 (4K), 1024 x 8 (8K) or 2048 x 8 (16K)**
- **2-Wire Serial Interface**
- **Schmitt Trigger, Filtered Inputs for Noise Suppression**
- **Bidirectional Data Transfer Protocol**
- **100 kHz (1.8V, 2.5V, 2.7V) and 400 kHz (5V) Compatibility**
- **Write Protect Pin for Hardware Data Protection**
- **8-Byte Page (1K, 2K), 16-Byte Page (4K, 8K, 16K) Write Modes**
- **Partial Page Writes Are Allowed**
- **Self-Timed Write Cycle (10 ms max)**
- **High Reliability**
  - **Endurance: 1 Million Write Cycles**
  - **Data Retention: 100 Years**
  - **ESD Protection: >3000V**
- **Automotive Grade and Extended Temperature Devices Available**
- **8-Pin and 14-Pin JEDEC SOIC, 8-Pin PDIP, 8-Pin MSOP, and 8-Pin TSSOP Packages**

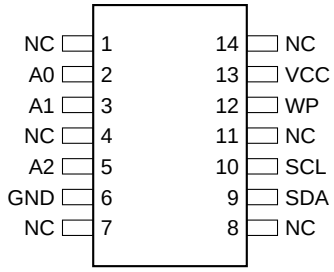
Description

The AT24C01A/02/04/08/16 provides 1024/2048/4096/8192/16384 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 128/256/512/1024/2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation are essential. The AT24C01A/02/04/08/16 is available in space saving 8-pin PDIP, (AT24C01A/02/04/08/16), 8-Pin MSOP (AT24C01A/02), 8-Pin TSSOP (AT24C01A/02/04/08/16), and 8-Pin and 14-Pin JEDEC SOIC (AT24C01A/02/04/08/16) packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 5.0V (4.5V to 5.5V), 2.7V (2.7V to 5.5V), 2.5V (2.5V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

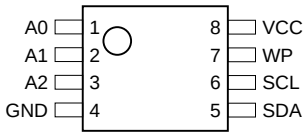
Pin Configurations

Pin Name	Function
A0 - A2	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
NC	No Connect

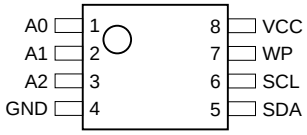
14-Pin SOIC



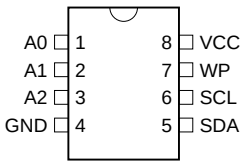
8-Pin TSSOP



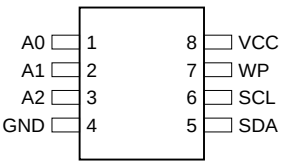
8-Pin MSOP



8-Pin PDIP



8-Pin SOIC



2-Wire Serial EEPROM

1K (128 x 8)

2K (256 x 8)

4K (512 x 8)

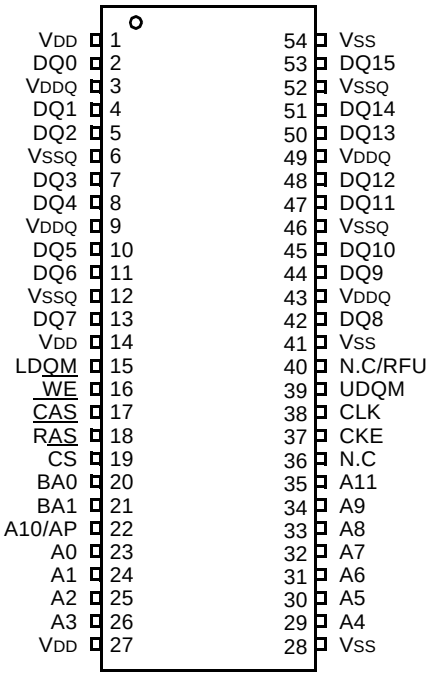
8K (1024 x 8)

16K (2048 x 8)

AT24C01A
AT24C02
AT24C04
AT24C08
AT24C16

Rev. 0180D–10/98

PIN CONFIGURATION (Top view)



54Pin TSOP (II)
(400mil x 875mil)
(0.8 mm Pin pitch)

PIN FUNCTION DESCRIPTION

Pin	Name	Input Function
CLK	*System clock*	Active on the positive going edge to sample all inputs.
$\overline{CS}$	*Chip select*	Disables or enables device operation by masking or enabling all inputs except CLK, CKE and L(U)DQM
CKE	*Clock enable*	Masks system clock to freeze operation from the next clock cycle. CKE should be enabled at least one cycle prior to new command. Disable input buffers for power down in standby.
A_0 ~ A_{11}	*Address*	Row/column addresses are multiplexed on the same pins. Row address : RA_0 ~ RA_{11}, Column address : CA_0 ~ CA_7
BA_0 ~ BA_1	*Bank select address*	Selects bank to be activated during row address latch time. Selects bank for read/write during column address latch time.
$\overline{RAS}$	*Row address strobe*	Latches row addresses on the positive going edge of the CLK with $\overline{RAS}$ low. Enables row access & precharge.
$\overline{CAS}$	*Column address strobe*	Latches column addresses on the positive going edge of the CLK with $\overline{CAS}$ low. Enables column access.
$\overline{WE}$	*Write enable*	Enables write operation and row precharge. Latches data in starting from $\overline{CAS}$, $\overline{WE}$ active.
L(U)DQM	*Data input/output mask*	Makes data output Hi-Z, t_{SHZ} after the clock and masks the output. Blocks data input when L(U)DQM active.
$DQ_{0 \sim 15}$	*Data input/output*	Data inputs/outputs are multiplexed on the same pins.
V_{DD}/V_{SS}	*Power supply/ground*	Power and ground for the input buffers and the core logic.
V_{DDQ}/V_{SSQ}	*Data output power/ground*	Isolated power supply and ground for the output buffers to provide improved noise immunity.
N.C/RFU	*No connection /reserved for future use*	This pin is recommended to be left No Connection on the device.

ELM97xxxxA VOLTAGE DETECTOR

■ GENERAL DESCRIPTION

ELM 97xxxxA Series is a CMOS Voltage Detector IC for battery-operated portable devices. It consists of a very low-power-consumption reference voltage source, a comparator, an output driver, a hysteresis circuit, and detection voltage setting resistors. Output logic is positive, therefore output level is low when VDD is lower than detection voltage.

It can be used as a reset controller in microcomputer-based systems. And it can be widely applied to the devices, such as battery checkers, switching circuit of back-up power source, power failure detectors, etc. Two output styles are available, N-ch opendrain and CMOS output.

It is available in SOT-89 and SOT-23.

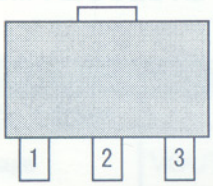
■ FEATURES

- Low power operation : TYP. 1.0 μ A (VDD = 1.5V)
- Low voltage operation : Reset operation assured at 0.8V
- High accuracy of detection voltage : $\pm$ 2.5%
- Low temperature coefficient : TYP. −300ppm/°C (Detection voltage $<$ 2.0V)
  : TYP. −100ppm/°C (Detection voltage $\geqq$ 2.0V)
- Very small package : SOT-89, SOT-23

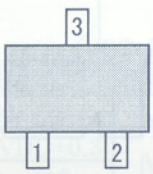
■ APPLICATION

- Reset for microcomputer
- Battery checker
- Power failure detector
- Switching of back-up power source

■ PIN CONFIGURATION (TOP VIEW)



SOT-89

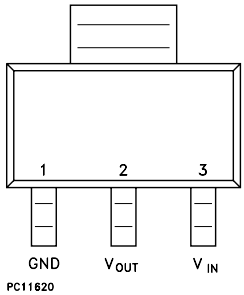


SOT-23

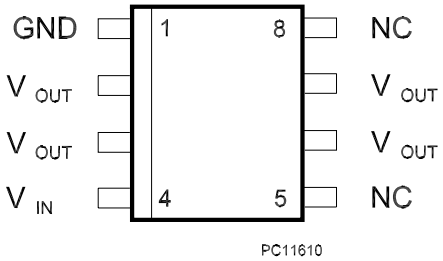
Pin No.	Pin Name
1	OUT
2	VDD
3	VSS

Pin No.	Pin Name
1	OUT
2	VSS
3	VDD

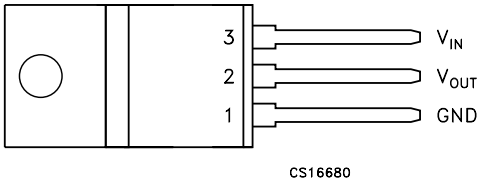
CONNECTION DIAGRAM (top view)



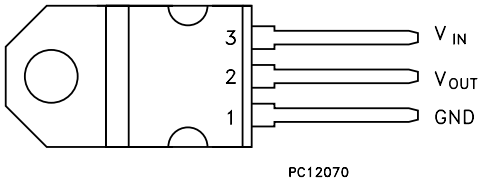
SOT-223



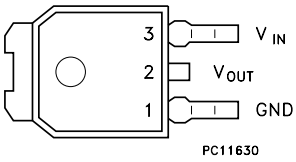
SO-8



TO-220FM



TO-220



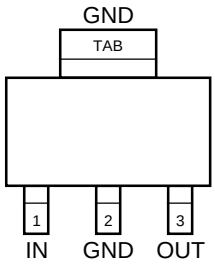
DPAK

NOTE: The TAB is connected to the V_{OUT}.

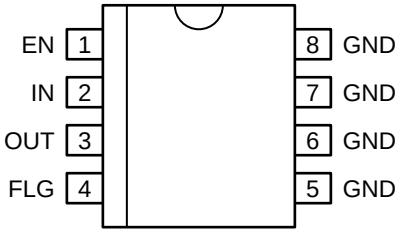
ORDERING CODES

SOT-223	SO-8	DPAK	TO-220	TO-220FM	OUTPUT VOLTAGE
LD1117S12	LD1117D12 (*)	LD1117DT12	LD1117V12 (*)	LD1117F12 (*)	1.2 V
LD1117S18	LD1117D18	LD1117DT18	LD1117V18	LD1117F18	1.8 V
LD1117S18C	LD1117D18C	LD1117DT18C	LD1117V18C	LD1117F18C	1.8 V
LD1117S25	LD1117D25	LD1117DT25	LD1117V25	LD1117F25	2.5 V
LD1117S25C	LD1117D25C	LD1117DT25C	LD1117V25C	LD1117F25C	2.5 V
LD1117S28	LD1117D28	LD1117DT28	LD1117V28	LD1117F28	2.85 V
LD1117S30	LD1117D30	LD1117DT30	LD1117V30	LD1117F30	3 V
LD1117S30C	LD1117D30C	LD1117DT30C	LD1117V30C	LD1117F30C	3 V
LD1117S33	LD1117D33	LD1117DT33	LD1117V33	LD1117F33	3.3 V
LD1117S33C	LD1117D33C	LD1117DT33C	LD1117V33C	LD1117F33C	3.3 V
LD1117S50	LD1117D50	LD1117DT50	LD1117V50	LD1117F50	5 V
LD1117S50C	LD1117D50C	LD1117DT50C	LD1117V50C	LD1117F50C	5 V
LD1117S	LD1117D	LD1117DT	LD1117V	LD1117F	ADJUSTABLE FROM 1.25 TO 15V
LD1117SC	LD1117DC	LD1117DTC	LD1117VC	LD1117FC	ADJUSTABLE FROM 1.25 TO 15V

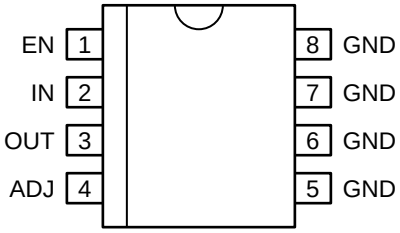
Pin Configuration



MIC39100-x.x
Fixed
SOT-223 (S)



MIC39101-x.x
Fixed
SOP-8 (M)

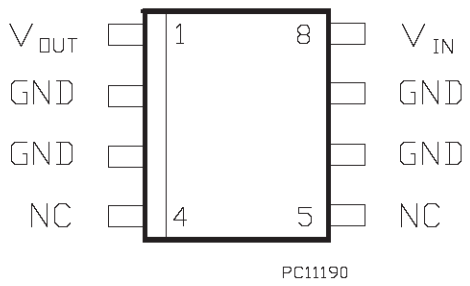


MIC39102
Adjustable
SOP-8 (M)

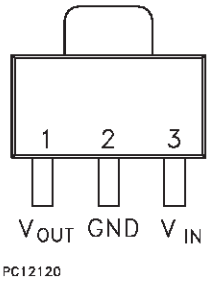
Pin Description

Pin No. MIC39100	Pin No. MIC39101	Pin No. MIC39102	Pin Name	Pin Function
1	1	1	EN	Enable (Input): CMOS-compatible control input. Logic high = enable, logic low or open = shutdown.
	2	2	IN	Supply (Input)
3	3	3	OUT	Regulator Output
	4		FLG	Flag (Output): Open-collector error flag output. Active low = output under-voltage.
		4	ADJ	Adjustment Input: Feedback input. Connect to resitive voltage-divider network.
2, TAB	5–8	5–8	GND	Ground

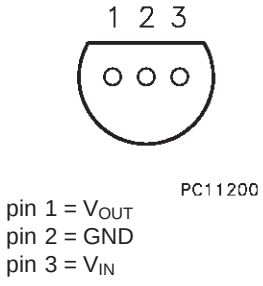
CONNECTION DIAGRAM AND ORDERING NUMBERS (top view)



SO-8



SOT-89

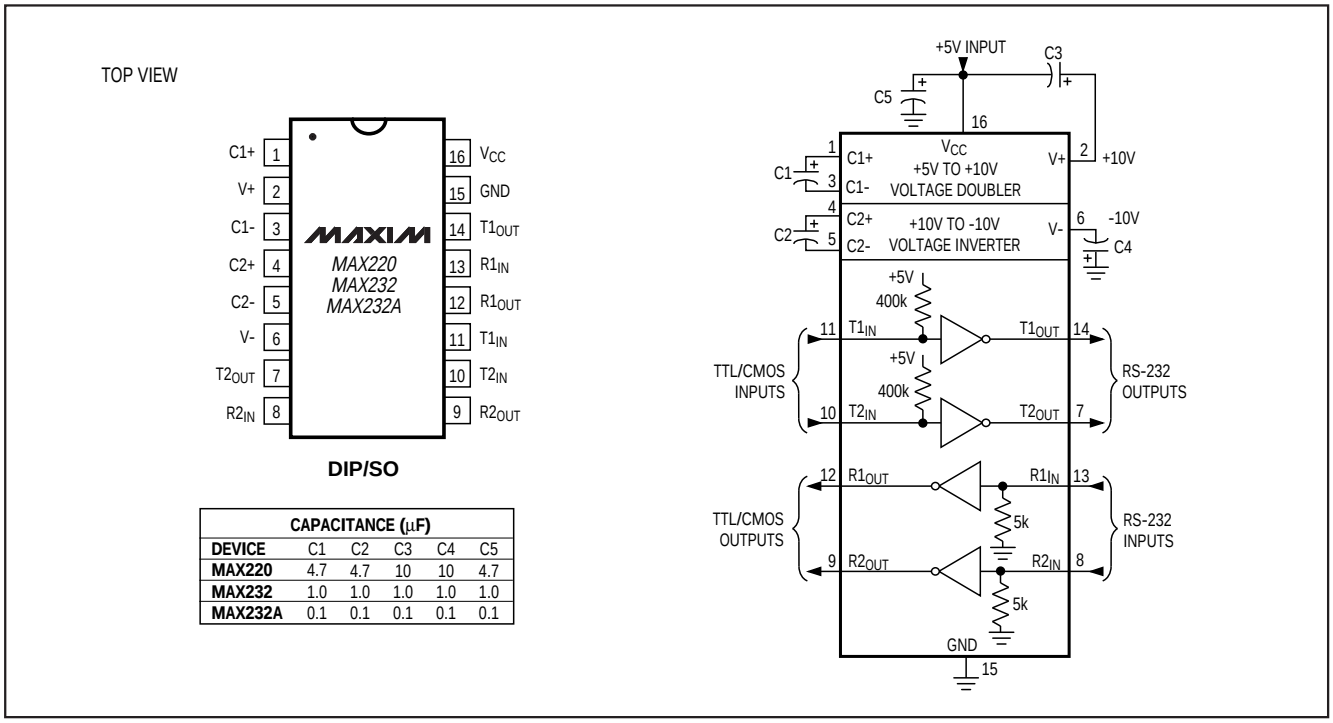


TO-92

BOTTOM VIEW

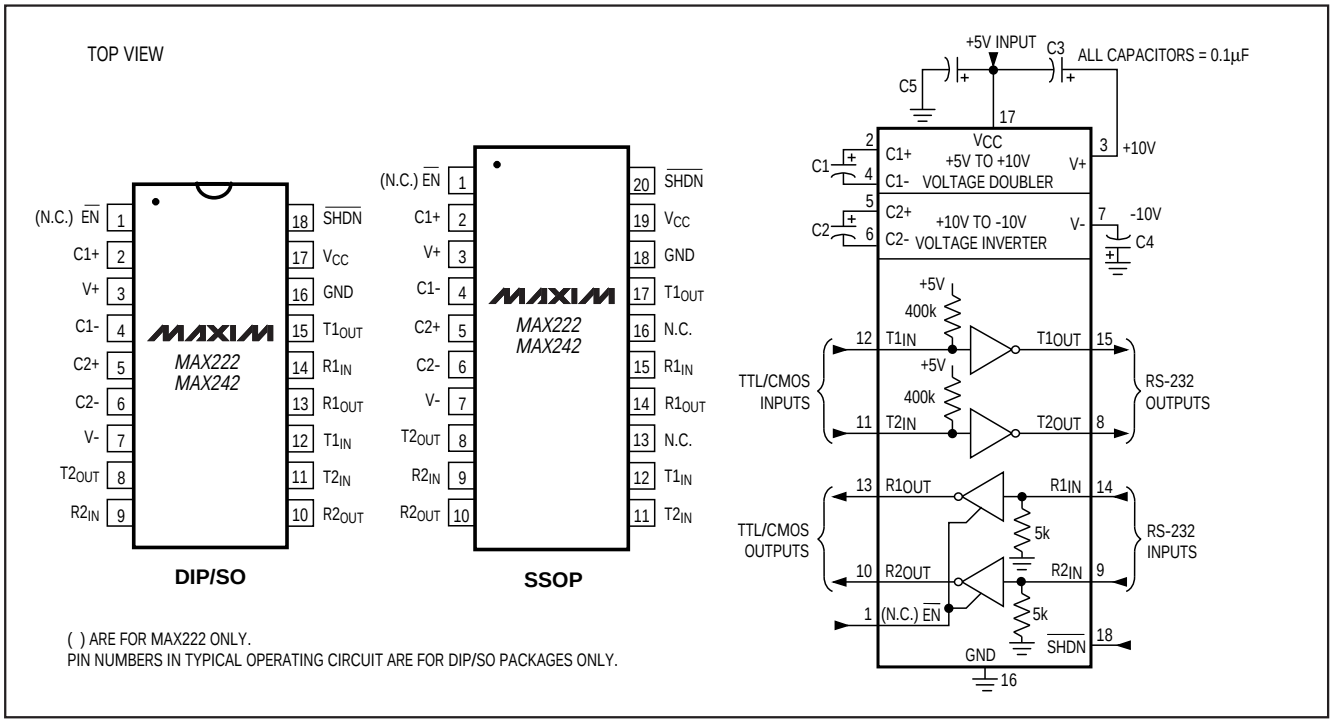
ORDERING NUMBERS

Type	SO-8	TO-92	SOT-89 (T&R)	Output Voltage
L78L33AC	L78L33ACD	L78L33ACZ	L78L33ACUTR	3.3 V
L78L33AB	L78L33ABD	L78L33ABZ	L78L33ABUTR	3.3 V
L78L05C	L78L05CD	L78L05CZ		5 V
L78L05AC	L78L05ACD	L78L05ACZ	L78L05ACUTR	5 V
L78L05AB	L78L05ABD	L78L05ABZ	L78L05ABUTR	5 V
L78L06C	L78L06CD	L78L06CZ		6 V
L78L06AC	L78L06ACD	L78L06ACZ	L78L06ACUTR	6 V
L78L06AB	L78L06ABD	L78L06ABZ	L78L06ABUTR	6 V
L78L08C	L78L08CD	L78L08CZ		8 V
L78L08AC	L78L08ACD	L78L08ACZ	L78L08ACUTR	8 V
L78L08AB	L78L08ABD	L78L08ABZ	L78L08ABUTR	8 V
L78L09C	L78L09CD	L78L09CZ		9 V
L78L09AC	L78L09ACD	L78L09ACZ	L78L09ACUTR	9 V
L78L09AB	L78L09ABD	L78L09ABZ	L78L09ABUTR	9 V
L78L12C	L78L12CD	L78L12CZ		12 V
L78L12AC	L78L12ACD	L78L12ACZ	L78L12ACUTR	12 V
L78L12AB	L78L12ABD	L78L12ABZ	L78L12ABUTR	12 V
L78L15C	L78L15CD	L78L15CZ		15 V
L78L15AC	L78L15ACD	L78L15ACZ	L78L15ACUTR	15 V
L78L15AB	L78L15ABD	L78L15ABZ	L78L15ABUTR	15 V
L78L18C	L78L18CD	L78L18CZ		18 V
L78L18AC	L78L18ACD	L78L18ACZ	L78L18ACUTR	18 V
L78L18AB	L78L18ABD	L78L18ABZ	L78L18ABUTR	18 V
L78L24C	L78L24CD	L78L24CZ		24 V
L78L24AC	L78L24ACD	L78L24ACZ	L78L24ACUTR	24 V
L78L24AB	L78L24ABD	L78L24ABZ	L78L24ABUTR	24 V



CAPACITANCE (µF)					
DEVICE	C1	C2	C3	C4	C5
MAX220	4.7	4.7	10	10	4.7
MAX232	1.0	1.0	1.0	1.0	1.0
MAX232A	0.1	0.1	0.1	0.1	0.1

Figure 5. MAX220/MAX232/MAX232A Pin Configuration and Typical Operating Circuit



( ) ARE FOR MAX222 ONLY.
PIN NUMBERS IN TYPICAL OPERATING CIRCUIT ARE FOR DIP/SO PACKAGES ONLY.

Figure 6. MAX222/MAX242 Pin Configurations and Typical Operating Circuit

7 PINNING

SYMBOL	PIN	PAD TYPE	DESCRIPTION
BCK	1	5 V tolerant digital input pad; note 1	bit clock input
WS	2	5 V tolerant digital input pad; note 1	word select input
DATAI	3	5 V tolerant digital input pad; note 1	serial data input
V_{DDD}	4	digital supply pad	digital supply voltage
V_{SSD}	5	digital ground pad	digital ground
SYSCLK	6	5 V tolerant digital input pad; note 1	system clock input
SFOR1	7	5 V tolerant digital input pad; note 1	serial format select 1
MUTE	8	5 V tolerant digital input pad; note 1	mute control
DEEM	9	5 V tolerant digital input pad; note 1	de-emphasis control
PCS	10	3-level input pad; note 2	power control and sampling frequency select
SFOR0	11	digital input pad; note 2	serial format select 0
$V_{ref(DAC)}$	12	analog pad	DAC reference voltage
V_{DDA}	13	analog supply pad	DAC analog supply voltage
VOUTL	14	analog output pad	DAC output left
V_{SSA}	15	analog ground pad	DAC analog ground
VOUTR	16	analog output pad	DAC output right

Notes

1. 5 V tolerant is only supported if the power supply voltage is between 2.7 and 3.6 V. For lower power supply voltages this is maximum 3.3 V tolerant.
2. Because of test issues these pads are not 5 V tolerant and they should be at power supply voltage level or at a maximum of 0.5 V above that level.

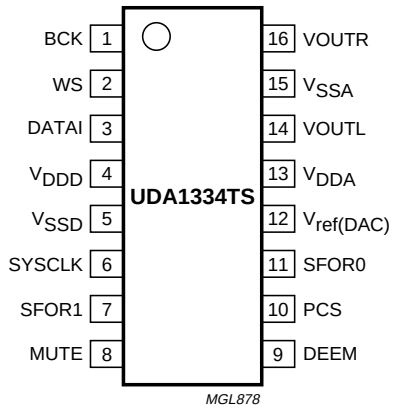
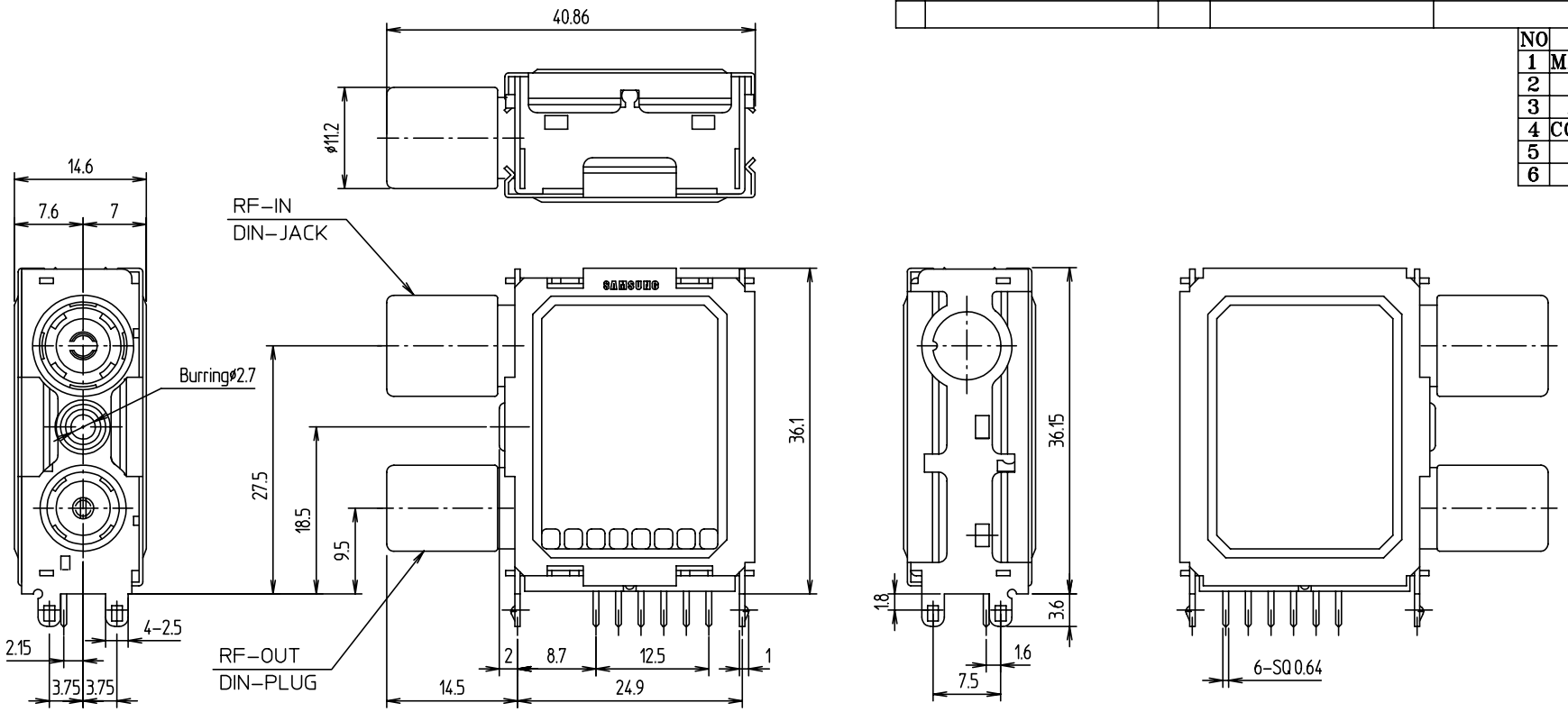


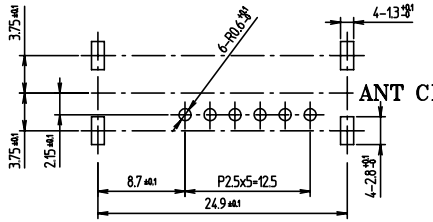
Fig.2 Pin configuration.

A3

NO	PART NAME	Q'TY	MATERIAL	FINISH	REMARK

NO	NAME
1	MAIN POWER
2	VIDEO IN
3	AUDIO IN
4	CONTROL B+
5	SDA
6	SCL





Dimension of P.C.B for RF Modulator Mounting (Viewed from Copper Pattern)

Rev.	DATE	WRITTEN BY	CHECKED BY	REVISION RECORD	REMARK
3					
2					
1					

UNIT	m / m	DRAW	DESIGNED	CHECKED	APPROVED	NAME	PART NAME	OUTDRAWING
SCALE	2 / 1	CAD	H.J.H	L.N.K	K.T.H		MODEL NAME	RF MOD 14SERIES
TOLERANCE	±0.5	2002.08.06					SEMCO P/N	RMUP74055AB
SAMSUNG ELECTRO-MECHANICS		File name RMUP74055AB		3RD ANGLE PROJECTION			NO.	B-10300-14000ZZ-0

A3

A3(420X297)

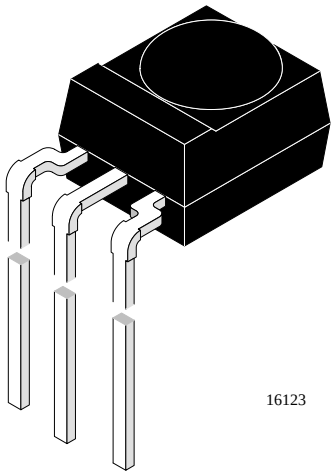
Photo Modules for PCM Remote Control Systems

Available types for different carrier frequencies

Type	fo	Type	fo
TSOP4830SB1	30 kHz	TSOP4833SB1	33 kHz
TSOP4836SB1	36 kHz	TSOP4837SB1	36.7 kHz
TSOP4838SB1	38 kHz	TSOP4840SB1	40 kHz
TSOP4856SB1	56 kHz		

Description

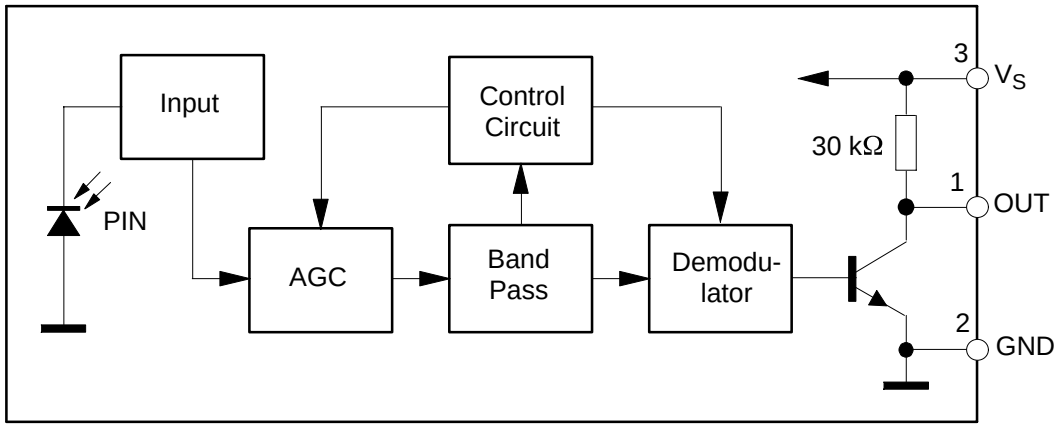
The TSOP48..SB1 – series are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter.
The demodulated output signal can directly be decoded by a microprocessor. TSOP48..SB1 is the standard IR remote control receiver series, supporting all major transmission codes.



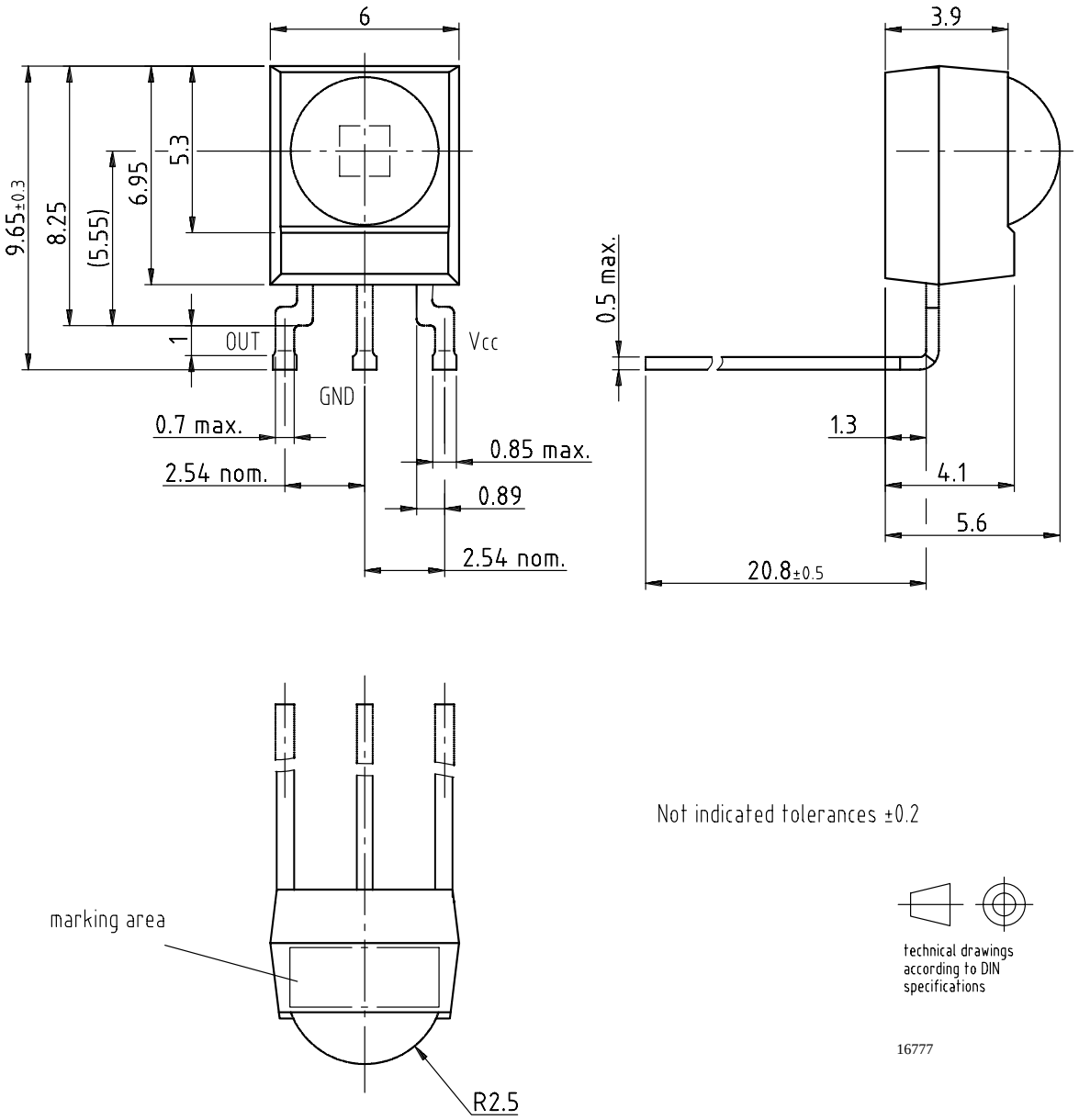
Features

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Low power consumption
- High immunity against ambient light
- Continuous data transmission possible (800 bit/s)
- Suitable burst length ≥10 cycles/burst

Block Diagram



Dimensions in mm



Not indicated tolerances ±0.2

technical drawings
according to DIN
specifications

16777

KA1L0380B/KA1L0380RB/ KA1M0380RB/KA1H0380RB

Fairchild Power Switch(FPS)

Features

- Precision fixed operating frequency
- KA1L0380B/KA1L0380RB (50KHz)
- KA1M0380RB (67KHz)
- KA1H0380RB (100KHz)
- Pulse by pulse over current limiting
- Over load protection
- Over voltage protection (Min. 23V)
- Internal thermal shutdown function
- Under voltage lockout
- Internal high voltage sense FET
- Auto restart (KA1L0380RB/KA1M0380RB/KA1H0380RB)

Description

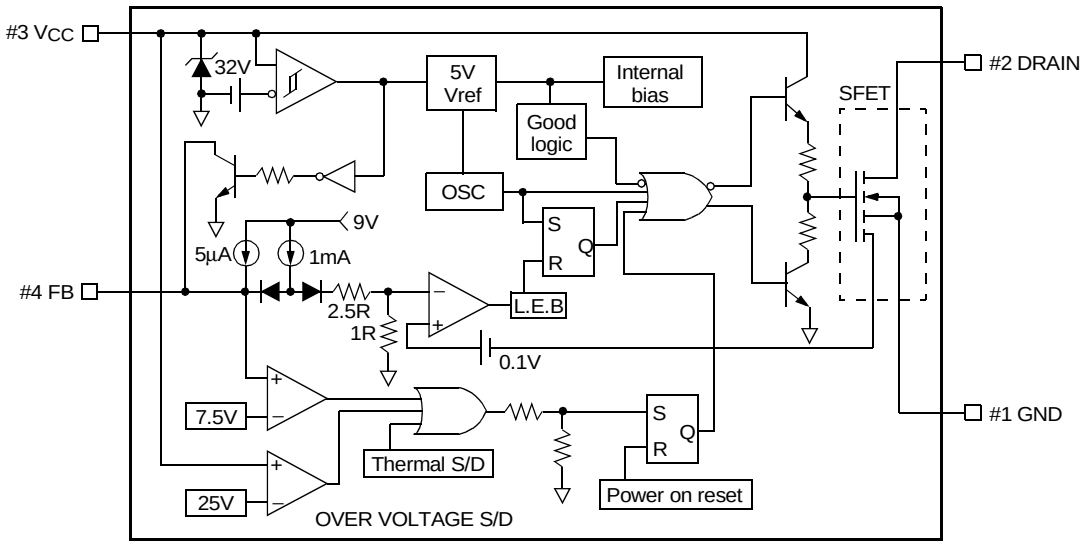
The Fairchild Power Switch(FPS) product family is specially designed for an off line SMPS with minimal external components. The Fairchild Power Switch(FPS) consist of high voltage power SenseFET and current mode PWM controller IC. PWM controller features integrated fixed oscillator, under voltage lock out, leading edge blanking, optimized gate turn-on/ turn-off driver, thermal shut down protection, over voltage protection, temperature compensated precision current sources for loop compensation and fault protection circuit. compared to discrete MOSFET and controller or R_{CC} switching converter solution, a Fairchild Power Switch(FPS) can reduce total component count, design size, weight and at the same time increase & efficiency, productivity, and system reliability. It has a basic platform well suited for cost effective design in either a flyback converter or a forward converter.

TO-220F-4L

1

1. GND 2. DRAIN 3. V_{CC} 4. FB

Internal Block Diagram



Rev.1.0.2

KA431/KA431A/KA431L

Programmable Shunt Regulator

Features

- Programmable output voltage to 36 volts
- Low dynamic output impedance 0.20 typical
- Sink current capability of 1.0 to 100mA
- Equivalent full-range temperature coefficient of 50ppm/ °C typical
- Temperature compensated for operation over full rated operating temperature range
- Low output noise voltage
- Fast turn-on response

Description

The KA431/KA431A/KA431L are three-terminal adjustable regulator series with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between VREF (approximately 2.5 volts) and 36 volts with two external resistors These devices have a typical dynamic output impedance of 0.2W Active output circuitry provides a very sharp turn on characteristic,
making these devices excellent replacement for zener diodes in many applications.

TO-92

1. Ref 2. Anode 3. Cathode

8-DIP

1.Cathode 2.3.4.5.7.NC
6.Anode 8.Ref

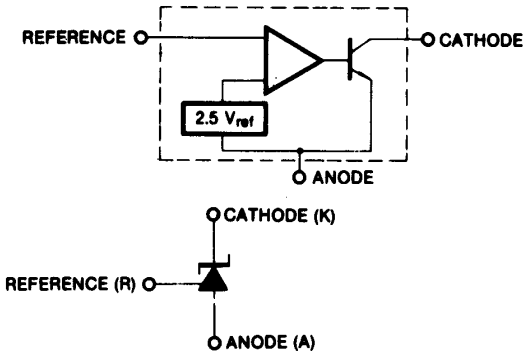
8-SOP

1.Cathode 2.3.6.7.Anode
4.5.NC 8.Ref

SOT-23F

1. Cathode 2. Ref 3. Anode

Internal Block Diagram

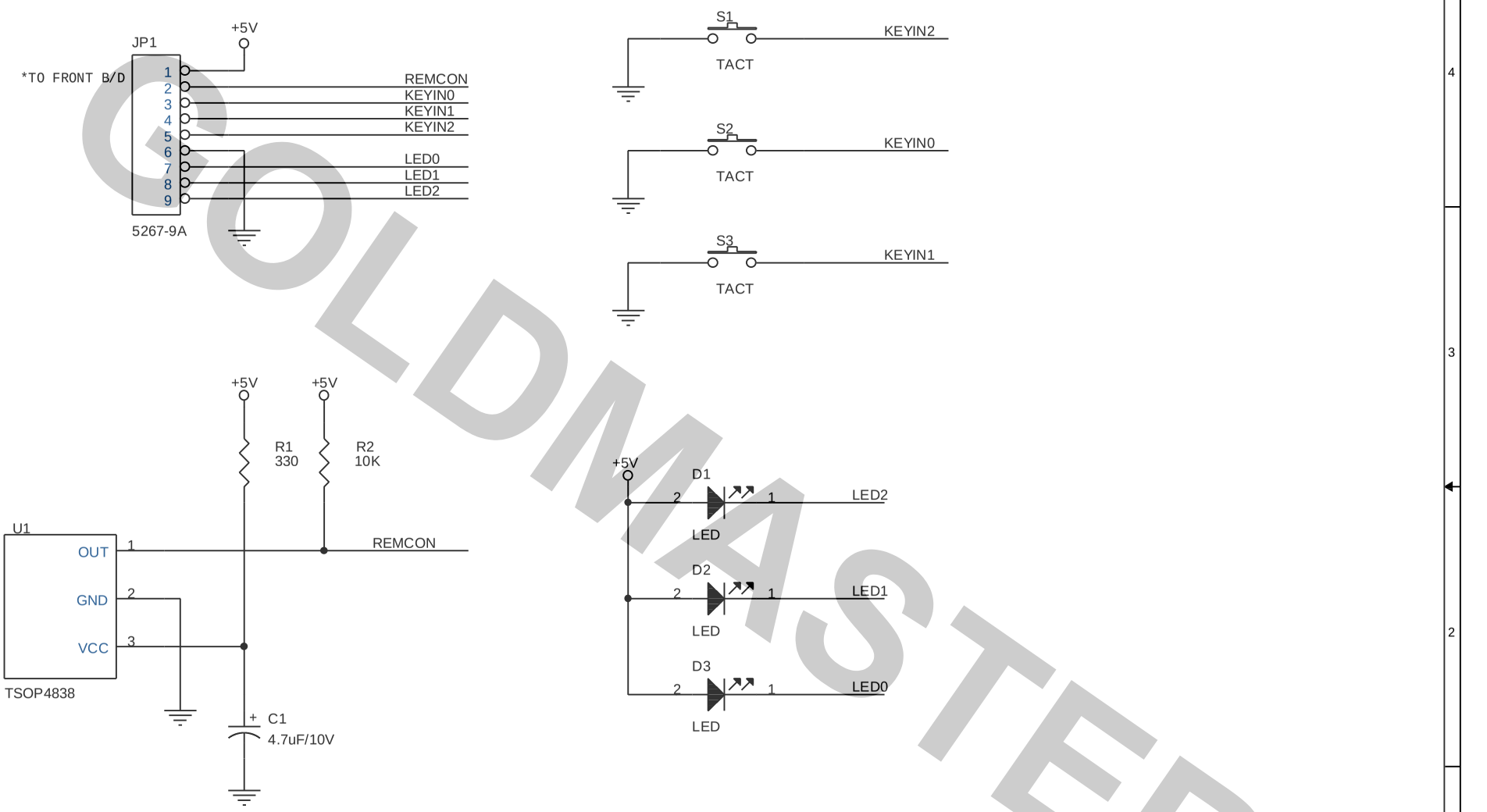


Rev. 1.0.4

7. Schematic Diagrams

7.1. Schematic diagram of Front Board

- see next page.



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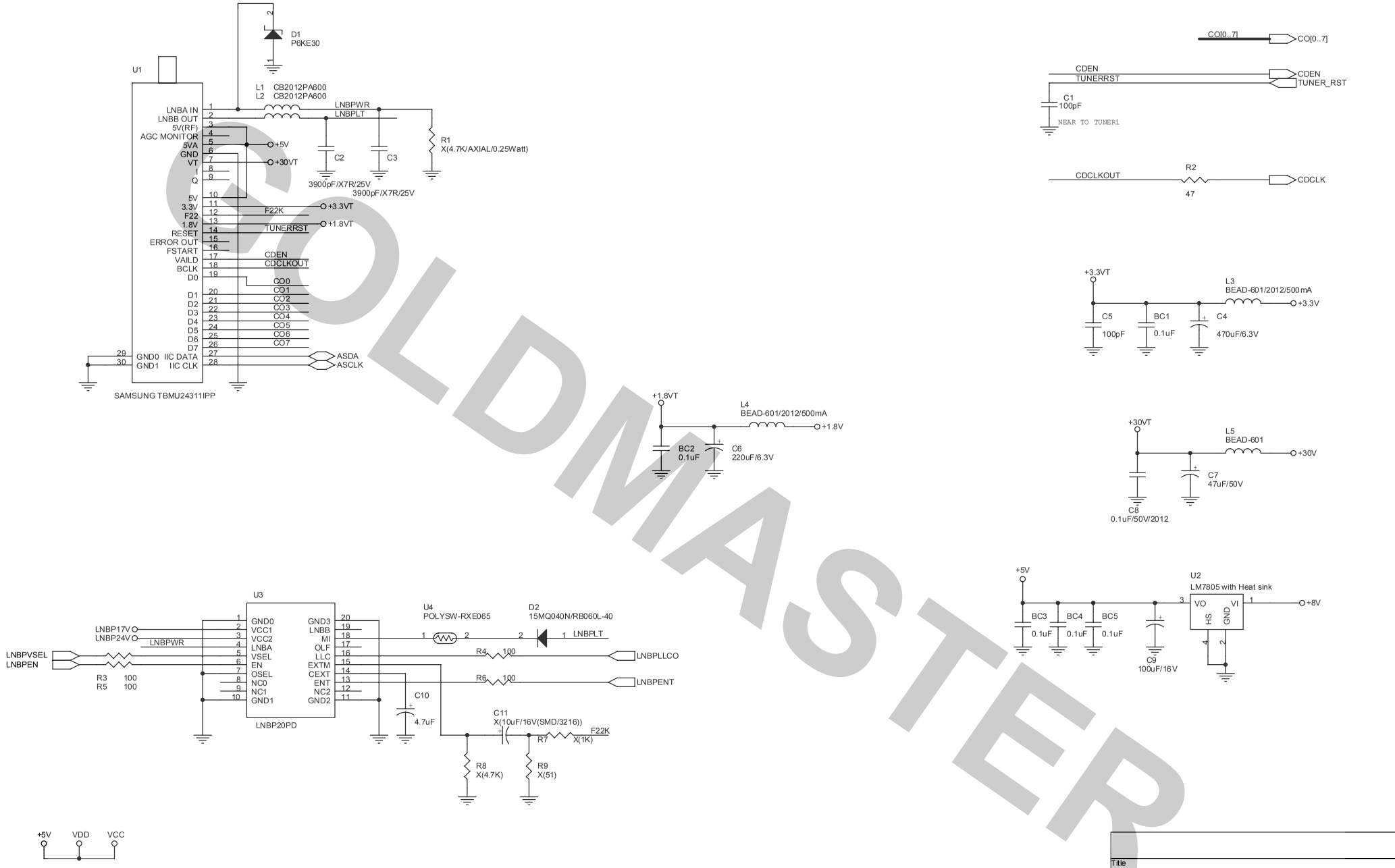
Size A	Document Number IO	Rev {RevCode}
Date: Friday, November 03, 2000	Sheet 1 of 1	

7.2. Schematic diagram of Main Board

- see next page. -


D1
P6KE30
U1
L1 CB2012PA600
L2 CB2012PA600
LNBA IN
LNBB OUT
5V(RF)
AGC MONITOR
5VA
GND
VT
I
Q
5V
3.3V
F22
1.8V
RESET
ERROR OUT
FSTART
VAILD
BCLK
D0
D1
D2
D3
D4
D5
D6
D7
GND0 IIC DATA
GND1 IIC CLK
LNBPWR
LNBPLT
+5V
+30VT
+3.3VT
+1.8VT
F22K
TUNERRST
CDEN
CDCLKOUT
CO0
CO1
CO2
CO3
CO4
CO5
CO6
CO7
ASDA
ASCLK
R1
X(4.7K/AXIAL/0.25Watt)
C2
3900pF/X7R/25V
C3
3900pF/X7R/25V
SAMSUNG TBMU24311IPP
CO[0..7]
CDEN
TUNERRST
C1
100pF
NEAR TO TUNER1
CDCLKOUT
R2
47
CDCLK
+3.3VT
L3
BEAD-601/2012/500mA
C5
100pF
BC1
0.1uF
C4
470uF/6.3V
+1.8VT
L4
BEAD-601/2012/500mA
BC2
0.1uF
C6
220uF/6.3V
+30VT
L5
BEAD-601
C7
47uF/50V
C8
0.1uF/50V/2012
U3
LNBP17V
LNBP24V
LNBPWR
LNBPVSEL
LNBPEN
R3 100
R5 100
GND0
VCC1
VCC2
LNBA
VSEL
EN
OSEL
NC0
NC1
GND1
GND3
LNBB
MI
OLF
LLC
EXTM
CEXT
ENT
NC2
GND2
LNBP20PD
U4
POLYSW-RXE065
D2
15MQ040N/RB060L-40
LNBPLT
R4 100
LNBPLLCO
R6 100
LNBPENT
C10
4.7uF
C11
X(10uF/16V(SMD/3216))
R7
F22K
X(1K)
R8
X(4.7K)
R9
X(51)
+5V
BC3
0.1uF
BC4
0.1uF
BC5
0.1uF
U2
LM7805 with Heat sink
VO
VI
HS
GND
+8V
C9
100uF/16V
+5V
VDD
VCC
Title
TF4000Fi
Size
Document Number
TUNER
Rev
1.4
Date:
월요일, 3월 15, 2004
Sheet
1
of
12

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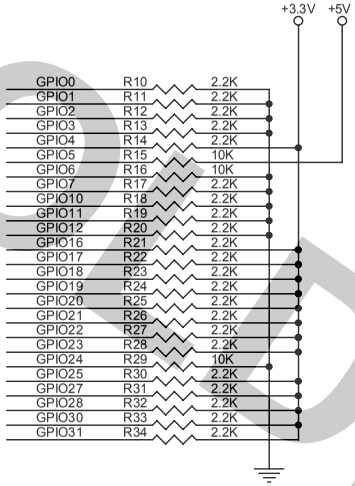
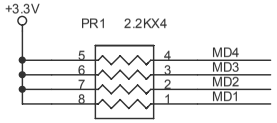
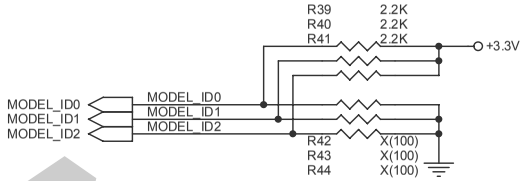
KEY_IN[0..2] KEY_IN[0..2]







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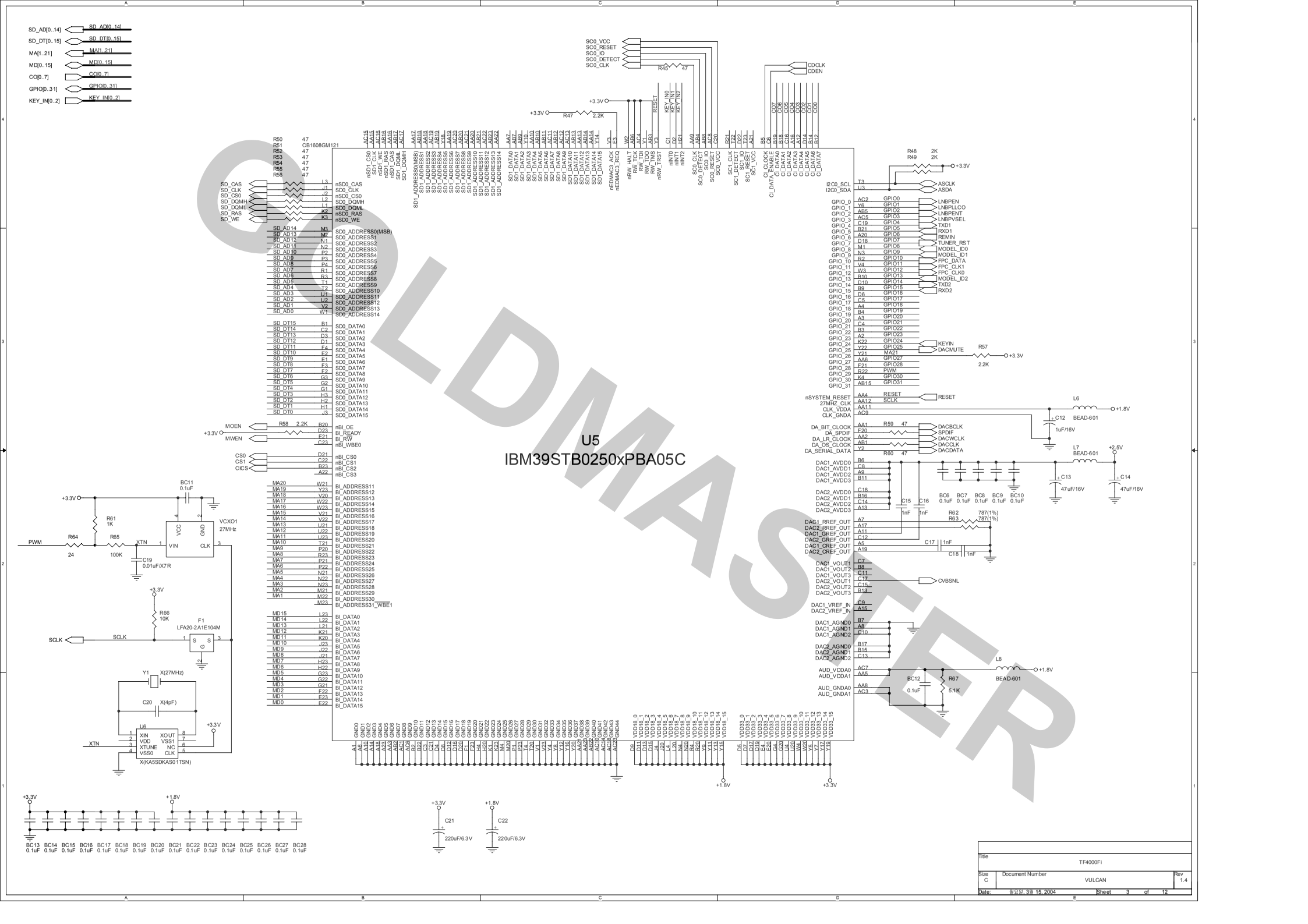
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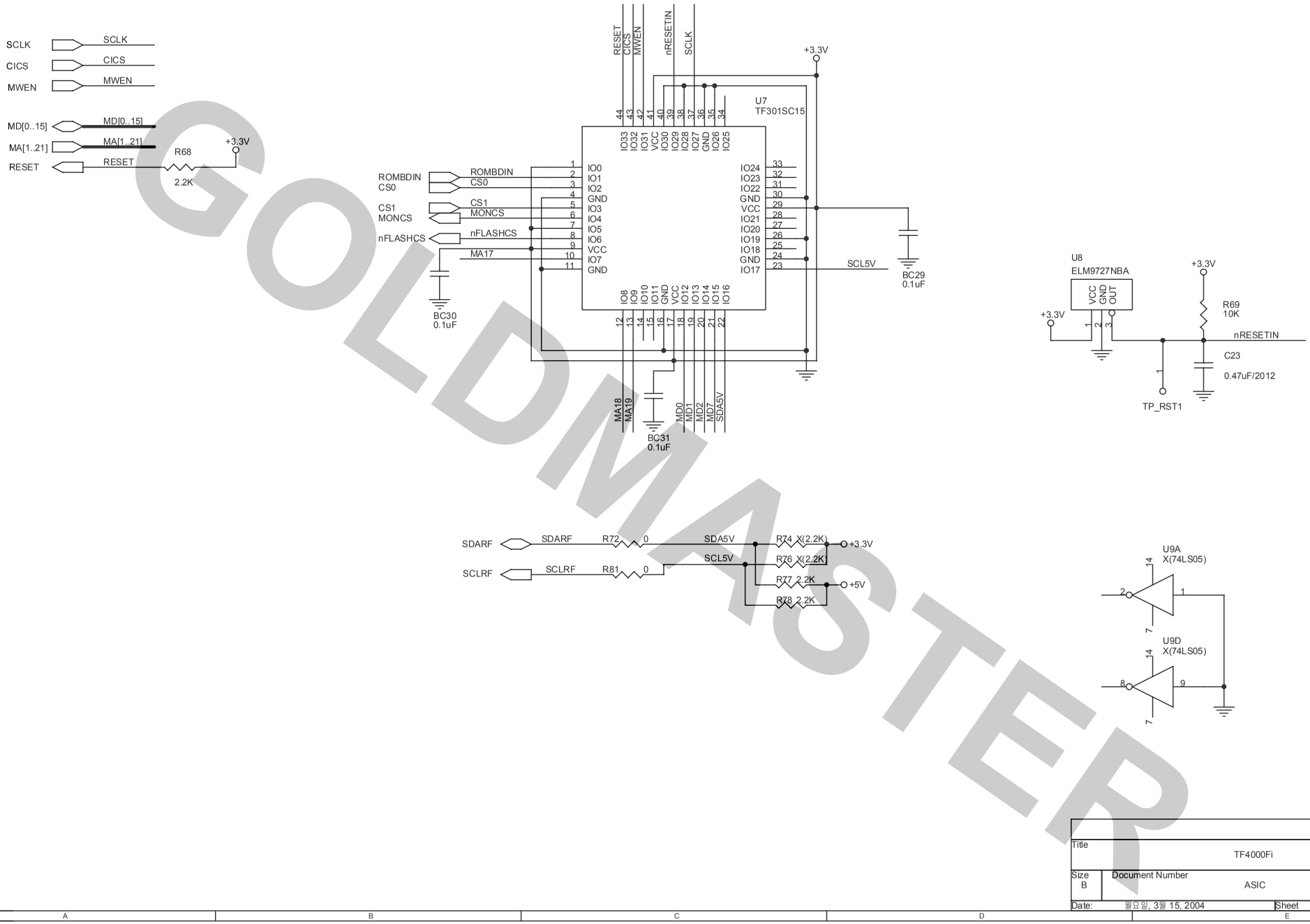
SD_DT[0..15]
MA[1..21]
MD[0..15]
CO[0..7]
GPIO[0..31]
KEY_IN[0..2]
U5
IBM39STB0250xPBA05C
VCXO1
27MHz
F1
LFA20-2A1E104M
X(27MHz)
X(4pF)
X(KA5SDKAS01TSN)
GM1121
CB1608
CDCLK
CDEN
ASCLK
ASDA
KEYIN
DACMUTE
CVBSNL
RESET
SCLK
DACBCLK
SPDIF
DACWCLK
DACCLK
DACDATA
TF4000Fi
VULCAN
Rev 1.4
Sheet 3 of 12



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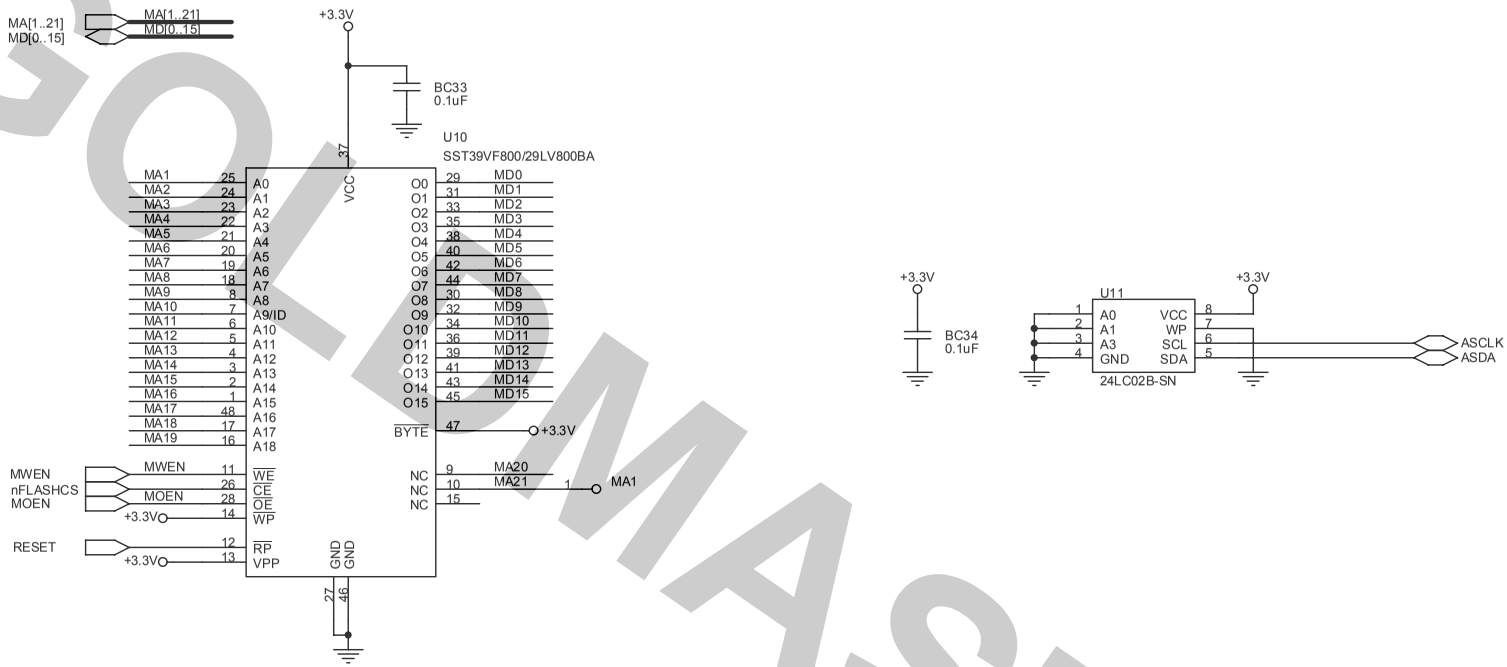

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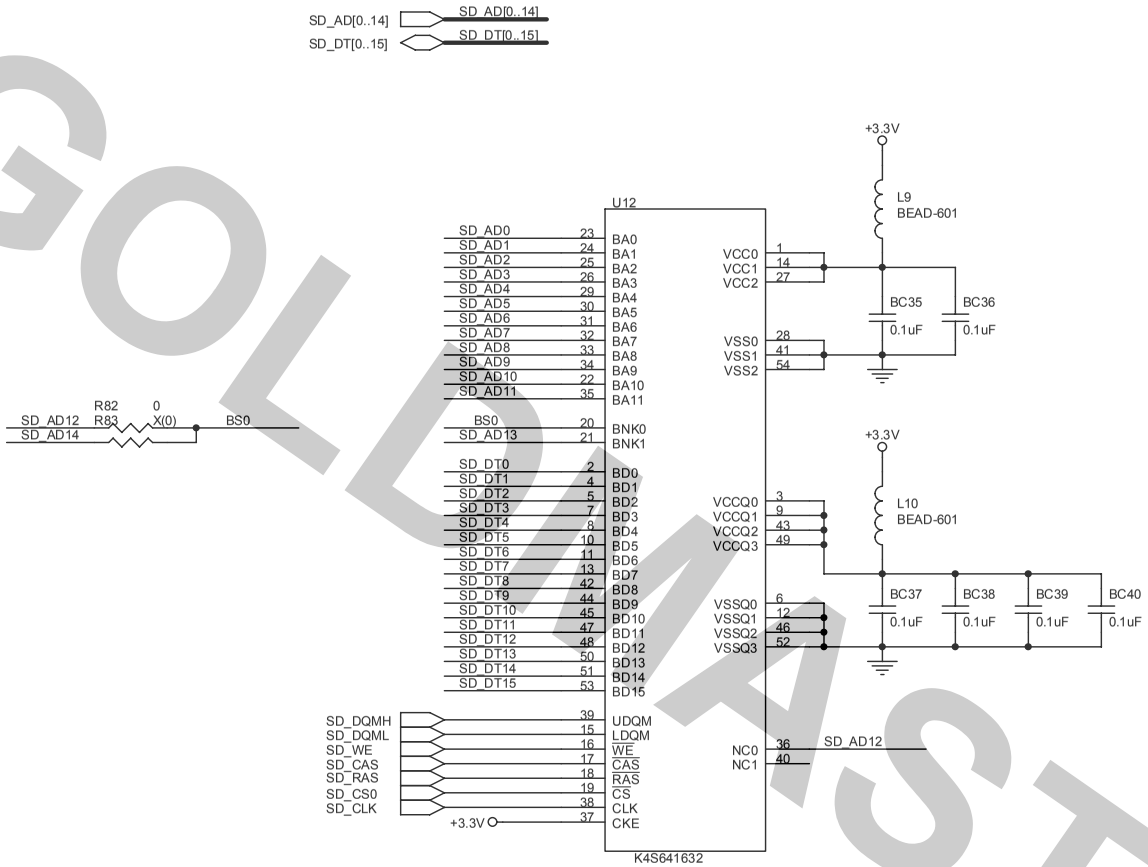

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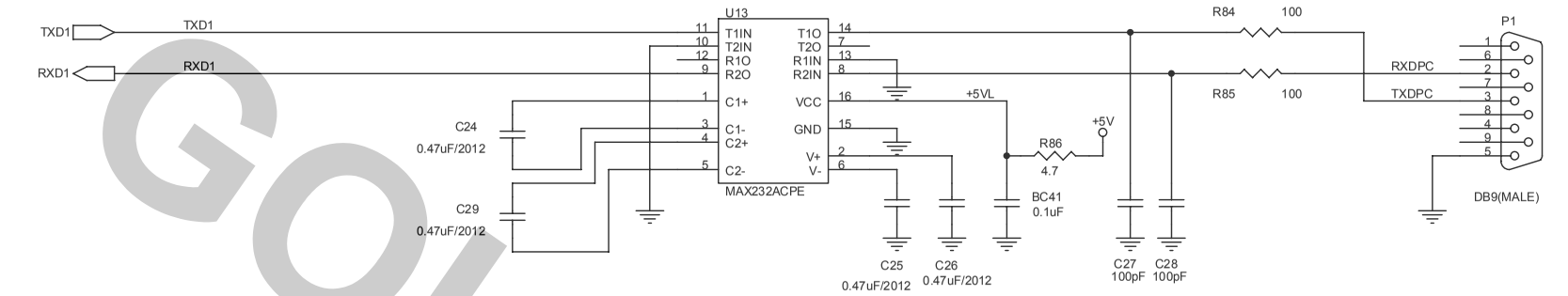

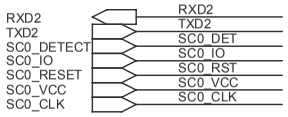

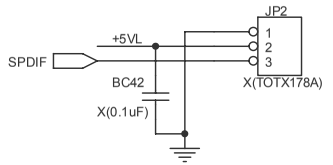

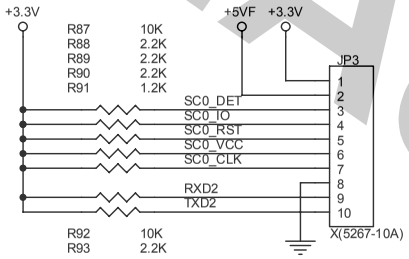

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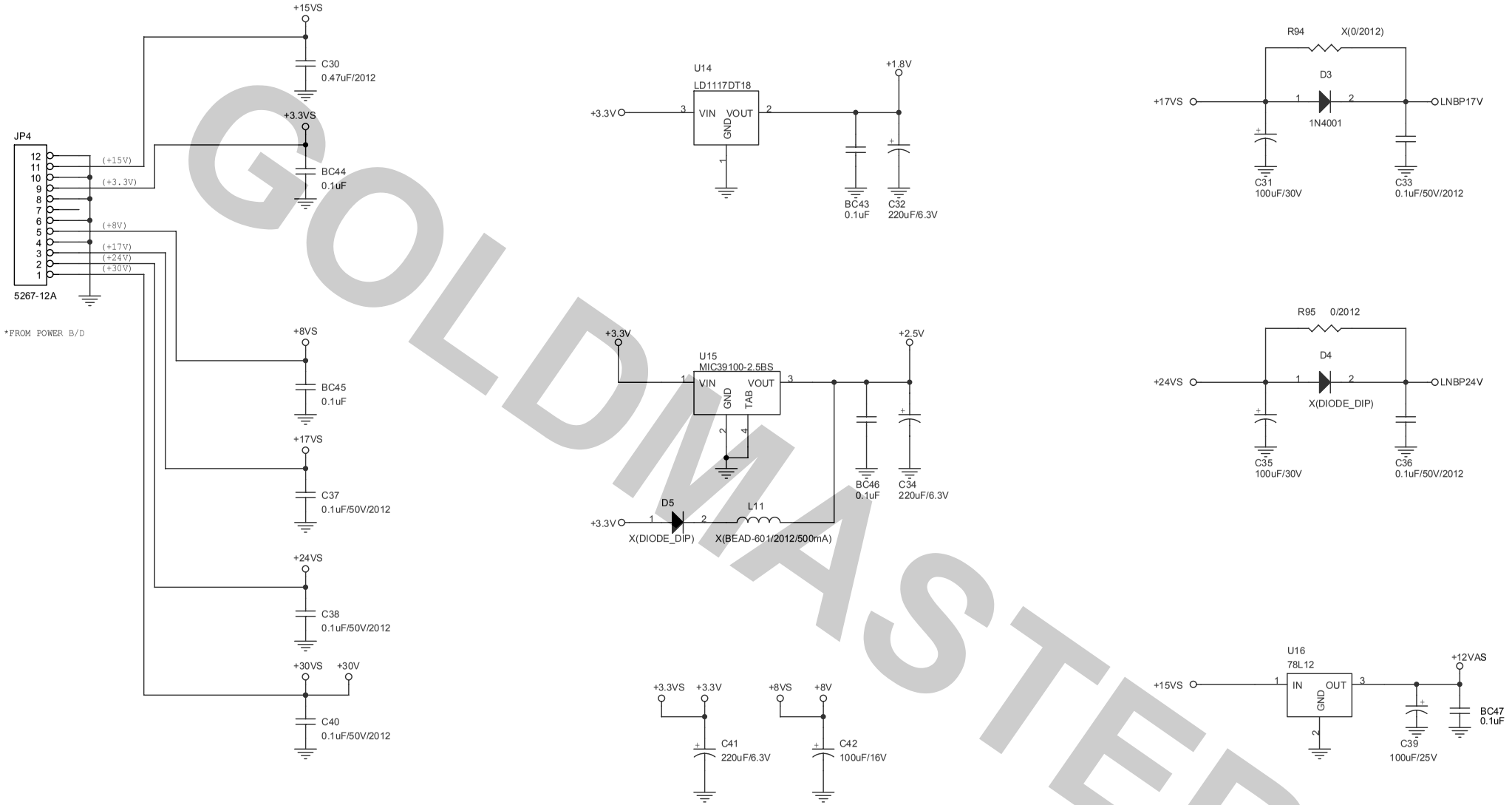

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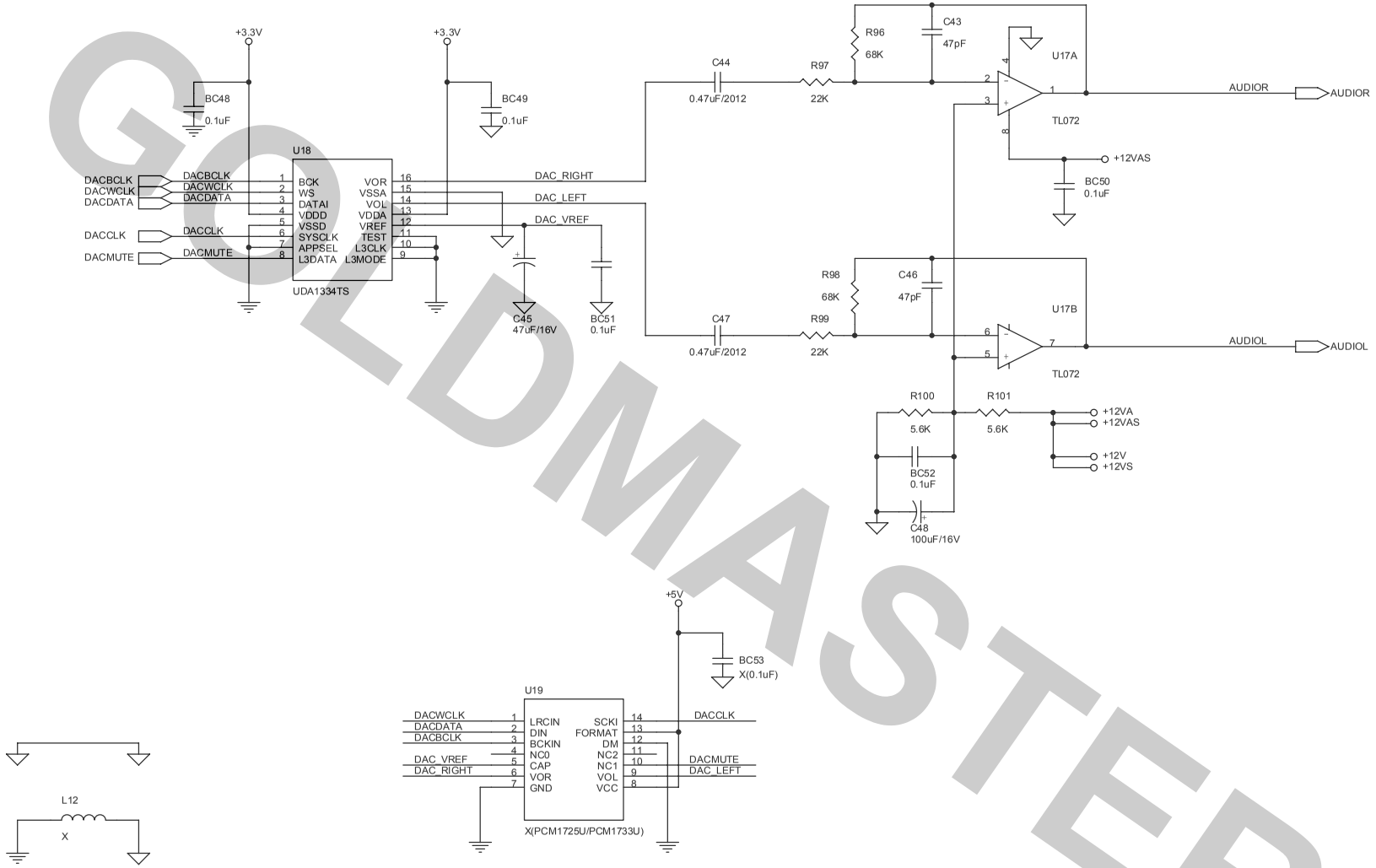

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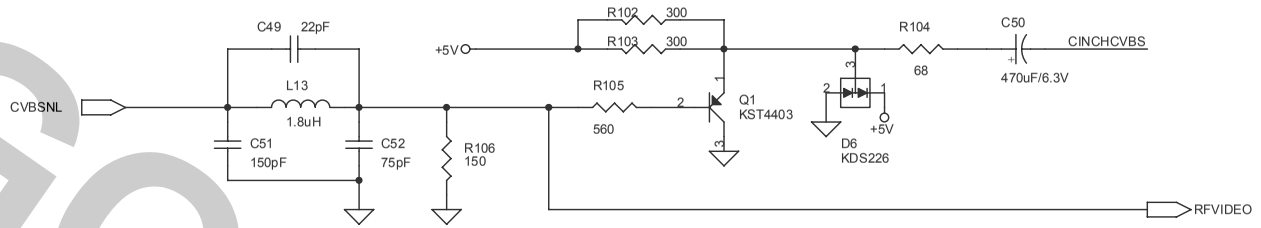

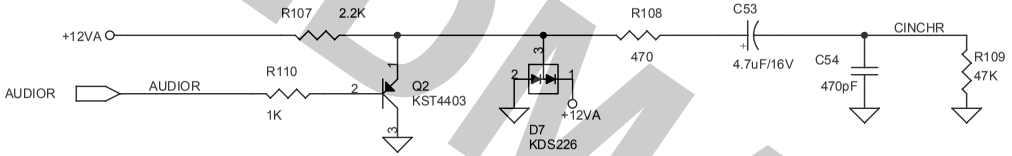

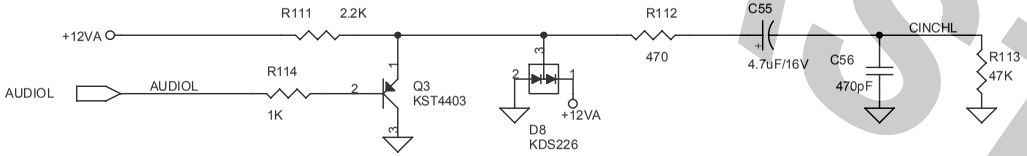

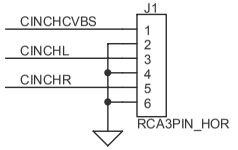

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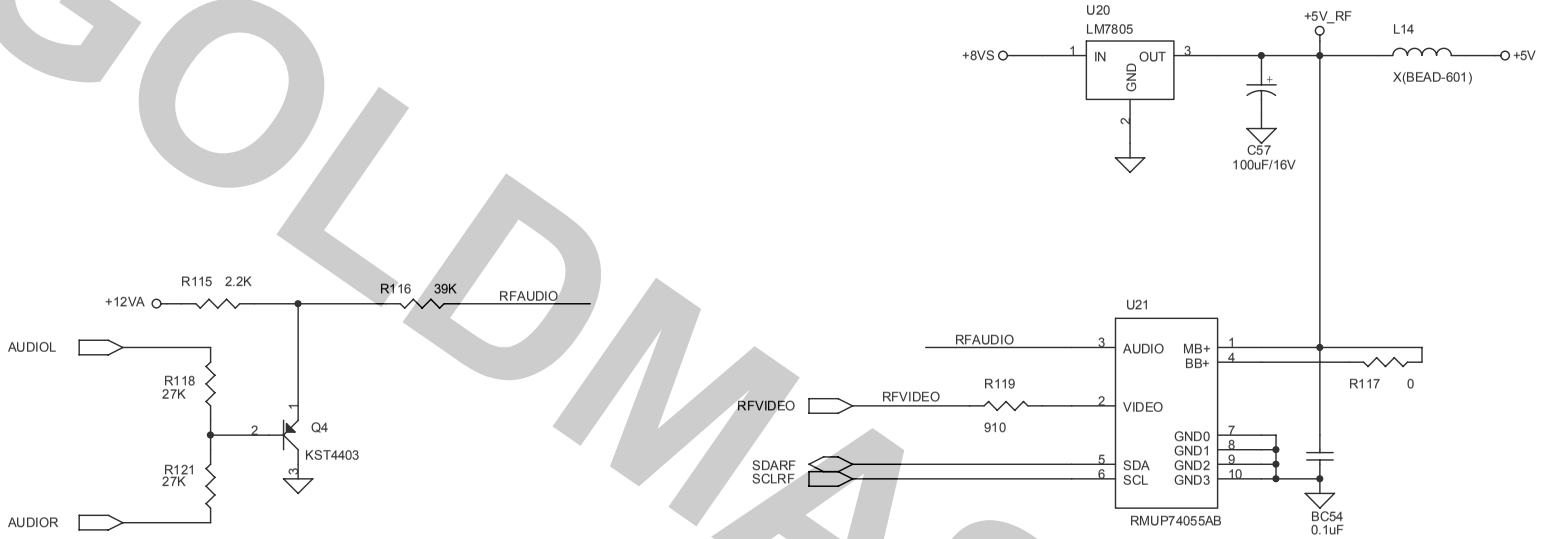
Size	Document Number	AV OUTPUT	Rev 1.4
Date: 월요일, 3월 15, 2004	Sheet 10 of 12		



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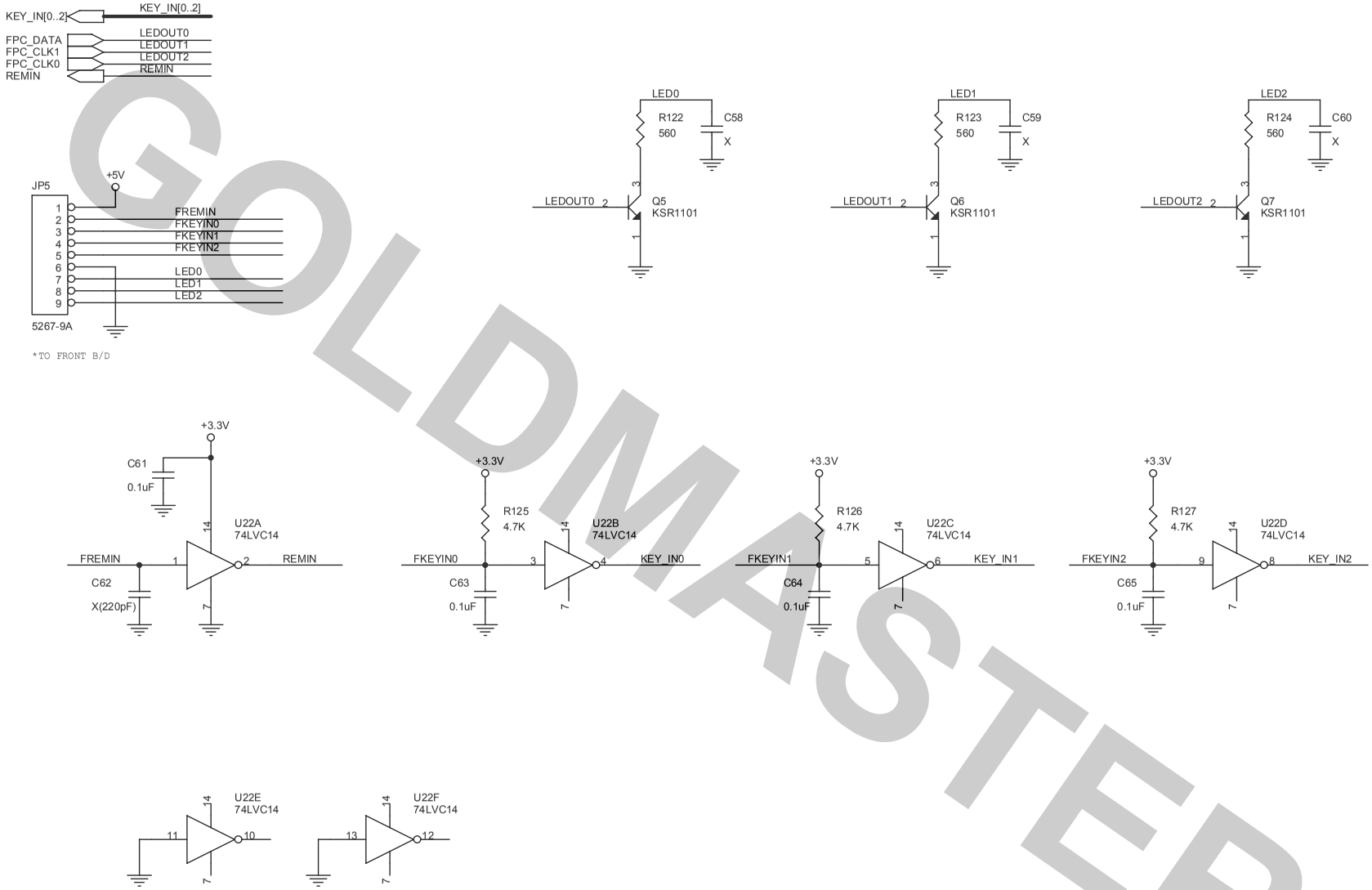

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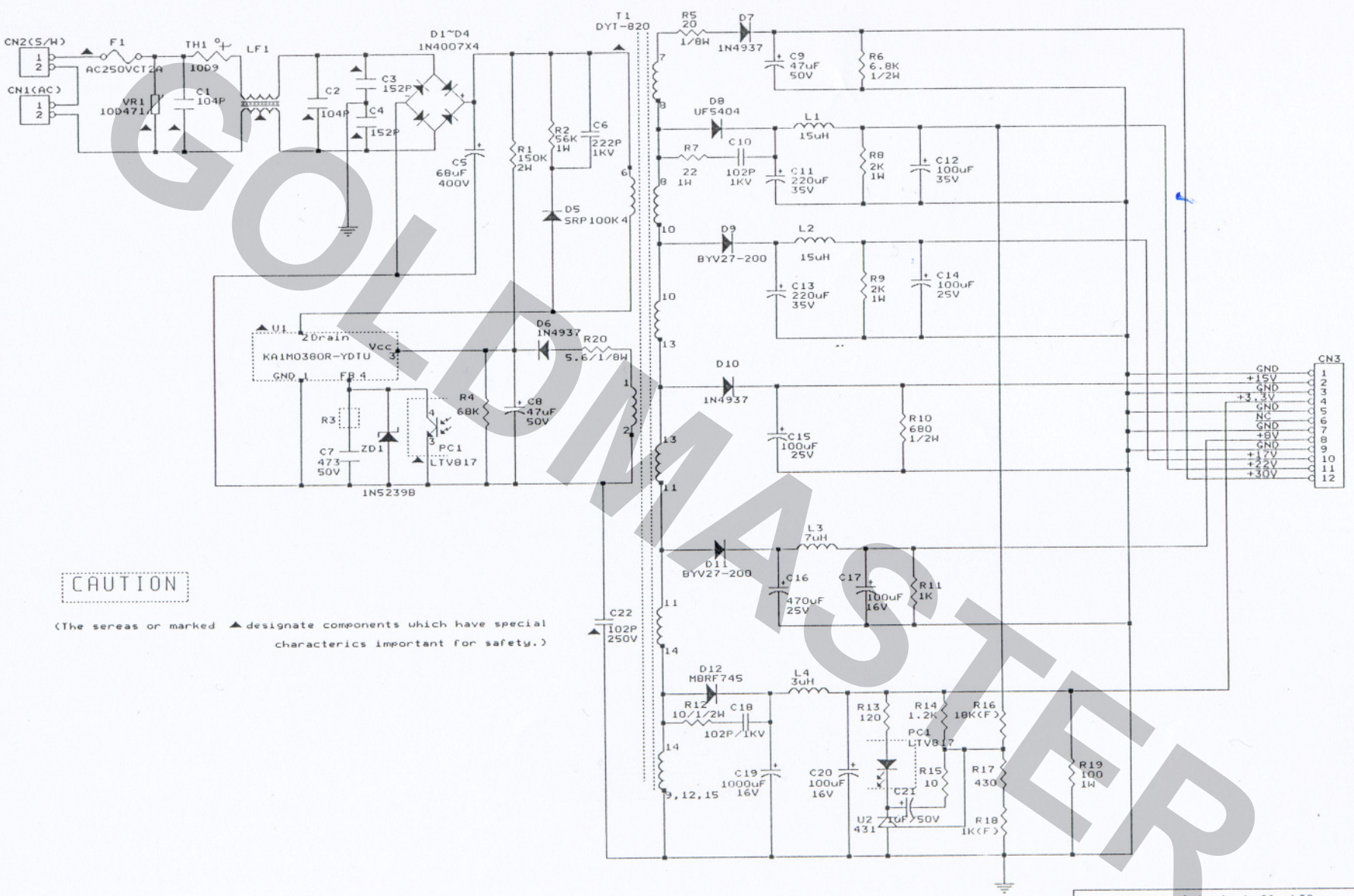
Date: 월요일, 3월 15, 2004	Sheet 12 of 12	

7.3. Schematic diagram of SMPS (power supply)

- see next page. -



CAUTION

(The sereas or marked ▲ designate components which have special characterics important for safety.)

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Size: A3	Document Number: FTA	REV: 00
Date: March 8, 2001	Sheet: of	