LCD Television

Service Manual

Chassis： **MTK5658**

Product: **US TV**

Hisense Electric Co.，Ltd.

July. 2017

REVISION HISTROY			
Version	Revise content	Reviser	Date
V1.00	First issued		2016-7-25
V1.01	add 6715 board	Zhang Shujuan	2017-3-3
V1.02	add 7733/7412 board	Zhang Shujuan	2017-7-4

Contents

Service Manual

1. Precautions and notices

BEFORE SERVICING THE LCD TV, READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

USE ONLY MANUFACTURER SPECIFIED REPLACEMENT PARTS WHEN SERVICING.

USE OF NON-AUTHORIZED PARTS WILL VOID THE MANUFACTURE'S WARRANTY

Proper service and repair is important to the safe, reliable operation of all Hisense Equipment. The service procedures recommended by Hisense and described in this Service Guide are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment and pose risk of personal injury

. It is also important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Service should only be performed by an experienced electronics

techician trained in the proper Television safety and service methods and procedures Hereafter throughout this manual, HISENSE will be referred to.

1.1 Warning

1.1.1

Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list. Use of non-manufacturer's recommended parts may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from RCA. Hisense Eassumes no liability, express or implied, arising out of any unauthorized modification of design. Servicetech assumes all liability.

1.1.2.

All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, be sure to use anti-static table mats and properly use a grounding wrist stra. Keep components and tools also at this same potential.

IMPORTANT:

Always disconnect the power cord from AC outlet before replacing parts or modules.

1.1.3

To prevent electrical shock, use only a properly grounded 3 prong outlet or extension cord.

1.1.4

When replacement parts are required, be sure to use replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards and will void the manufacturer's warranty.

1.1.5

Safety regulations require that after a repair the set must be returned in its original condition. In addition, prior to closing set, check that:

-Note:

>All wire harnesses and flex cables are properly routed and secured with factory tape and/or mounted cable clamps.

> All cables and connectors are properly insulated and do not have any bare wires/lead exposed

1.1.6

(1) Do not supply a voltage higher than that specified to this product. This may damage the product and may cause a fire.

(2) Do not use this product:

> High humidity areas

> In an area where any water could enter or splash into the unit.

High humidity and water could damage the product and cause fire.

(3) If a foreign substance (such as water, metal, or liquid) gets inside the panel module, immediately turn off the power. Continuing to use the product may cause fire or electric shock.

(4) If the product emits smoke, and abnormal smell, or makes an abnormal sound, immediately turn off the power. Continuing to use the product, it may cause fire or electric shock.

(5) Do not pull out or insert the power cable from/to an outlet with wet hands. It may cause electric shock.

(6) Do not damage or modify the power cable. It may cause fire or electric shock.

(7) If the power cable is damaged, or if the connector is loose, do not use the product: otherwise, this can lead to fire or electric shock.

(8) If the power connector or the connector of the power cable becomes dirty or dusty, wipe it with a dry cloth. Otherwise, this can lead to fire.

(9) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over

1.2 Notes

Notes on Safe Handling of the LCD panel and during service

The work procedures shown with the Note indication are important for ensuring the safety of the product and the servicing work. Be sure to follow these instructions.

• Before starting the work, secure a sufficient working space.

• At all times other than when adjusting and checking the product, be sure to turn OFF the POWER Button and disconnect the power cable from the power source of the TV during servicing.

• To prevent electric shock and breakage of PC board, start the servicing work at least 30 seconds after the main power has been turned off. Especially when installing and removing the power board, start servicing at least 2 minutes after the main power has been turned off.

• While the main power is on, do not touch any parts or circuits other than the ones specified. If any connection other than the one specified is made between the measuring equipment and the high voltage power supply block, it can result in electric shock or may trip the main circuit breaker When installing the LCD module in, and removing it from the packing carton, be sure to have at least two persons perform the work.

• When the surface of the panel comes into contact with the cushioning materials, be sure to confirm that there is no foreign matter on top of the cushioning materials before the surface of the panel comes into contact with the cushioning materials. Failure to observe this precaution may result in, the surface of the panel being scratched by foreign matter.

• Be sure to handle the circuit board by holding the large parts as the heat sink or transformer. Failure to observe this precaution may result in the occurrence of an abnormality in the soldered areas.

• Do not stack the circuit boards. Failure to observe this precaution may result in

problems resulting from scratches on the parts, the deformation of parts, and short-circuits due to residual electric charge.

• Perform a safety check when servicing is completed. Verify that the peripherals of the serviced points have not undergone any deterioration during servicing. Also verify that the screws, parts and cables removed for servicing purposes have all been returned to their proper locations in accordance with the original setup.

The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the products enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

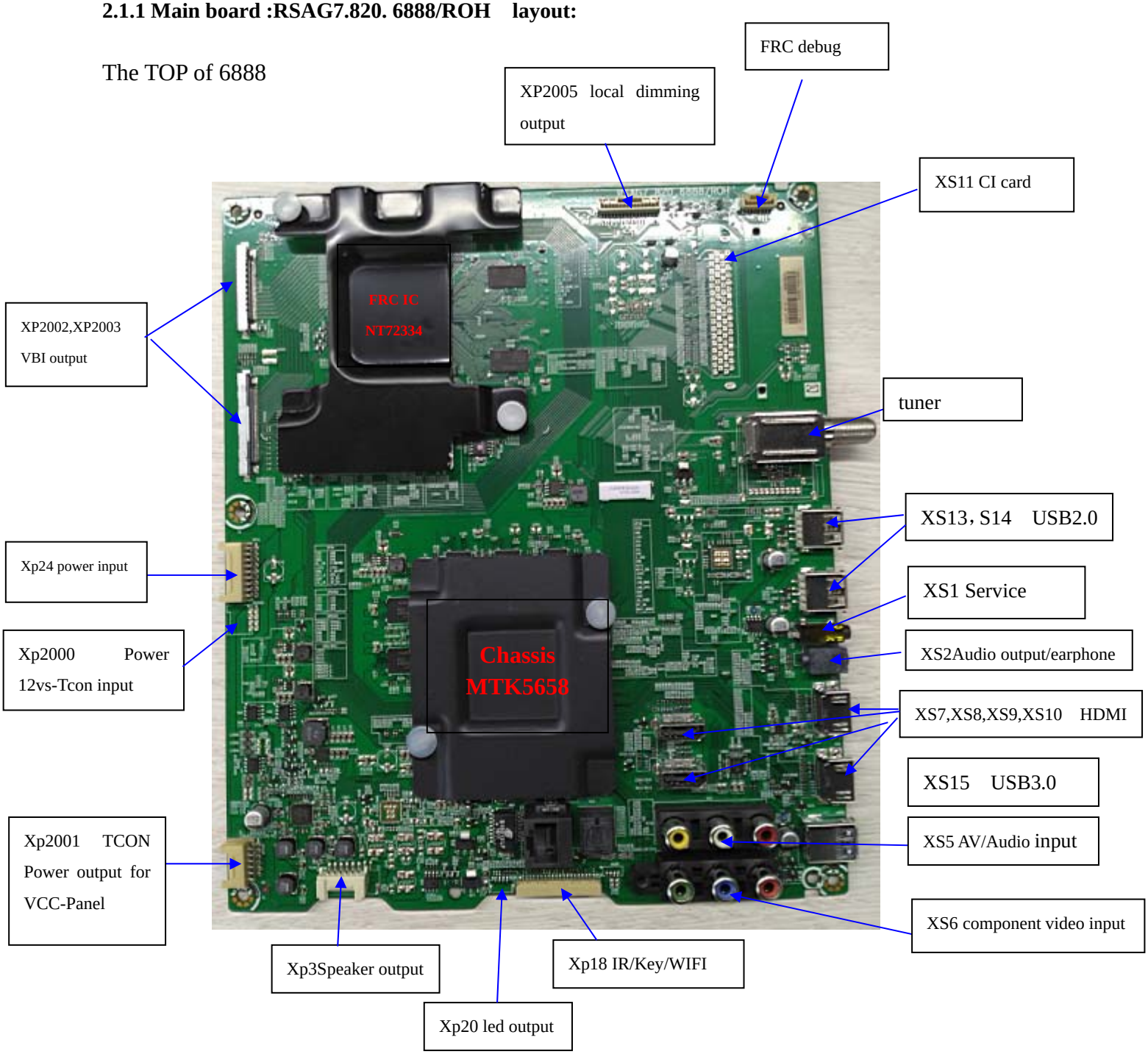
The exclamation point within an equilateral triangle is intended to alert the service personnel to important safety information in the service literature. .

2. TV boards:

2.1 Main board layout

2.1.1 Main board :RSAG7.820. 6888/ROH layout:

The TOP of 6888

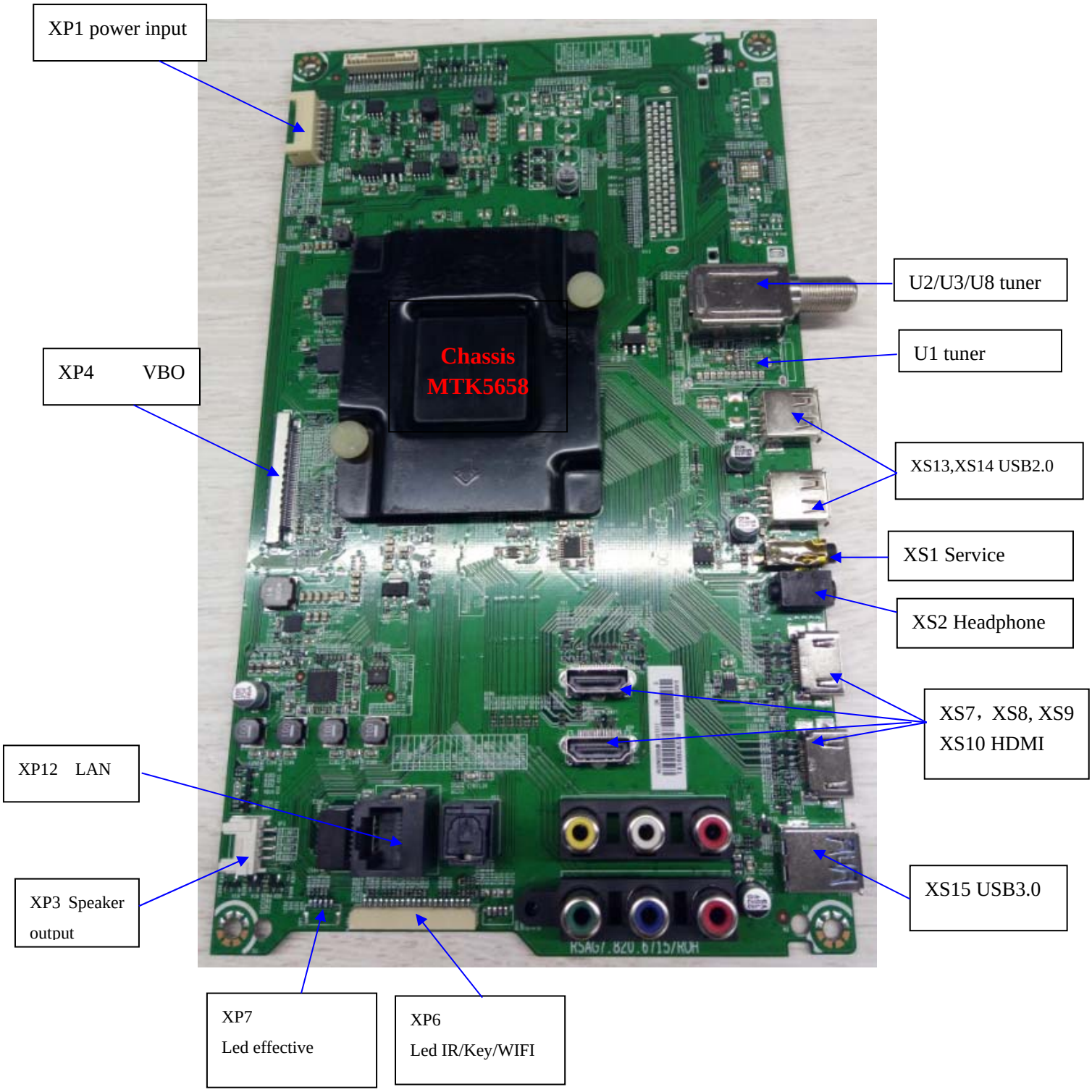


Board 6888 External terminals description:

Terminal	Terminal description	remark
XS3	Digital Audio out	
XS2	Earphone out/Audio out	composite
XS6	COMPONENT Video input	
XS5	AV/COMPONENT Audio input	composite
XS7	HDMI1/MHL input	4K@60Hz
XS8	HDMI2/ARC input	4K@60Hz
XS9	HDMI3 input	4K@30Hz
XS10	HDMI4 input	4K@30Hz
XS11	CI Card	PCMIA
XS12	LAN	
XS13	USB1 (2.0)	
XS14	USB2 (2.0)	
XS15	USB3 (3.0)	
U2/U3	RF input	NTSC/PAL/SECAM/ATSC/DVB-T/DVB-C/DVB-T2
U1	RF input	ISDB
U8	RF input	DVB-S2/T2

2.1.2 Main board :RSAG7.820. 6715/ROH layout

The TOP of 6715

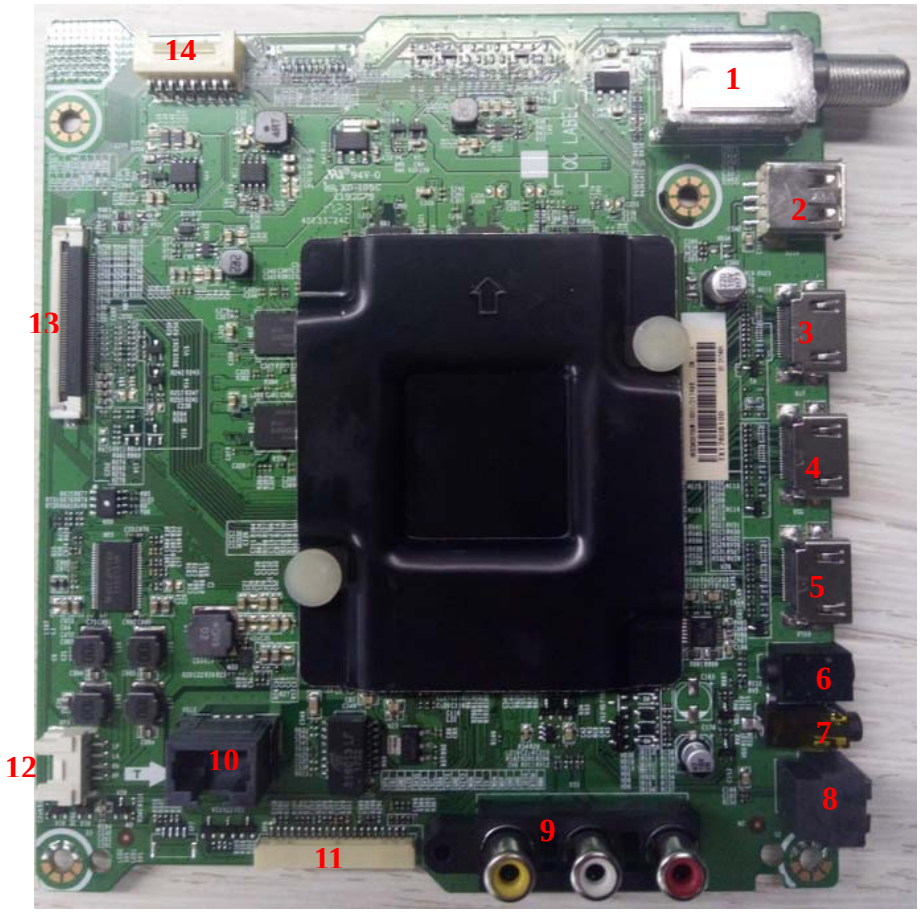


Board 6715 External terminals description:

Terminal	Terminal description	remark
XS3	Digital Audio out	
XS2	Earphone out/Audio out	composite
XS6	COMPONENT Video input	
XS5	AV/COMPONENT Audio input	composite
XS7	HDMI1/MHL input	4K@60Hz
XS8	HDMI2/ARC input	4K@60Hz
XS9	HDMI3 input	4K@30Hz
XS10	HDMI4 input	4K@30Hz
XS12	LAN	
XS13	USB1 (2.0)	
XS14	USB2 (2.0)	
XS15	USB3 (3.0)	
U2/U3	RF input	NTSC/PAL/SECAM/ATSC/DVB-T/DVB-C/DVB-T2

2.1.3 Main board :RSAG7.820. 7733\ROH layout

The TOP of 7733:



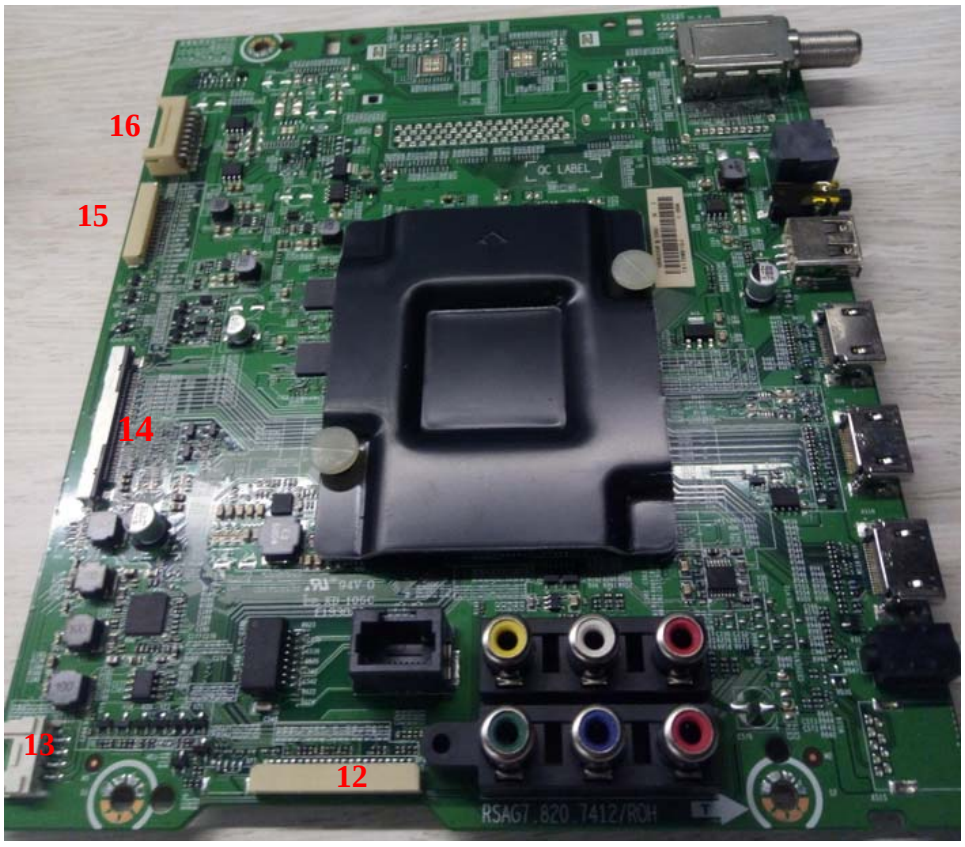
The vertical terminals of 7733:

The side terminals of 7733:

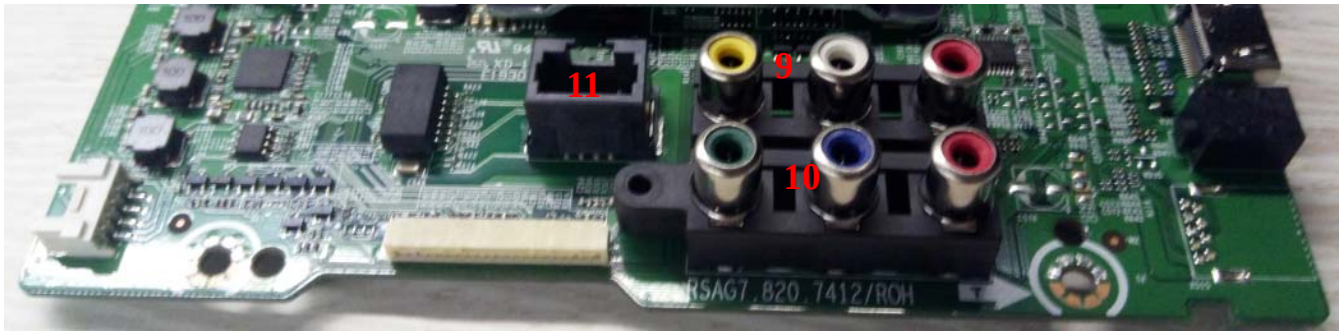
NO.	Position	Description
1	U9	RF INPUT(ANT/Cable)
2	XS14	USB
3	XS7	HDMI(4K@ 60Hz)
4	XS6	HDMI(4K@ 60Hz) ARC
5	XS10	HDMI(4K@ 30Hz)
6	XS2	Headphone
7	XS1	Debug service port
8	XS3	Digital audio out
9	XS5	AV in (video L/R)
10	XS12	LAN
11	XP6	IR/Key/WIFI
12	XP3	Speaker
13	XP4	LVDS
14	XP1	Power input

2.1.4 Main board :RSAG7.820. 7412\ROH layout

The TOP of 7412:



The vertical terminals of 7412:



The side terminals of 7412:

Number	Reference	Introduction	Remark
1	U2	RF signal	ATSC signal
2	XS3	SPDIF	
3	XS1	Service	
4	XS14	USB（2.0）	
5	XS7	HDMI1/MHL input	
6	XS8	HDMI2/ARC input	
7	XS10	HDMI3 input	
8	XS2	Headphone/Audio out	
9	XS5	AV Video input/Audio input	
10	XS6	COMPONENT Video input	
11	XS12	LAN	
12	XP6	IR/KEY/WIFI	
13	XP3	AMP	
14	XP4	VB1 output 51pin	
15	XP8	Local dimming	
16	XP1	Main power input	

2.2 Main board difference

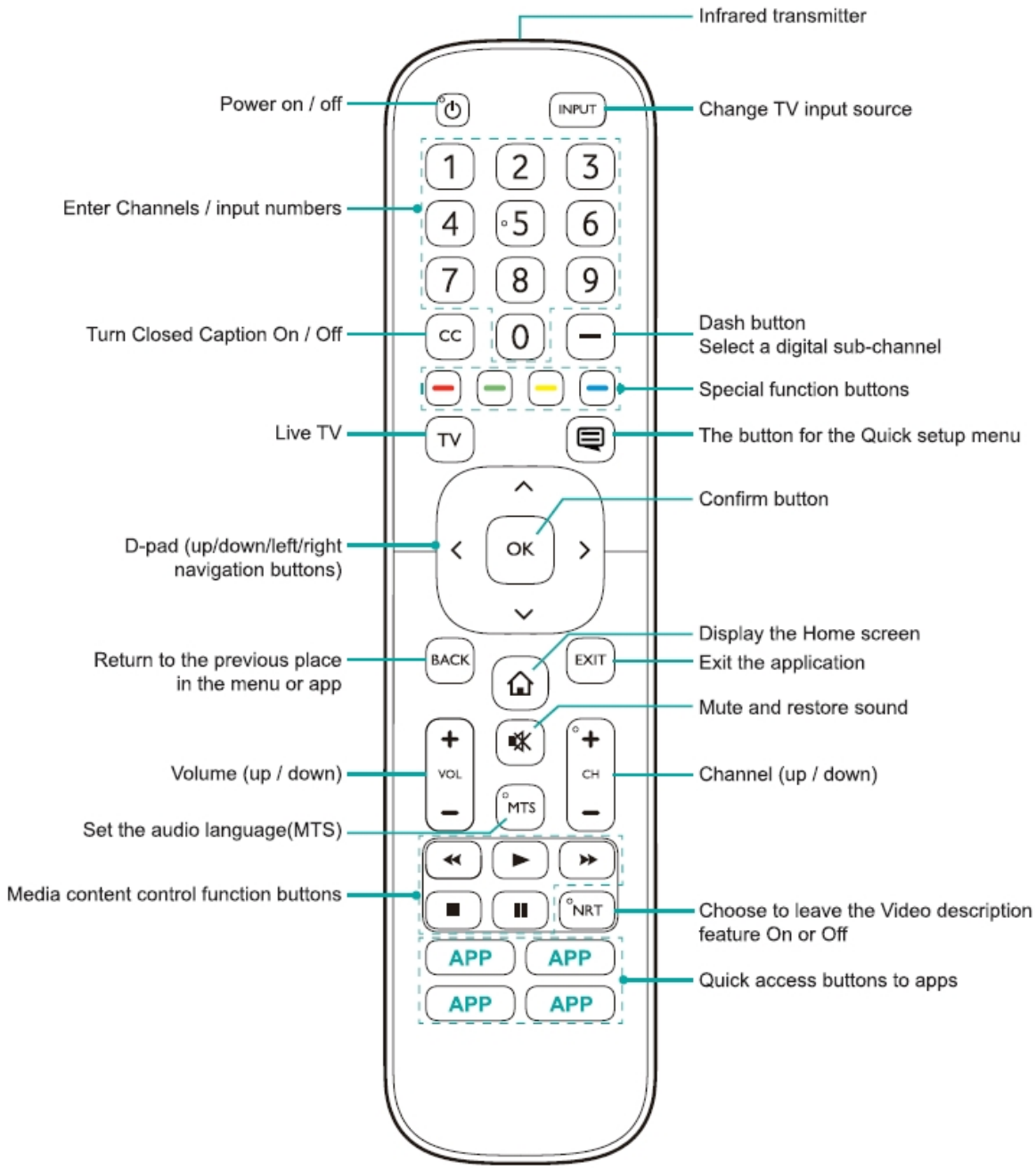
Main board	**Boards function difference**	**for Series**
6888	Have FRC, Side terminals and vertical terminals.	MTK5658+FRC72334
6715	No FRC, Side terminals and vertical terminals.	MTK5658,for N3000UW、 5010UW、 M6000、 3070、 5503……
7333	No FRC, Side terminals and vertical terminals.	HU55N3070UW（0100）
7412	No FRC, Side terminals and vertical terminals.	HU60N3500UW HU60N3540UW

3. Factory/Service OSD Menu and Adjustment

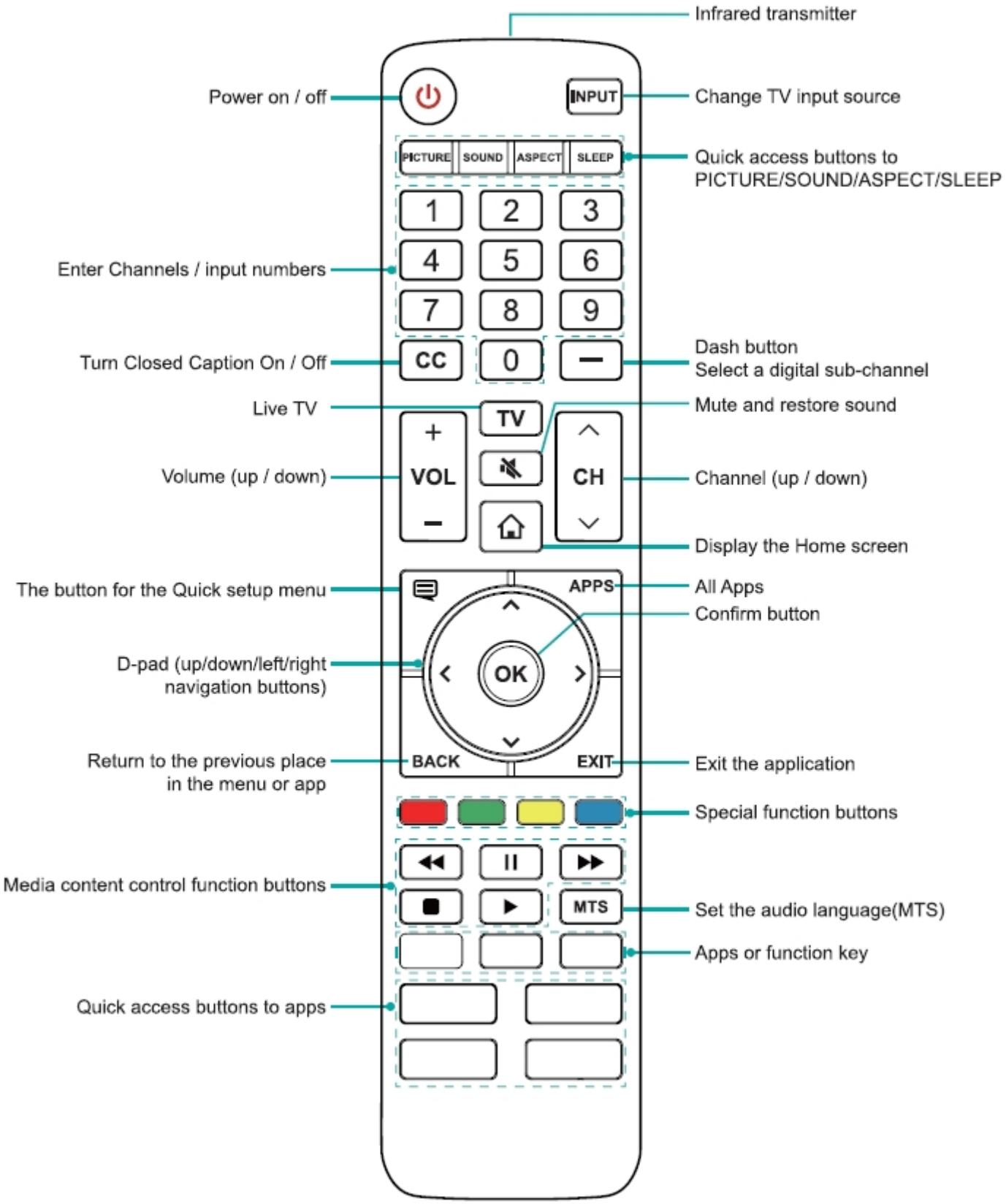
3.1 How to enter the Factory OSD Menu

The remote control has two different kind of layouts.

Buttons on TV Remote picture-1:



Buttons on TV Remote picture-2:



With user's RC

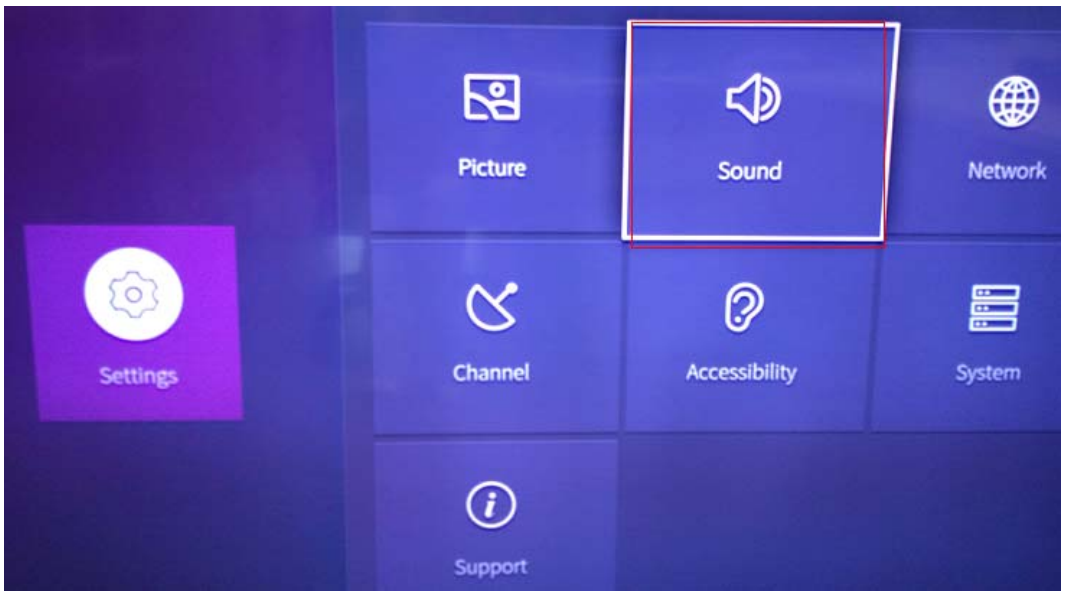
1. Power on the TV.
2. TV Press  "quick set up button" on RC then call up "**Menu**" option
3. Select **Settings** ->**Sound**-> **Advanced Audio setting** -> **Balance**
4. When on Balance , Input 1->9->6->9 in sequence on RC.

Note: It is important to remind that the hand fingers can't shield the RC emitter diode. If necessary ,re-enter number keys.

5. Factory OSD appears.
6. DC power off and DC power on the TV, which can exit Factory OSD.

Figures as following:

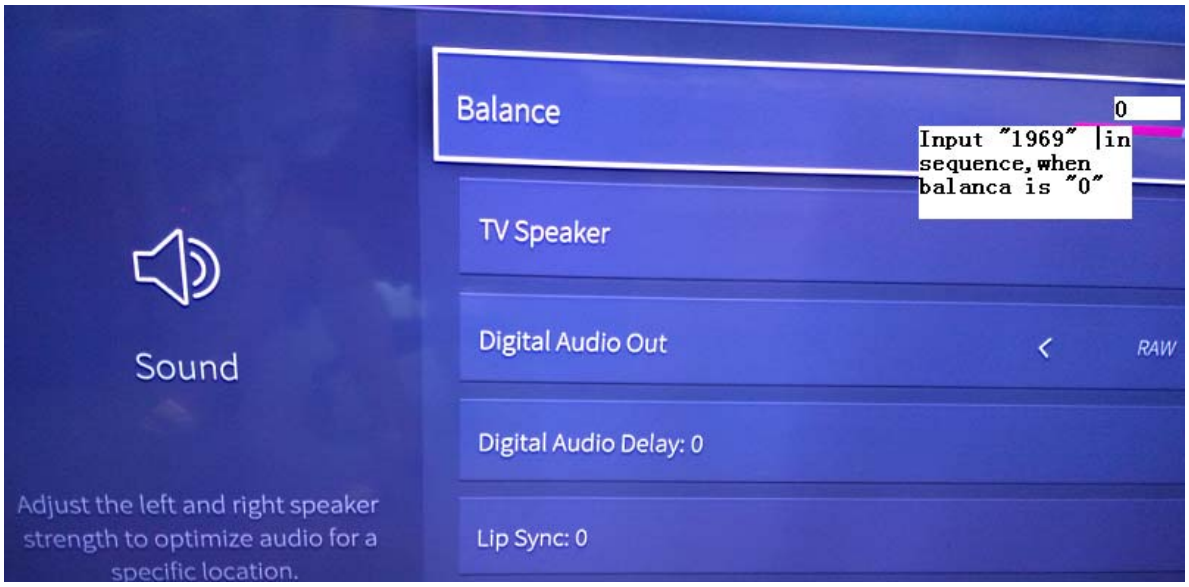
Next


Picture
Sound
Network
Settings
Channel
Accessibility
System
Support

Next


Sound Mode: Standard
Total Sonics
Total Surround
Total Volume
Wall Mount Setup
Advanced Audio Settings
Reset Default Audio Settings
Sound
Tune the audio settings and quality of the TV.

Next



When Balance is “0” ,Enter figure “1->9->6->9” in sequence with remote control..

3.2 Factory OSD Menu

Factory OSD menu list: if you want to learn more about TV, you’d better read it but would not adjust the value please. The Factory menu may be has difference for diverse market and customer.


Factory
Design
White Balance
Channel Init
Options
Soft Version
Write Keys
Version
HU70.V00.M7100.UWG
01.00aG0720
MAC Adr
08:D0:B7:E5:D0:75
USA shp eng
HDCP2.2 key
hdcp2.2_key_set
_1948729.enc
ESN
HISETVK42200000
000000000000000
000000001038
WIDEVINE key
WIDEVNMTK5658HS
00000039
Service No.
0000000000000000

	Factory menu	Description	Remark
Meun	**White Balance**	White Balance data adjusting, different source has different WB values. Before adjusting, please change to desired source.	
	channel init	TV Produce signal preset, during the factory produce using.	
	Option	can choose	
	Clean Chip	intialize the factory signal ，EEPROM reset	
	Automatic	auto color adjust with Component and VGA channels.	
	Test Pattern	red\blue\white\green\black five colors,for factory panel testing.	
	soft version	current software version information	
	inside pattern	Factory white balance adjust	
	Version for example ：E58.V0000.K220.00.30.20A.E1114	software Version information	Software information
	MAC adr:C8：16：BD:B2：34：69 country ，language，Logo	MAC address information	
	HDCP2.2 key	HDCP key information	
	CI key	CI key information	no
	ESN	ESN information	
	KMS Device ID code		
	Customer service code ： 23 bit .for example 00000000000001K5R140031		

White Balance	BIN B1	can choose B1/B2/B3/B4/B5/B6
	R Gain 128	High Brightness Red
	G Gain 128	High Brightness Green
	B Gain 128	High Brightness Blue
	R Offset 128	Low Brightness Red
	G Offset 128	Low Brightness Green
	B Offset 128	Low Brightness Blue

Channel init	huangdao old	
	Qing Dao	TV Produce signal preset, during the factory produce using.
	huangdao new	
	……	

Option	ToFAC M/U	"M" used in factory product. "U" used in exit factory state,
	LNB POWER	Not all,the chassis that must support the satellite signal for example: Europe TV :13V，18V，OFF；Japan：15V
	country	country choose
	Language	language choose
	Logo	region logo choose
	power mode memory	remember mode/Power on mode/standby mode
	set MAC	set MAC address
	USB upgrade	If the TV has the function of USB disk upgrade directly in the factory menu then can use the item.
	FRC upgrade	FRC upgrade
	driver upgrade	Led backlight driver upgrade
	PQ upgrade	if the panel parameter of smart TV is not right then can USB upgrade directly .
	URAT on/off	when choose "on" then can serial port connect with Tool

	PVR Record all	PVR Record function
	Mirror enable	Only for paneL testing
	Flip enable	

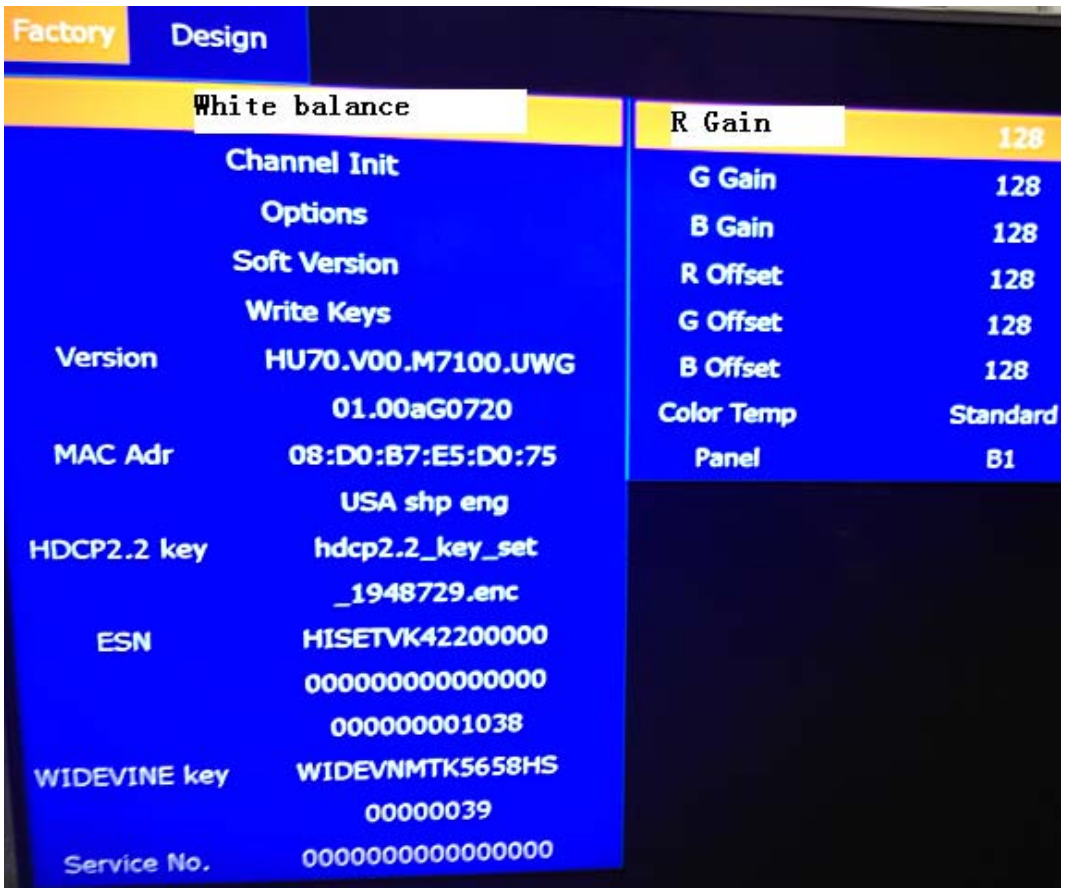
soft version	soft version： E58.V0000.K220.00.30.20A.E1114	soft version information
	date： 2014-11-14 04:47:50	The date of current version
	TV Code：00000000000001K5R140031	TV code information
	MAC version：C8：16：BD:B2：34：69	MAC version information
	FRC version：	FRC version：if TV no FRC function then can ignore.

Note:

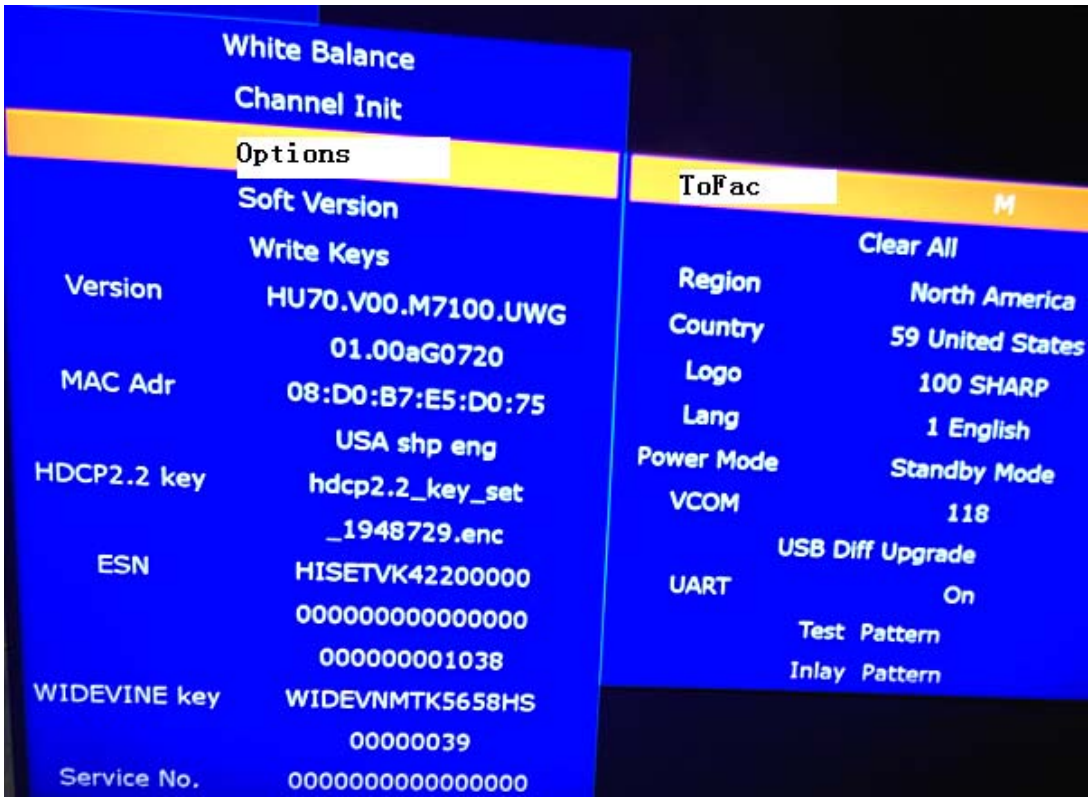
The Factory menu may be has difference for diverse market and customer ,above only for reference.

3.2.1 White Balance

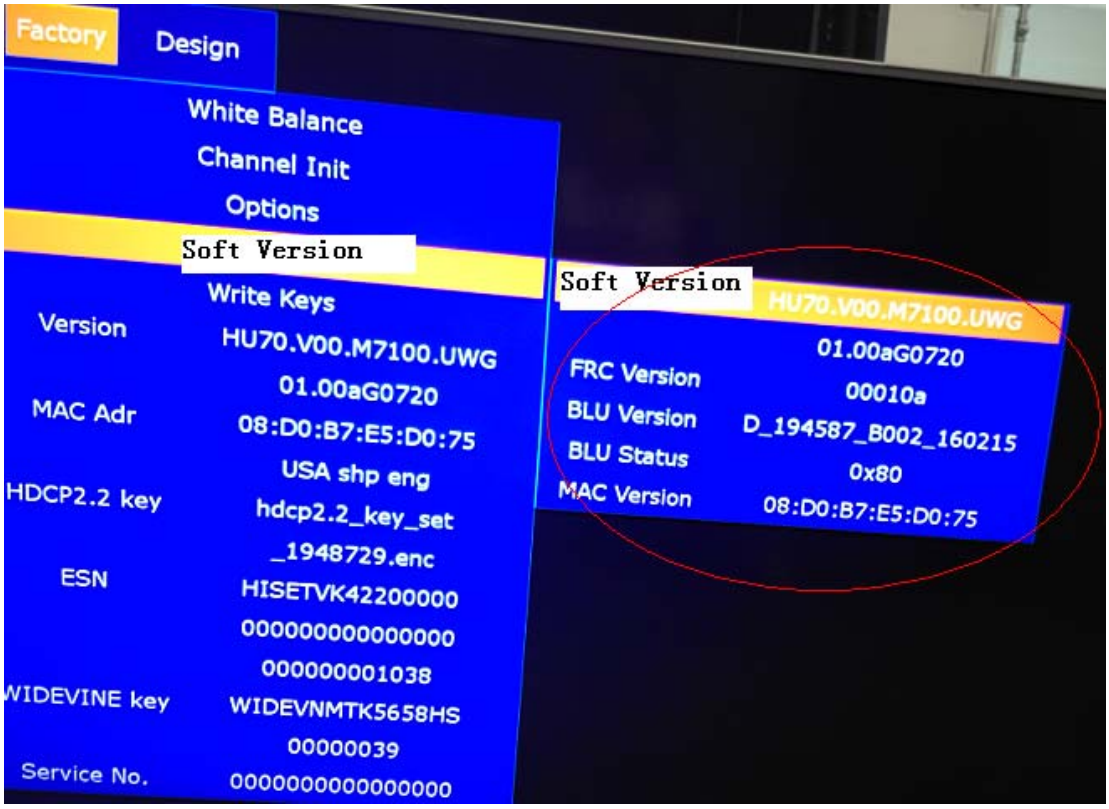
Note: Different source has different WB values. Before adjusting, please change to desired source.



Options:

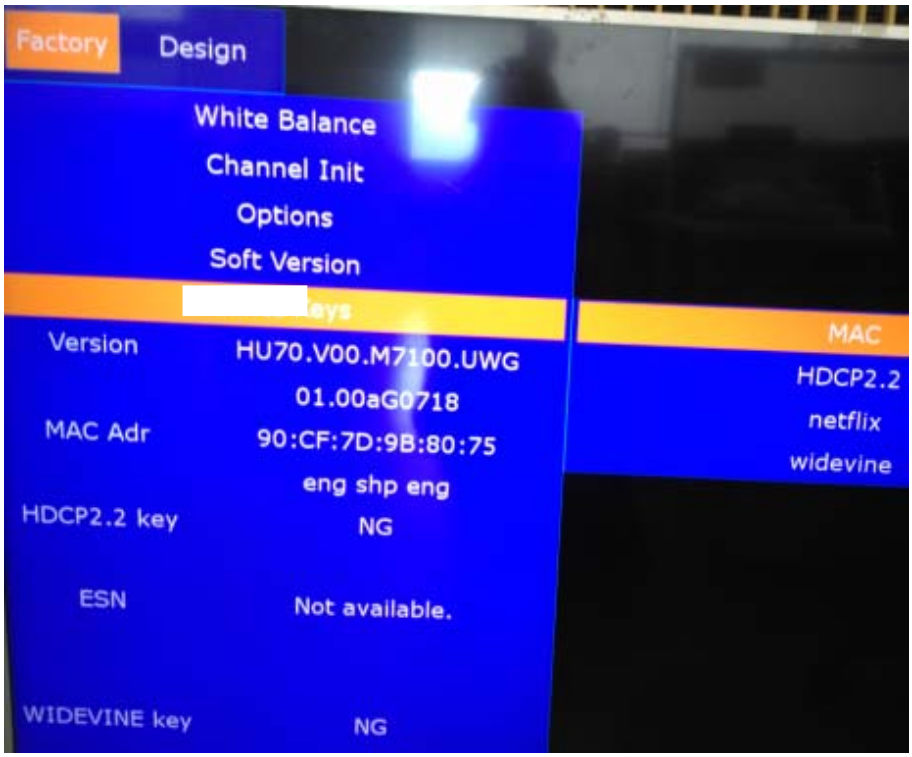


Soft Version:



Note:
BLU Version is backlight drive software.

Write keys:



Note: The factory menu date varies according to different sources. Incase changing the factory data by error, you can choose to "Clean Protected", by which you can resume the default value.

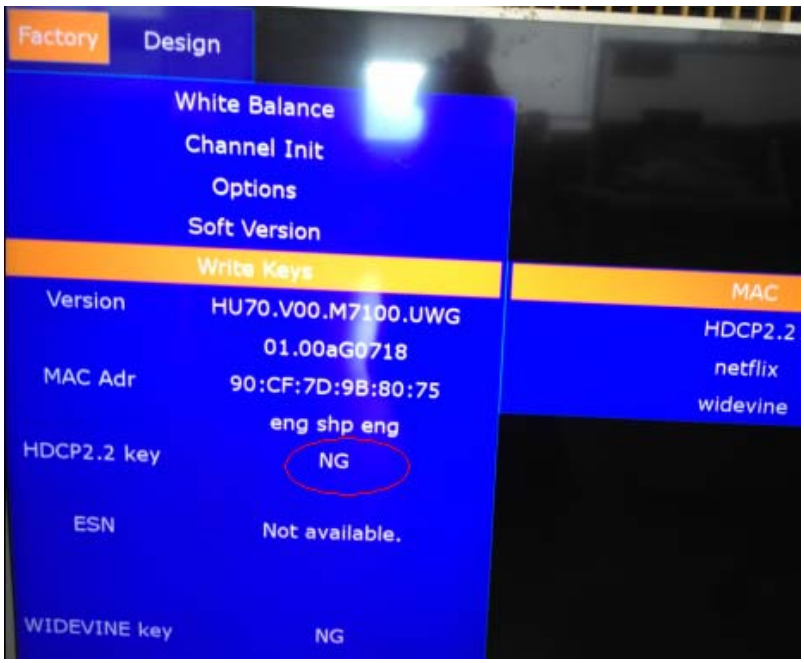
To clear the EEPROM:

a. Select the item "**Option**"--"**Clean all**" in Factory mode.
b. Press VOL+ button to clear the EEPROM data.
c. Close the OSD menu after 5 seconds.
d. Restart the TV.
e. TV restart，better enter TV factory OSD Menu to ensure the new main software Version /TCON (FRC) and BLU Version

f. information.
Also the Keys information must been checked, if appear "NG", then must rewrite key code.

Note:

check whether the Key information under the Version is OK, if appear "NG" then need rewrite the key.



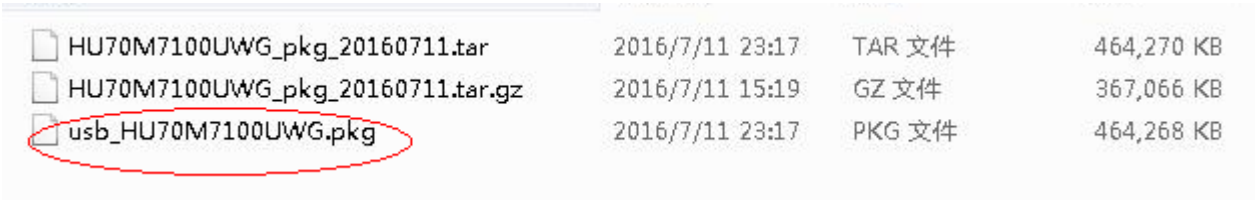
4. Software Upgrading

4.1 USB Upgrading

4.1.1 Main software upgrading directly with USB

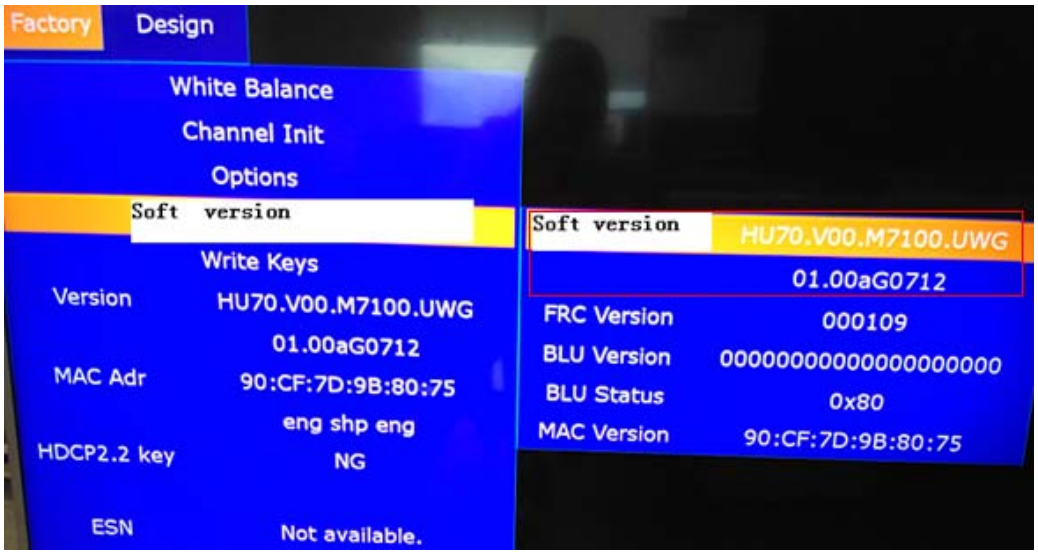
The main software can be upgraded with USB Disk. Take HU70M7100UWG for example.

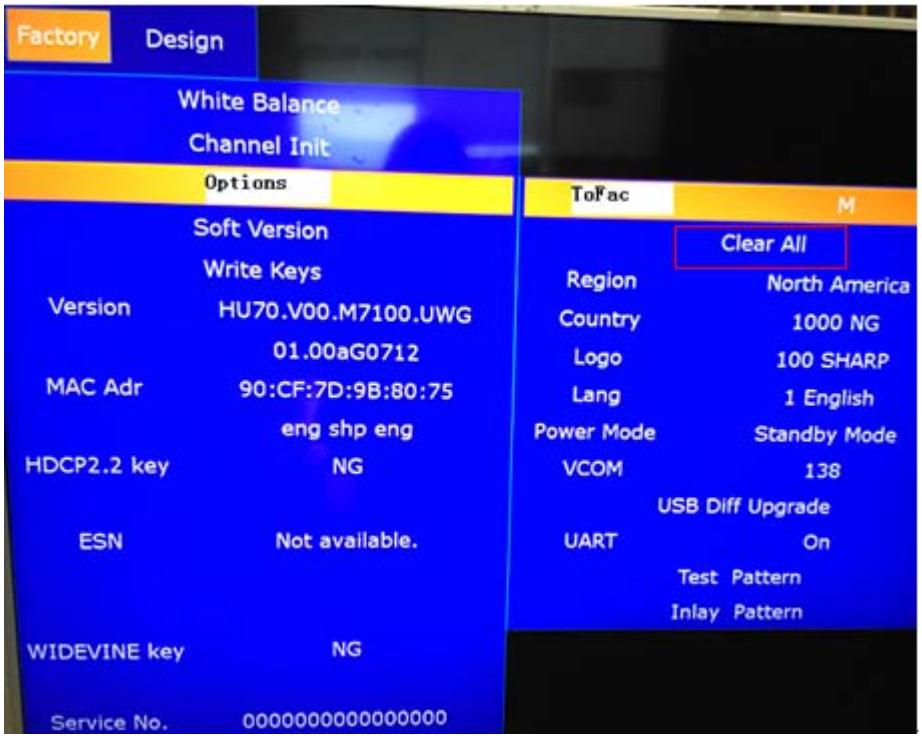
- First, copy the main software "usb_HU70M7100UWG.pkg" file to the USB root Disk.



- Second, ensure there are no other "*.pkg" files in the root directory of USB Disk ,and no FRC software ,such as: "frc_ HU70M7100UWG.bin" and Backlight drive software "blu.bin".Insert the USB Disk to TV USB port, AC power off then AC power on the TV. at the same time press standby button "  " on the remote control for about 5-10s,until pop up the update process bar.
- The TV will identify the software and upgrade automatically. It need spend 6 minutes to complete the upgrade.
- After update success, TV can automatically start.
- Enter the Factory OSD Menu and ensure the main software version. then "Clear All"

The following figures ⇨

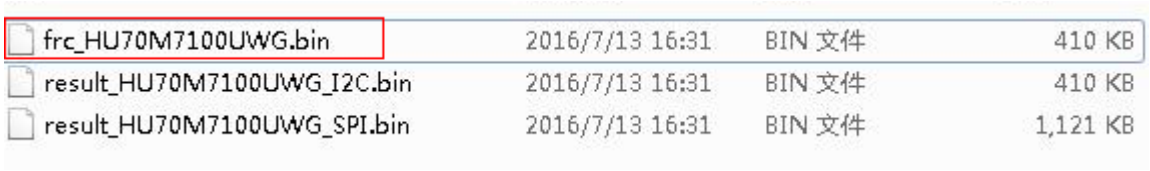

Factory
Design
White Balance
Channel Init
Options
Soft version
Write Keys
Version
HU70.V00.M7100.UWG
01.00aG0712
MAC Adr
90:CF:7D:9B:80:75
eng shp eng
HDCP2.2 key
NG
ESN
Not available.
Soft version
HU70.V00.M7100.UWG
01.00aG0712
FRC Version
000109
BLU Version
0000000000000000000
BLU Status
0x80
MAC Version
90:CF:7D:9B:80:75


Factory
Design
White Balance
Channel Init
Options
Soft Version
Write Keys
Version
HU70.V00.M7100.UWG
01.00aG0712
MAC Adr
90:CF:7D:9B:80:75
eng shp eng
HDCP2.2 key
NG
ESN
Not available.
WIDEVINE key
NG
Service No.
0000000000000000
ToFac
M
Clear All
Region
North America
Country
1000 NG
Logo
100 SHARP
Lang
1 English
Power Mode
Standby Mode
VCOM
138
USB Diff Upgrade
UART
On
Test Pattern
Inlay Pattern

4.1.2 TCON software and backlight drive software upgrading directly with USB

1、Take Chassis MTK5658 HU70M7100UWG for example. TCON upgrading file named “frc_ HU70M7100UWG.bin” .

2、Take Chassis MTK5658 HU70M7100UWG for example. backlight upgrading file named “blu.bin”

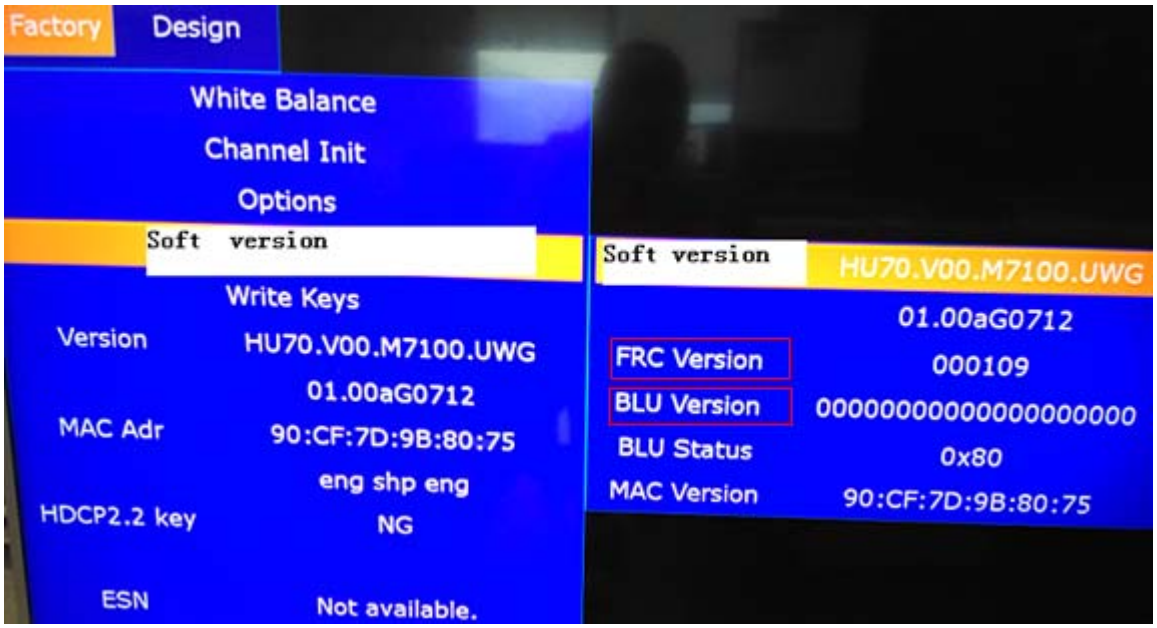


3、If the TV need upgrade the main software、TCON software and backlight software respectively, then the three upgrade softwares must be saved in three different USB disks that no other same names in .

4、The TCON and back light update process same to main software upgrading directly with USB(as following)

- Insert the USB Disk to TV USB port, AC power off then AC power on the TV. at the same time press standby button “” on the remote control for about 5-10s,until pop up the update process bar.
- The TV will identify the software and upgrade automatically.
- After update success, TV can automatically start.

5、Enter the Factory OSD Menu and ensure the FRC version and BLU version.

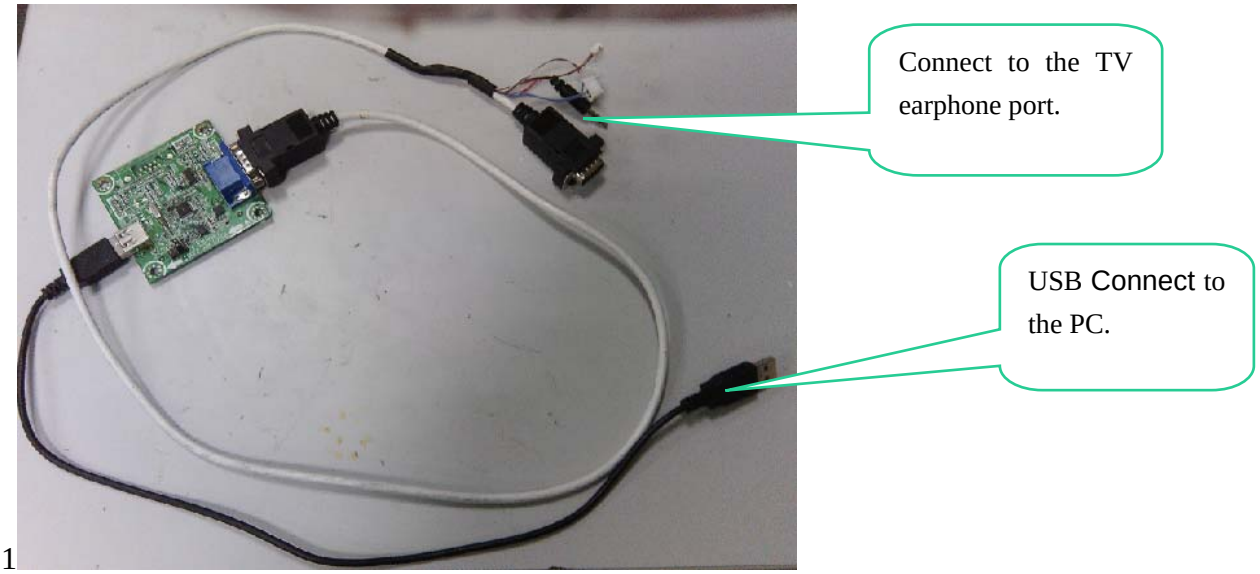


4.2 USB upgrade fail

If USB upgrading defeat, TV crashed. We must burn the emmc flash program file“ ***.bin** ”to the flash IC first. second USB disk to upgrade the **upgrade_loader.pkg** file.

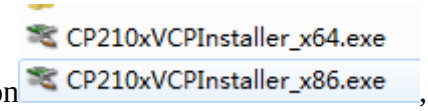
Hardware connecting

Connect the unit to your pc with a USB-to-serial port cable. USB port connects to your PC and earphone connects to the TV’s earphone hole. As following.

1 

4.2.1 Install the driver

4.2.1 Install the bebug board driver for first use MTK FlashTool.

Double click the icon 

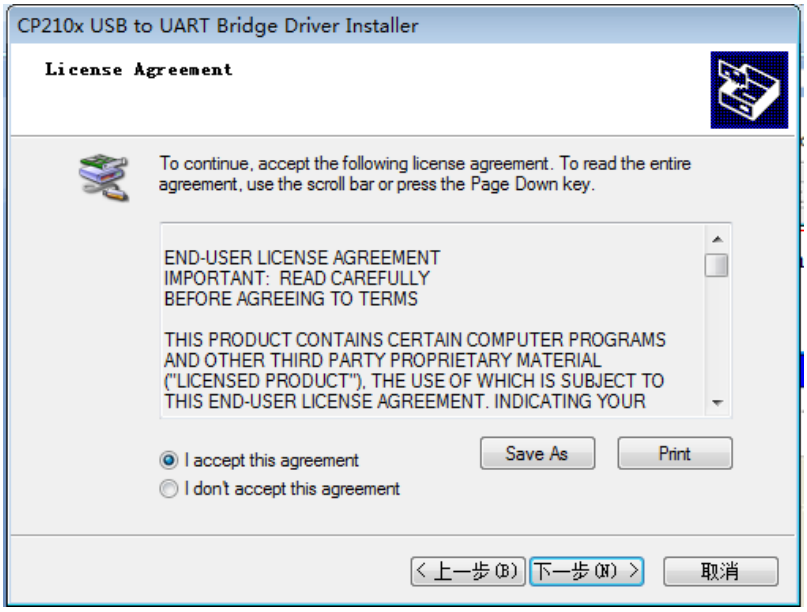
, install the driver.

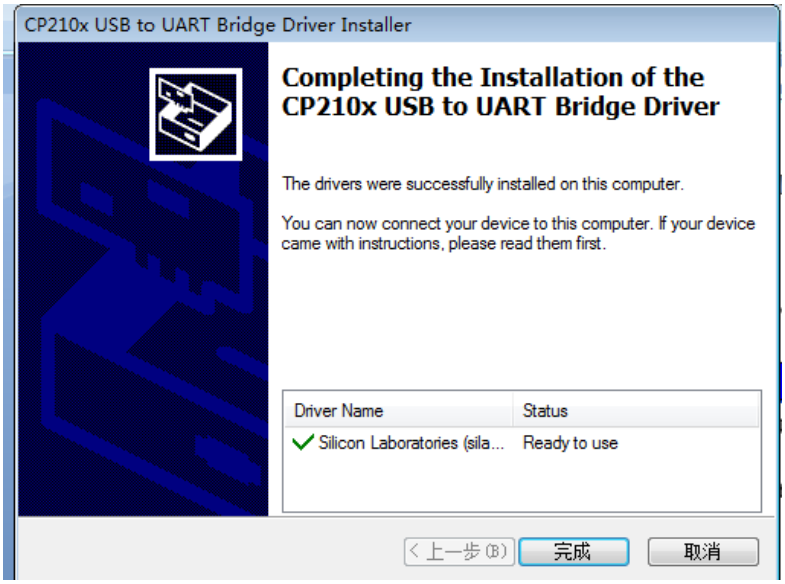
Note:

X64.exe is fit for 64bit system configure of the computer.

X86.exe is fit for 32bit system configure of the computer.

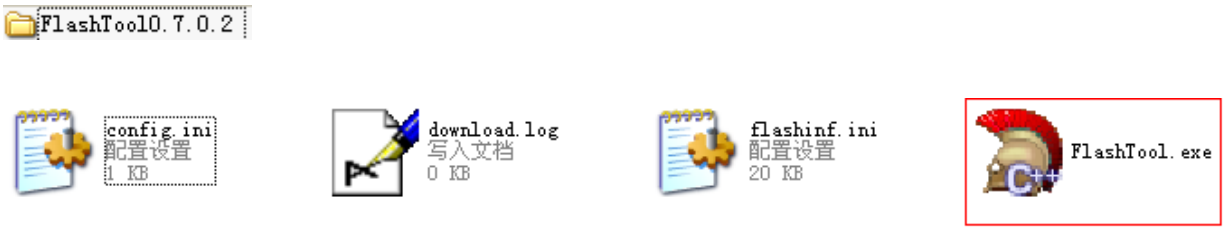
Select the default value, the driver will be installed step by step.

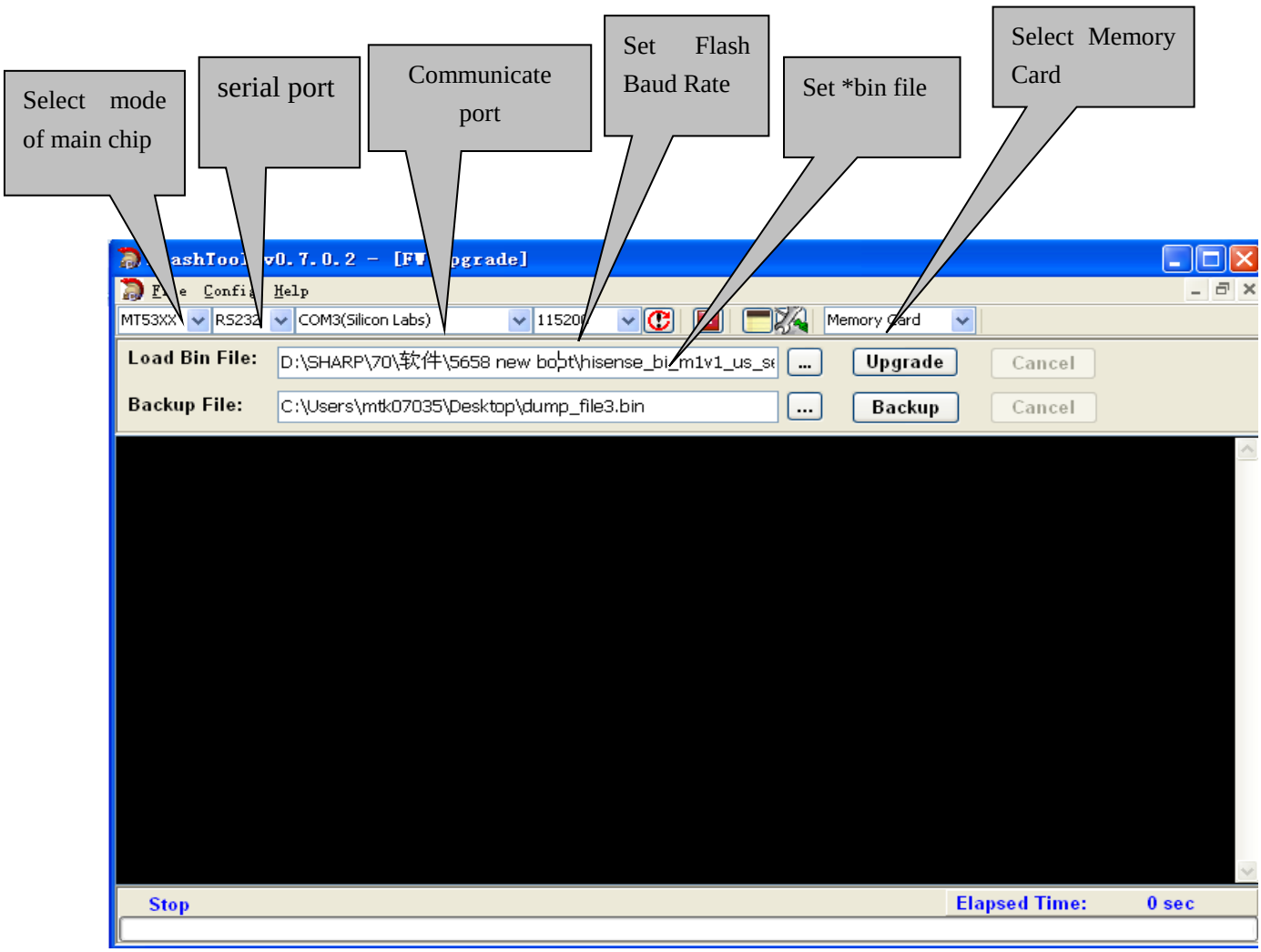



CP210x USB to UART Bridge Driver Installer
Completing the Installation of the CP210x USB to UART Bridge Driver
The drivers were successfully installed on this computer.
You can now connect your device to this computer. If your device came with instructions, please read them first.
Driver Name
Status
Silicon Laboratories (sila...
Ready to use
< 上一步(B)
完成
取消

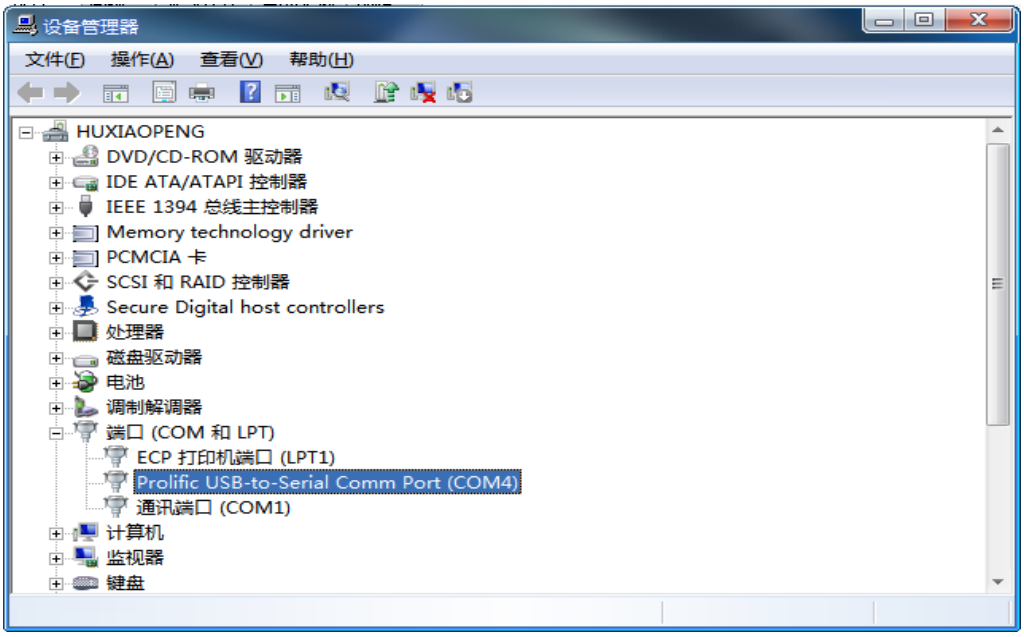
4.3 Upgrading with the FlashTool 0.7.0.2.exe

1、FlashTool 0.7.0.2 is a green program needing no installation. After Connect the unit to your pc with a USB-to-serial port cable， run FlashTool.exe. Please refer to the following steps to set.



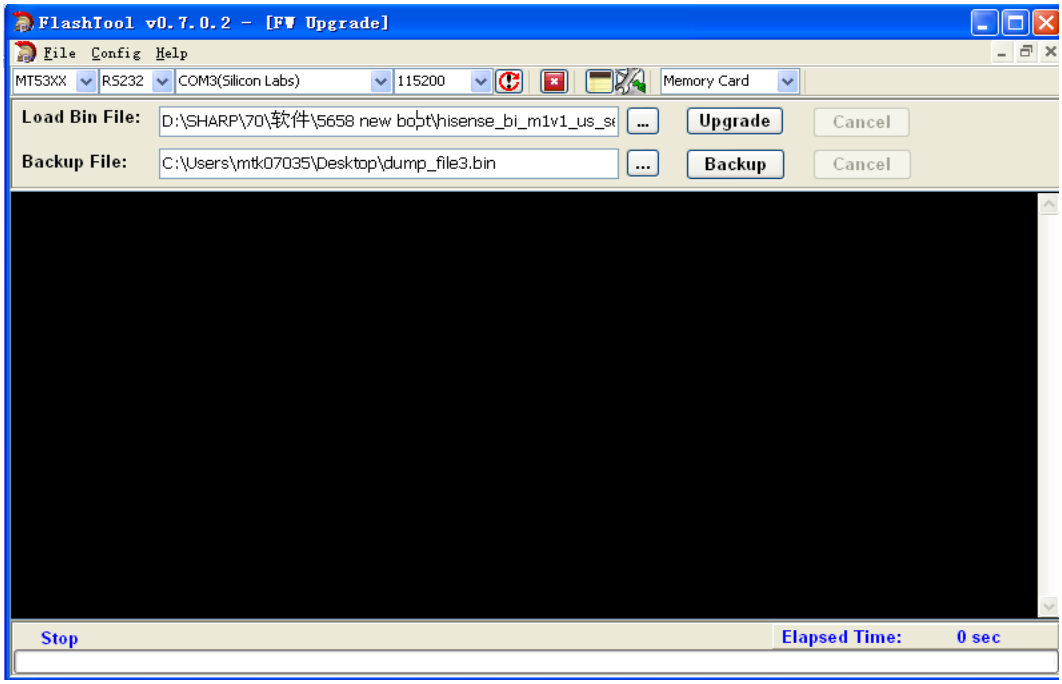


How to choose Communicate port and flash baud rate? See the following instruction..



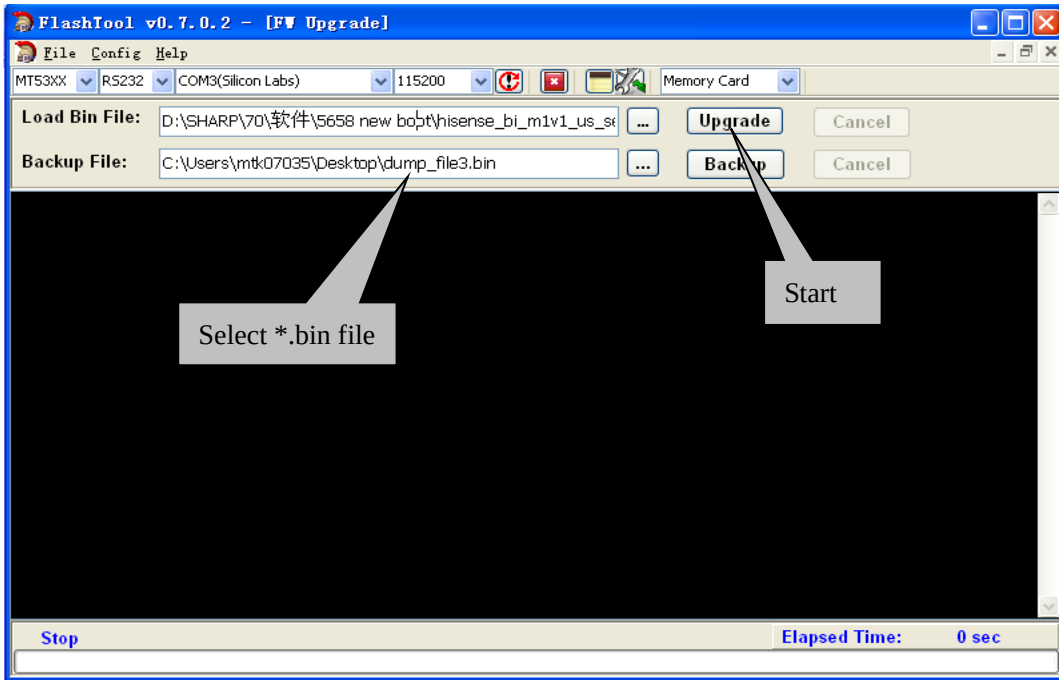
Open “Device Manager” and find which port is connected with the TV. In above picture, COM3 is connected to the TV, so, select “COM3” and if COM6 is connected to the TV, so select “COM6”. Select the right baud rate according to chip model. For this unit(chip model is MT5658), select 115200.

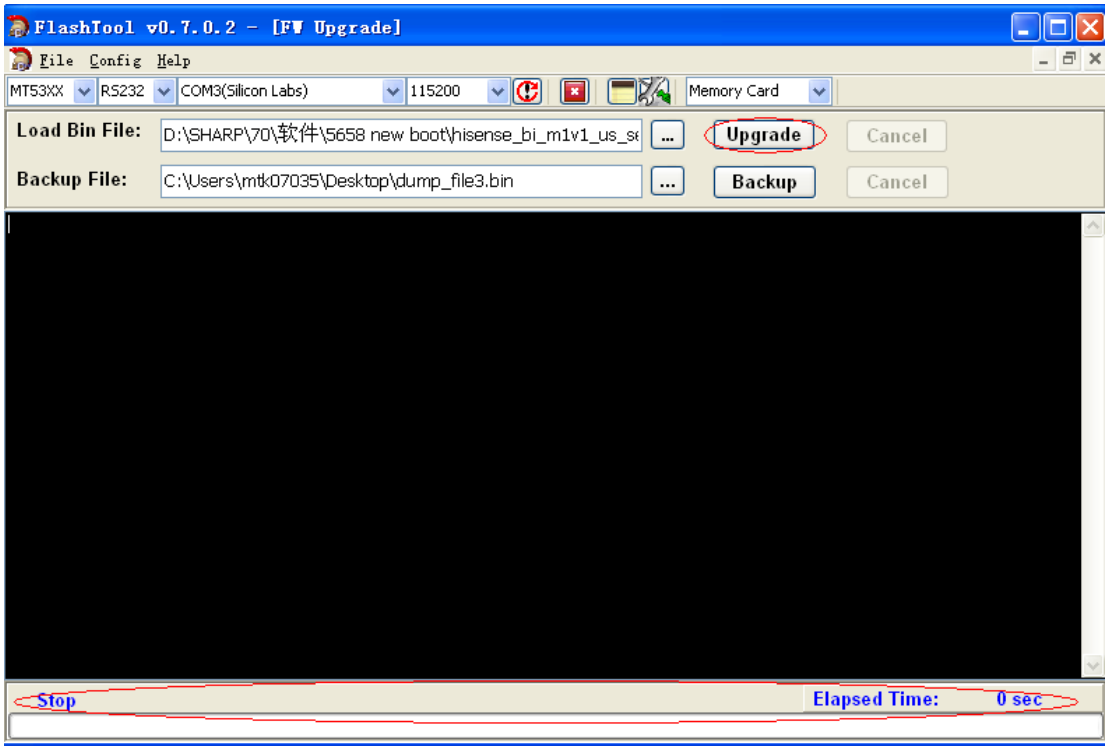
2、AC power on the TV ,then Click  to connect， if connect successfully then button  from red turn green  .



Click  , bounce the following dialog box. Load Bin File：find the upgrading program file, his_m1v1_us_secure_emmcboot.bin.

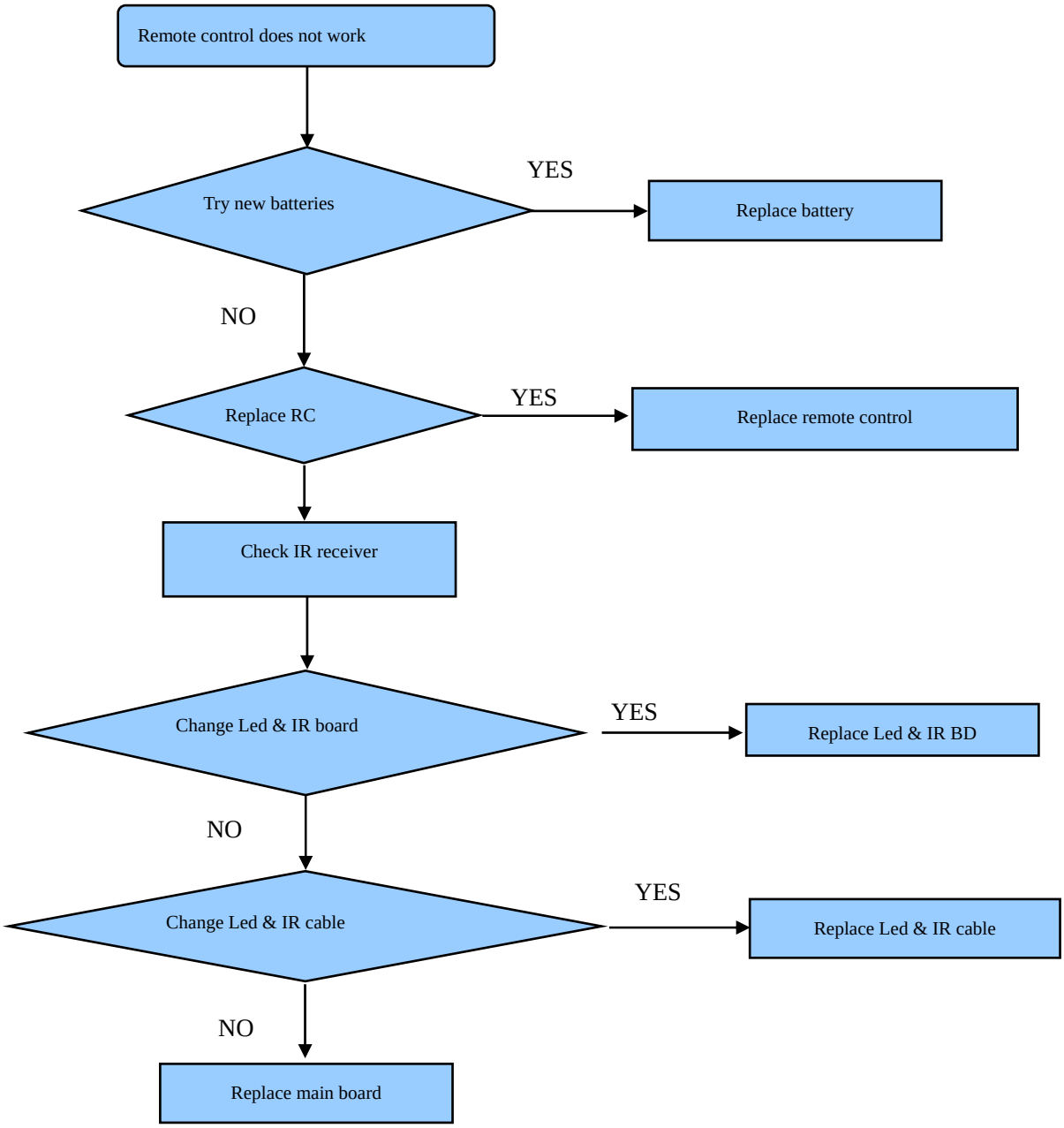
Press “Upgrade” button and start upgrading.，if update defeat, try again.



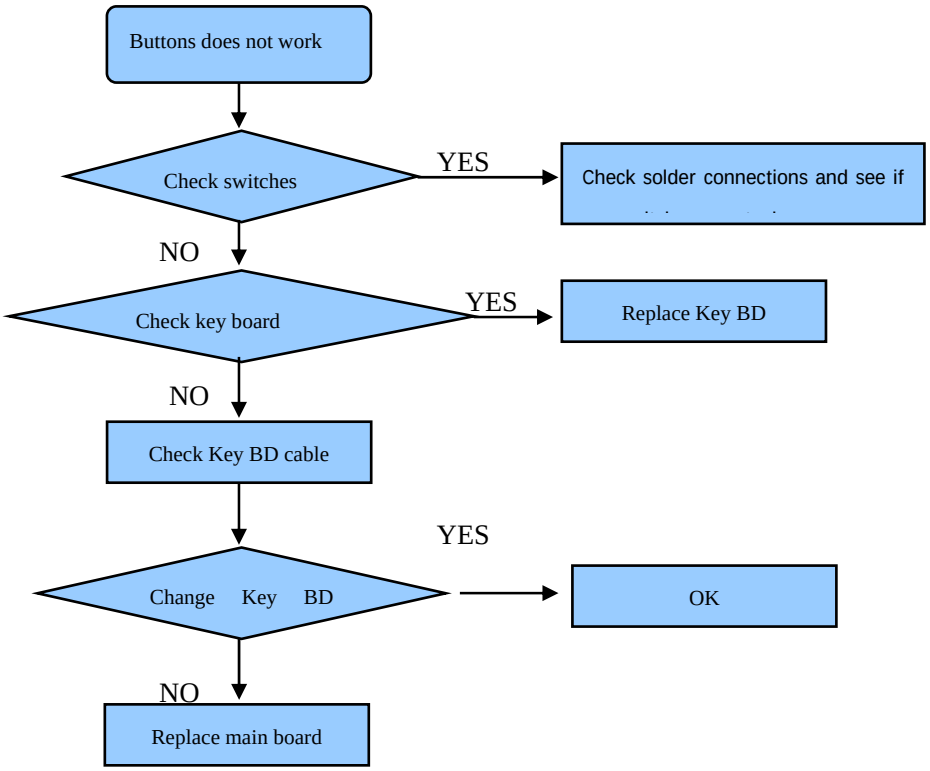


5. Trouble shooting

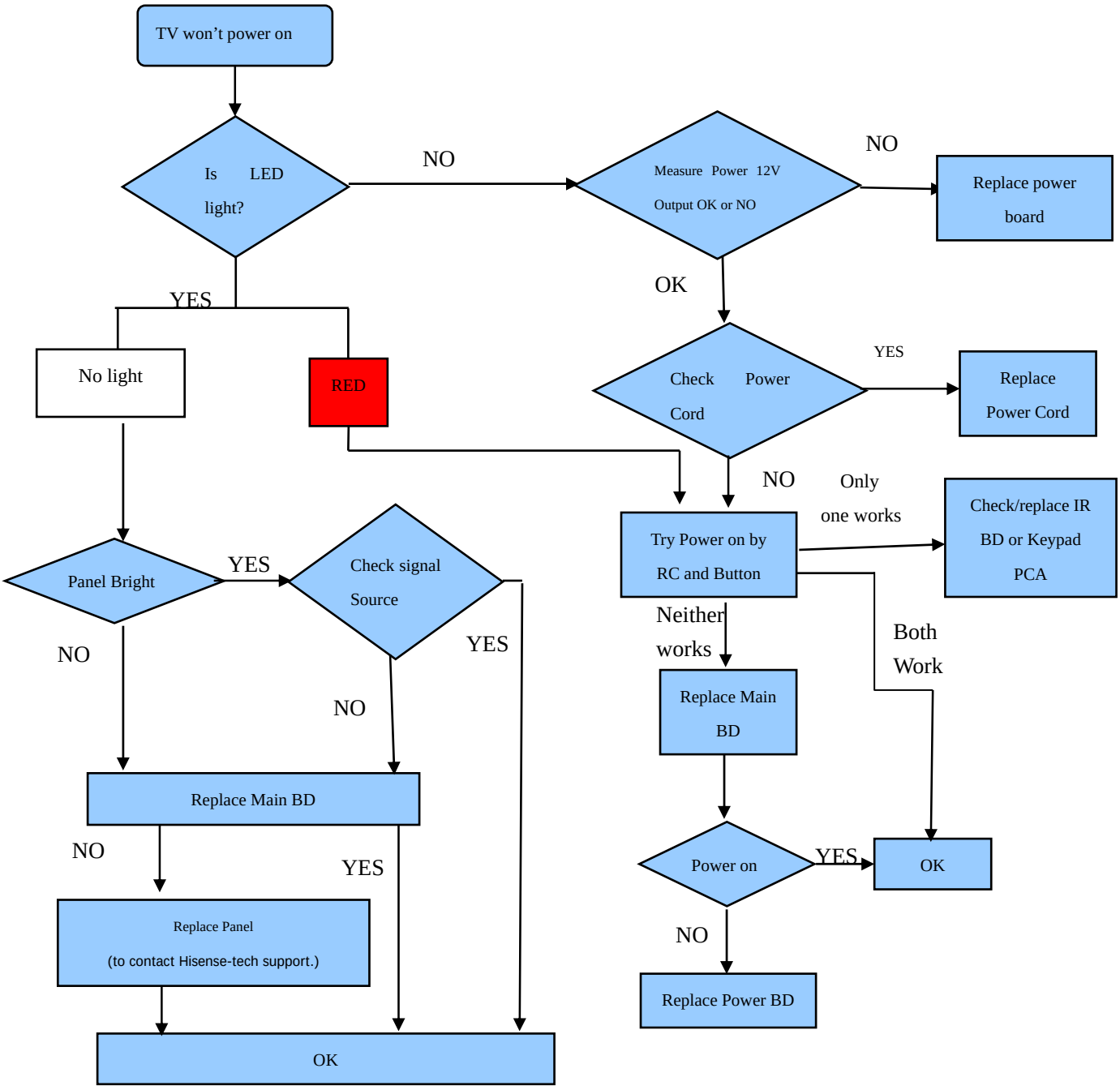
5.1 Troubleshooting for Remote Control



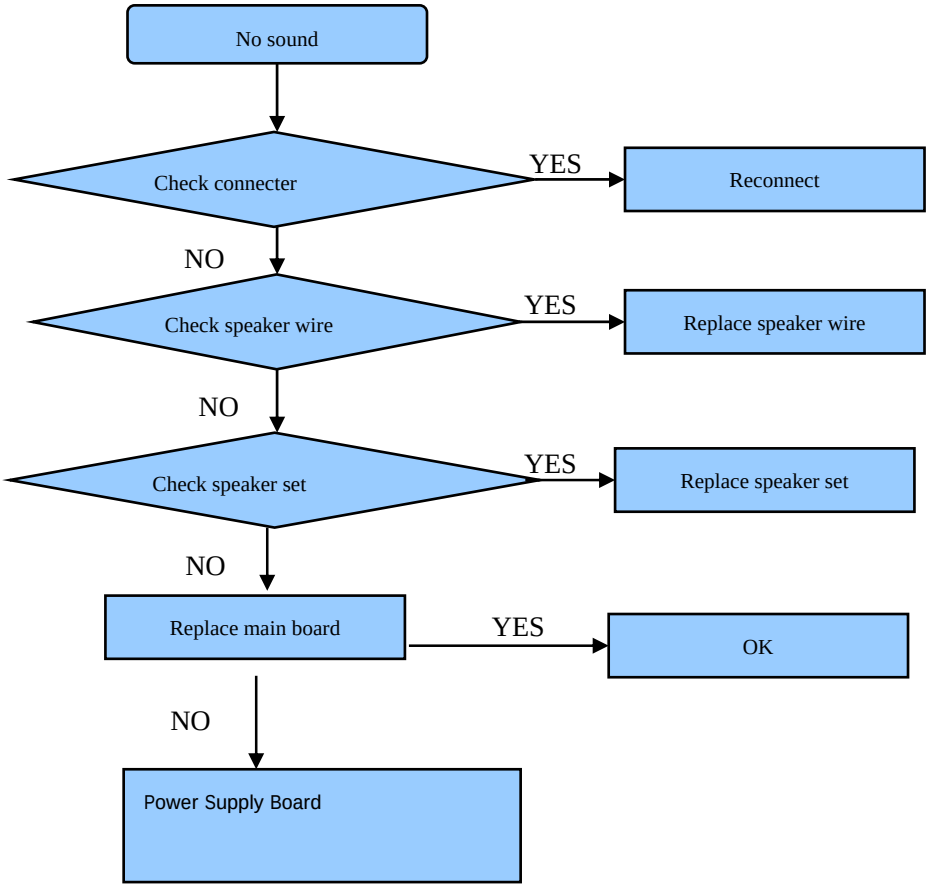
5.2 Troubleshooting for Function Key



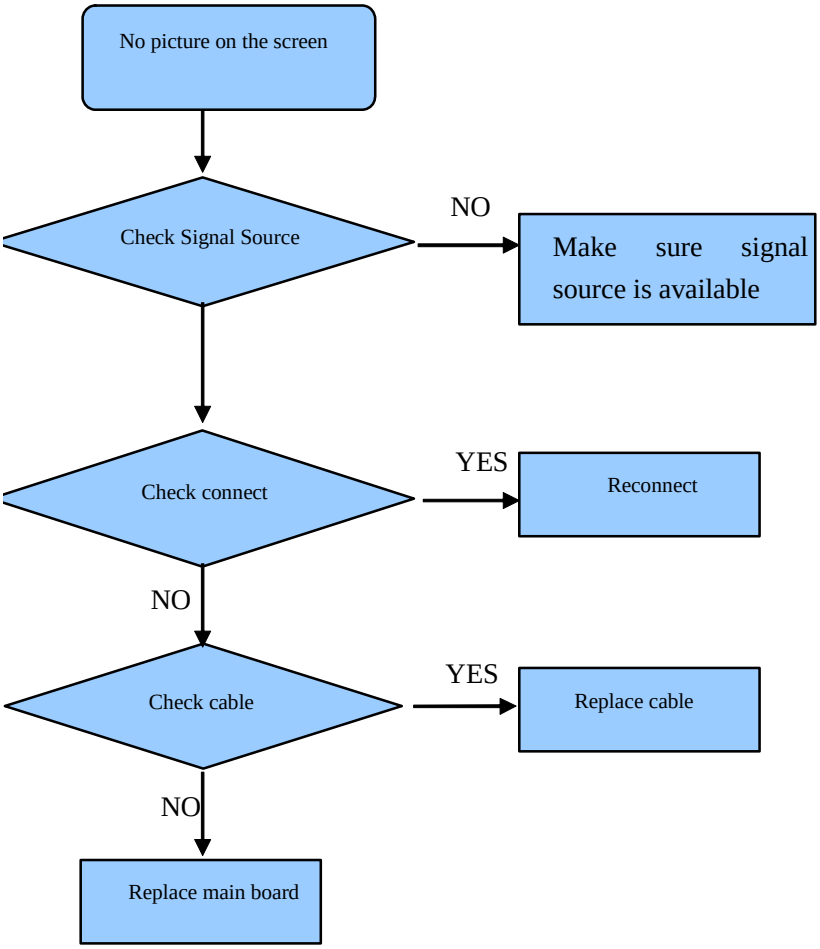
5.3 TV won’t Power On



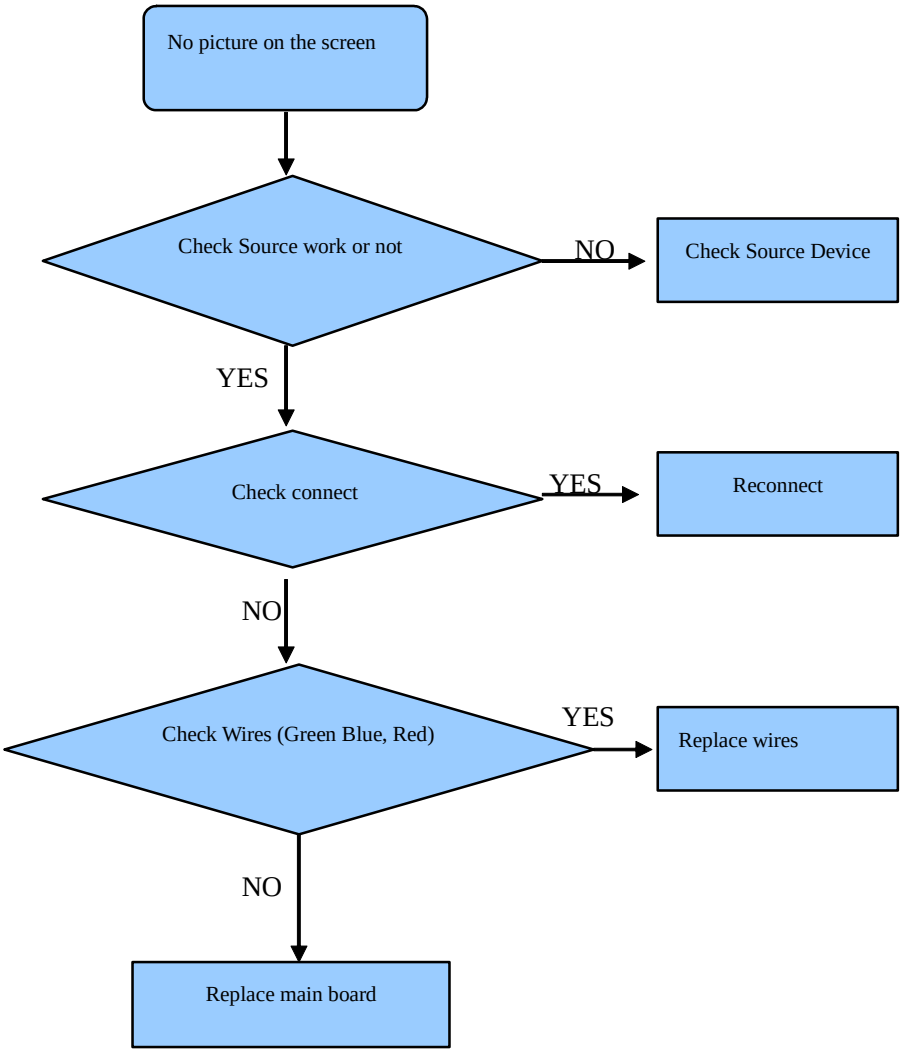
5.4 Troubleshooting for Audio



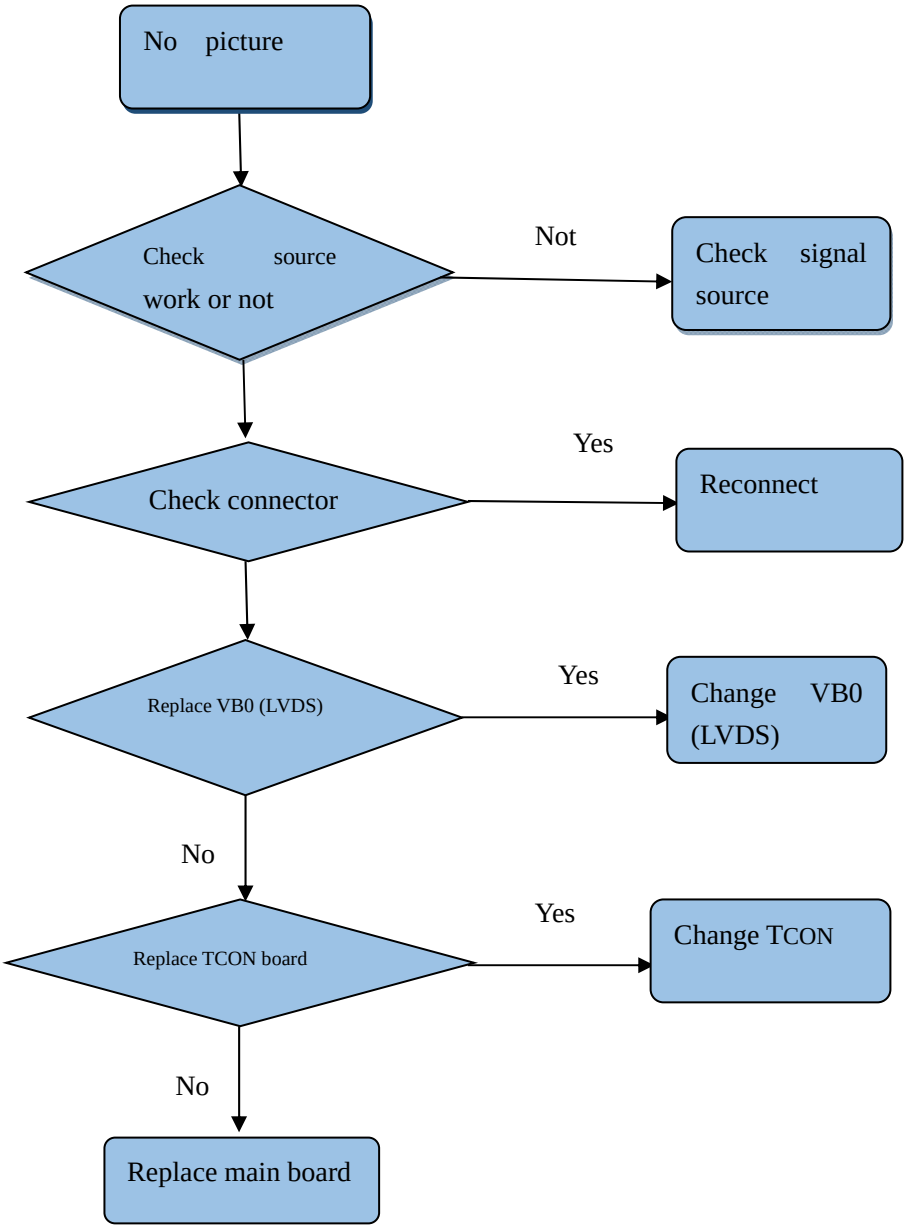
5.5 Troubleshooting for TV/VGA/HDMI input



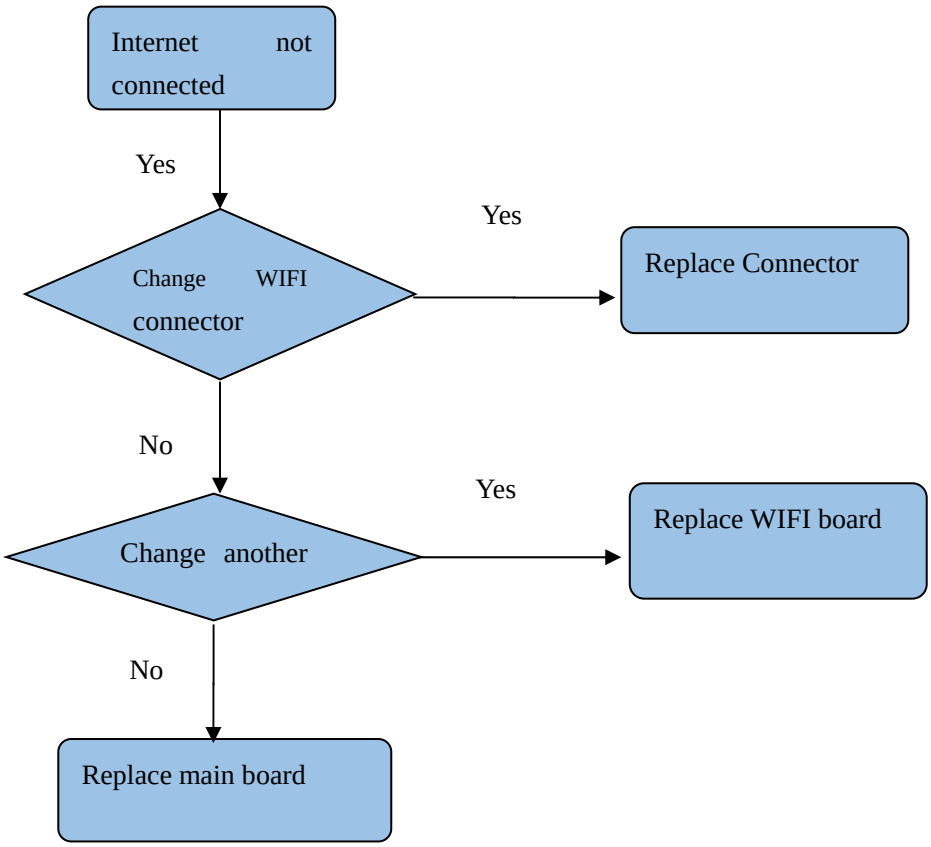
5.6 Troubleshooting for YPbPr input



5.7 Troubleshooting for Video input

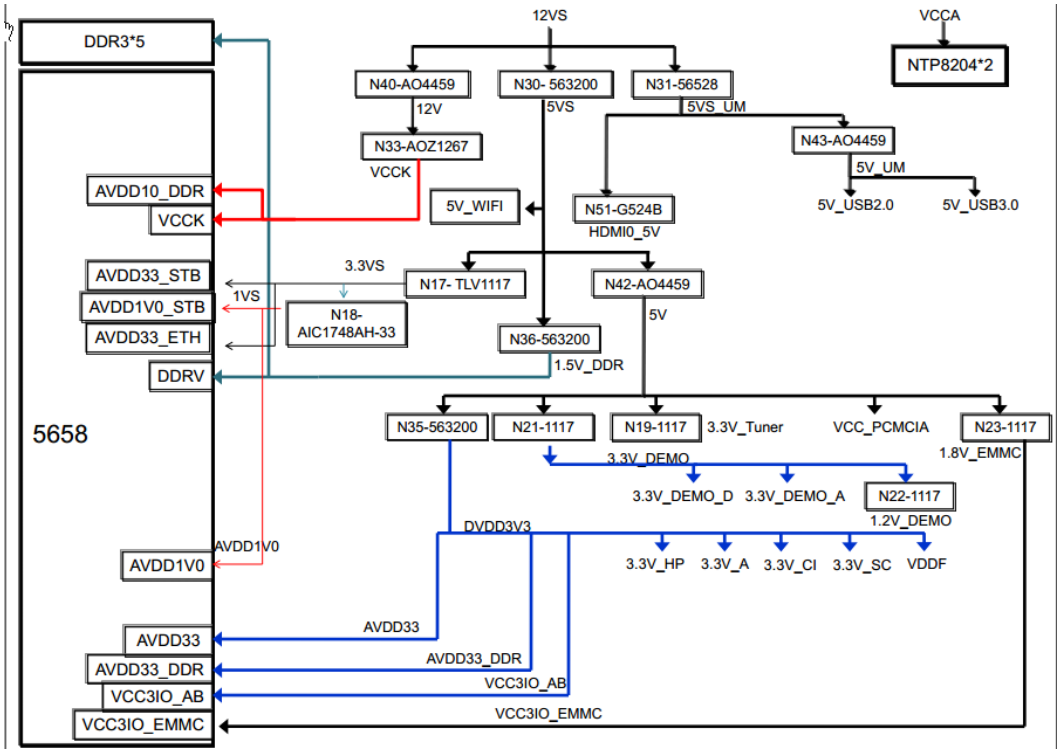


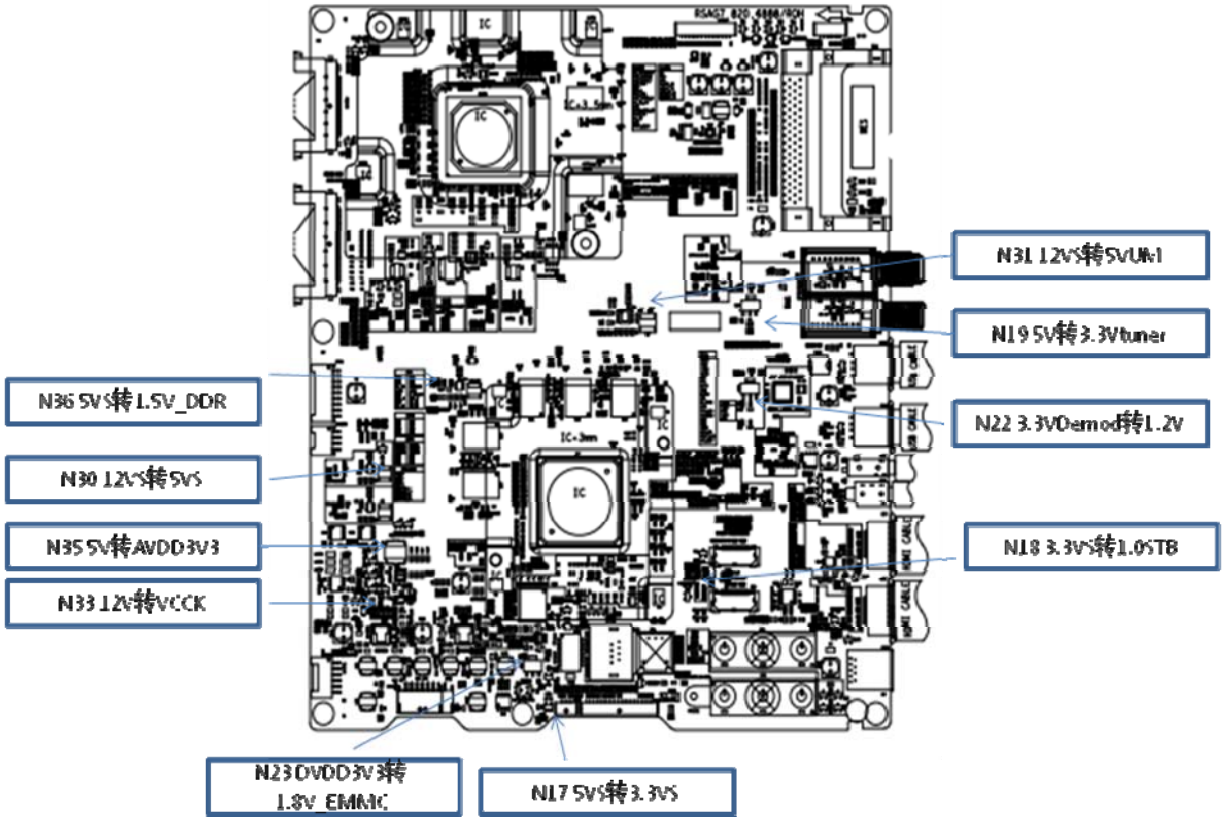
5.7 Troubleshooting for WIFI



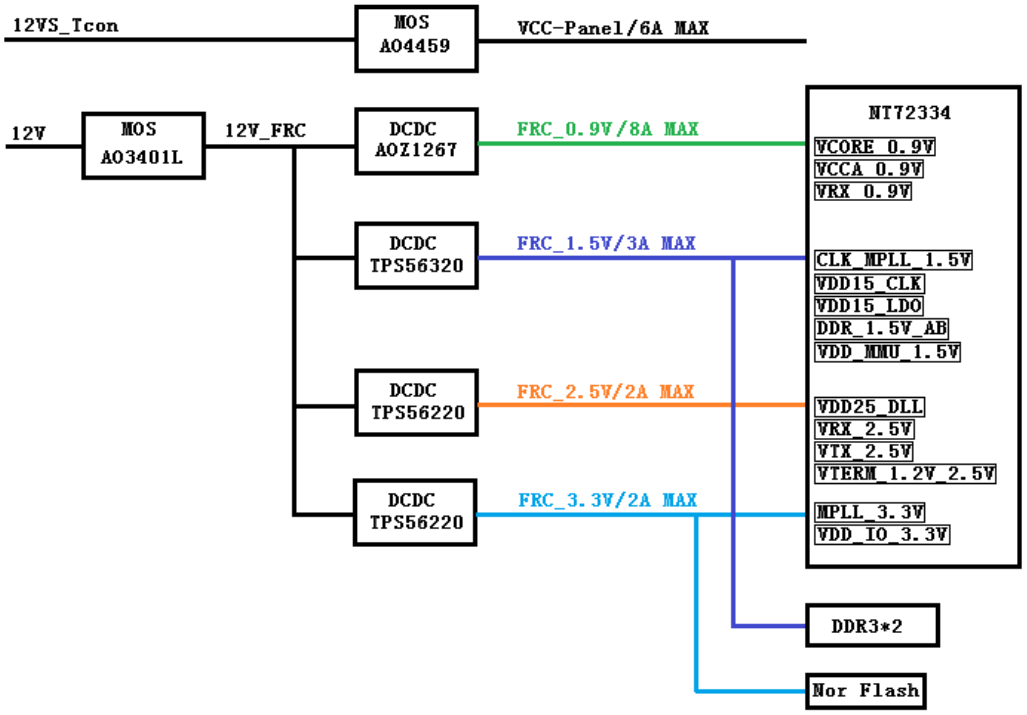
6. Signals Block Diagram & power assign & schematic diagram :

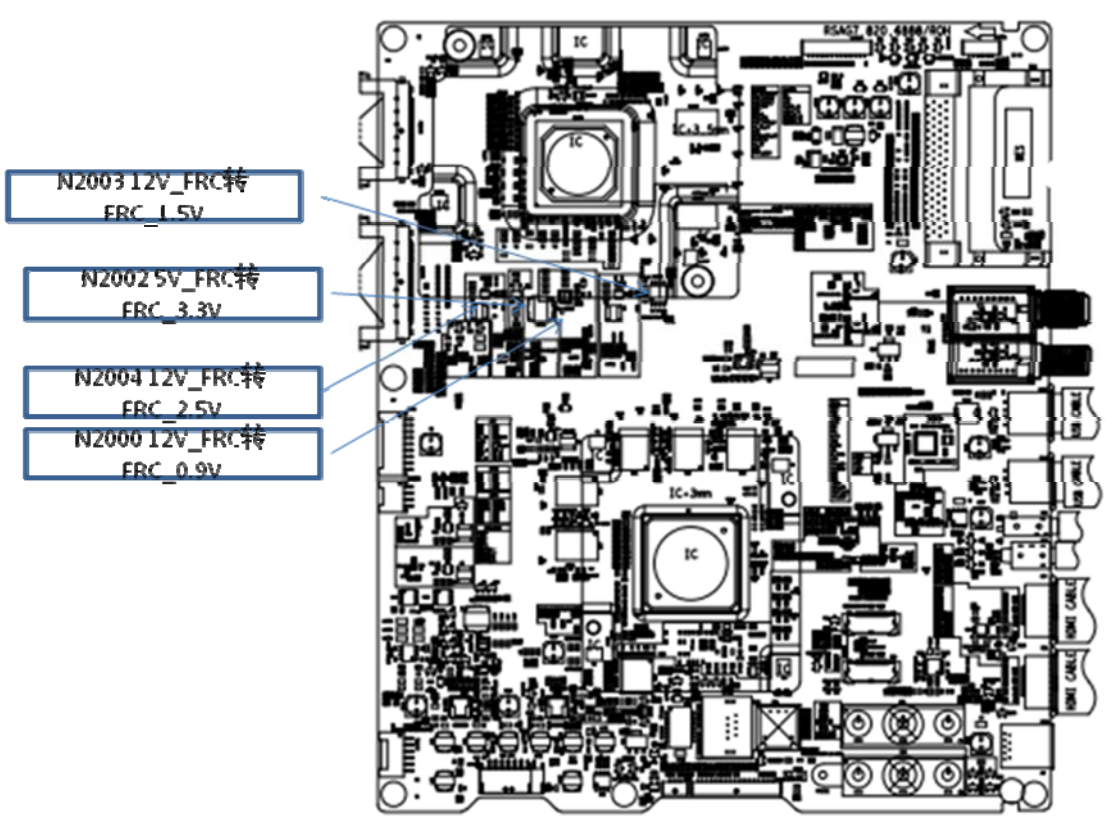
power assign:





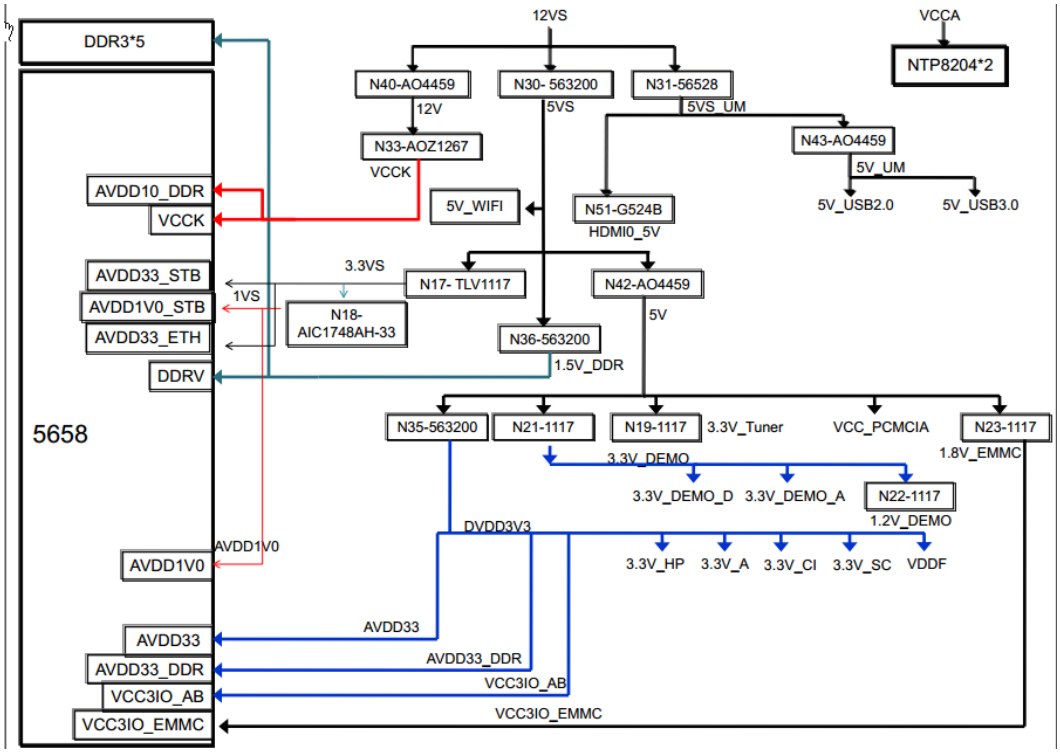
FRC NT72334 Power assign:

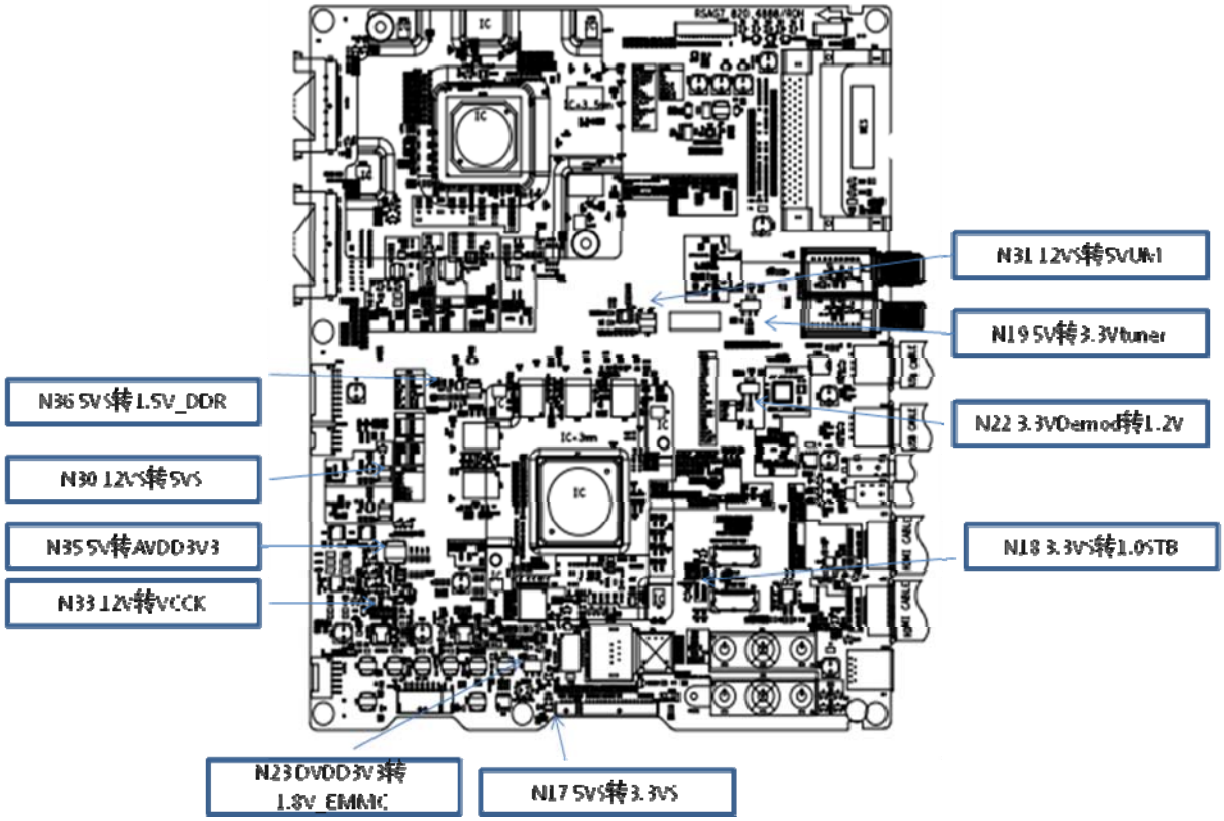




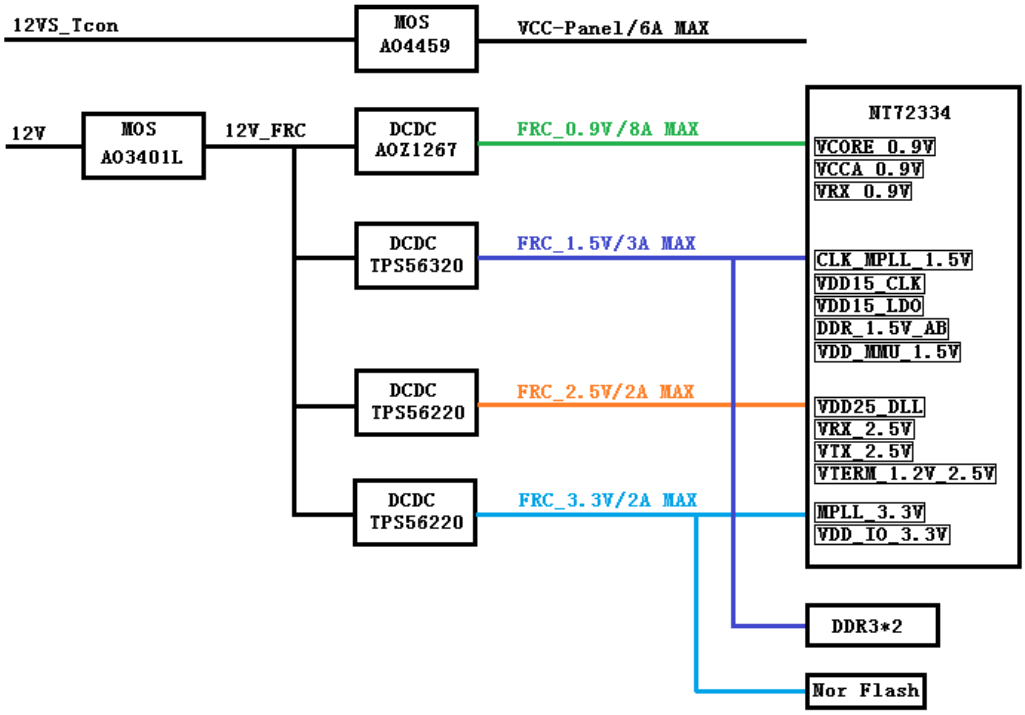
6. Signals Block Diagram & power assign & schematic diagram :

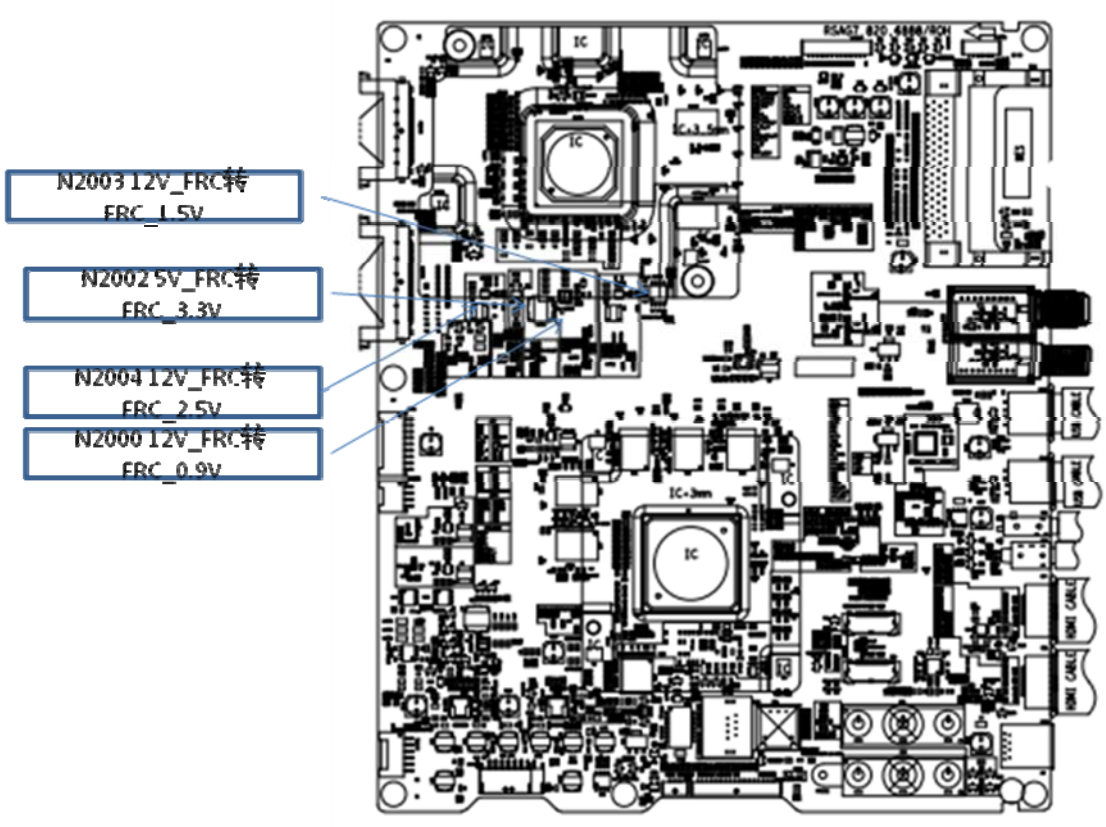
power assign:

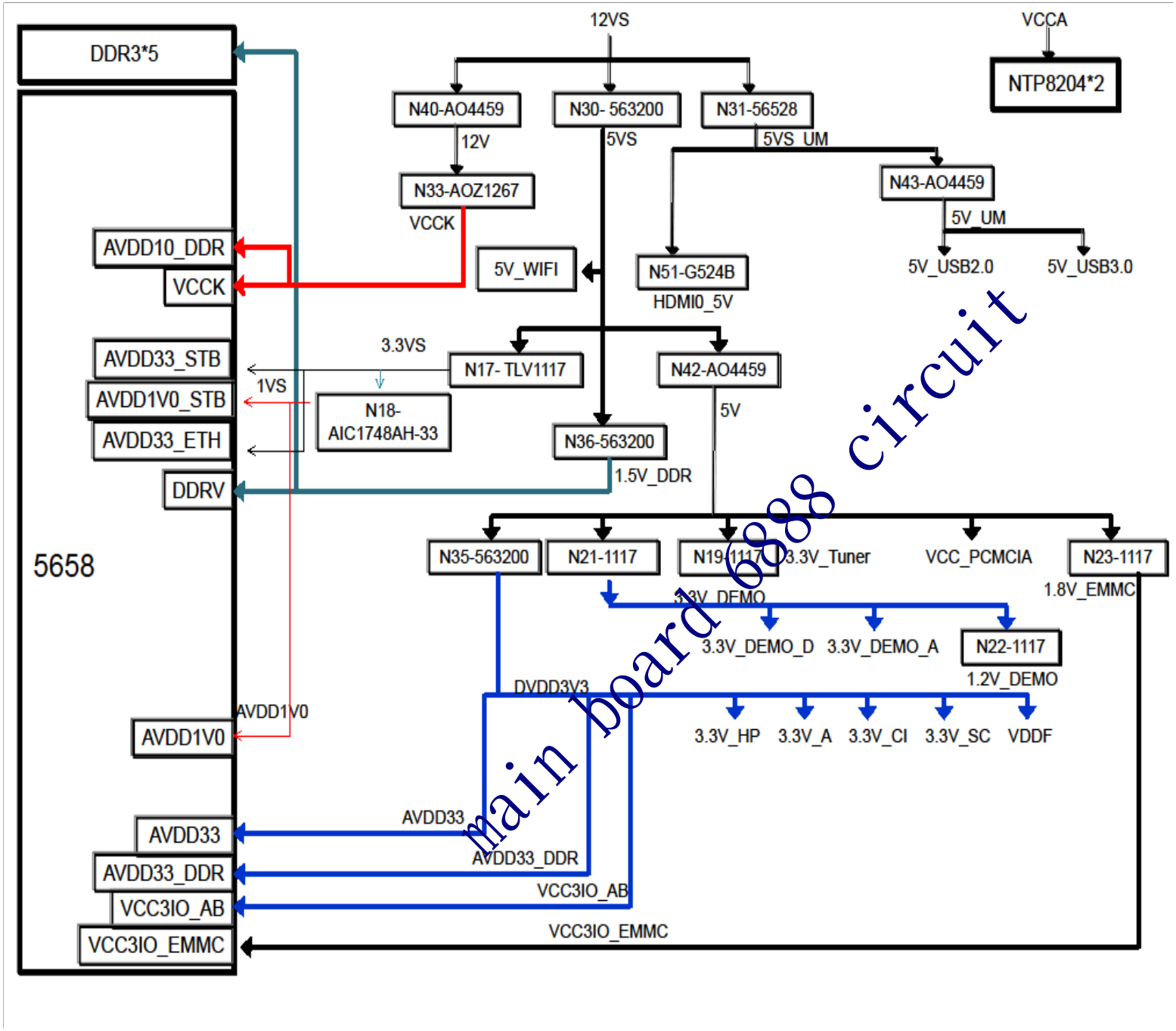




FRC NT72334 Power assign:

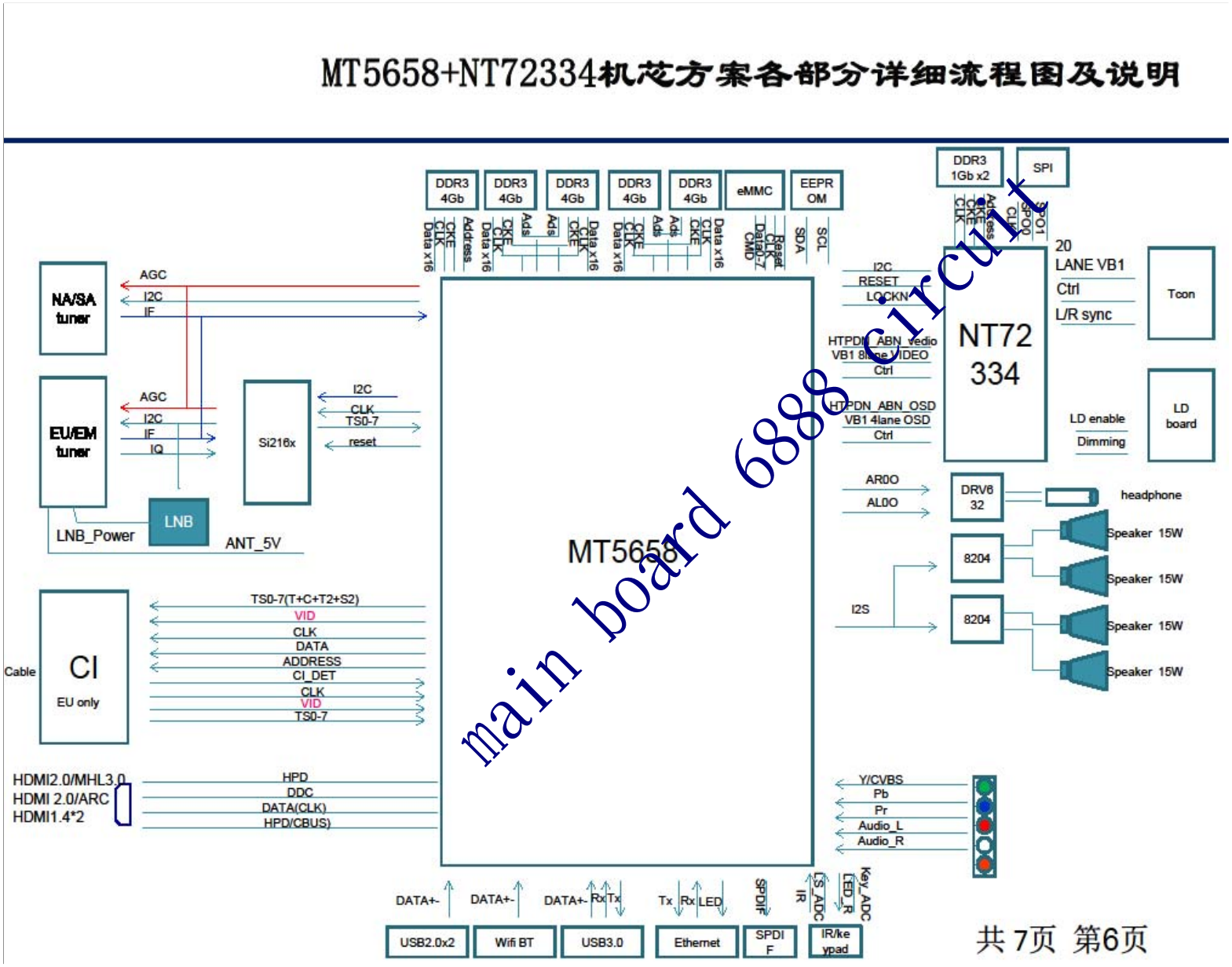




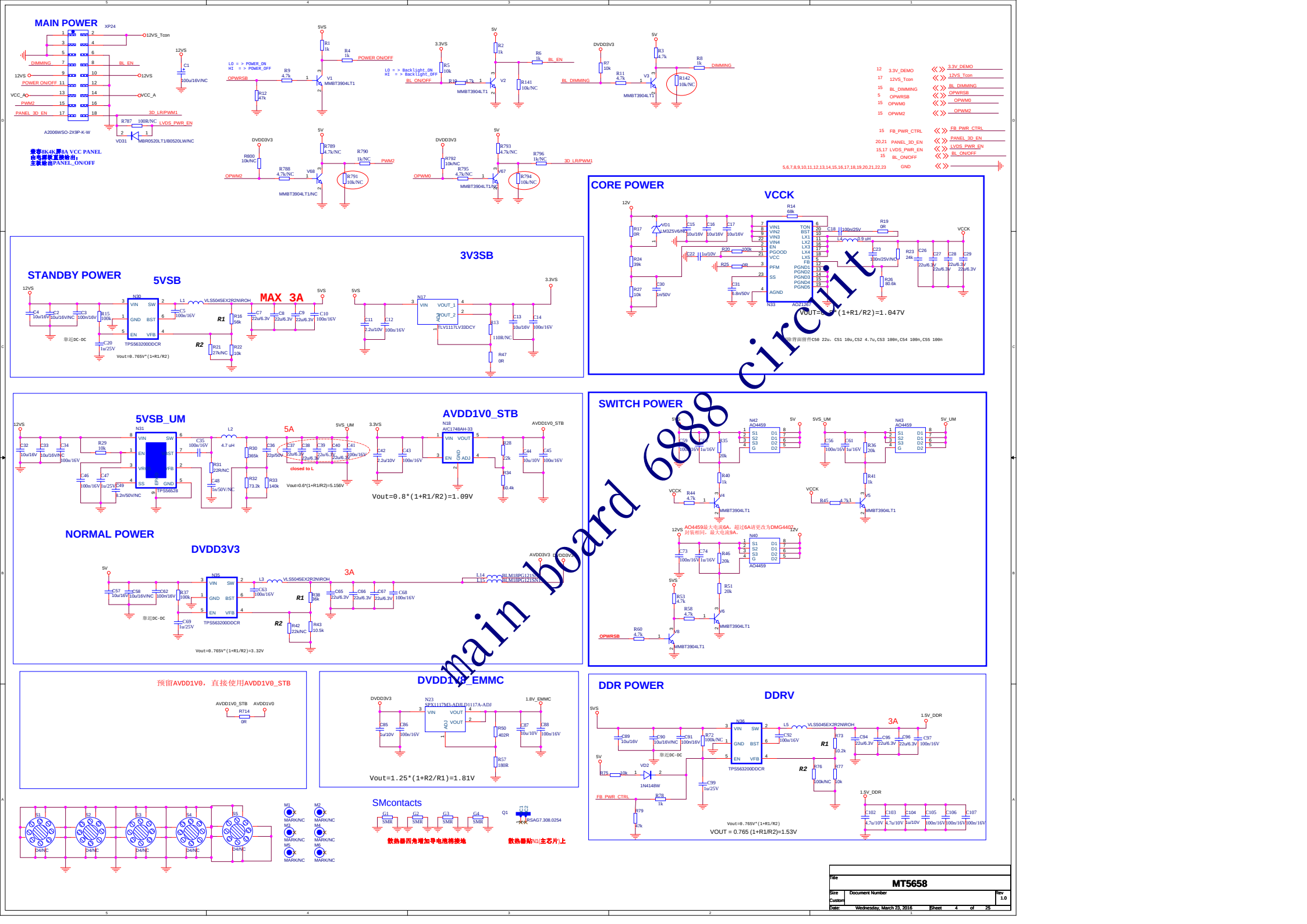


Title	MT5658	
Size A3	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 2 of 25	

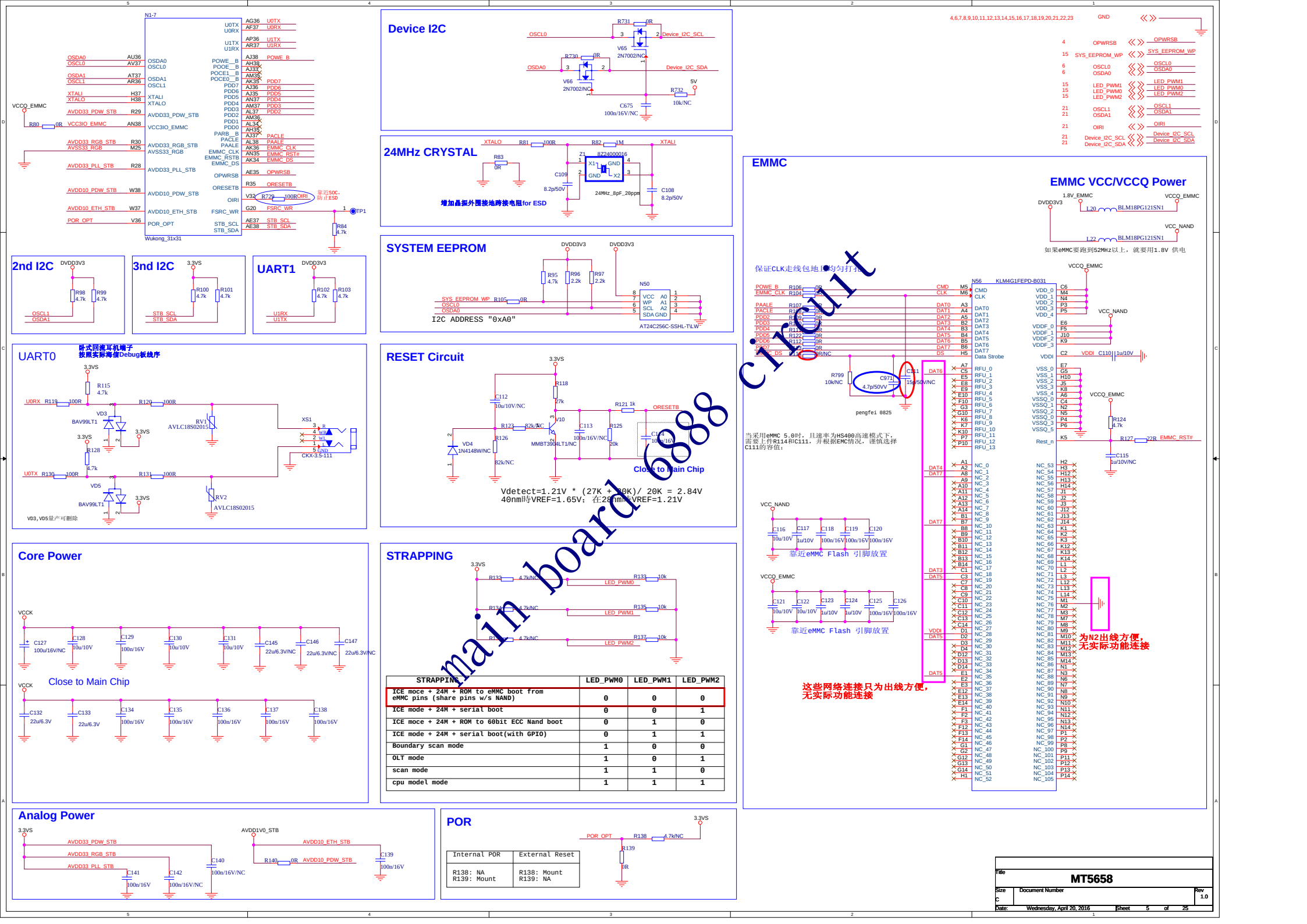
Block Diagram



Title	MT5658	
Size A3	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 3 of 25	

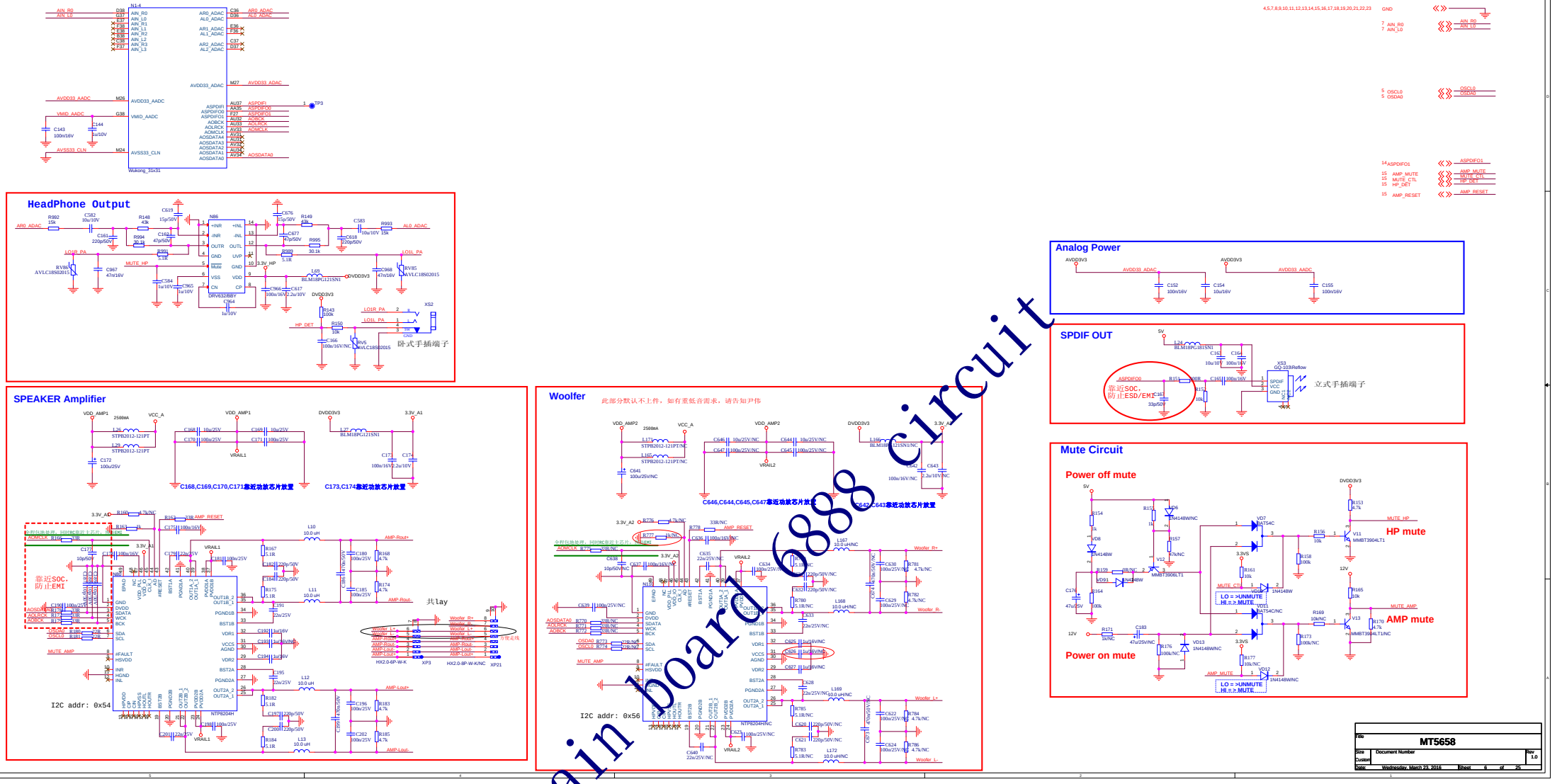


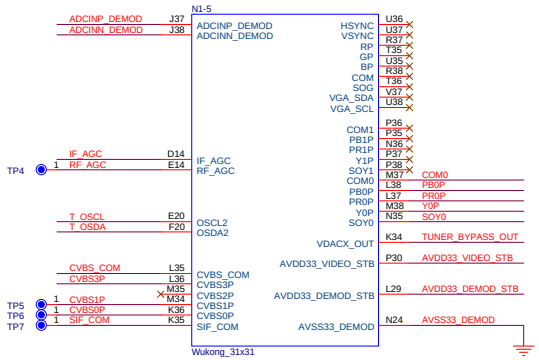
Title	MT5658
Size	Custom
Document Number	
Rev	1.0
Date:	Wednesday, March 23, 2016
Sheet	4 of 25

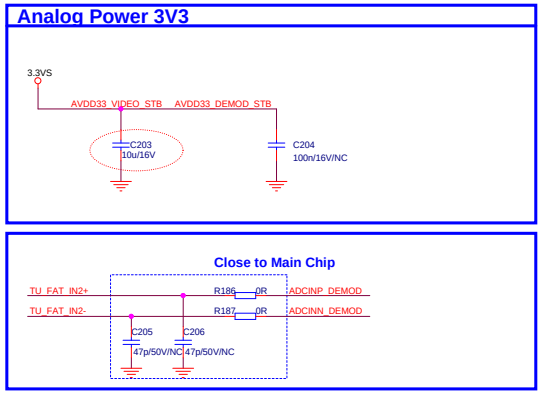


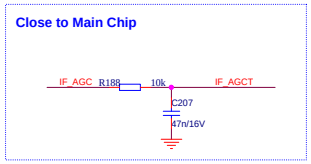
STRAPPING	LED_PWM0	LED_PWM1	LED_PWM2
ICE moce + 24M + ROM to eMMC boot from eMMC pins (share pins w/s NAND)	0	0	0
ICE mode + 24M + serial boot	0	0	1
ICE mode + 24M + ROM to 60bit ECC Nand boot	0	1	0
ICE mode + 24M + serial boot(with GPIO)	0	1	1
Boundary scan mode	1	0	0
OLT mode	1	0	1
scan mode	1	1	0
cpu model mode	1	1	1

Title	MT5658		
Size C	Document Number		Rev 1.0
Date: Wednesday, April 20, 2016	Sheet 5 of 25		









4,5,6,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23 GND

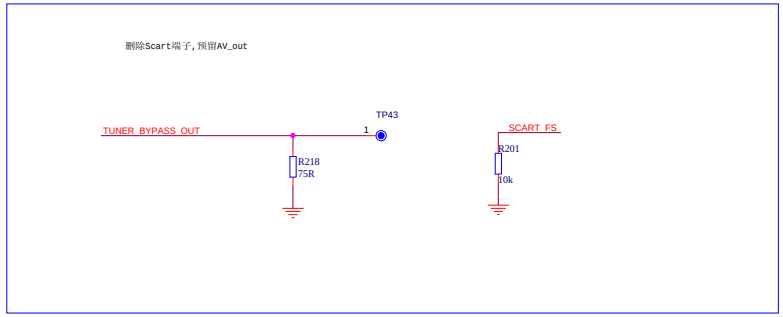
6 AIN_R0 — AIN_R0
6 AIN_L0 — AIN_L0

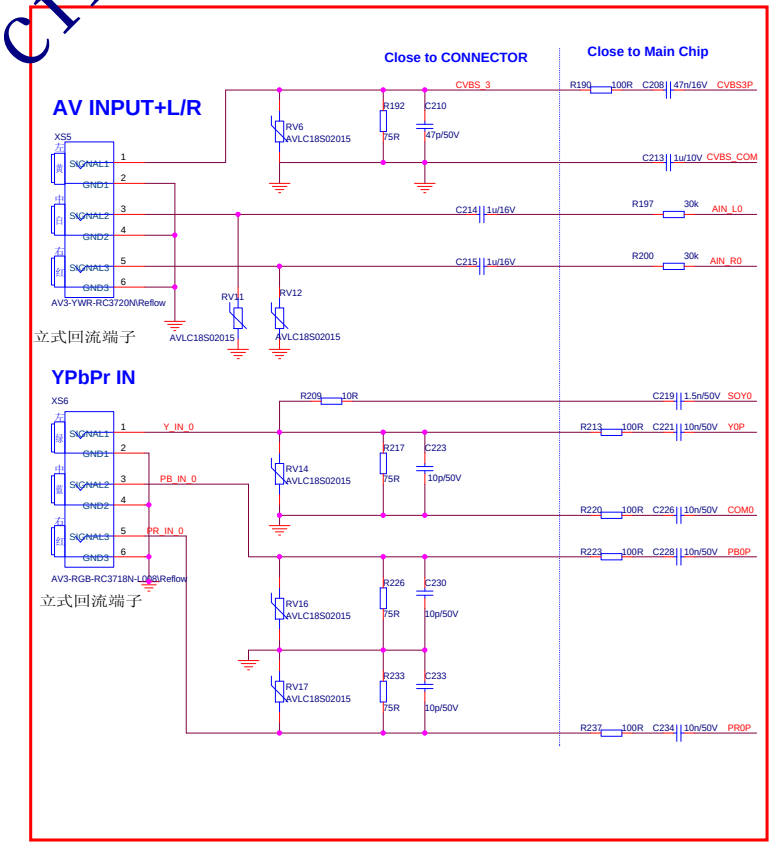
12 IF_AGCT — IF_AGCT

15 SCART_FS — SCART_FS

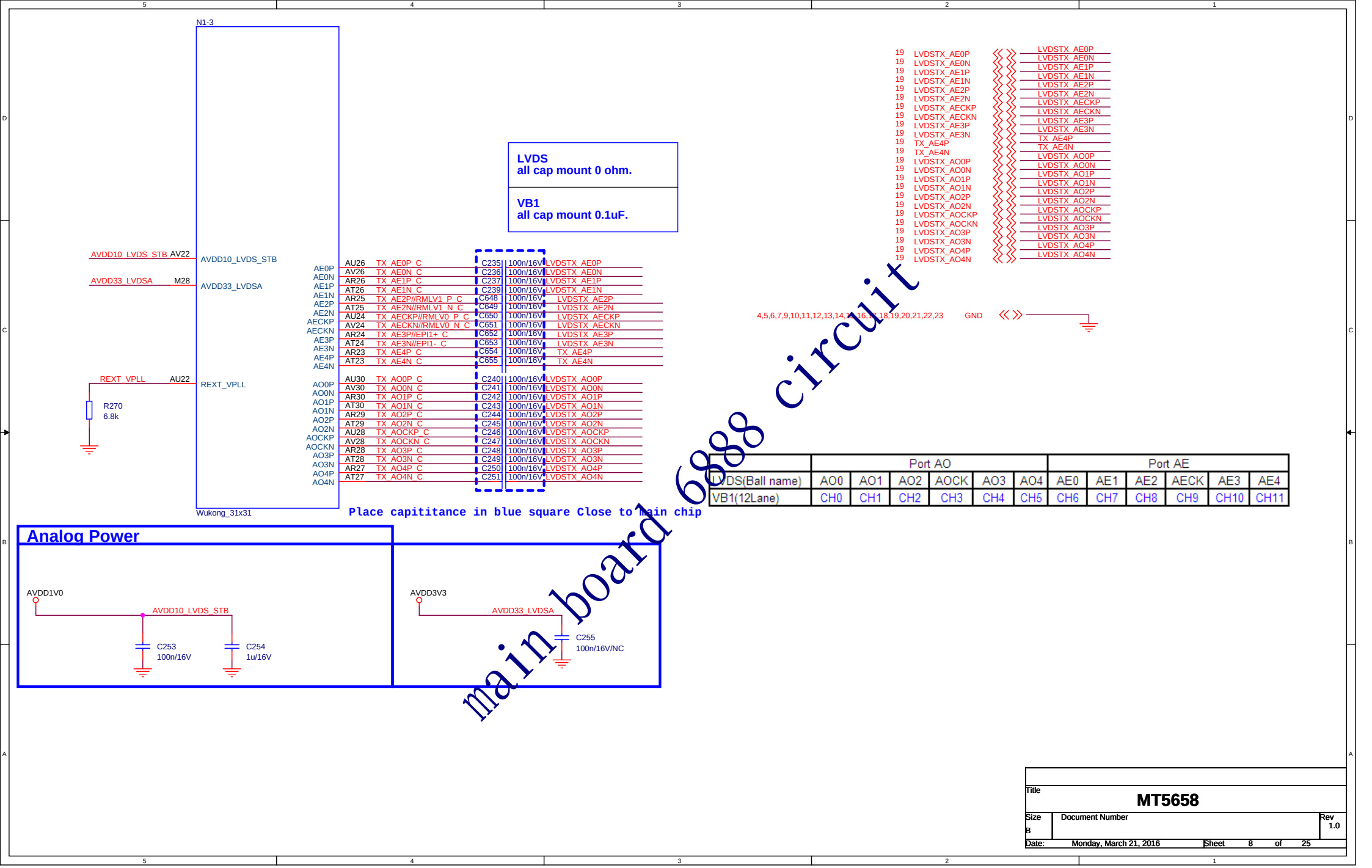
12 TU_FAT_IN2+ — TU_FAT_IN2+
12 TU_FAT_IN2- — TU_FAT_IN2-

12 T_OSCL — T_OSCL
12 T_OSDA — T_OSDA



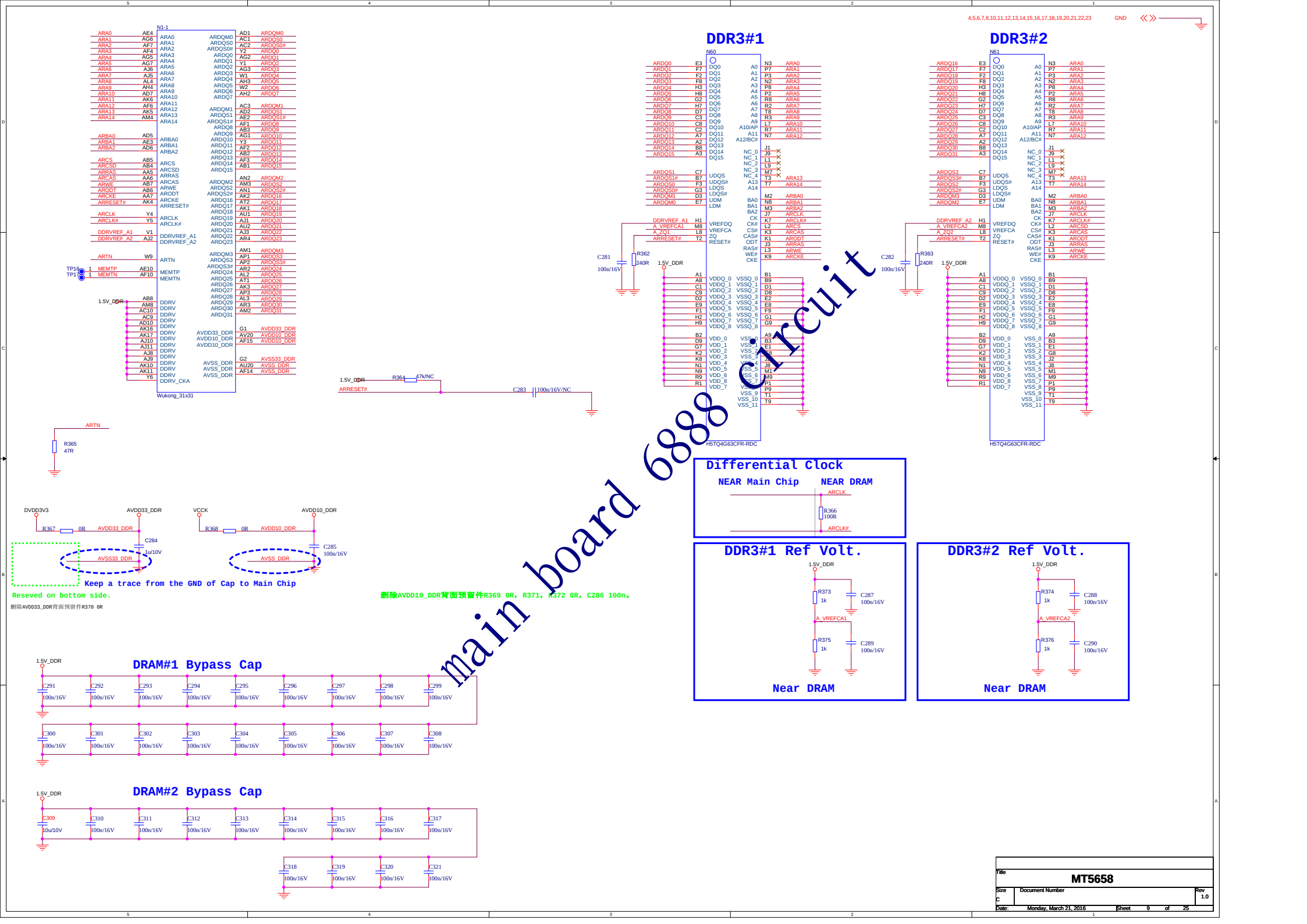


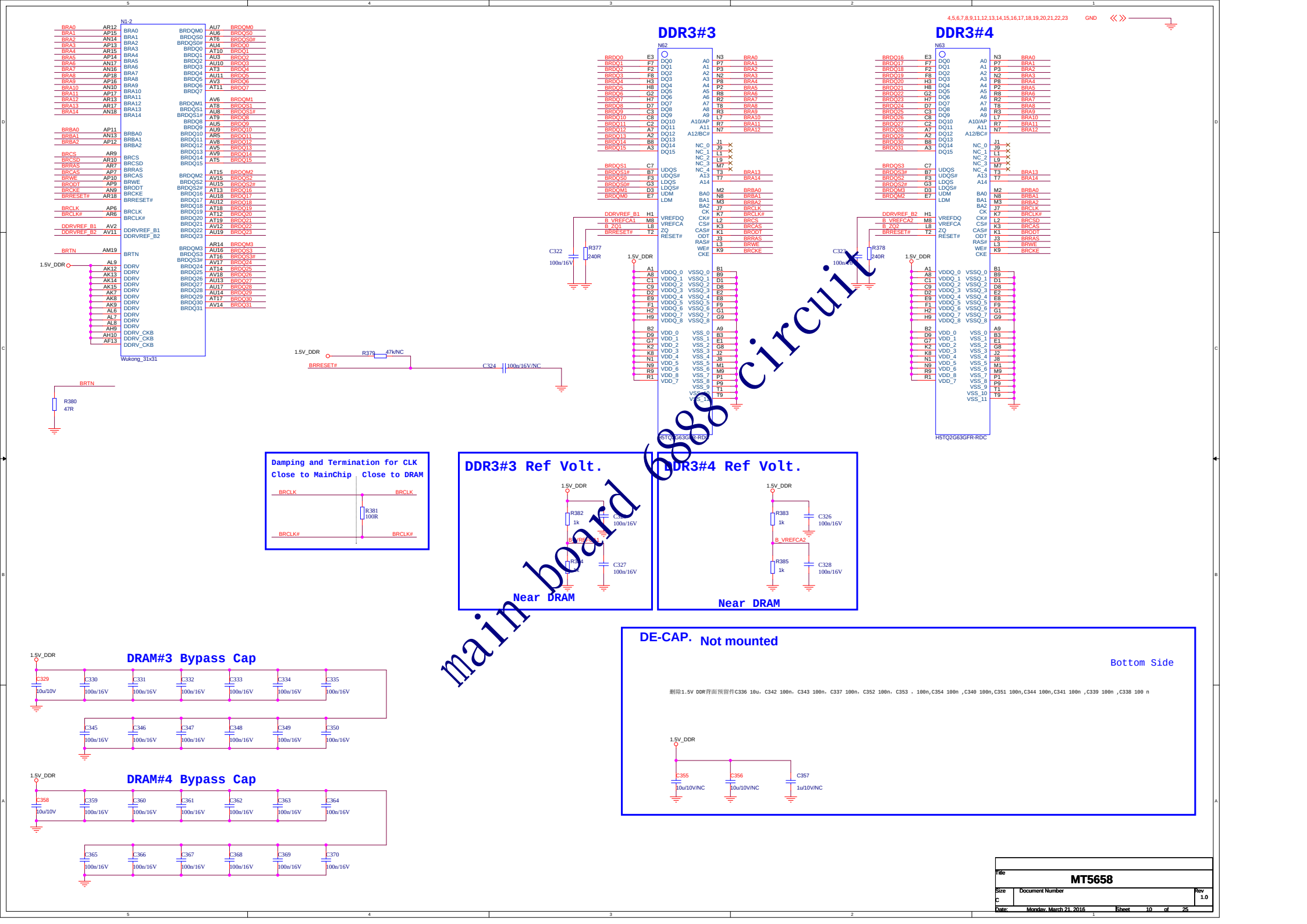
Title	MT5658	
Size C	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 7 of 25	

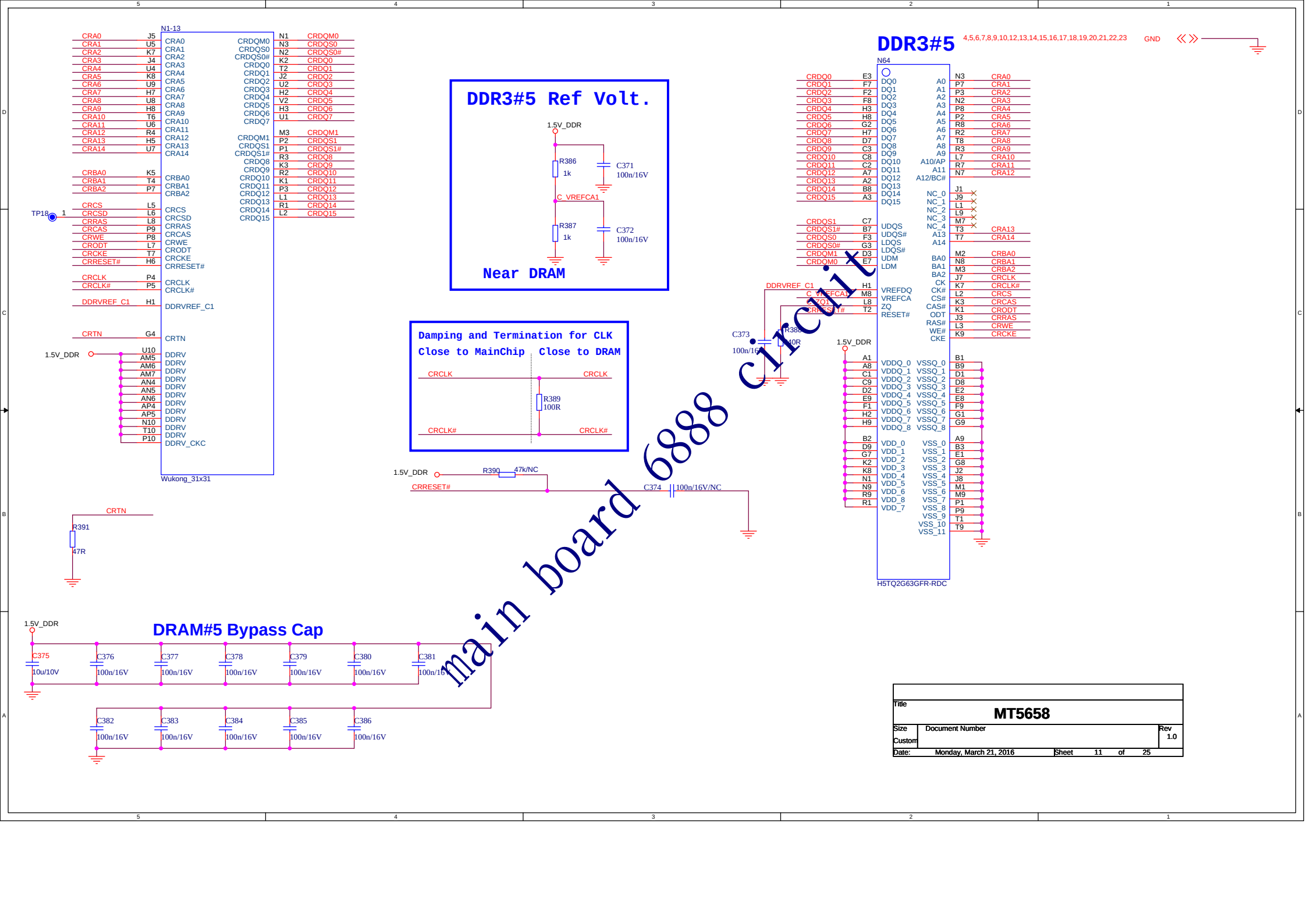


	Port AO						Port AE					
LVDS(Ball name)	AO0	AO1	AO2	AOCK	AO3	AO4	AE0	AE1	AE2	AECK	AE3	AE4
VB1(12Lane)	CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11

Title: MT5658
Size: B
Document Number:
Rev: 1.0
Date: Monday, March 21, 2016
Sheet 8 of 25

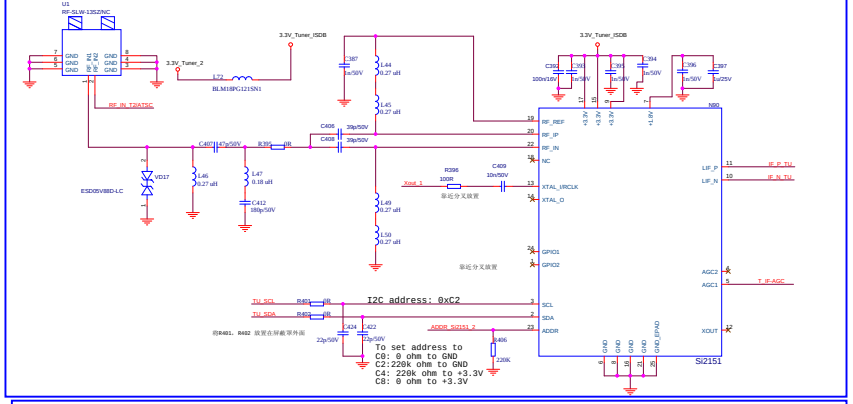

4,5,6,7,8,10,11,12,13,14,15,16,17,18,19,20,21,22,23
GND
DDR3#1
DDR3#2
N1-1
Wukong_31x31
N60
N61
H5TQ4G63CFR-RDC
1.5V_DDR
ARRESET#
R364 47k/NC
C283 100n/16V/NC
ARTN
R365 47R
Differential Clock
NEAR Main Chip
NEAR DRAM
ARCLK
R366 100R
ARCLK#
DDR3#1 Ref Volt.
R373 1k
C287 100n/16V
A_VREFCA1
R375 1k
C289 100n/16V
Near DRAM
DDR3#2 Ref Volt.
R374 1k
C288 100n/16V
A_VREFCA2
R376 1k
C290 100n/16V
Near DRAM
DVDD3V3
AVDD33_DDR
R367 0R
C284 1u/10V
AVSS33_DDR
VCCK
AVDD10_DDR
R368 0R
C285 100n/16V
AVSS_DDR
Keep a trace from the GND of Cap to Main Chip
Reseved on bottom side.
删除AVDD33_DDR背面预留件R370 0R
删除AVDD10_DDR背面预留件R369 0R, R371, R372 0R, C286 100n.
DRAM#1 Bypass Cap
C291 C292 C293 C294 C295 C296 C297 C298 C299
C300 C301 C302 C303 C304 C305 C306 C307 C308
DRAM#2 Bypass Cap
C309 C310 C311 C312 C313 C314 C315 C316 C317
C318 C319 C320 C321
main board 6888 circuit
Title
MT5658
Size C
Document Number
Rev 1.0
Date: Monday, March 21, 2016
Sheet 9 of 25


DDR3#3
DDR3#4
N1-2
Wukong_31x31
N62
N63
H5TQ2G63GFR-RDC
4,5,6,7,8,9,11,12,13,14,15,16,17,18,19,20,21,22,23
GND
1.5V_DDR
BRTN
R380
47R
R379
47k/NC
BRRESET#
C324
100n/16V/NC
C322
100n/16V
R377
240R
C323
100n/16V
R378
240R
Damping and Termination for CLK
Close to MainChip
Close to DRAM
BRCLK
BRCLK#
R381
100R
DDR3#3 Ref Volt.
R382
1k
C325
100n/16V
B_VREFCA1
R384
1k
C327
100n/16V
Near DRAM
DDR3#4 Ref Volt.
R383
1k
C326
100n/16V
B_VREFCA2
R385
1k
C328
100n/16V
Near DRAM
DRAM#3 Bypass Cap
C329
10u/10V
C330
C331
C332
C333
C334
C335
C345
C346
C347
C348
C349
C350
100n/16V
DRAM#4 Bypass Cap
C358
10u/10V
C359
C360
C361
C362
C363
C364
C365
C366
C367
C368
C369
C370
DE-CAP.
Not mounted
Bottom Side
删除1.5V DDR背面预留件C336 10u. C342 100n. C343 100n. C337 100n. C352 100n. C353 . 100n,C354 100n ,C340 100n,C351 100n,C344 100n,C341 100n ,C339 100n ,C338 100 n
C355
10u/10V/NC
C356
10u/10V/NC
C357
1u/10V/NC
main board 6888 Circuit
Title
MT5658
Size
C
Document Number
Rev
1.0
Date:
Monday, March 21, 2016
Sheet
10
of
25

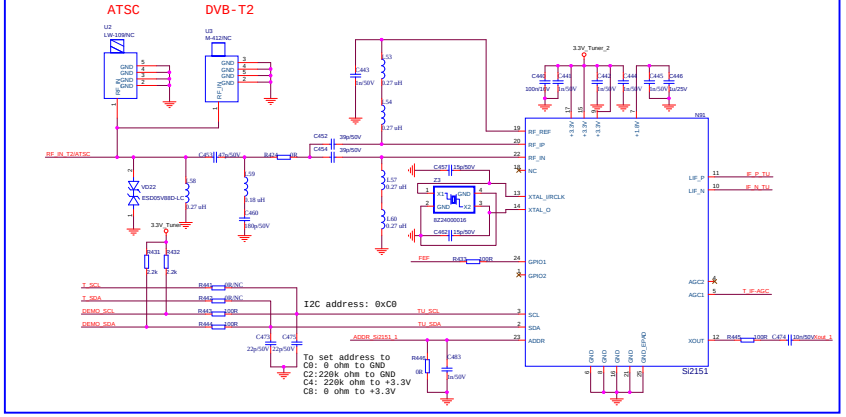

DDR3#5
DDR3#5 Ref Volt.
Near DRAM
Damping and Termination for CLK
Close to MainChip
Close to DRAM
DRAM#5 Bypass Cap
Wukong_31x31
H5TQ2G63GFR-RDC
main board 6888 circuit
Title
MT5658
Size
Custom
Document Number
Rev
1.0
Date: Monday, March 21, 2016
Sheet 11 of 25

Tuner On Board for SA Cable

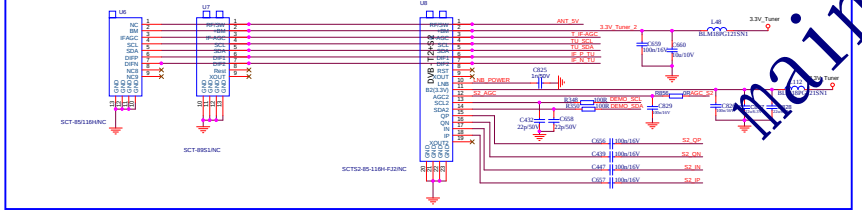
每个tuner预留14mm宽度,28.8mm长度范围内



Tuner On Board for SA Air/ATSC/DVB-T2/T/C



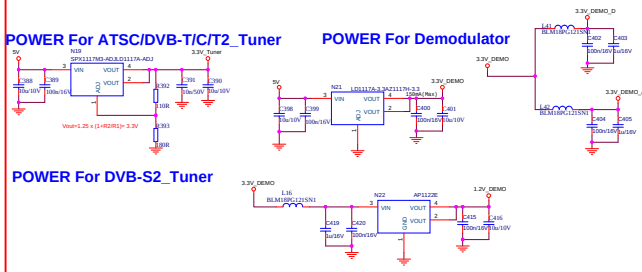
Tuner for T2+S2



POWER For ATSC/DVB-T/C/T2_Tuner

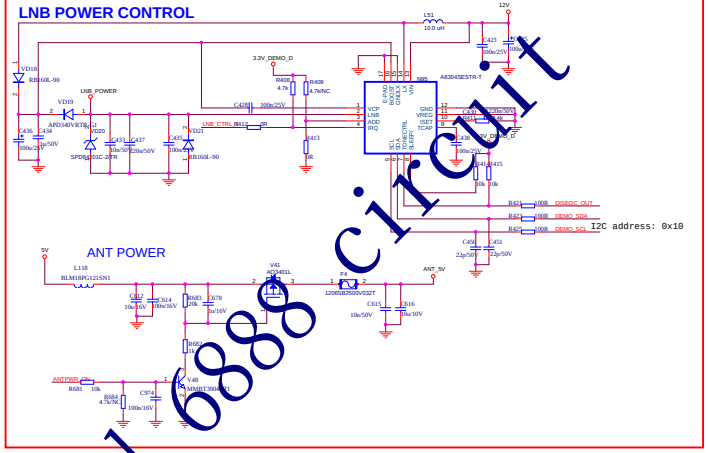
POWER For Demodulator

POWER For DVB-S2_Tuner



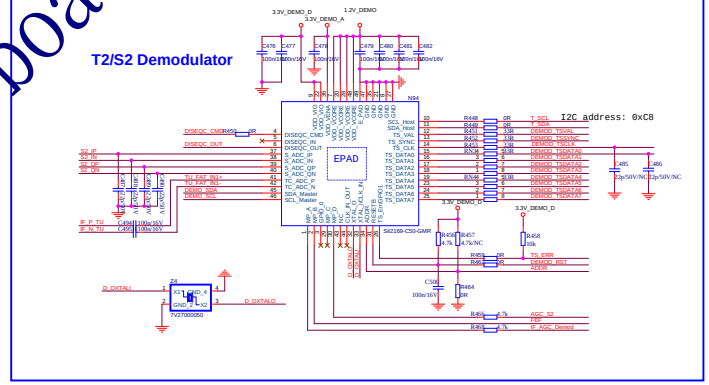
靠近S2的tuner放置

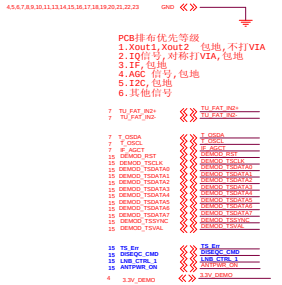
LNB POWER CONTROL



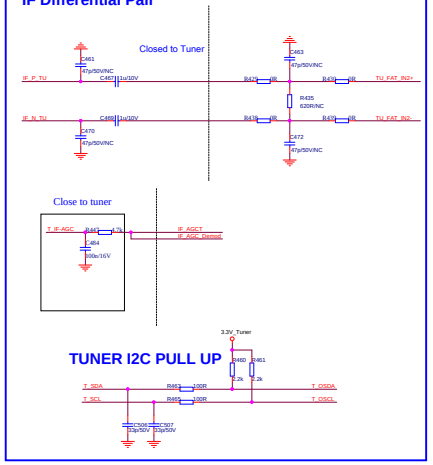
ANT POWER

T2/S2 Demodulator



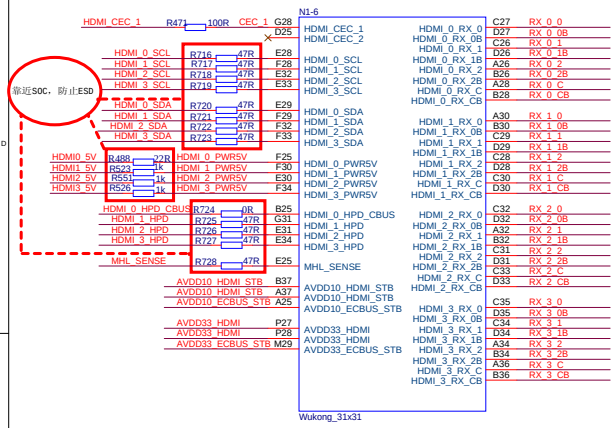


IF Differential Pair

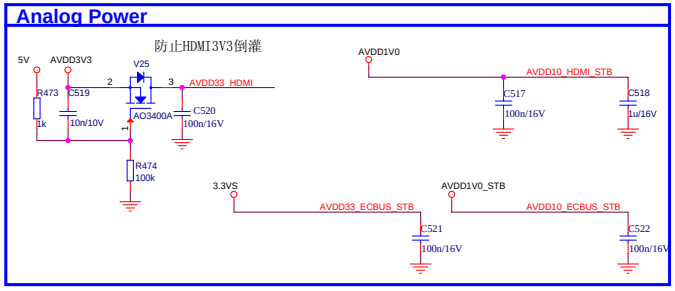


TUNER I2C PULL UP

Title	MT5658		
Size	Document Number		Rev 1.0
Custom			
Date:	Monday, March 21, 2016	Sheet 12 of 25	



Analog Power



4,5,6,7,8,9,10,11,12,14,15,16,17,18,19,20,21,22,23 GND

DDC and CEC

HDMI_CEC_1 — HDMI_CEC_1 14
HDMI_2_SCL — HDMI_2_SCL 14
HDMI_2_SDA — HDMI_2_SDA 14
HDMI_3_SCL — HDMI_3_SCL 14
HDMI_3_SDA — HDMI_3_SDA 14
HDMI_0_SCL
HDMI_0_SDA
HDMI_1_SCL — HDMI_1_SCL 14
HDMI_1_SDA — HDMI_1_SDA 14

5V Input Detect

HDMI1_5V — HDMI1_5V 14
HDMI2_5V — HDMI2_5V 14
HDMI3_5V — HDMI3_5V 14

Hotplug control

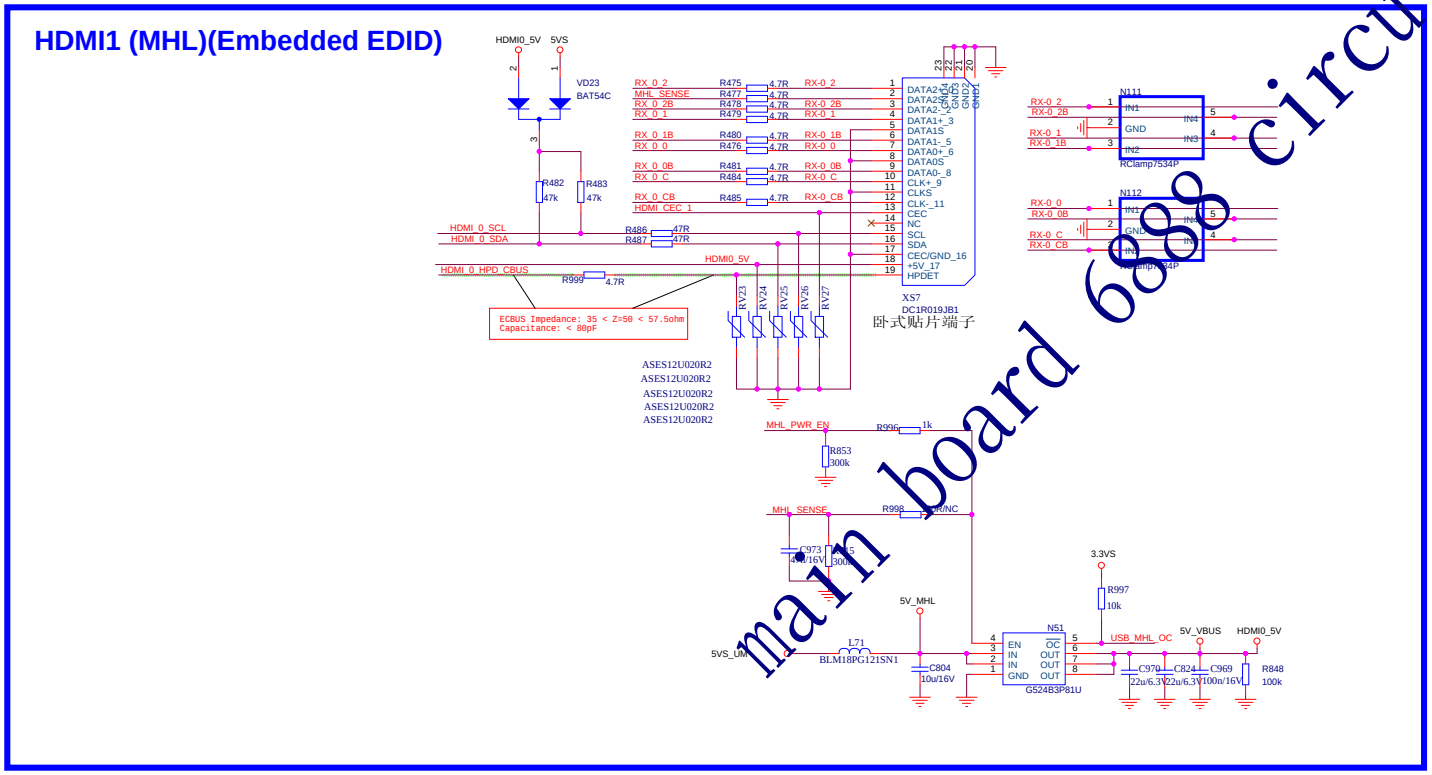
HDMI_1_HPD — HDMI_1_HPD 14
HDMI_2_HPD — HDMI_2_HPD 14
HDMI_3_HPD — HDMI_3_HPD 14

MHL_PWR_EN — MHL_PWR_EN 15
USB_MHL_OC — USB_MHL_OC 15

TMDS

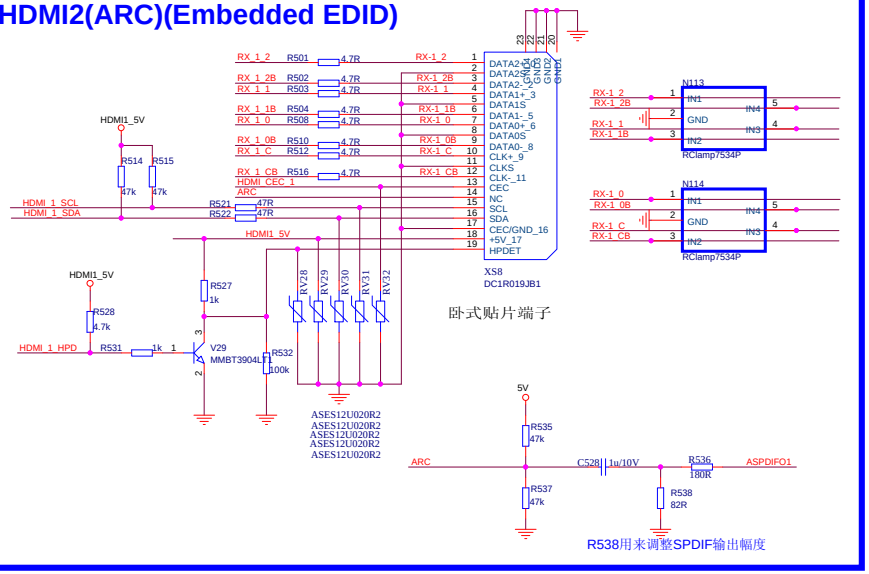
RX_1_CB — RX_1_CB 14
RX_1_C — RX_1_C 14
RX_1_0B — RX_1_0B 14
RX_1_0 — RX_1_0 14
RX_1_1B — RX_1_1B 14
RX_1_1 — RX_1_1 14
RX_1_2B — RX_1_2B 14
RX_1_2 — RX_1_2 14
RX_2_CB — RX_2_CB 14
RX_2_C — RX_2_C 14
RX_2_0B — RX_2_0B 14
RX_2_0 — RX_2_0 14
RX_2_1B — RX_2_1B 14
RX_2_1 — RX_2_1 14
RX_2_2B — RX_2_2B 14
RX_2_2 — RX_2_2 14
RX_3_CB — RX_3_CB 14
RX_3_C — RX_3_C 14
RX_3_0B — RX_3_0B 14
RX_3_0 — RX_3_0 14
RX_3_1B — RX_3_1B 14
RX_3_1 — RX_3_1 14
RX_3_2B — RX_3_2B 14
RX_3_2 — RX_3_2 14

HDMI1 (MHL)(Embedded EDID)

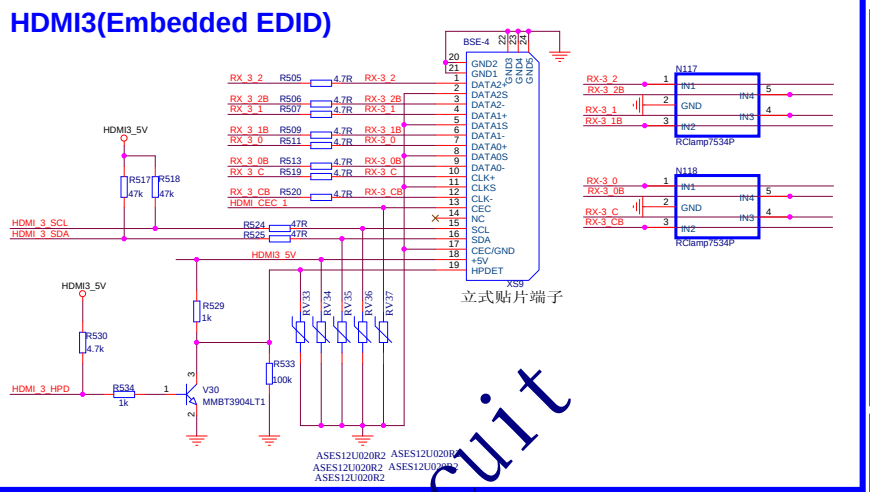


Title	MT5658	
Size C	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 13 of 25	

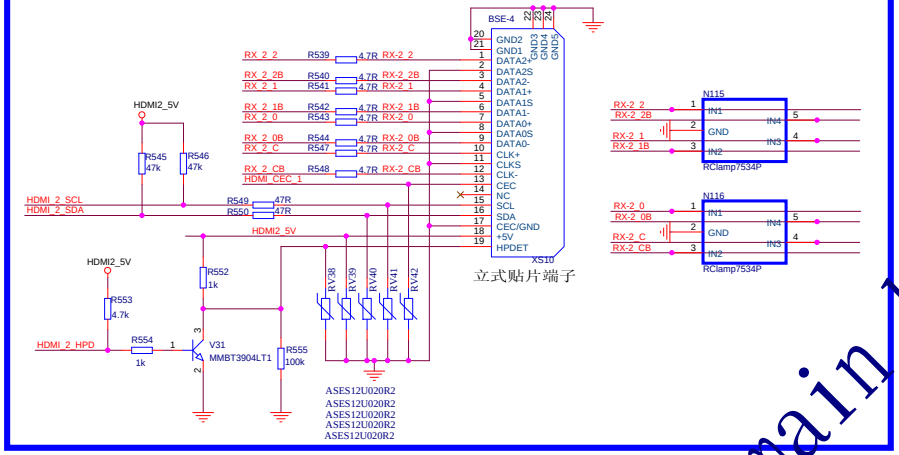
HDMI2(ARC)(Embedded EDID)



HDMI3(Embedded EDID)



HDMI4(Embedded EDID)



TMDS

RX_1_CB 13
RX_1_C 13
RX_1_0B 13
RX_1_0 13
RX_1_1B 13
RX_1_1 13
RX_1_2B 13
RX_1_2 13
RX_2_CB 13
RX_2_C 13
RX_2_0B 13
RX_2_0 13
RX_2_1B 13
RX_2_1 13
RX_2_2B 13
RX_2_2 13
RX_3_CB 13
RX_3_C 13
RX_3_0B 13
RX_3_0 13
RX_3_1B 13
RX_3_1 13
RX_3_2B 13
RX_3_2 13

HDMI1_5V 13
HDMI2_5V 13
HDMI3_5V 13

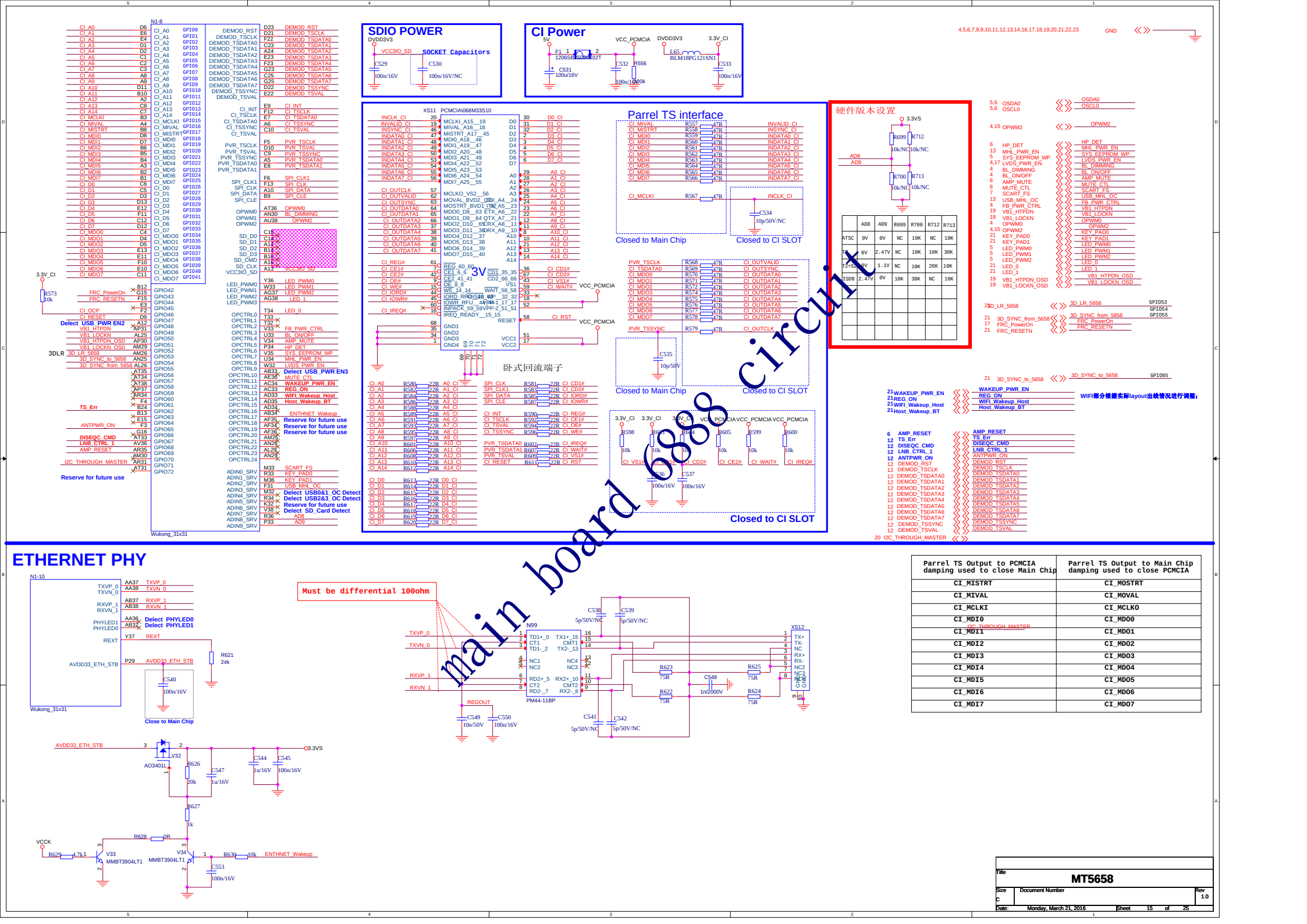
Hotplug control

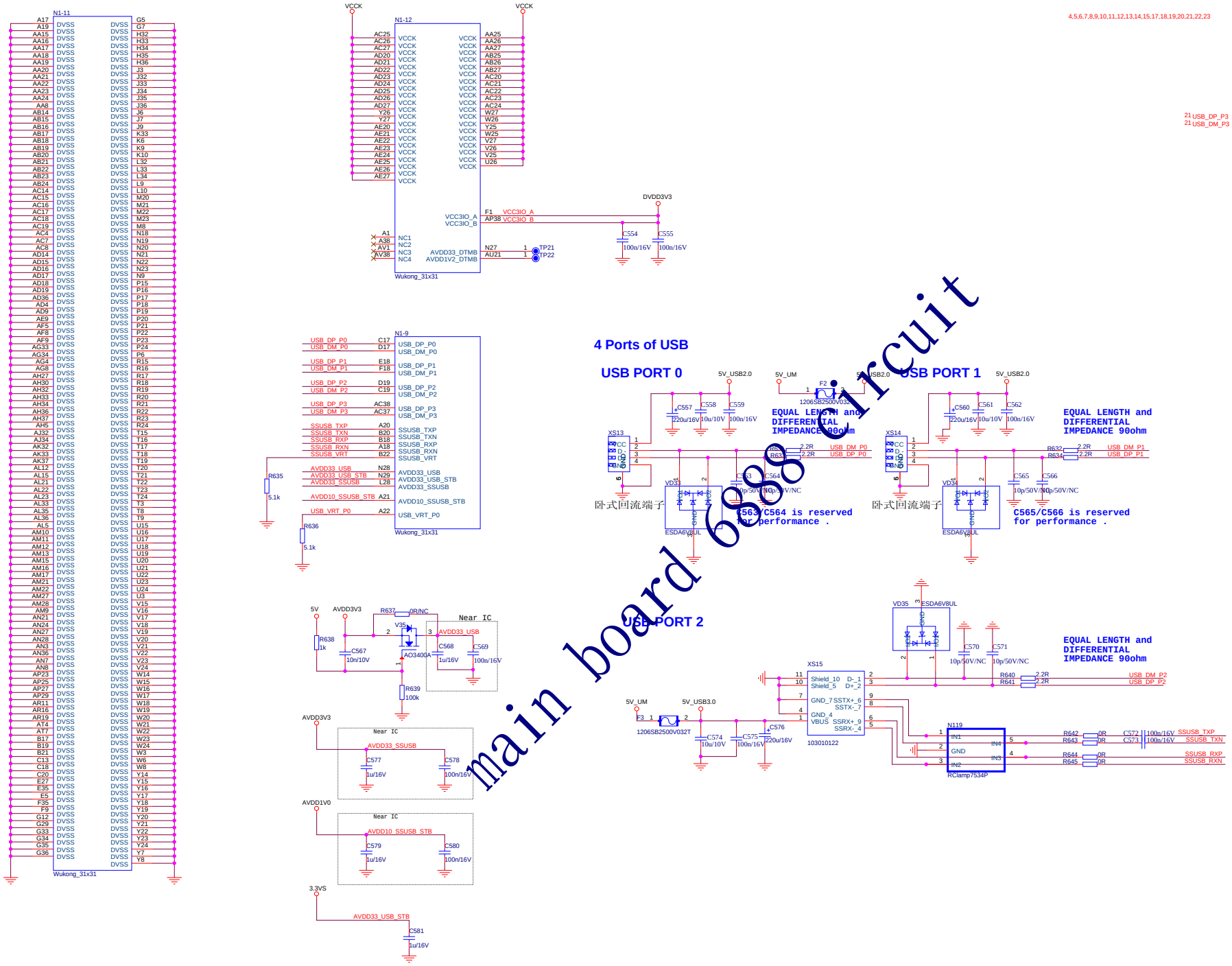
HDMI_1_HPD 13
HDMI_2_HPD 13
HDMI_3_HPD 13

DDC and CEC

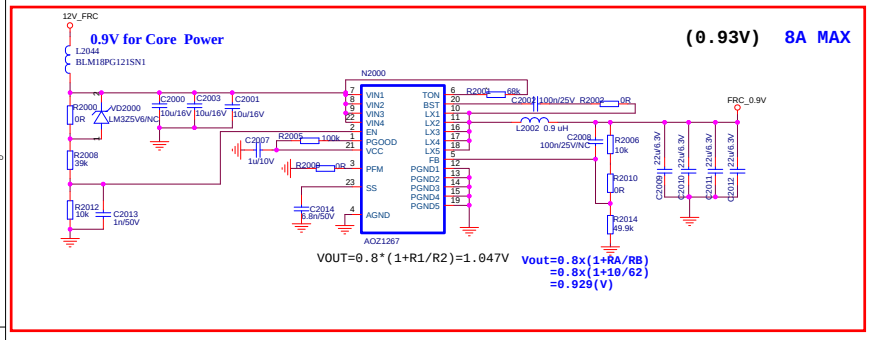
HDMI_CEC_1 13
ASPDIFO1 6
HDMI_1_SCL 13
HDMI_1_SDA 13
HDMI_2_SCL 13
HDMI_2_SDA 13
HDMI_3_SCL 13
HDMI_3_SDA 13

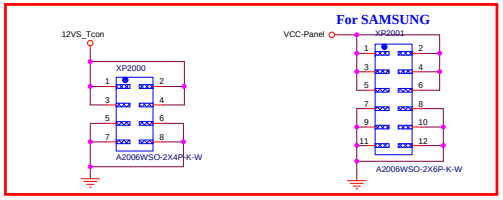
Title	MT5658	
Size C	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 14 of 25	

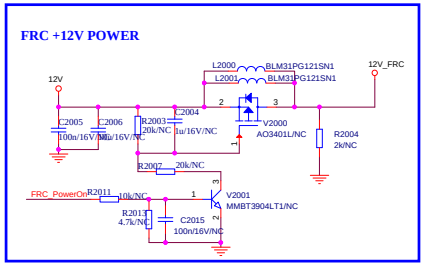

SDIO POWER
CI Power
Parrel TS interface
硬件版本设置
Closed to Main Chip
Closed to CI SLOT
卧式回流端子
ETHERNET PHY
Must be differential 100ohm
main board 6888 circuit
Parrel TS Output to PCMCIA damping used to close Main Chip
Parrel TS Output to Main Chip damping used to close PCMCIA
CI_MISTRT
CI_MIVAL
CI_MCLKI
CI_MDI0
CI_MDI1
CI_MDI2
CI_MDI3
CI_MDI4
CI_MDI5
CI_MDI6
CI_MDI7
CI_MDO0
CI_MDO1
CI_MDO2
CI_MDO3
CI_MDO4
CI_MDO5
CI_MDO6
CI_MDO7
MT5658
Title
Size
Document Number
Rev
1.0
Date: Monday, March 21, 2016
Sheet 15 of 25

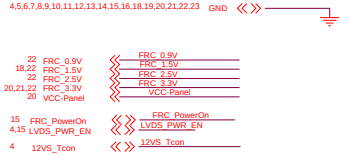


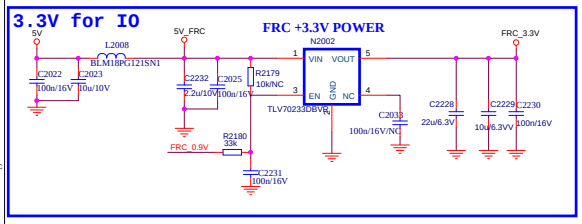
Title	MT5658
Size	C
Document Number	
Rev	1.0
Date:	Monday, March 21, 2016
Sheet	16 of 25

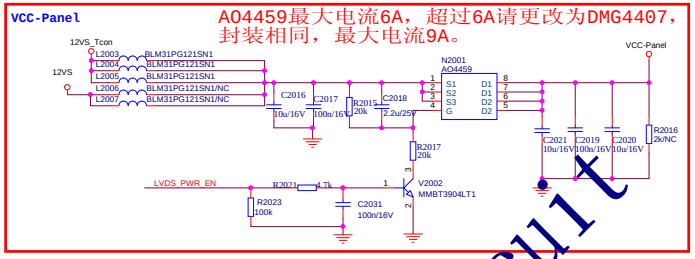


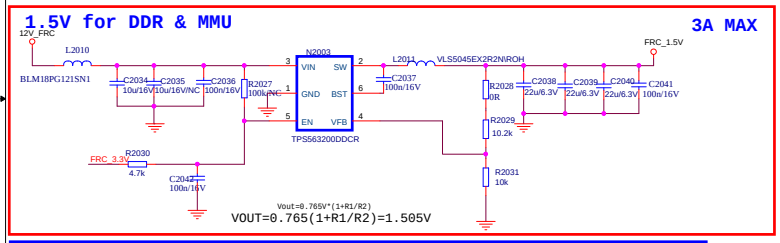


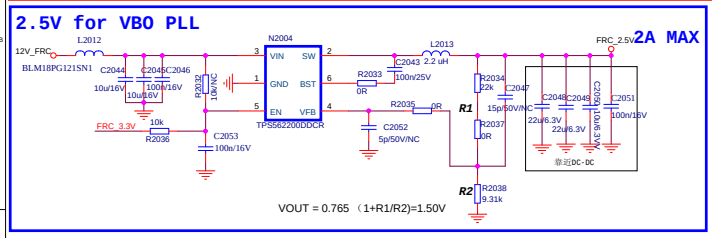












Q2000
RSAG7.308.0259

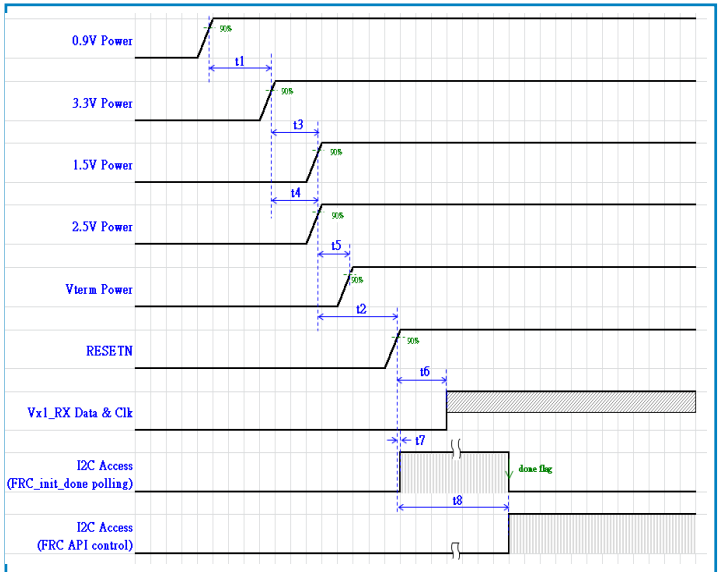
SMcontacts

SMcontacts

G2005 SMR/NC
G2004 SMR/NC
G2000 SMR
G2001 SMR
G2002 SMR
G2003 SMR

散热器四角增加导电泡棉接地

Power On Sequence Requirement:



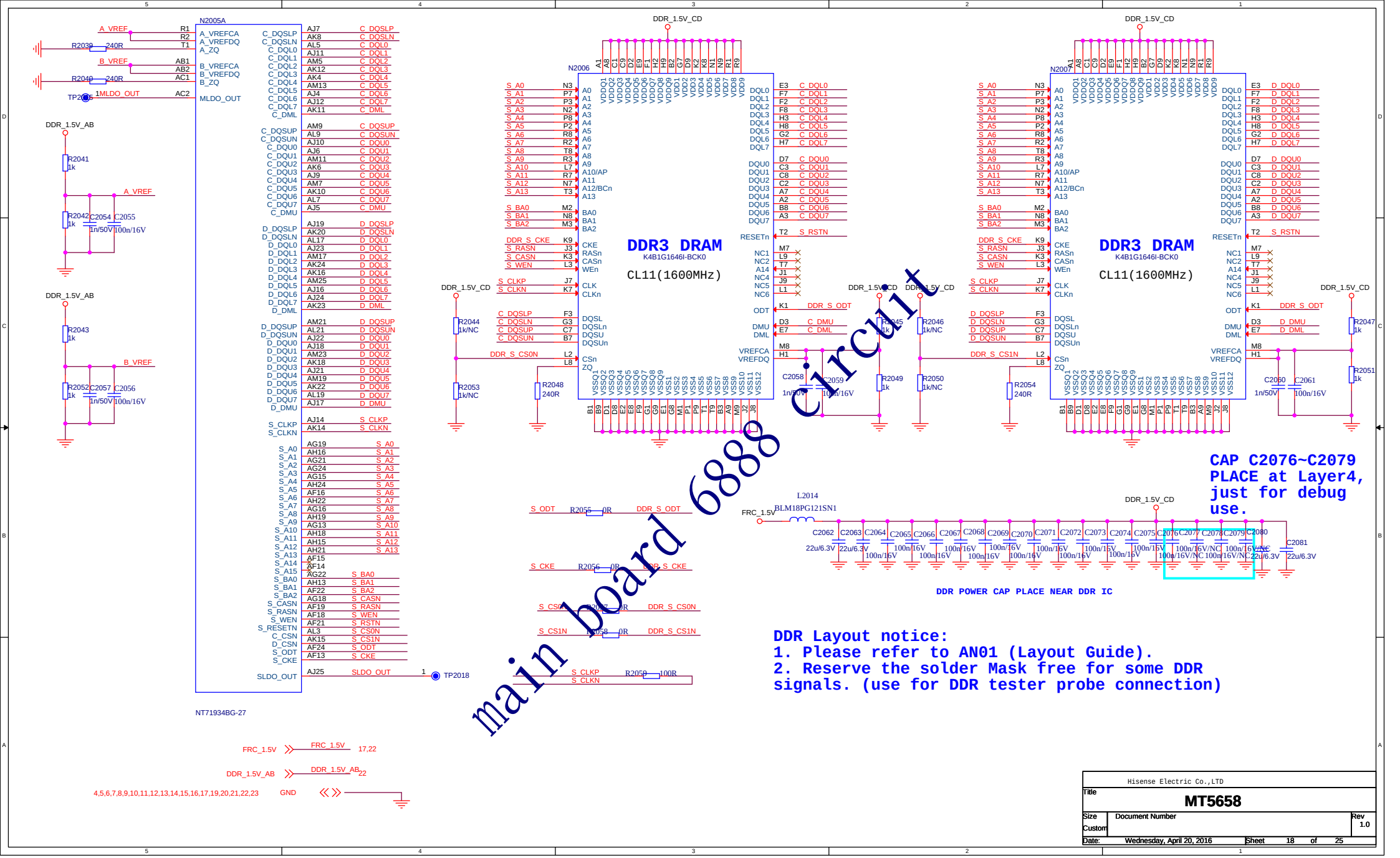
Parameter	Value			Unit.	Note.
	Min.	Typ.	Max.		
t1	3	–	–	msec	0.9V ↑ to 3.3V ↑ delay time
t2	10	–	–	msec	All power stabled to RESETN ↑ delay time
t3	0	–	2	msec	3.3V ↑ to 1.5V ↑ delay time
t4	0	–	2	msec	3.3V ↑ to 2.5V ↑ delay time
t5	0	–	5	msec	2.5V ↑ to Vterm ↑ delay time
t6	–	–	10	msec	RESETN ↑ to "Vx1_RX clk stable" delay time
t7	0	–	–	msec	RESETN ↑ to "SOC start polling FRC_init_done flag" delay time
t8	–	–	800	msec	RESETN ↑ to "FRC ready to accept API command" delay time

Hisense Electric Co.,LTD

Title: **MT5658**

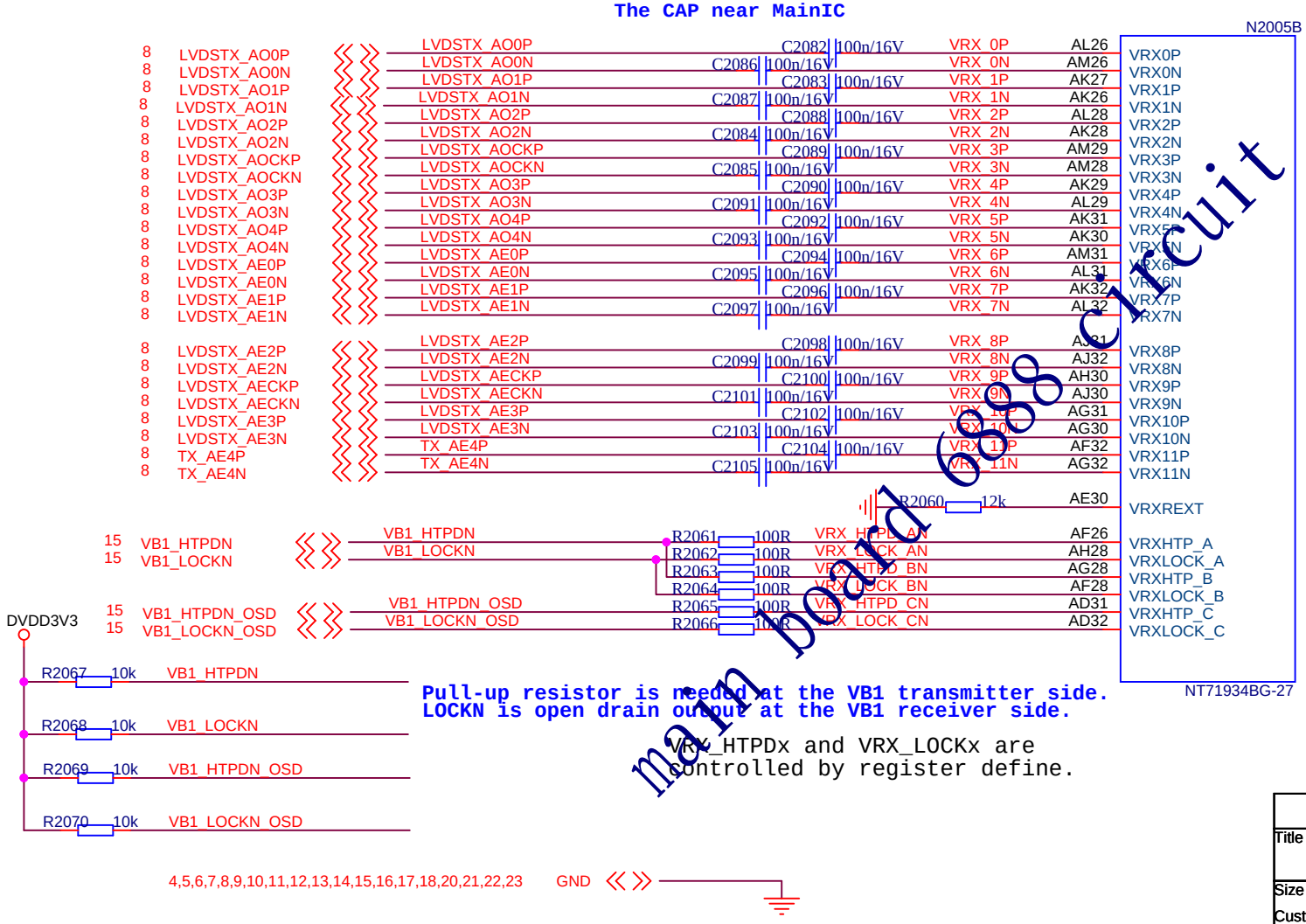
Size: Custom | Document Number | Rev: 1.0

Date: Monday, April 25, 2016 | Sheet 17 of 25


N2005A
NT71934BG-27
N2006
N2007
DDR3 DRAM
K4B1G1646I-BCK0
CL11(1600MHz)
DDR_1.5V_CD
DDR_1.5V_AB
A_VREF
B_VREF
MLDO_OUT
SLDO_OUT
FRC_1.5V
L2014
BLM18PG121SN1
TP2018
main board 6888 circuit
CAP C2076~C2079 PLACE at Layer4, just for debug use.
DDR POWER CAP PLACE NEAR DDR IC
DDR Layout notice:
1. Please refer to AN01 (Layout Guide).
2. Reserve the solder Mask free for some DDR signals. (use for DDR tester probe connection)
Hisense Electric Co.,LTD
Title
MT5658
Size
Custom
Document Number
Rev
1.0
Date: Wednesday, April 20, 2016
Sheet 18 of 25

For Vx1 RX Layout:
1. Trace length difference require < 100mil under same group.(VRX Lane0-7; VRX Lane8-11)
2. Each P/N pair length difference require < 20mil if possible.
3. Layout needs 100 ohm impedance matching.

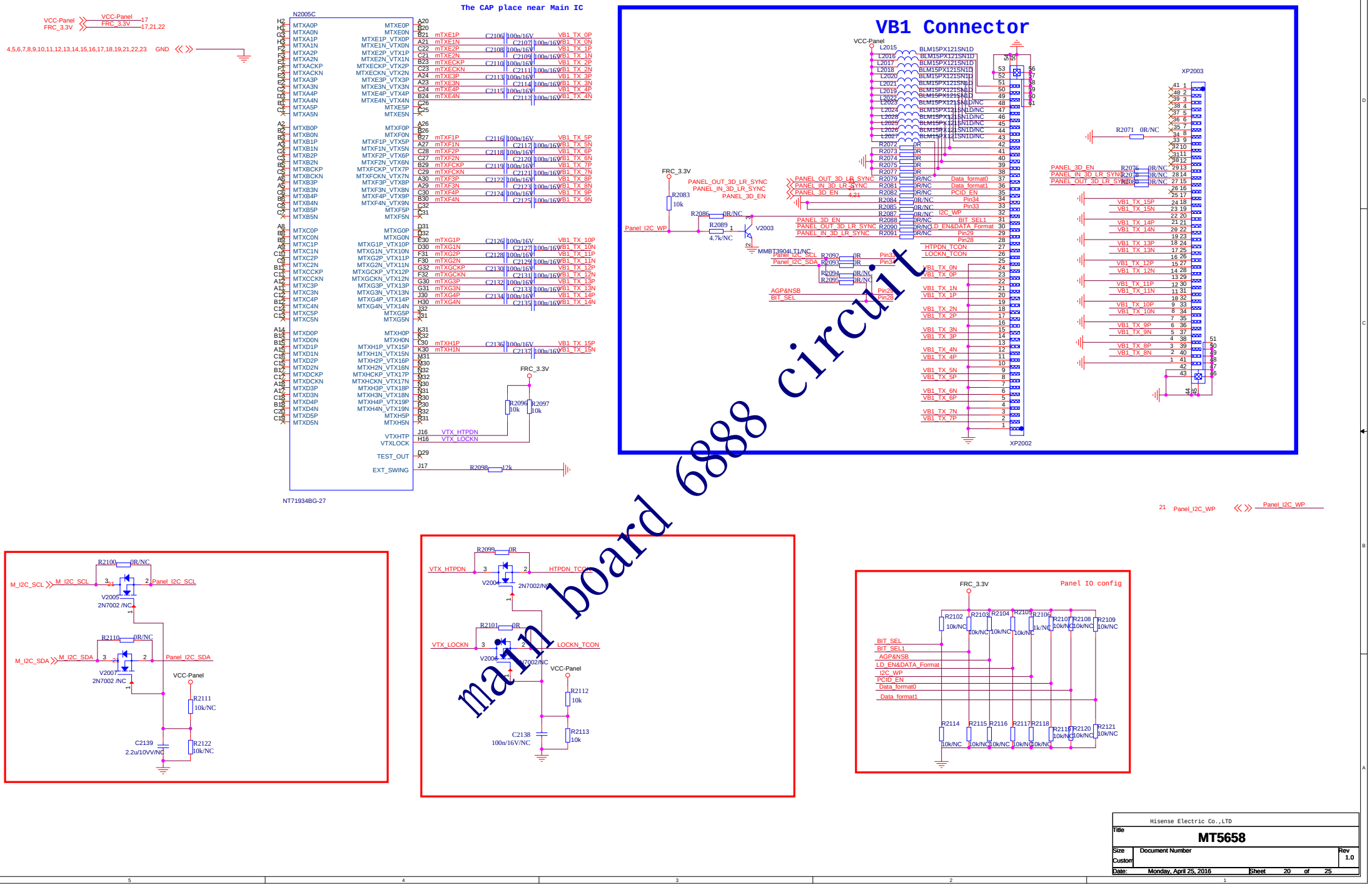
The CAP near MainIC



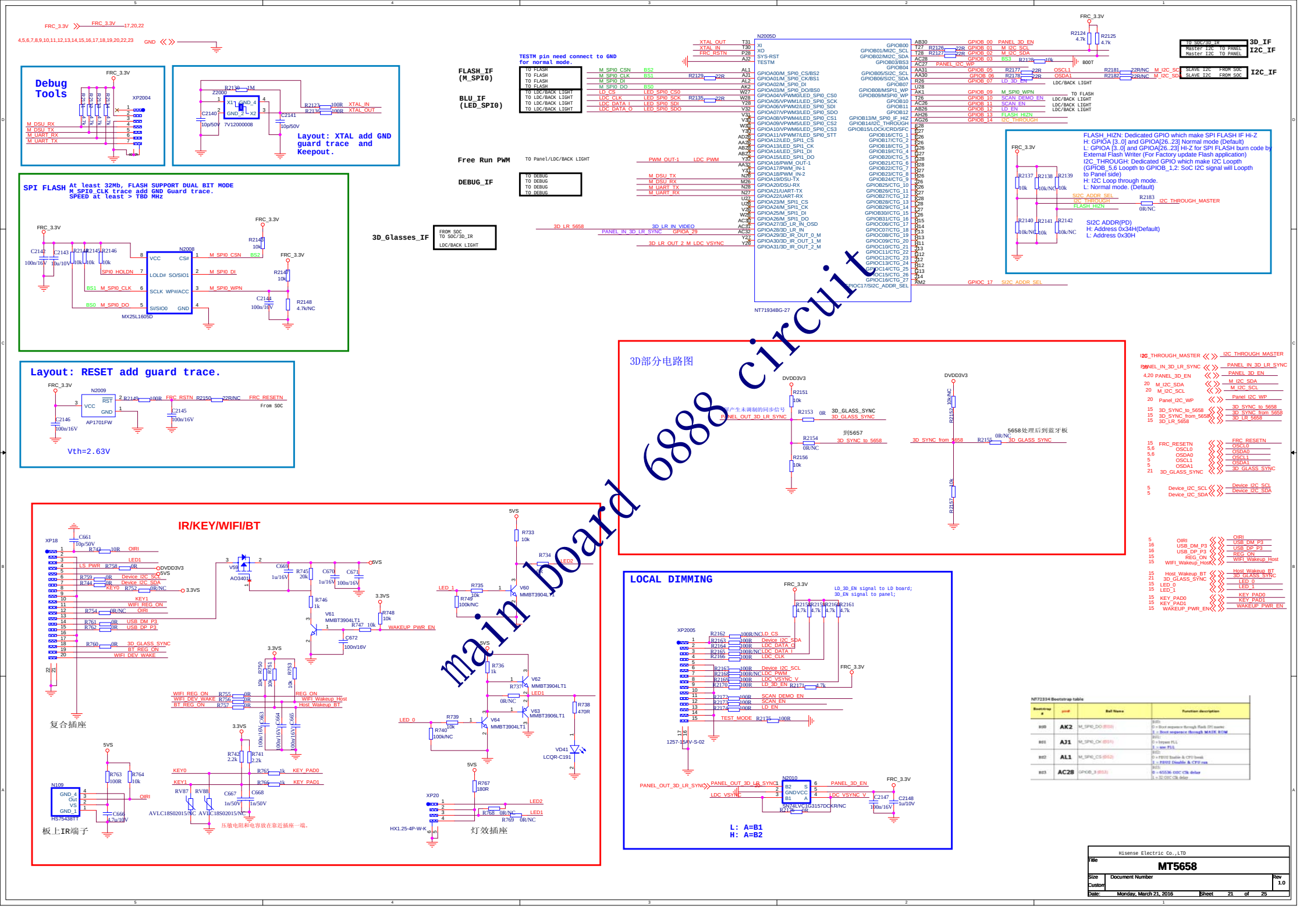
Pull-up resistor is needed at the VB1 transmitter side.
LOCKN is open drain output at the VB1 receiver side.

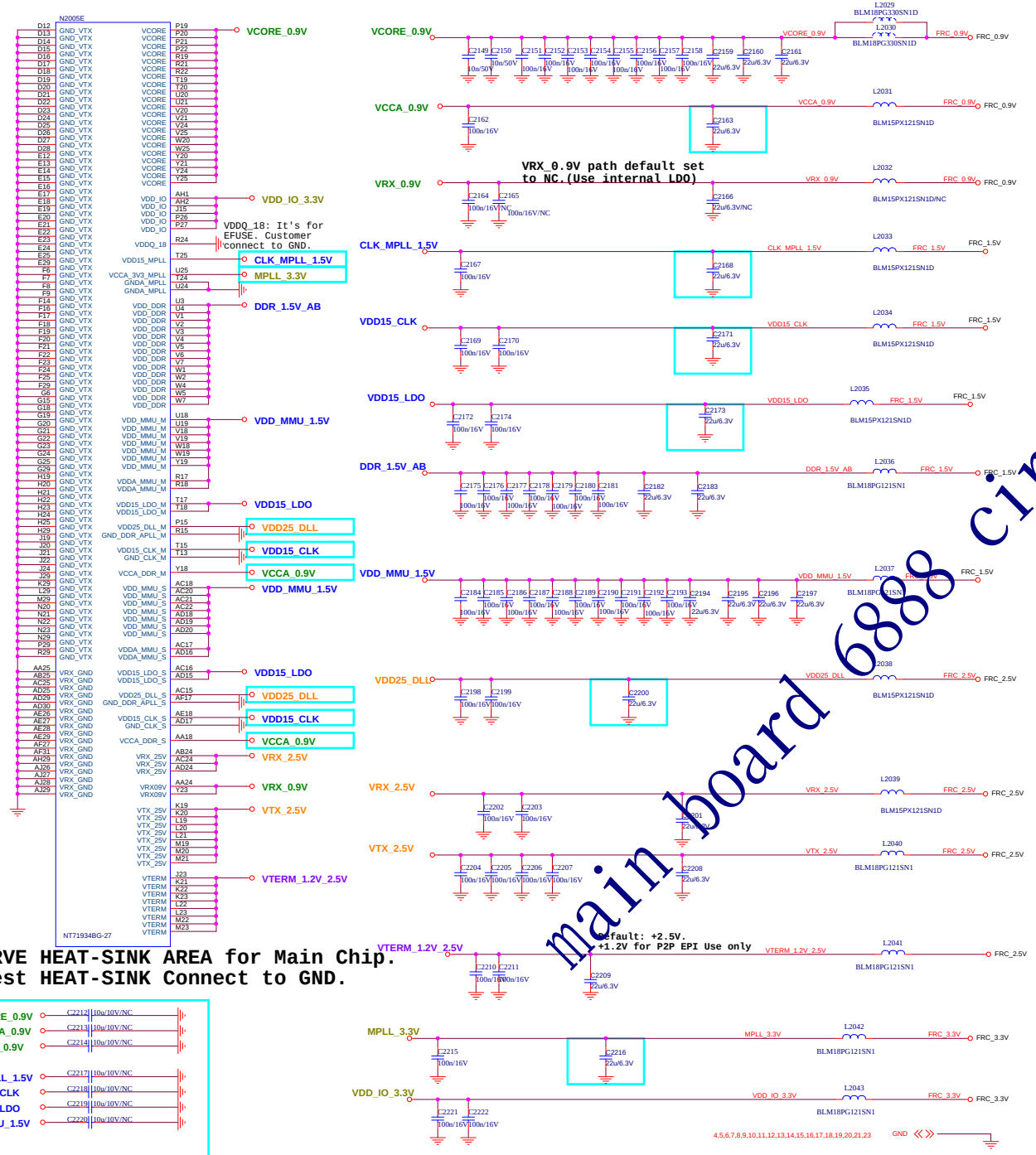
VRX_HTPDx and VRX_LOCKx are controlled by register define.

Hisense Electric Co.,LTD		
Title: **MT5658**		
Size: Custom	Document Number	Rev: 1.0
Date: Monday, March 21, 2016	Sheet 19 of 25	



Hisense Electric Co.,LTD	
Title	MT5658
Size / Custom	Document Number / Rev 1.0
Date: Monday, April 25, 2016	Sheet 20 of 25


Debug Tools
XP2004
M_DSU_RX
M_DSU_TX
M_UART_RX
M_UART_TX
Layout: XTAL add GND guard trace and Keepout.
SPI FLASH At least 32Mb, FLASH SUPPORT DUAL BIT MODE
M_SPI0_CLK trace add GND Guard trace.
SPEED at least > TBD MHz
MX25L1605D
Layout: RESET add guard trace.
AP1701FW
Vth=2.63V
FLASH_IF (M_SPI0)
BLU_IF (LED_SPI0)
Free Run PWM
DEBUG_IF
3D_Glasses_IF
TESTM pin need connect to GND for normal mode.
NT71934BG-27
FLASH_HIZN: Dedicated GPIO which make SPI FLASH IF Hi-Z
H: GPIOA [3..0] and GPIOA[26..23] Normal mode (Default)
L: GPIOA [3..0] and GPIOA[26..23] HI-Z for SPI FLASH burn code by External Flash Writer (For Factory update Flash application)
I2C_THROUGH: Dedicated GPIO which make I2C Loopth (GPIOB_5,6 Loopth to GPIOB_1,2: SoC I2C signal will Loopth to Panel side)
H: I2C Loop through mode.
L: Normal mode. (Default)
SI2C ADDR(PD)
H: Address 0x34H(Default)
L: Address 0x30H
3D_IF
I2C_IF
I2C_IF
3D部分电路图
IR/KEY/WIFI/BT
复合插座
板上IR端子
灯效插座
LOCAL DIMMING
L: A=B1
H: A=B2
main board 6888 circuit
Hisense Electric Co.,LTD
MT5658
Monday, March 21, 2016
Sheet 21 of 25



Power consumpiton estimate (Draft)

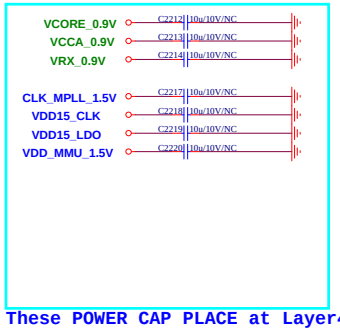
Name	Ball name	Voltage (V)	Current (mA)	Power (mW)	Total Current (mA)
LVR	LVR	0.9	0.2	0.18	4226.2
MDDR	VCCA_DDR_M	0.9	30	27	
SDDR	VCCA_DDR_S	0.9	30	27	
VCORE	VCORE	0.9	4056	3650.4	
VRX	VRX_0.9V	0.9	110	99	
VTX	VTERM	1.2	TBD	TBD	
EXT DDR	EXT DDR	1.5	284	426	1540
INT DDR DIE	VDD_DDR	1.5	284	426	
MDDR	VDD15_LDO_M	1.5	110	165	
MDDR	VDDA_MMU_M	1.5	68	102	
MDDR	VDD_MMU_M	1.5	273	409.5	
MDDR	VDD15_CLK_M	1.5	20	30	
MPLL	VDD15_MPLL	1.5	30	45	
SDDR	VDD15_LDO_S	1.5	110	165	
SDDR	VDDA_MMU_S	1.5	68	102	
SDDR	VDD_MMU_S	1.5	273	409.5	
SDDR	VDD15_CLK_S	1.5	20	30	
MDDR	VDD25_DLL_M	2.5	37	92.5	828
SDDR	VDD25_DLL_S	2.5	37	92.5	
VRX	VRX_25V	2.5	60	150	
VTX	VTX_25V	2.5	694	1735	
IO	VDD_IO	3.3	5	16.5	13
LVR	LVR	3.3	1	3.3	
MPLL	VCCA_3V3_MPLL	3.3	7	23.1	

PCB External Trace Width Calculator

Trace Width Calculator (For Layout reference)

Item	Data	Units
+0.90V	Location: Set = External	
	Temp CHANGE: Solve = 20	Degree C
	Width: Solve = 80	Mil
	Thickness: Solve = 1.	○ Mil ◉ Oz
	Current: Solve = 5.509	Amp
+1.2V	Location: Set = External	
	Temp CHANGE: Solve = 10	Degree C
	Width: Solve = 20	Mil
	Thickness: Solve = 1.	○ Mil ◉ Oz
	Current: Solve = 1.61	Amp
+1.5V	Location: Set = External	
	Temp CHANGE: Solve = 10	Degree C
	Width: Solve = 30	Mil
	Thickness: Solve = 1.	○ Mil ◉ Oz
	Current: Solve = 2.116	Amp
+2.5V	Location: Set = External	
	Temp CHANGE: Solve = 10	Degree C
	Width: Solve = 10	Mil
	Thickness: Solve = 1.	○ Mil ◉ Oz
	Current: Solve = 1.01	Amp
+3.3V	Location: Set = External	
	Temp CHANGE: Solve = 10	Degree C
	Width: Solve = 100	Mil
	Thickness: Solve = 1.	○ Mil ◉ Oz
	Current: Solve = 6.402	Amp

RESERVE HEAT-SINK AREA for Main Chip.
Suggest HEAT-SINK Connect to GND.

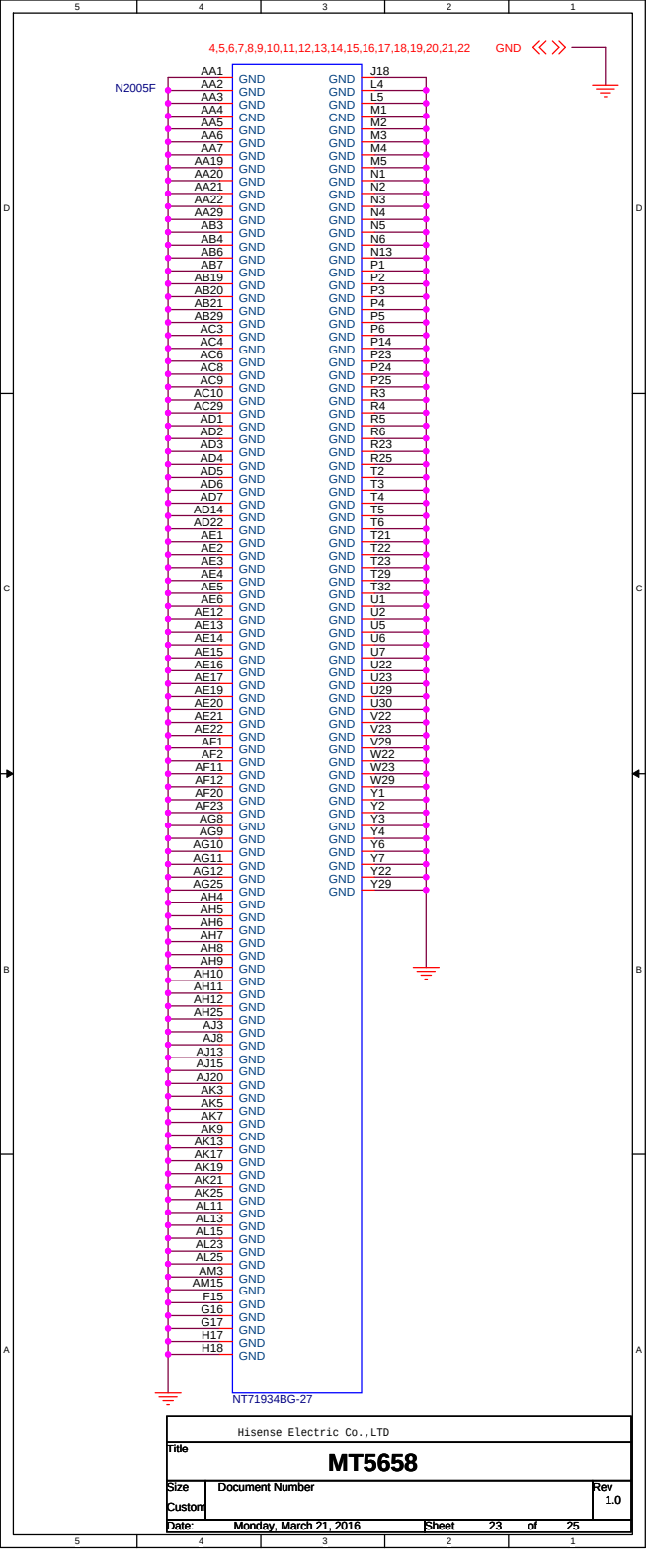


These POWER CAP PLACE at Layer4, just for debug use.

The POWER CAP PLACE NEAR Main IC

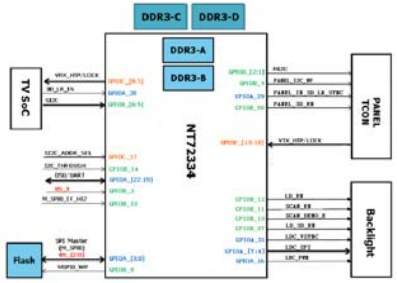
Please add a 22uF cap for the CLK/DLL/MPLL power IF.

Hisense Electric Co.,LTD	
Title	MT5658
Size / Document Number	Rev 1.0
Custom	
Date: Monday, March 21, 2016	Sheet 22 of 25



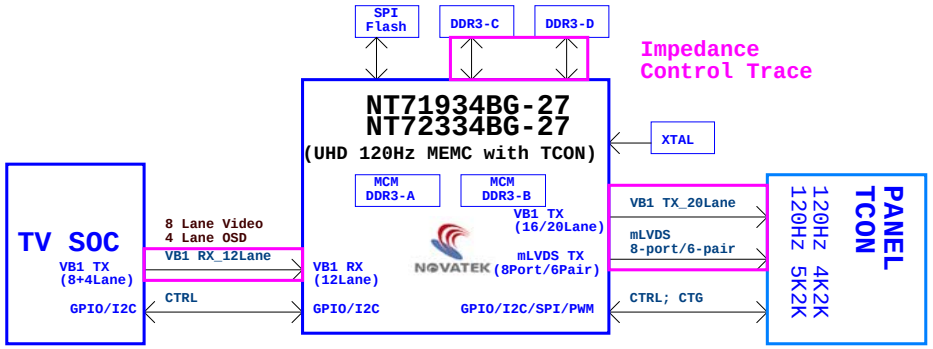
main board 6888 circuit

GPIO LIST

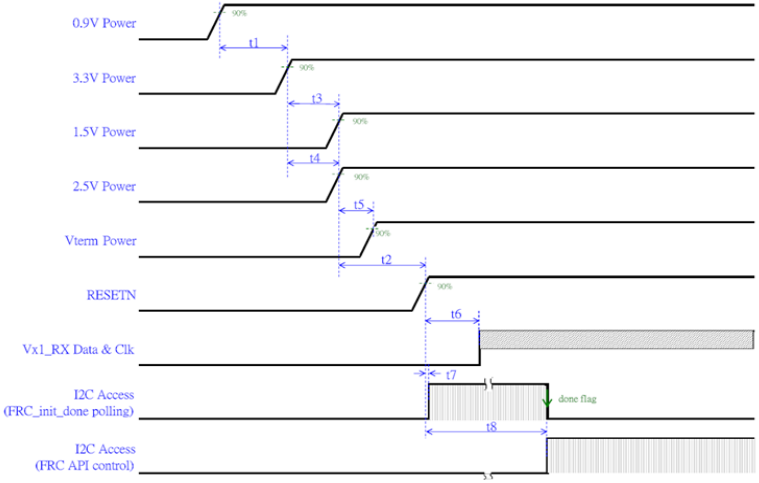


Ball name	Hisense name	Ball No.	Hisense Function	Power on Default status	Output/Input Voltage	Driving Strength (mA)	
GPIOA00/M_SPI0_CS/BS2	M_SPI0_CSN	AL1	SPI_Flash CSn	Input/PU	3.3V	8mA	
GPIOA01/M_SPI0_CK/BS1	M_SPI0_CLK	AJ1	SPI_Flash Clock	Input/PU	3.3V	8mA	
GPIOA02/M_SPI0_DI	M_SPI0_DI	AL2	SPI_Flash MISO	Input/PU	3.3V	8mA	
GPIOA03/M_SPI0_DO/BS0	M_SPI0_DO	AK2	SPI_Flash MOSI	Input/PU	3.3V	8mA	
GPIOA04/VPWM0/LED_SPI0_CS0	LD_CS	W27	LDC CS	Input/PU	3.3V	8mA	
GPIOA05/VPWM1/LED_SPI0_SCK	LDC CLK	W28	LDC CLK	Input/PU	3.3V	8mA	
GPIOA06/VPWM2/LED_SPI0_SDI	LDC_DATA_I	Y28	LDC data input	Input/PU	3.3V	8mA	
GPIOA07/VPWM3/LED_SPI0_SDO	LDC_DATA_O	V32	LDC data output	Input/PU	3.3V	8mA	
GPIOA08/VPWM4/LED_SPI0_CS1	NC	V31	NC	Input/PU	3.3V	8mA	
GPIOA09/VPWM5/LED_SPI0_CS2	NC	V30	NC	Input/PU	3.3V	8mA	
GPIOA10/VPWM6/LED_SPI0_CS3	NC	W30	NC	Input/PU	3.3V	8mA	
GPIOA11/VPWM7/LED_SPI0_STT	NC	Y30	NC	Input/PU	3.3V	8mA	
GPIOA12/LED_SPI1_CS	NC	AD16	NC	Input/PU	3.3V	8mA	
GPIOA13/LED_SPI1_CK	NC	AA26	NC	Input/PU	3.3V	8mA	
GPIOA14/LED_SPI1_DI	NC	AB28	NC	Input/PU	3.3V	8mA	
GPIOA15/LED_SPI1_DO	NC	AB27	NC	Input/PU	3.3V	8mA	
GPIOA16/PWM_OUT-1	LDC_PWM	Y32	LDC_PWM	Input/PU	3.3V	4mA	
GPIOA17/PWM_IN-1	NC	AA32	NC	Input/PU	3.3V	4mA	
GPIOA18/PWM_IN-2	NC	Y31	NC	Input/PU	3.3V	4mA	
GPIOA19/DSU-TX	M_DSU_TX	N26	DSU TX for MCU debug	Input/PU	3.3V	4mA	
GPIOA20/DSU-RX	M_DSU_RX	M26	DSU TX for MCU debug	Input/PU	3.3V	4mA	
GPIOA21/UART-TX	M_UART_TX	N28	UART TX pin for MCU debug	Input/PU	3.3V	4mA	
GPIOA22/UART-RX	M_UART_RX	N27	UART TX pin for MCU debug	Input/PU	3.3V	4mA	
GPIOA23/M_SPI1_CS	NC	U27	NC	Input/PU	3.3V	8mA	
GPIOA24/M_SPI1_CK	NC	U26	NC	Input/PU	3.3V	8mA	
GPIOA25/M_SPI1_DI	NC	V26	NC	Input/PU	3.3V	8mA	
GPIOA26/M_SPI1_DO	NC	W26	NC	Input/PU	3.3V	8mA	
GPIOA27/3D_LR_IN_OSD	NC	AC30	NC	Input/PU	3.3V	4mA	
GPIOA28/3D_LR_IN	3D_LR_IN_VIDEO	AC31	3D-LR input indication from SoC	Input/PU	3.3V	4mA	
GPIOA29/3D_IR_OUT_0_M	PANEL_IN_3D_LR_SYNC	AC32	3D-LR output NT to display	Input/PU	3.3V	4mA	
GPIOA30/3D_IR_OUT_1_M	NC	Y27	NC	Input/PU	3.3V	4mA	
GPIOA31/3D_IR_OUT_2_M	LDC_VSYNC	Y26	Vsync to LDC Driver	Input/PU	3.3V	4mA	
GPIO800	PANEL_3D_EN	AB30	Panel 3D Enable	Input/PU	3.3V	4mA	
GPIO801/M3C_SCL	M_I2C_SCL	T27	I2C master to drive display panel	Input/PU	3.3V	4mA	
GPIO802/M3C_SDA	M_I2C_SDA	T28	I2C master to drive display panel	Input/PU	3.3V	4mA	
GPIO803/BS3	GPIOB_03	AC28	BootStrap3: normal LOW	Input/PU	3.3V	4mA	BOOT STRAP 3
GPIO804	PANEL_I2C_WP	AC27	Panel I2C WP TN	Input/PU	3.3V	4mA	
GPIO805/S2C_SCL	OSCL1	AA31	I2C slave: control by SoC	Input/PU	3.3V	4mA	
GPIO806/S2C_SDA	OSDA1	AA30	I2C slave: control by SoC	Input/PU	3.3V	4mA	
GPIO807	LD_3D_EN	R26	LDC 3D enbale	Input/PU	3.3V	4mA	
GPIO808/MSPI1_WP	NC	U28	NC	Input/PU	3.3V	4mA	
GPIO809/MSPI0_WP	M_SPI0_WPN	AE1	SPI_Flash WP	Input/PU	3.3V	4mA	
GPIO810	SCAN_DEMO_EN	T26	SCAN_DEMO_EN	Input/PU	3.3V	4mA	
GPIO811	SCAN_EN	AC26	SCAN_EN	Input/PU	3.3V	4mA	
GPIO812	LD_EN	AB26	LD_EN	Input/PU	3.3V	4mA	
GPIO813/M_SPI0_IF_HIZ	FLASH_HIZN	AH26	HIGH: Normal mode; LOW: SPI FLASH output Hi-Z	Input/PU	3.3V	4mA	LOW= Hiz; HIGH = Normal
GPIO814/I2C THROUGH	I2C THROUGH	AG26	LOW: Normal mode	Input/PD	3.3V	4mA	LOW
GPIO815/LOCK/CRD/SPC	NC	E36	NC	Input/PU	3.3V/1.8V/1.2V	4mA	
GPIO816/CTG_1		E27		Input/PD	3.3V	4mA	
GPIO817/CTG_2		E26		Input/PD	3.3V	4mA	
GPIO818/CTG_3		F26		Input/PD	3.3V	4mA	
GPIO819/CTG_4		G26		Input/PD	3.3V	4mA	
GPIO820/CTG_5		G27		Input/PD	3.3V	4mA	
GPIO821/CTG_6		G28		Input/PD	3.3V	4mA	
GPIO822/CTG_7		H28		Input/PU	3.3V	4mA	
GPIO823/CTG_8		H27		Input/PU	3.3V	4mA	
GPIO824/CTG_9		H26		Input/PD	3.3V	4mA	
GPIO825/CTG_10		J26		Input/PD	3.3V	4mA	
GPIO826/CTG_11		K26		Input/PD	3.3V	4mA	
GPIO827/CTG_12		K27		Input/PD	3.3V	4mA	
GPIO828/CTG_13		K28		Input/PD	3.3V	4mA	
GPIO829/CTG_14		L28		Input/PU	3.3V	4mA	
GPIO830/CTG_15		L27		Input/PD	3.3V	4mA	
GPIO831/CTG_16		L26		Input/PD	3.3V	4mA	
GPIOC06/CTG_17		H15		Input/PD	3.3V	4mA	
GPIOC07/CTG_18		H14		Input/PD	3.3V	4mA	
GPIOC08/CTG_19		F13		Input/PD	3.3V	4mA	
GPIOC09/CTG_20		H13		Input/PD	3.3V	4mA	
GPIOC10/CTG_21		H11		Input/PD	3.3V	4mA	
GPIOC11/CTG_22		J13		Input/PD	3.3V	4mA	
GPIOC12/CTG_23		G12		Input/PD	3.3V	4mA	
GPIOC13/CTG_24		J12		Input/PD	3.3V	4mA	
GPIOC14/CTG_25		H12		Input/PD	3.3V	4mA	
GPIOC15/CTG_26		G13		Input/PD	3.3V	4mA	
GPIOC16/CTG_27		J14		Input/PD	3.3V	4mA	
GPIOC17/S2C_ADDR_SEL	S2C_ADDR_SEL	AM3	High =0x34	Input/PU	3.3V	4mA	HIGH
RX Control	VTXHTP		VTXHTP	Input/PD	3.3V/1.8V/1.2V	4mA	
RX Control	VTXLOCK		VTXLOCK	Input/PD	3.3V/1.8V/1.2V	4mA	
RX1 Control	VRXHTP_A		VRXHTP_A	Input/PD	3.3V/1.8V/1.2V	4mA	
RX1 Control	VRXLOCK_A		VRXLOCK_A	Input/PD	3.3V/1.8V/1.2V	4mA	
RX2 Control	VRXHTP_B		VRXHTP_B	Input/PD	3.3V/1.8V/1.2V	4mA	
RX2 Control	VRXLOCK_B		VRXLOCK_B	Input/PD	3.3V/1.8V/1.2V	4mA	
RX3 CEC	VRXHTP_C		VRXHTP_C	Input/PD	3.3V/1.8V/1.2V	4mA	
RX3 CEC	VRXLOCK_C		VRXLOCK_C	Input/PD	3.3V/1.8V/1.2V	4mA	

MT5658



Power On Sequence Requirement:



Parameter	Value			Unit.	Note.
	Min.	Typ.	Max.		
t1	3	—	—	msec	0.9V ↑ to 3.3V ↑ delay time
t2	10	—	—	msec	All power stable to RESETN ↑ delay time
t3	-1	—	2	msec	3.3V ↑ to 1.5V ↑ delay time
t4	-1	—	2	msec	3.3V ↑ to 2.5V ↑ delay time
t5	0	—	5	msec	2.5V ↑ to Verm ↑ delay time
t6	—	—	10	msec	RESETN ↑ to "Vx1_RX **clk stable**" delay time
t7	0	—	—	msec	RESETN ↑ to "SOC start polling FRC_init_done flag" delay time
t8	—	—	800	msec	RESETN ↑ to "FRC ready to accept API command" delay time

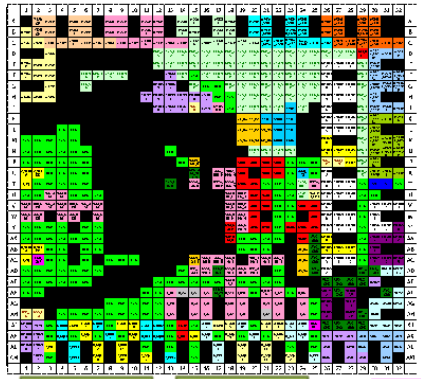
DIP SW GPIOx11 Uase Case Selection

Panel CTRL Jumper GPIOx8

Vx1 TX 8/16/20 Lane

mLVDS TX IF: 8port/6pair
CTG: GPIOB_[31:15]; CPIOC_[16:6]

NT72334/NT71934
27mm x 27mm



CTRL with SoC GPIOx9

I2C Slave SoC 2pin

M_CPU Debug IF

I2C Msater TCON 2pin

Crystal

Demura IF M_SPI1 IF

S_CPU Debug IF

LED 8pin PWM/SPI

Ambi IF LED SPI1

3D 6pin TCON, IR

PWM Ctrl 3pin

POWER Block

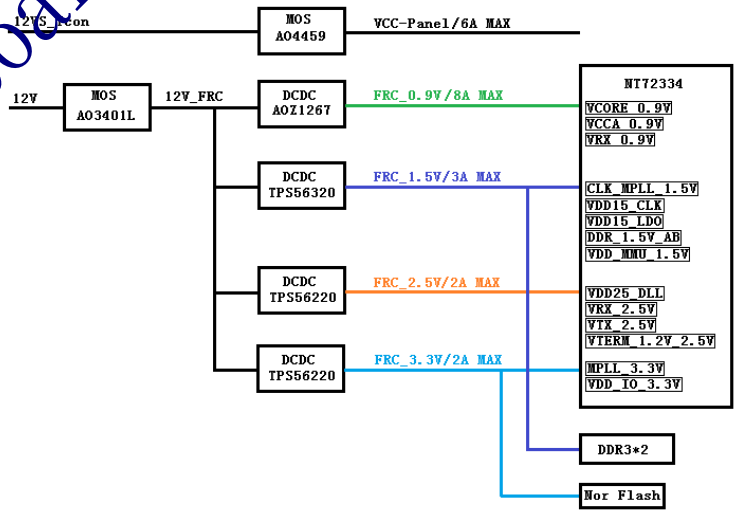
Boot Strap 4 Pin

SPI Flah 32Mb, Dual

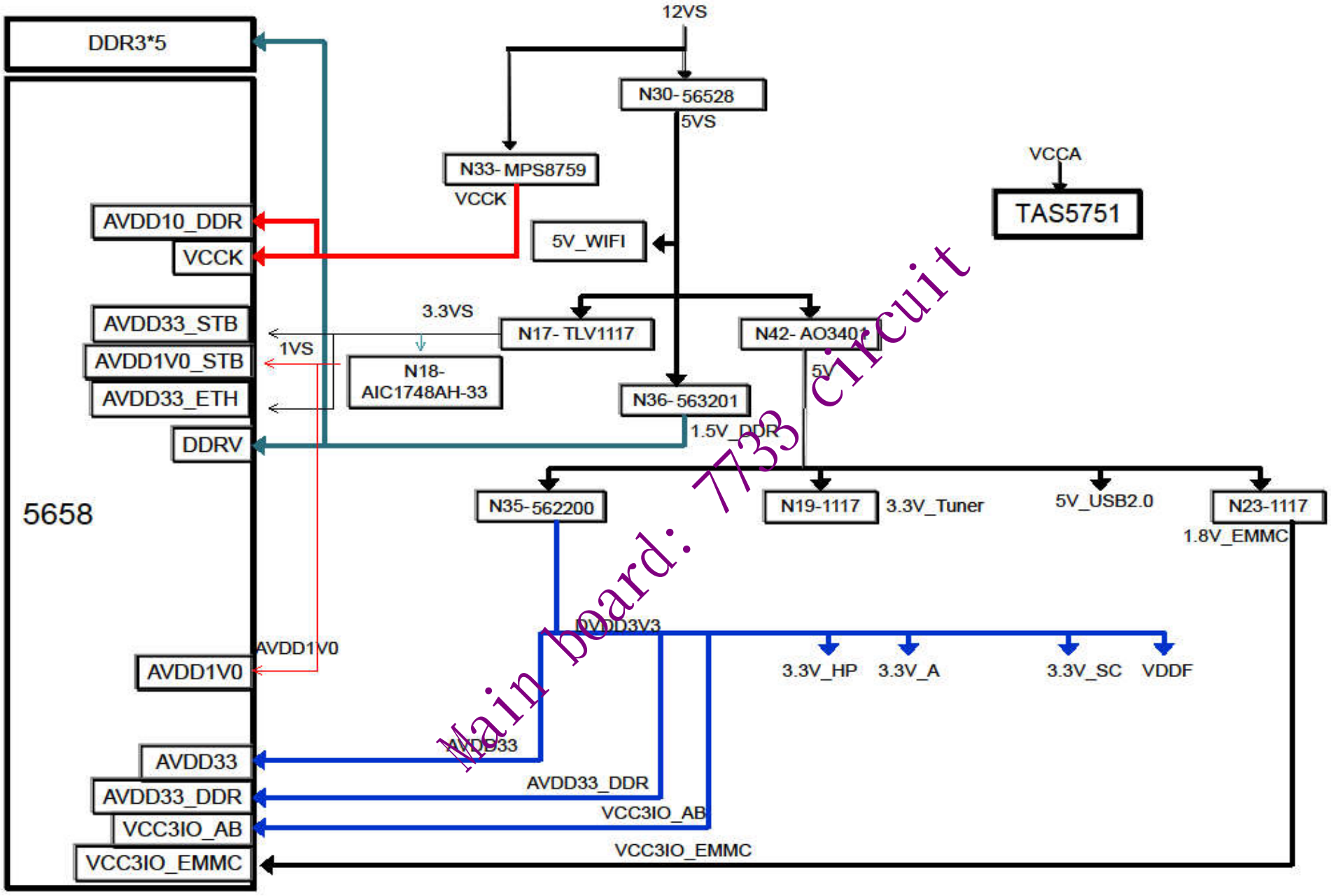
DDR3

DDR3

VB1 RX IF
8 Lane Video+
4 Lane OSD

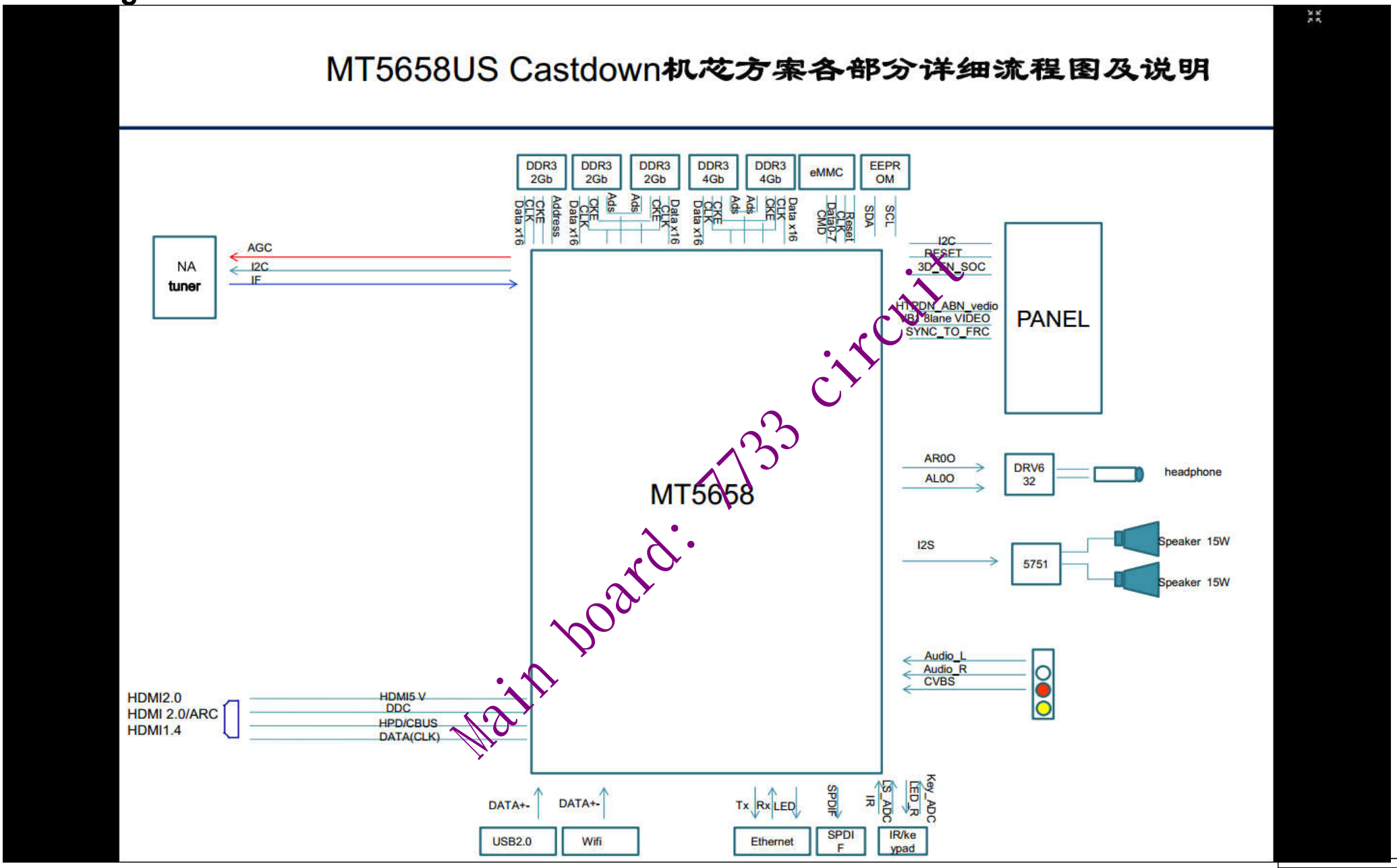


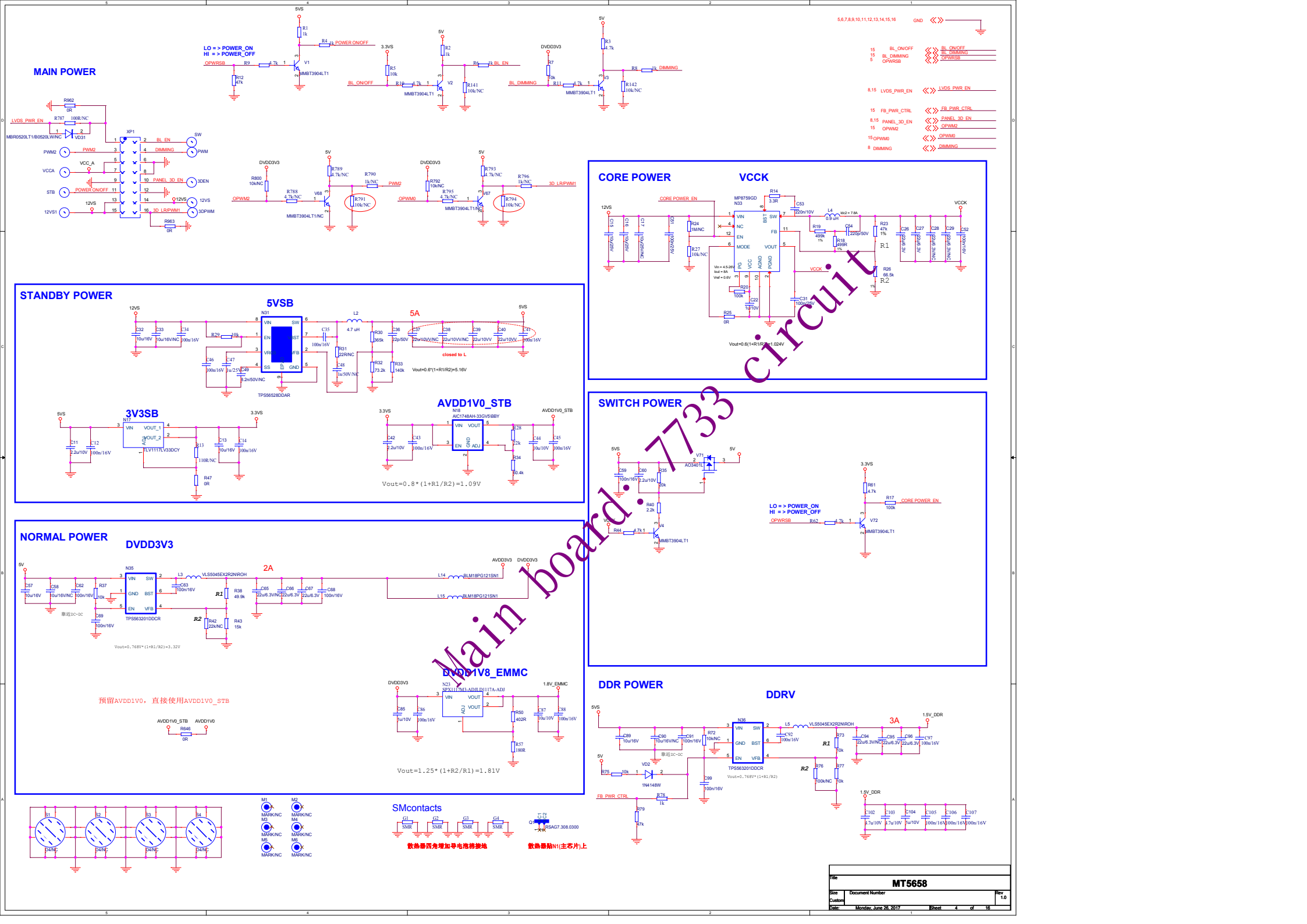
Hisense Electric Co.,LTD		
Title	MT5658	
Size: Custom	Document Number	Rev 1.0
Date: Monday, March 21, 2016	Sheet 25 of 25	

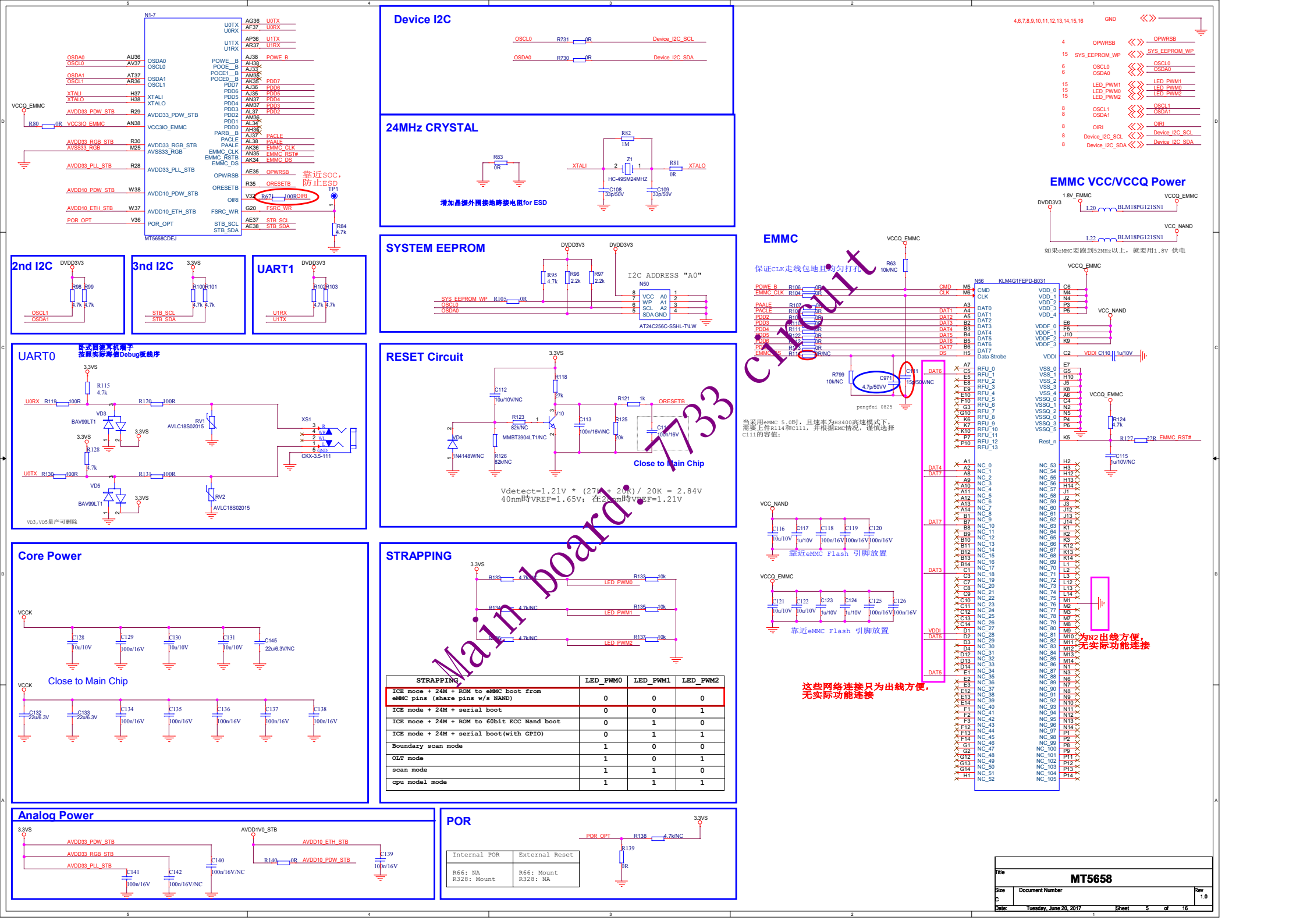


Title	MT5658	
Size C	Document Number	Rev 1.0
Date: Thursday, May 11, 2017	Sheet 2 of 16	

Block Diagram



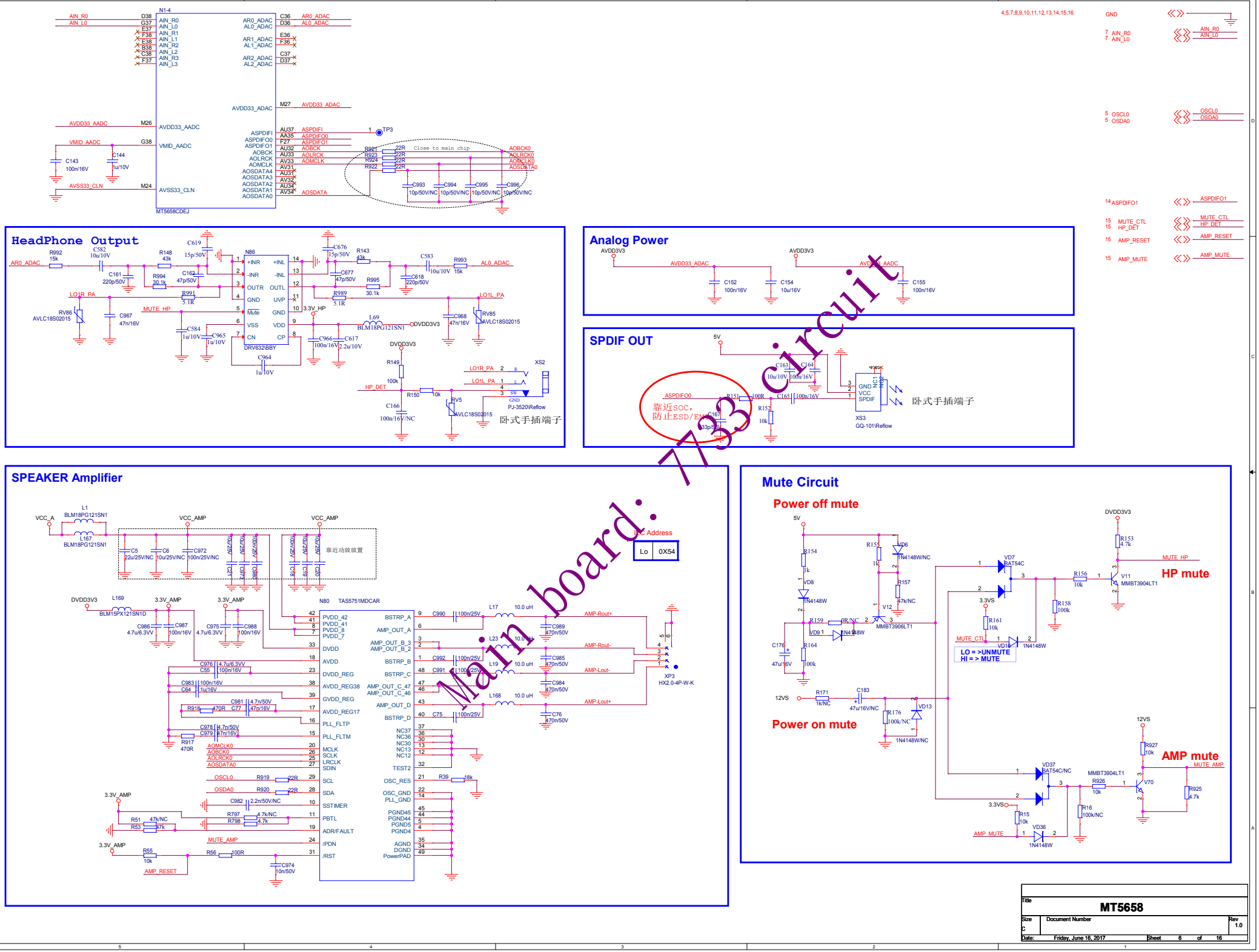

MAIN POWER
LO = > POWER_ON
HI = > POWER_OFF
OPWRSB
POWER ON/OFF
BL_ON/OFF
BL_DIMMING
BL_EN
DIMMING
LVDS_PWR_EN
PWM2
VCC_A
VCCA
STB
12VS1
PANEL_3D_EN
3D_LR/PWM1
3DEN
3DPWM
GND
BL_ON/OFF
BL_DIMMING
OPWRSB
LVDS_PWR_EN
FB_PWR_CTRL
PANEL_3D_EN
OPWM2
OPWM0
DIMMING
CORE POWER
VCCK
CORE POWER_EN
MP8759GD
Vout=0.6(1+R1/R2)=1.024V
STANDBY POWER
5VSB
TPS56528DDAR
closed to L
Vout=0.6*(1+R1/R2)=5.16V
3V3SB
TLV1117LV33DCY
AVDD1V0_STB
AIC1748AH-33GV/5/BBY
Vout=0.8*(1+R1/R2)=1.09V
SWITCH POWER
AO3401L
MMBT3904LT1
NORMAL POWER
DVDD3V3
TPS563201DDCR
Vout=0.768V*(1+R1/R2)=3.32V
2A
DVDD1V8_EMMC
SPX1117M3-ADJ/LD1117A-ADJ
Vout=1.25*(1+R2/R1)=1.81V
预留AVDD1V0，直接使用AVDD1V0_STB
DDR POWER
DDRV
3A
1.5V_DDR
1N4148W
SMcontacts
散热器四角增加导电连接接地
散热器贴N1(主芯片)上
Main board: 7733 circuit
Title
MT5658
Size
Custom
Document Number
Rev
1.0
Date:
Monday, June 26, 2017
Sheet
4
of
16

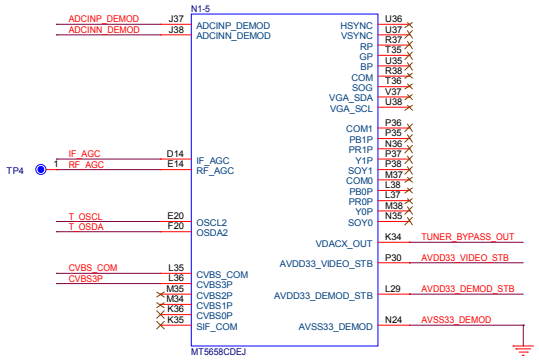


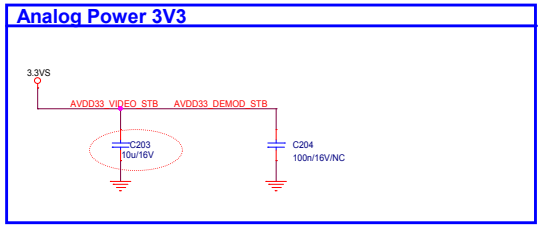
STRAPPING	LED_PWM0	LED_PWM1	LED_PWM2
ICE moce + 24M + ROM to eMMC boot from eMMC pins (share pins w/s NAND)	0	0	0
ICE mode + 24M + serial boot	0	0	1
ICE mode + 24M + ROM to 60bit ECC Nand boot	0	1	0
ICE mode + 24M + serial boot(with GPIO)	0	1	1
Boundary scan mode	1	0	0
OLT mode	1	0	1
scan mode	1	1	0
cpu model mode	1	1	1

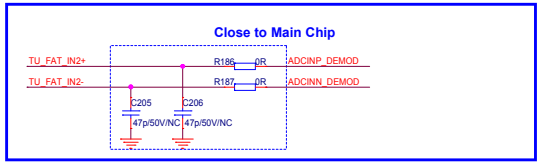
Internal POR	External Reset
R66: NA R328: Mount	R66: Mount R328: NA

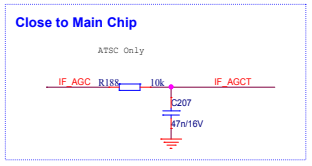
Title	MT5658		
Size: C	Document Number		Rev: 1.0
Date: Tuesday, June 20, 2017	Sheet 5 of 16		

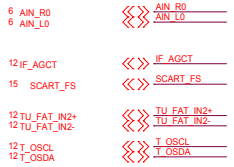

HeadPhone Output
Analog Power
SPDIF OUT
SPEAKER Amplifier
Mute Circuit
Power off mute
Power on mute
HP mute
AMP mute
Main board:
7733 circuit
卧式手插端子
靠近功放放置
靠近SOC，防止ESD/EMI
I2C Address
Lo 0X54
LO = >UNMUTE
HI = > MUTE
MT5658CDEJ
TAS5751MDCAR
DRV632BBY
Close to main chip
MT5658
Size C
Document Number
Rev 1.0
Date: Friday, June 16, 2017
Sheet 6 of 16



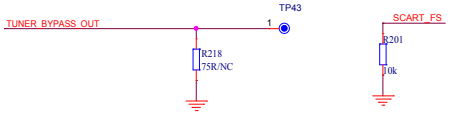


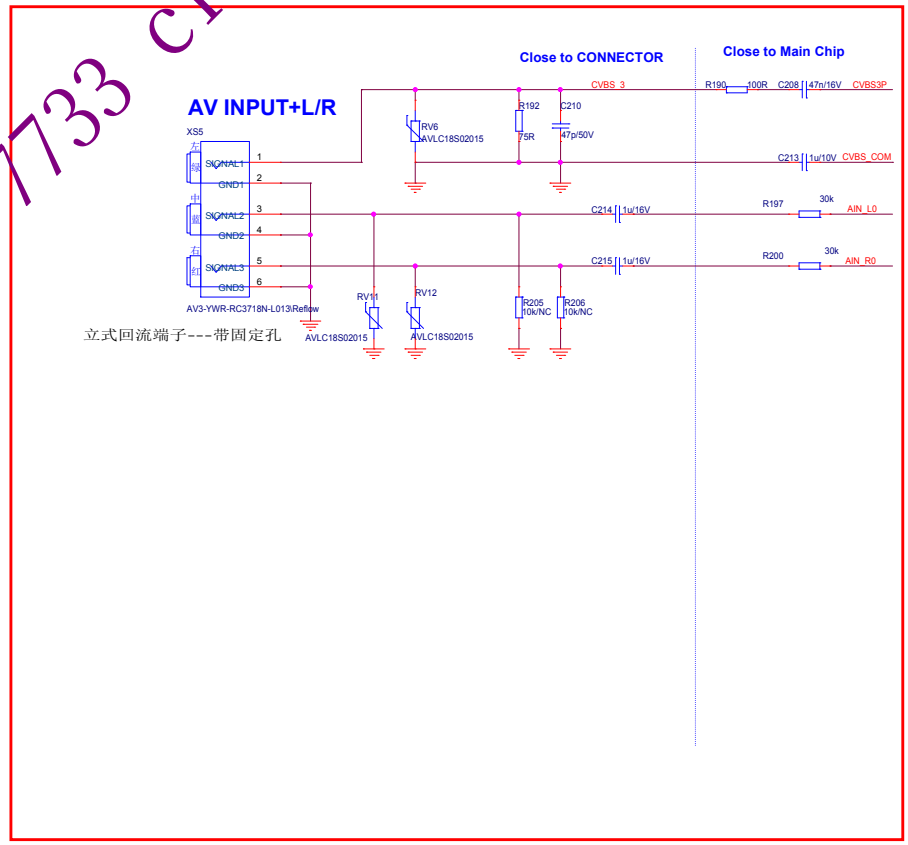




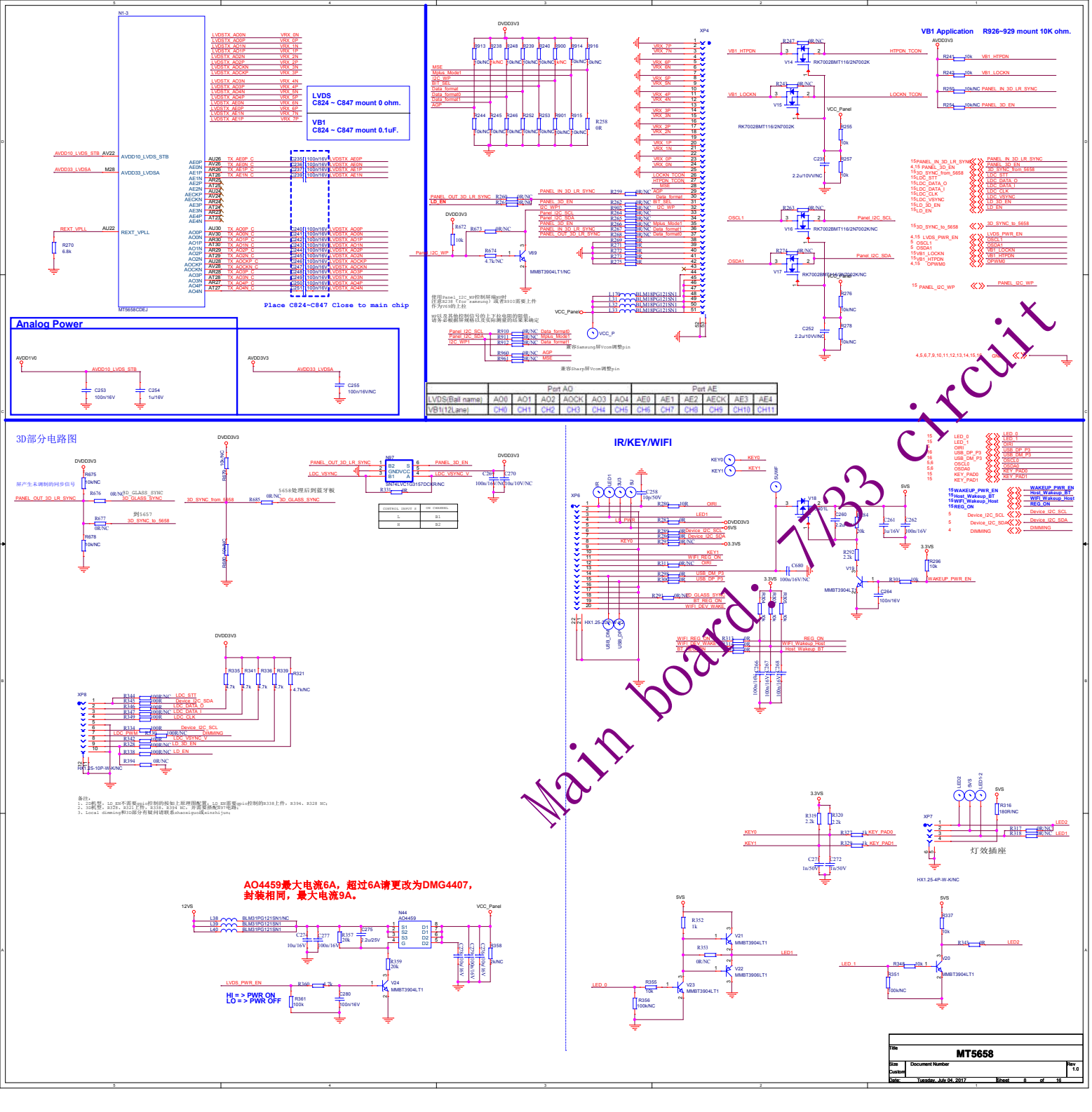


SCART (Full SCART) ---AV+RGB+AV OUT



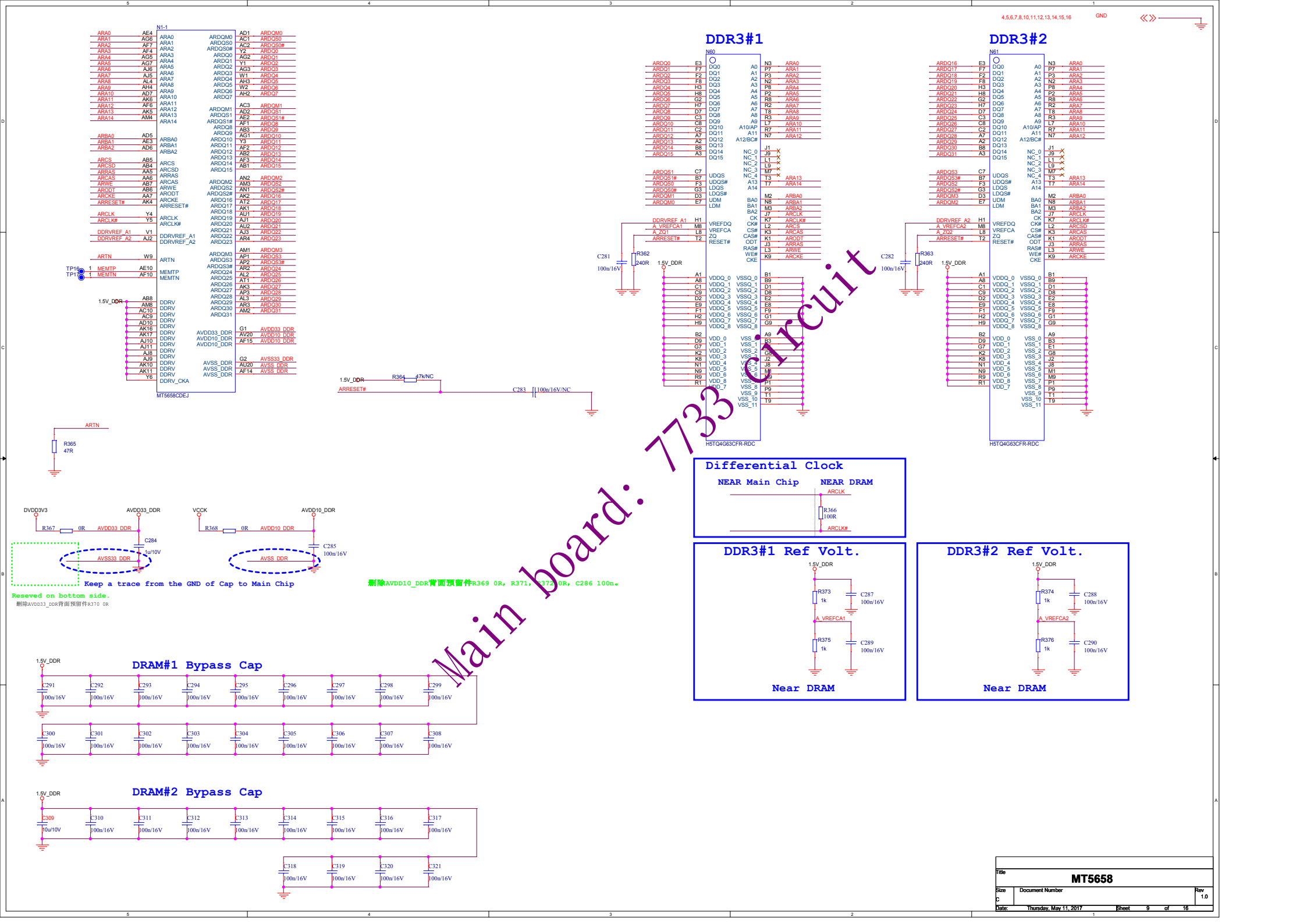


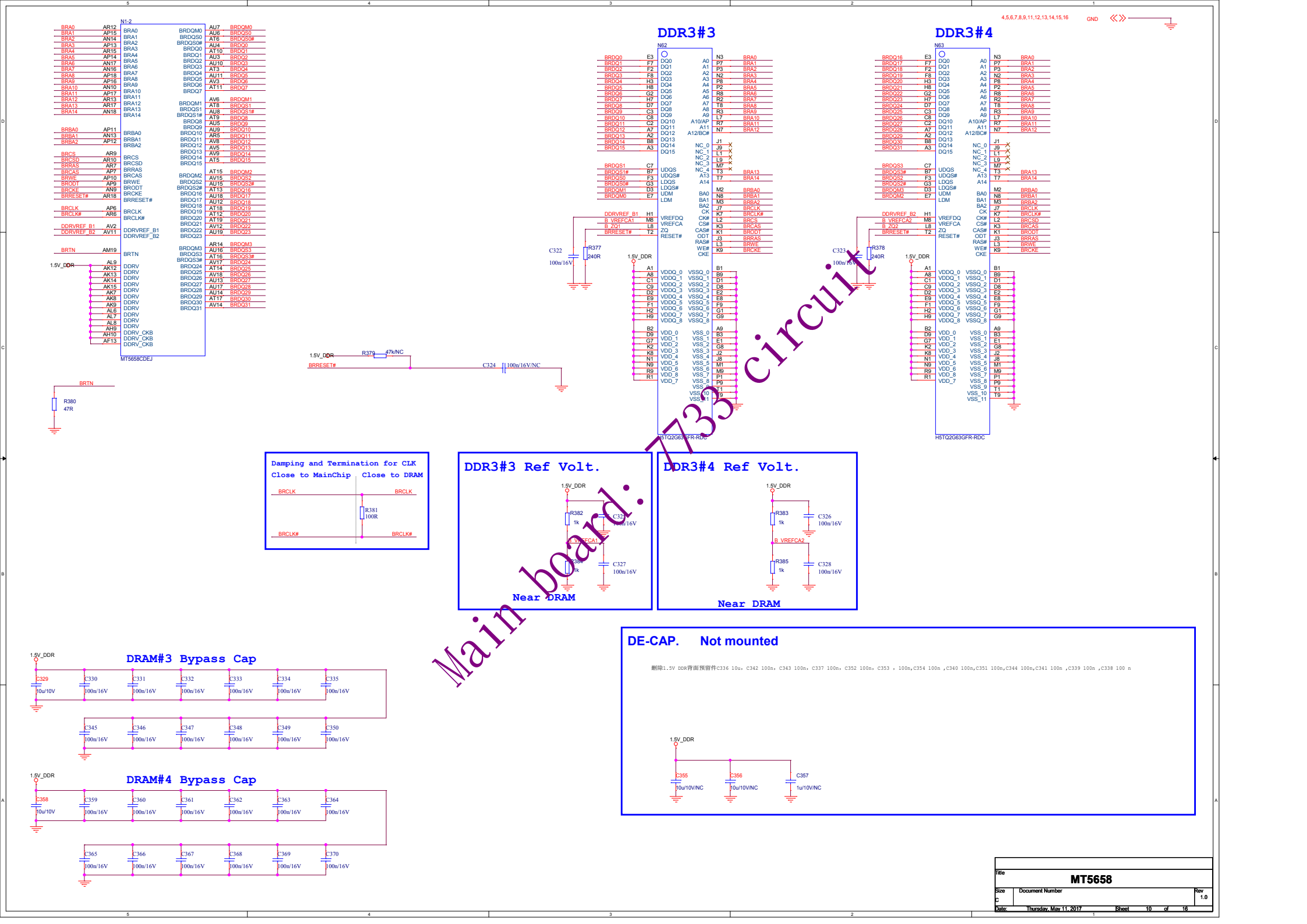
Title	MT5658	
Size: C	Document Number	Rev: 1.0
Date: Thursday, May 11, 2017	Sheet 7 of 16	



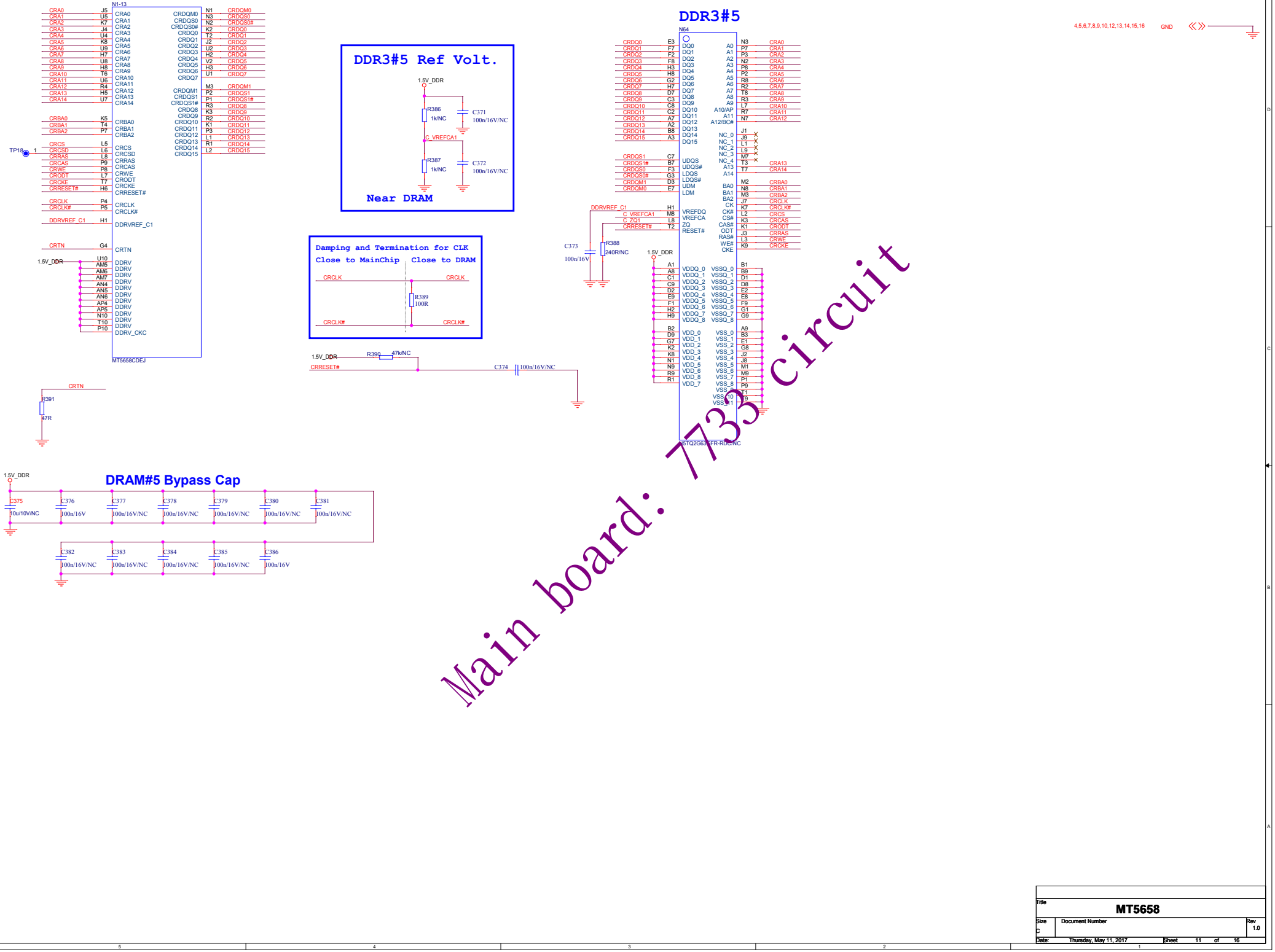
	Port A0					Port AE					
LVDS(Ball name)	AO0	AO1	AO2	AOCK	AO3	AO4	AE0	AE1	AE2	AECK	AE3	AE4
VB1(12Lane)	CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11

Title	MT5658		
Size: Custom	Document Number		Rev: 1.0
Date: Tuesday, July 04, 2017	Sheet 8	of	18

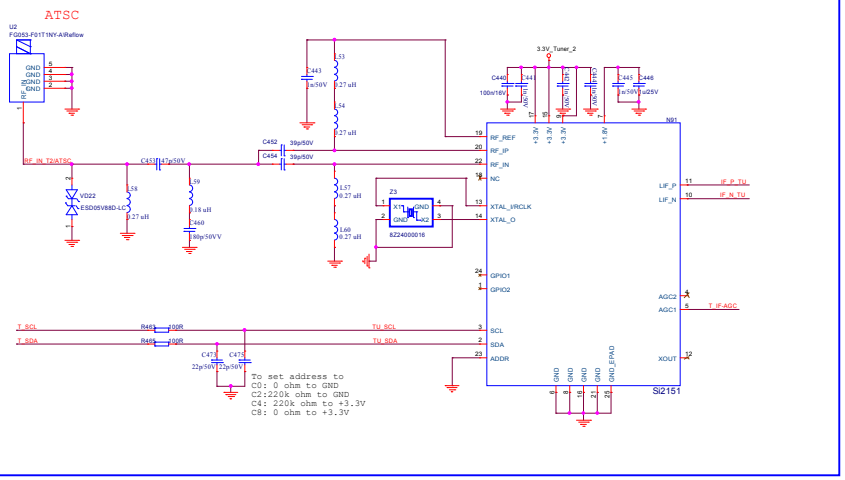

DDR3#1
DDR3#2
Differential Clock
NEAR Main Chip
NEAR DRAM
DDR3#1 Ref Volt.
DDR3#2 Ref Volt.
Near DRAM
Near DRAM
DRAM#1 Bypass Cap
DRAM#2 Bypass Cap
Keep a trace from the GND of Cap to Main Chip
Reseved on bottom side.
删除AVDD33_DDR背面预留件R370 0R
删除AVDD10_DDR背面预留件R369 0R, R371, R372 0R, C286 100n。
Main board: 7733 Circuit
MT5658
Title
Size
Document Number
Rev
1.0
Date: Thursday, May 11, 2017
Sheet 9 of 16



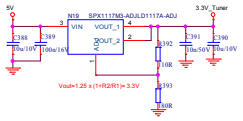
Title	MT5658
Size	C
Document Number	
Rev	1.0
Date:	Thursday, May 11, 2017
Sheet	10 of 16


DDR3#5
DDR3#5 Ref Volt.
Near DRAM
Damping and Termination for CLK
Close to MainChip
Close to DRAM
DRAM#5 Bypass Cap
MT5658CDEJ
Main board: 7735 circuit
Title
MT5658
Size
C
Document Number
Rev
1.0
Date: Thursday, May 11, 2017
Sheet 11 of 16

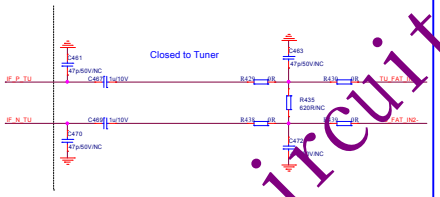
Tuner On Board for ATSC



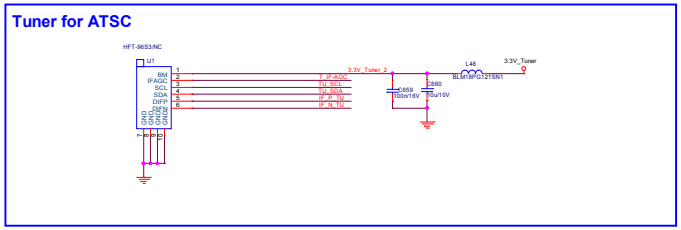
POWER For ATSC/DVB-T/C/T2_Tuner



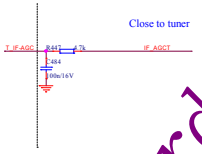
IF Differential Pair



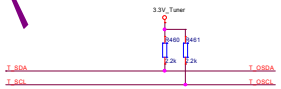
Tuner for ATSC

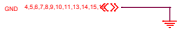


MT5658 AGC

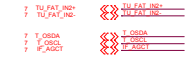


TUNER I2C PULL UP

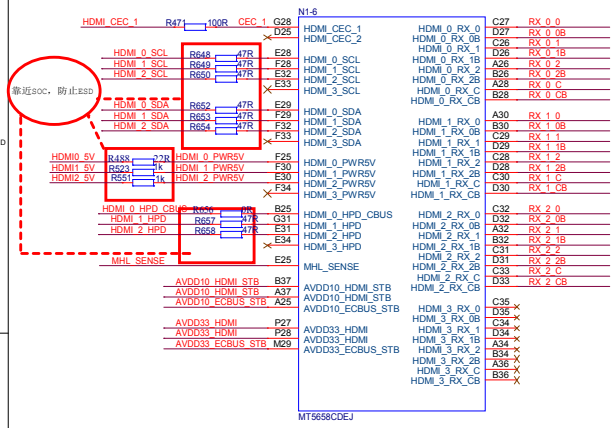


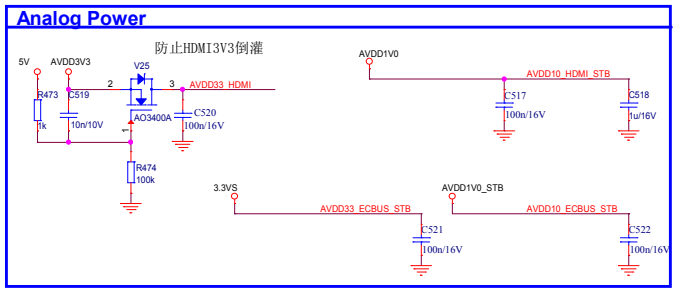


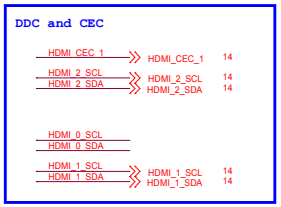
PCB排布优先等级
1.Xout1,Xout2 包地,不打VIA
2.IQ信号,对称打VIA,包地
3.IF,包地
4.AGC 信号,包地
5.I2C,包地
6.其他信号

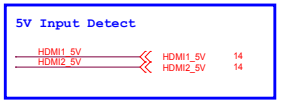


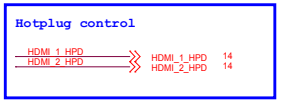
Title	MT5658	
Size: b	Document Number	Rev: 1.0
Date: Thursday, May 11, 2017	Sheet 12 of 16	

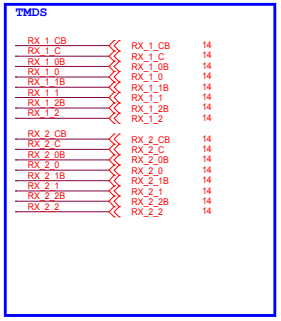




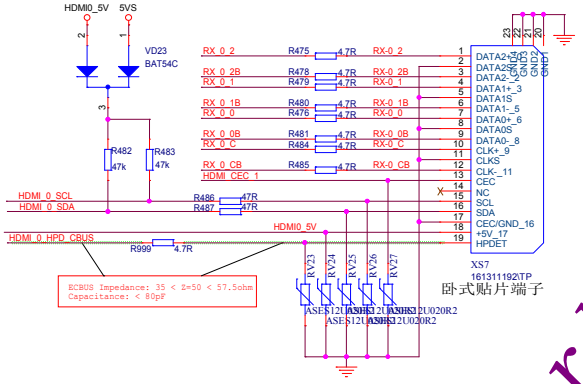


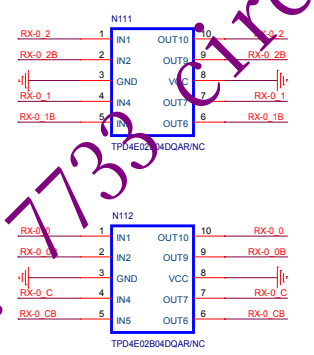


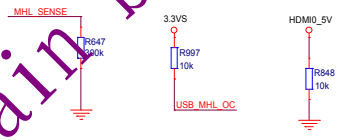




HDMI1 (Embedded EDID)

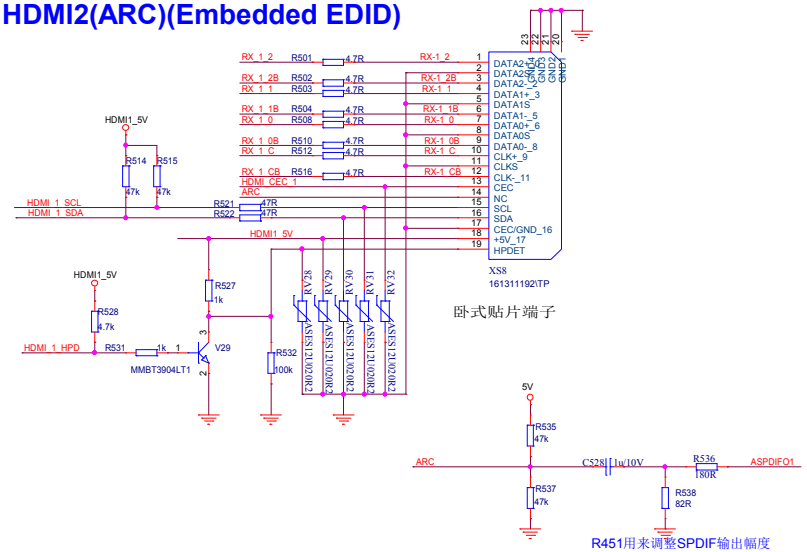


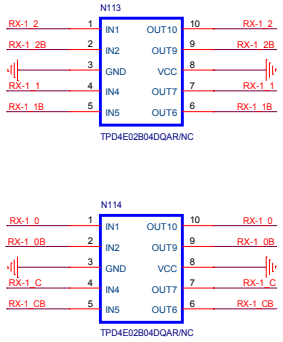




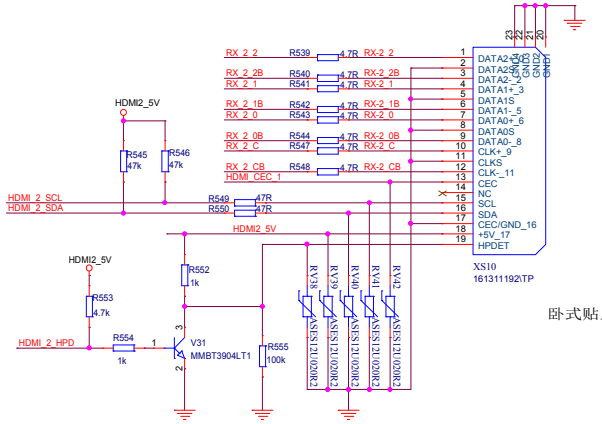
Title	MT5658	
Size: C	Document Number	Rev: 1.0
Date: Thursday, May 11, 2017	Sheet 13 of 16	

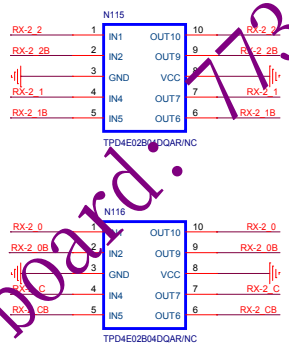
HDMI2(ARC)(Embedded EDID)





HDMI3(Embedded EDID)





4,5,6,7,8,9,10,11,12,13,15,16 GND

TMDS

RX_1_CB RX_1_CB 13
RX_1_C RX_1_C 13
RX_1_0B RX_1_0B 13
RX_1_0 RX_1_0 13
RX_1_1B RX_1_1B 13
RX_1_1 RX_1_1 13
RX_1_2B RX_1_2B 13
RX_1_2 RX_1_2 13
RX_2_CB RX_2_CB 13
RX_2_C RX_2_C 13
RX_2_0B RX_2_0B 13
RX_2_0 RX_2_0 13
RX_2_1B RX_2_1B 13
RX_2_1 RX_2_1 13
RX_2_2B RX_2_2B 13
RX_2_2 RX_2_2 13

HDMI1_5V HDMI1_5V 13
HDMI2_5V HDMI2_5V 13

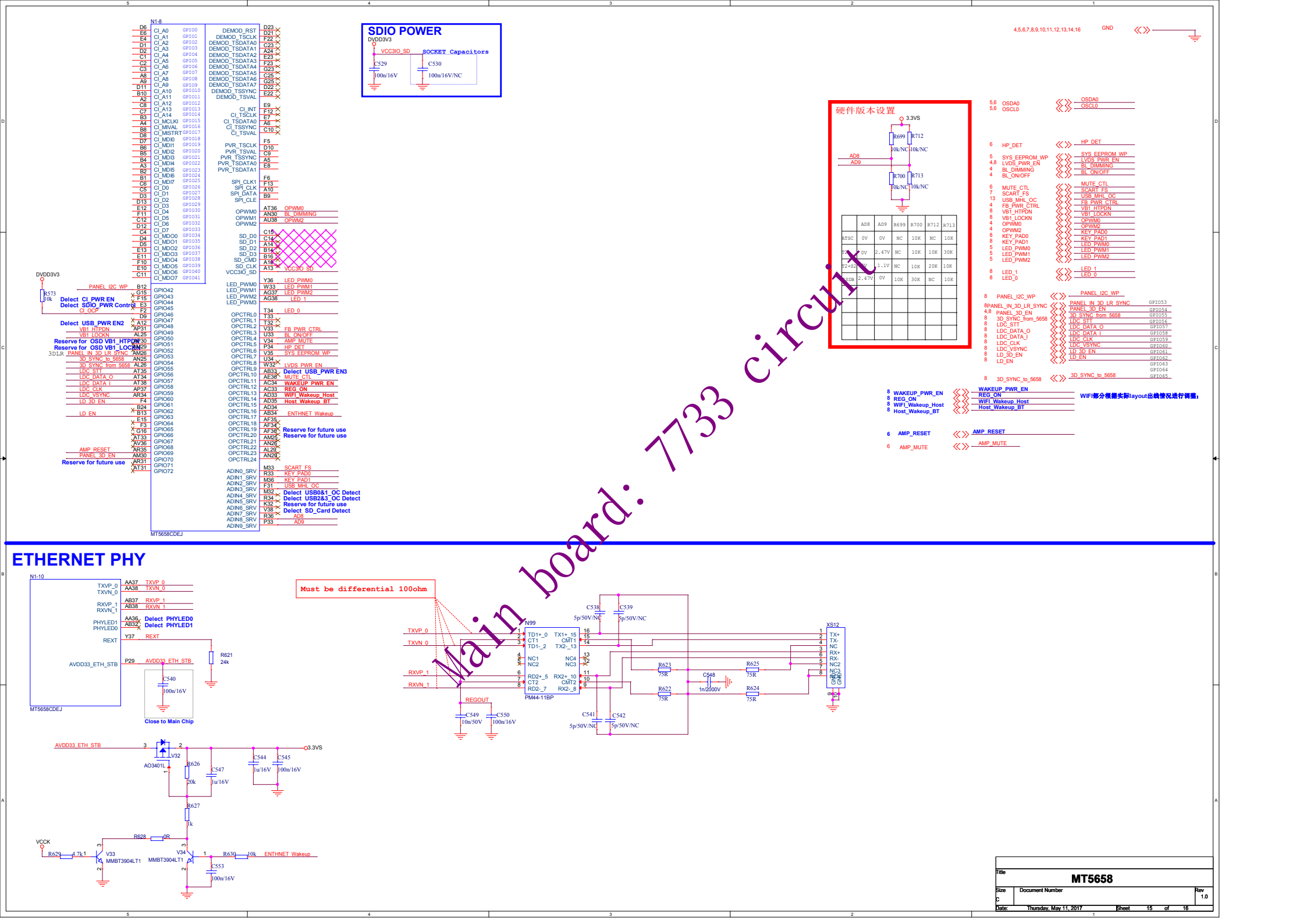
Hotplug control

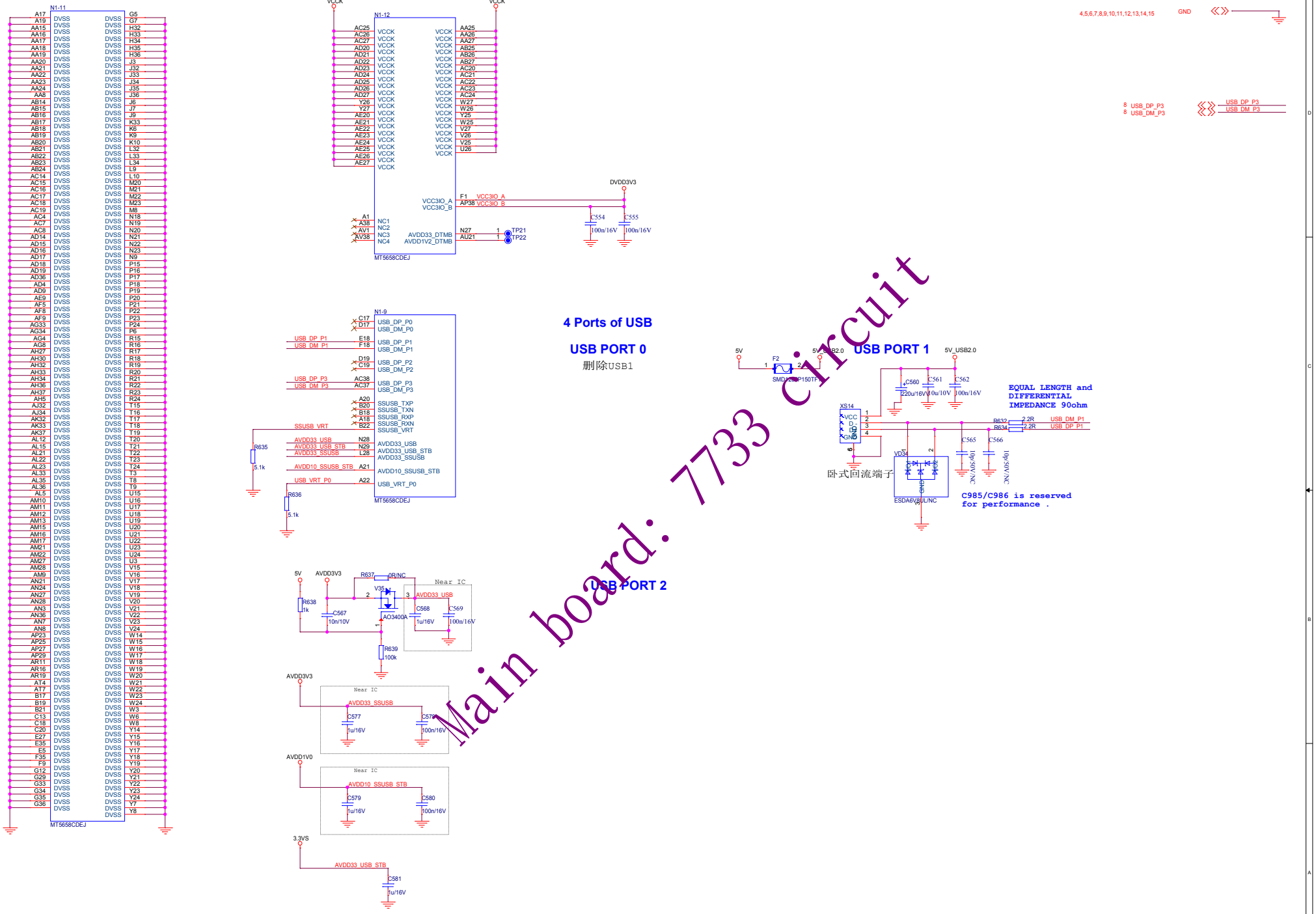
HDMI_1_HPD HDMI_1_HPD 13
HDMI_2_HPD HDMI_2_HPD 13

DDC and CEC

HDMI_CEC_1 HDMI_CEC_1 13
ASPDIFO1 ASPDIFO1 6
HDMI_1_SCL HDMI_1_SCL 13
HDMI_1_SDA HDMI_1_SDA 13
HDMI_2_SCL HDMI_2_SCL 13
HDMI_2_SDA HDMI_2_SDA 13

Title	MT5658	
Size C	Document Number	Rev 1.0
Date: Thursday, May 11, 2017	Sheet 14 of 16	


SDIO POWER
DVDD3V3
VCC3IO_SD
SOCKET Capacitors
C529
100n/16V
C530
100n/16V/NC
硬件版本设置
3.3VS
R699
R712
10k/NC
10k/NC
AD8
AD9
R700
R713
10k/NC
10k/NC
ETHERNET PHY
Must be differential 100ohm
Main board: 7733 circuit
MT5658
Title
Size
C
Document Number
Rev
1.0
Date: Thursday, May 11, 2017
Sheet 15 of 16


4 Ports of USB
USB PORT 0
删除USB1
USB PORT 1
USB PORT 2
EQUAL LENGTH and DIFFERENTIAL IMPEDANCE 90ohm
C985/C986 is reserved for performance .
卧式回流端子
Main board: 7733 circuit
MT5658
Monday, June 26, 2017