

Service  
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**Service**

4003S



# Service Manual

Chassis name	Platform	Model name
4003S	TSUMV56	24PHA4003S/70

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4003S 24" series.....	31

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# 1. Product information

Product information is subject to change without notice.

For detailed product information, please visit [www.philips.com/support](http://www.philips.com/support)

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## Display

### Type

Diagonal screen size

- 24PHA4003S/70: 23.6 inch

Display resolution

- 1366\*768p
- 

## Input resolution

Video formats

Resolution — Refresh rate

- 480i, 480p, 576i, 576p, 720p, 1080i, 1080p (24/25/30/50/60Hz) (anything larger than display size will be reduced to HD format)

Computer formats

Resolutions (amongst others)

- 720\*400@70HZ
  - 640\*480@60HZ
  - 800\*600@60HZ
  - 1024\*768@60HZ
  - 1360\*768@60HZ
- 

## Dimensions and Weights

### 24PHA4003S/70

- without TV stand:

Width 550 mm - Height 327 mm - Depth 66 mm - Weight 2.3 kg

- with TV stand:

Width 550 mm - Height 360 mm - Depth 156 mm - Weight 2.5 kg

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## Connectivity

TV Side

- HDMI 2 in
- HDMI 1 in
- USB x 1
- Headphone x 1

TV Rear

CVBS/Y Pb Pr : CVBS/Y Pb Pr, Audio L/R

Audio in: DVI

VGA x 1

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## Sound

Output Power (10% THD) RMS 8W

Speaker configuration 4W+4W

Speaker system 2.0

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Speaker type	built-in(normal)
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Auto Volume Levelier / Auto Volume Levelier +	YES
---	-----

Dolby Digital DecoderType	YES
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### Multimedia

Video Playback Formats	MPEG-2/MPEG-4 /H.264
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Subtitles Formats Support	SRT、ASS
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Music Playback Formats	MPEG-1,MPEG-2 (Layer I/II), MP3, AAC-LC
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Picture Playback Formats	JPEG、BMP、PNG
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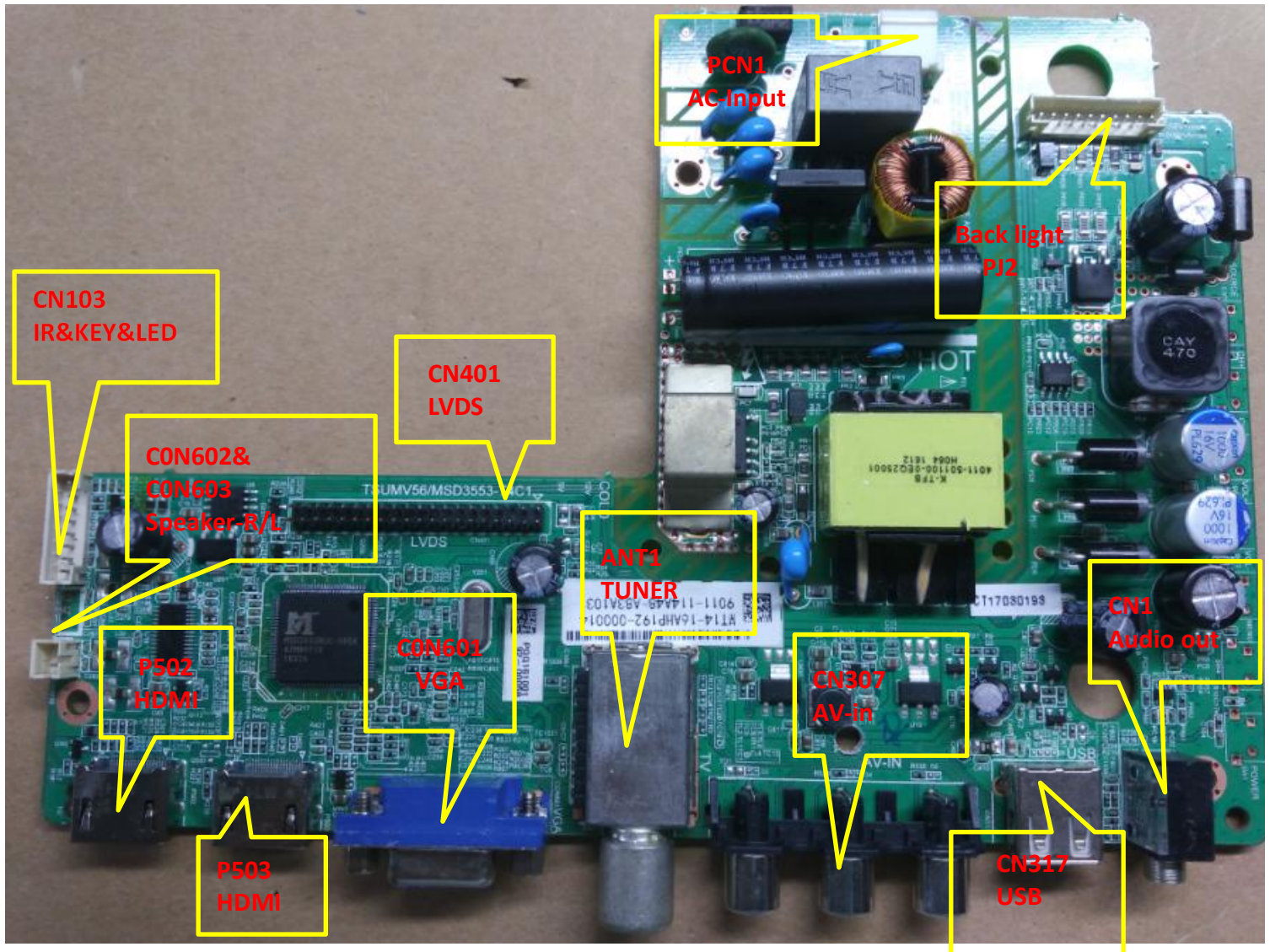
### Power

Product specifications are subject to change without notice. For more specification details of this product, see [www.philips.com/support](http://www.philips.com/support)

#### Power

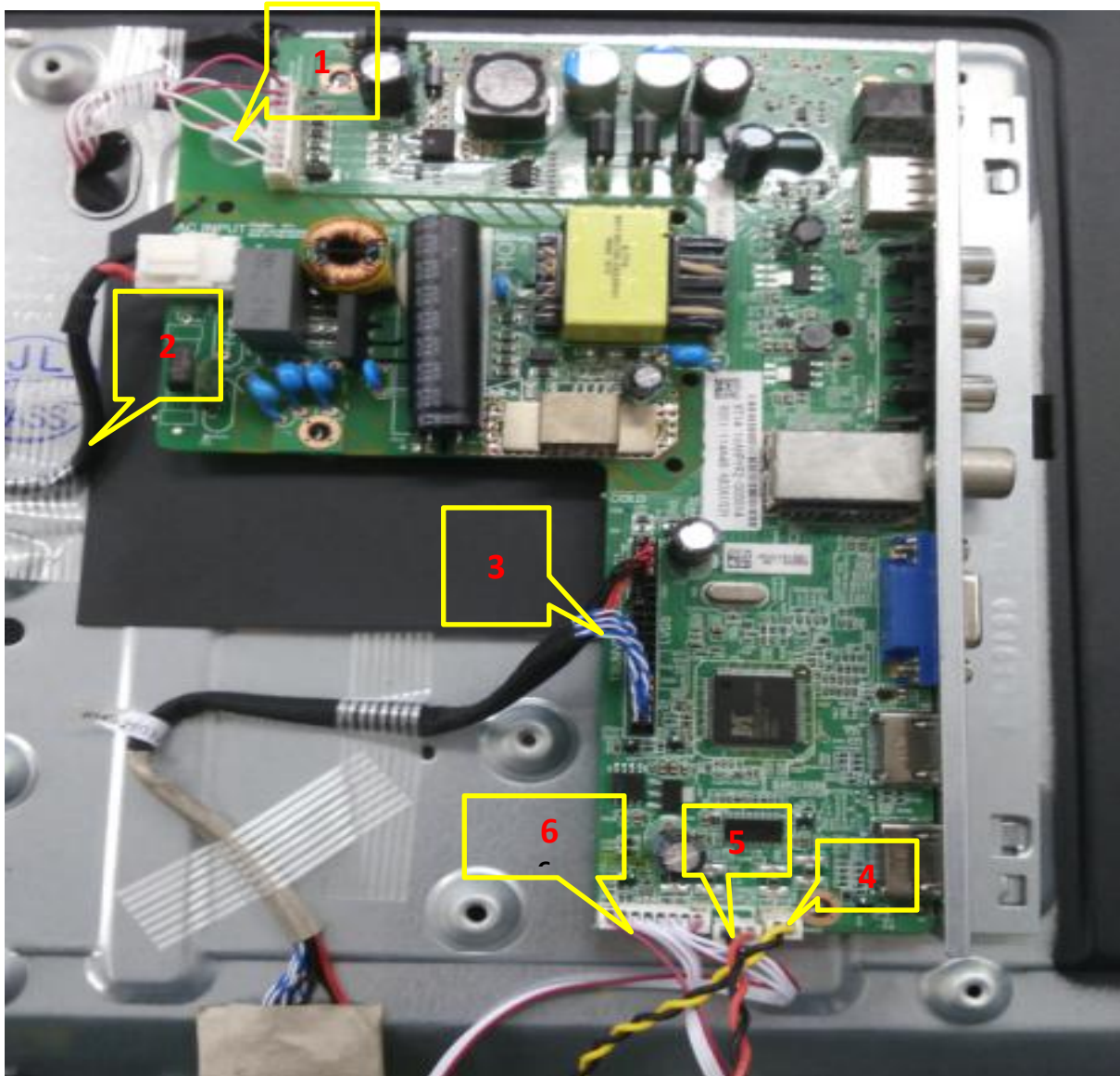
- Mains power : AC 100-240V 50/60Hz
- Standby Energy Consumption:≤0.5W
- Ambient temperature : 5°C to 40°C

## 2. Connections Overview



### 3. Mechanical Instructions

#### 3.1 Cable dressing



Serial no	Location	part description	function
1	KW16	Backlight wire	Connect to PJ2
2	KW01	Power wire	Connect to PCN1
3	KW02	LVDS wire	CN401 to T-CON board
4	KW12	Speaker wire	CON602 to speaker (yellow black wire)
5	KW11	Speaker wire	C0N603 to speaker (red black wire)
6	KW20	two-terminal wire	CN103 to KEY& IR board&LED

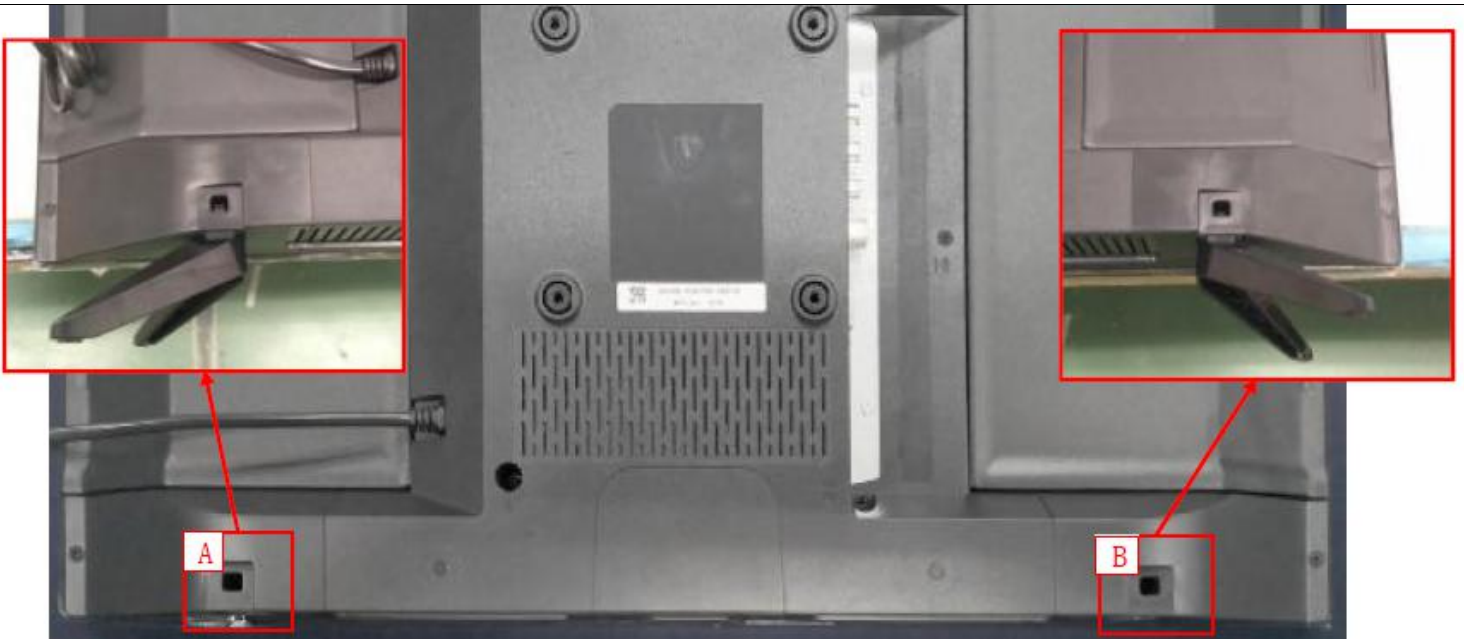
**Cable dressing(24" 4003S series)**

#### 3.2 Assembly/Panel Removal



##### 3.2.1 Stand removal

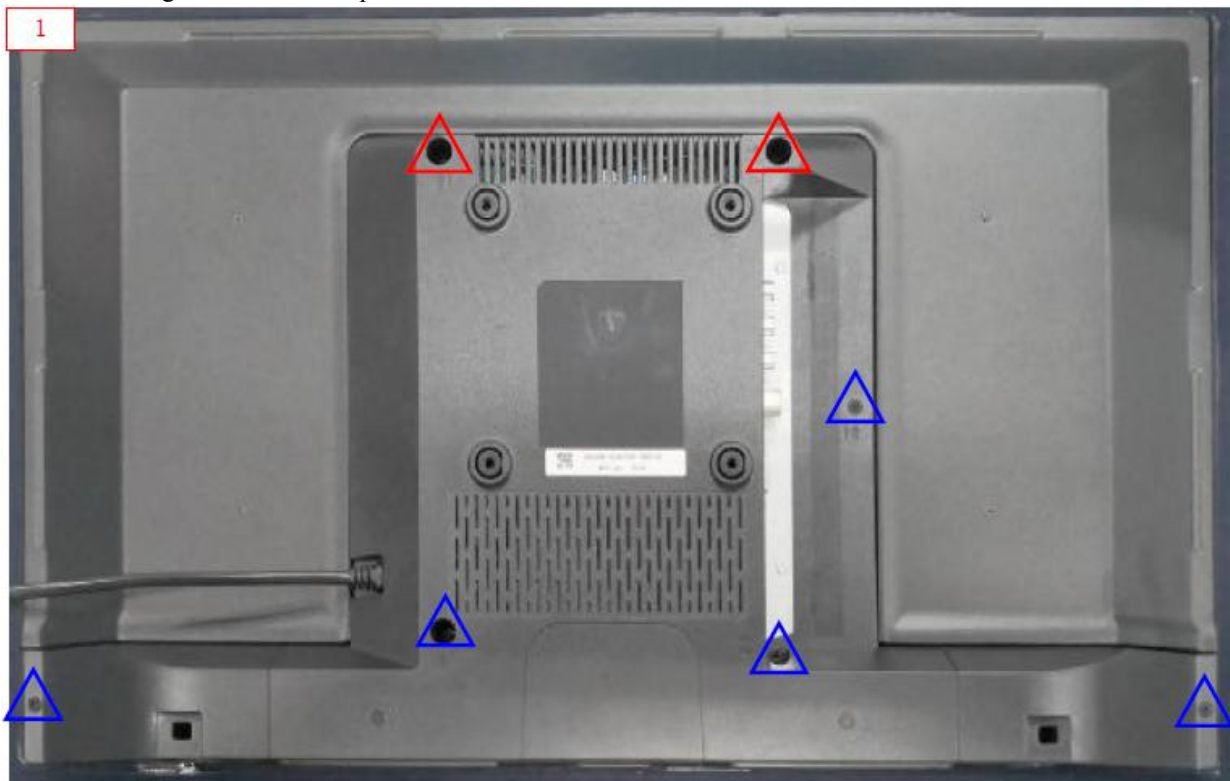
1. Put TV on the tooling plate, with screen downward. Use screwdriver to take down the base. Put base in material carton.





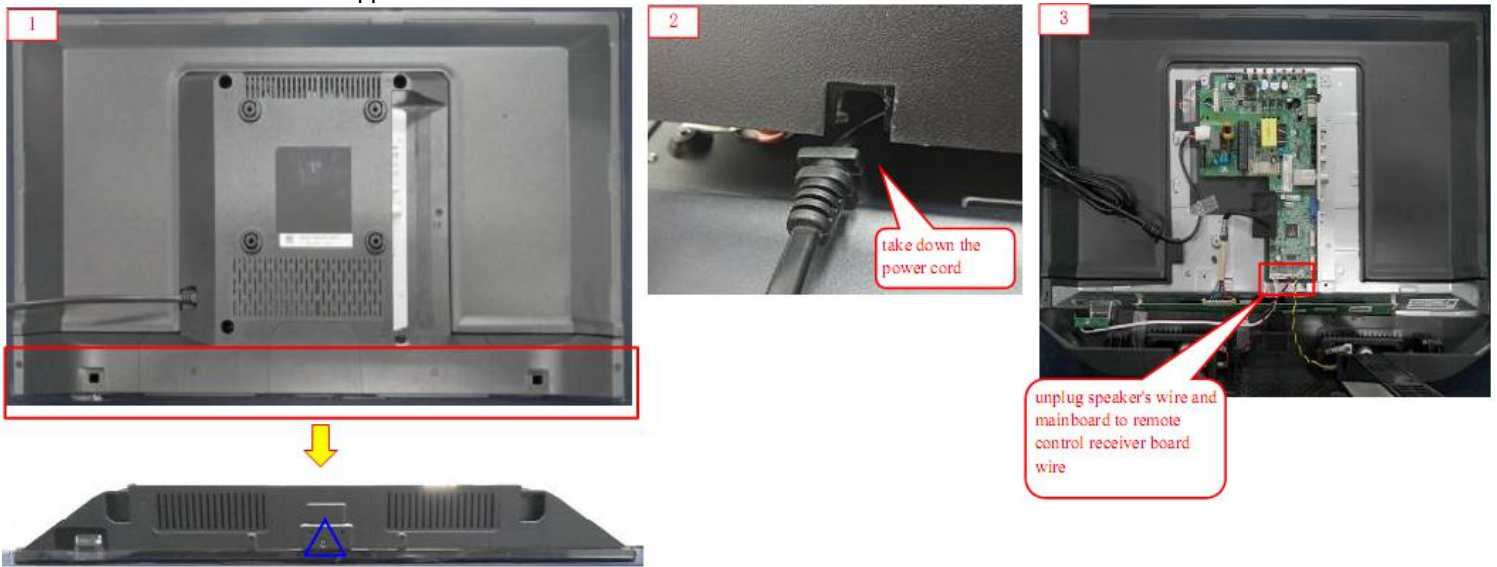
### 3.2.2 Disassemble back cover-1

1. Use electric screwdriver to unlock 5PCS  $\Phi 3 \times 5$ mm screws from back cover. Figure 1 
2. Use electric screwdriver to unlock 2PCS  $\Phi 3 \times 6$  round head black zinc plating machine screw with flat mat from back cover. Figure 1 
3. Categorize screws and put them in the material box.




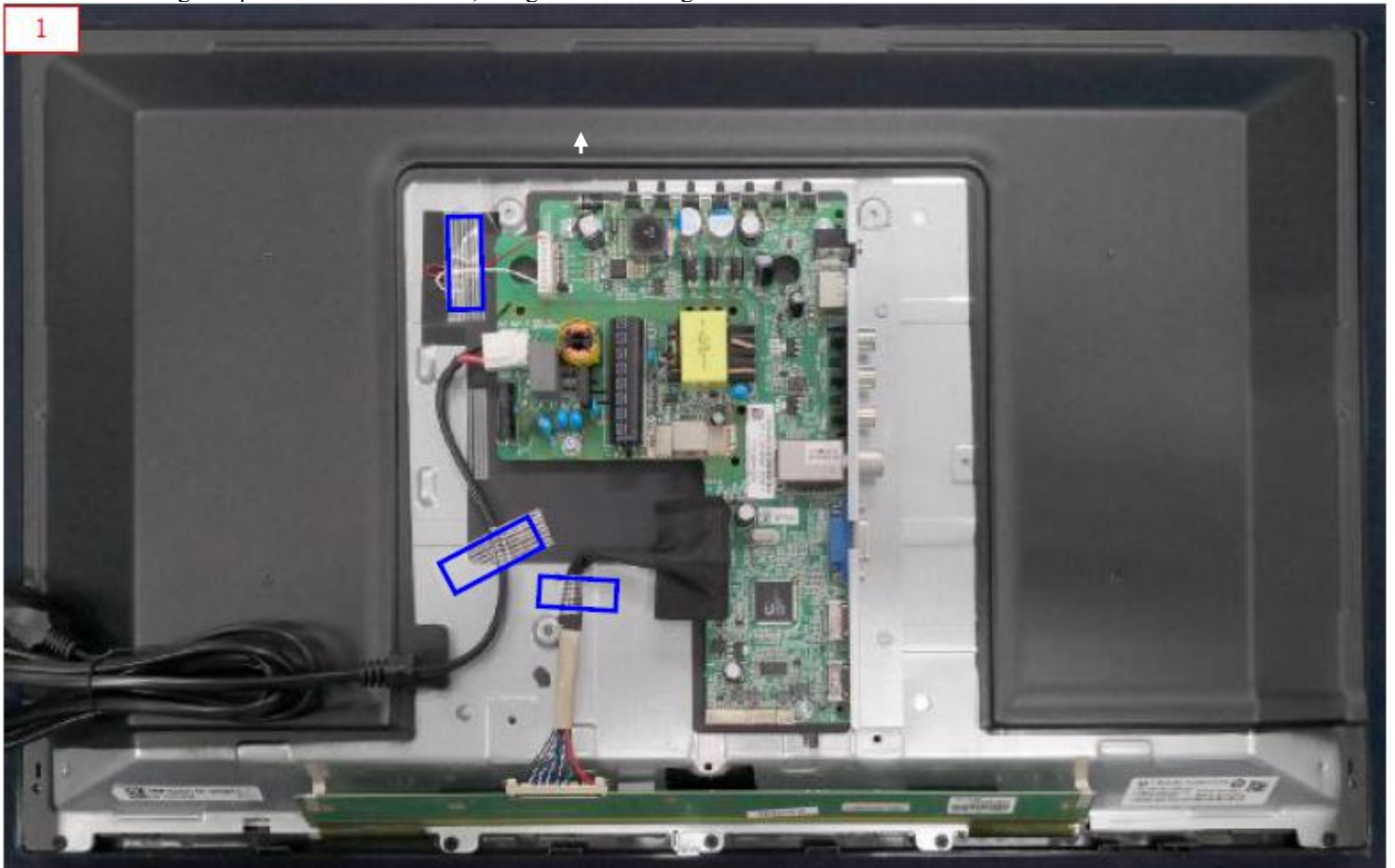
### 3.2.3 Disassemble back cover-2

1. Use electric screwdriver to unlock 5PCS  $\Phi 3\times 5\text{mm}$  screws from back cover. And put them in the material box. Figure 1
2. Lift up back cover, take down the power cord and unplug speaker's wire. Figure 2/3
3. Put back cover at the appointed material shelf



### 3.2.4 Disassemble TV-1

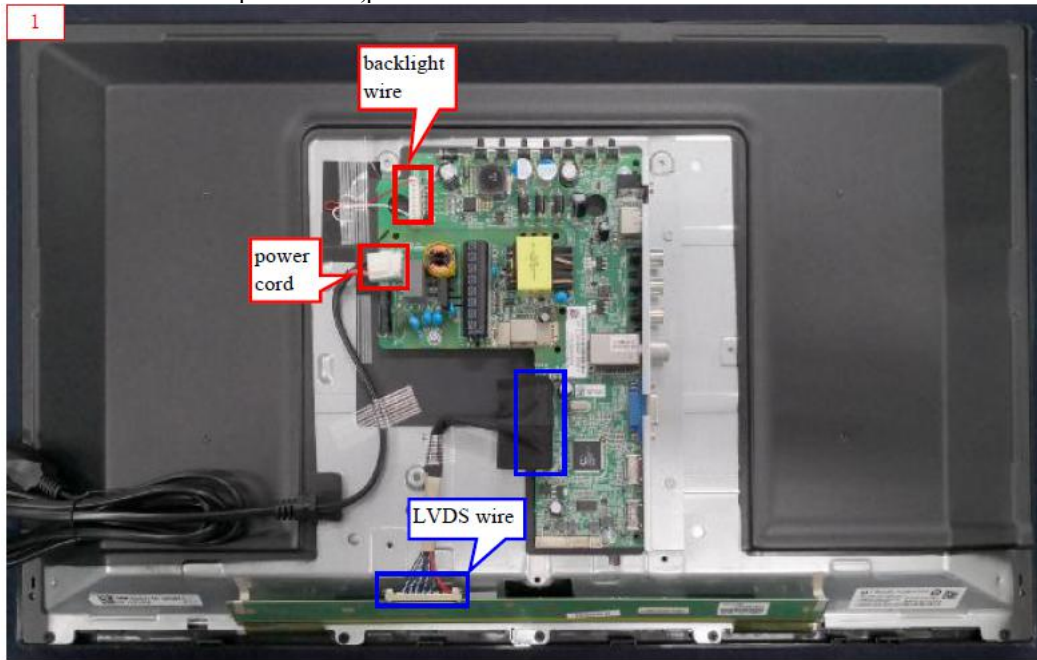
1. As Figure 1 show, tear off tapes. Figure 1 
2. Use diagonal plier to cut off cable tie, as Figure 1 show. Figure 1







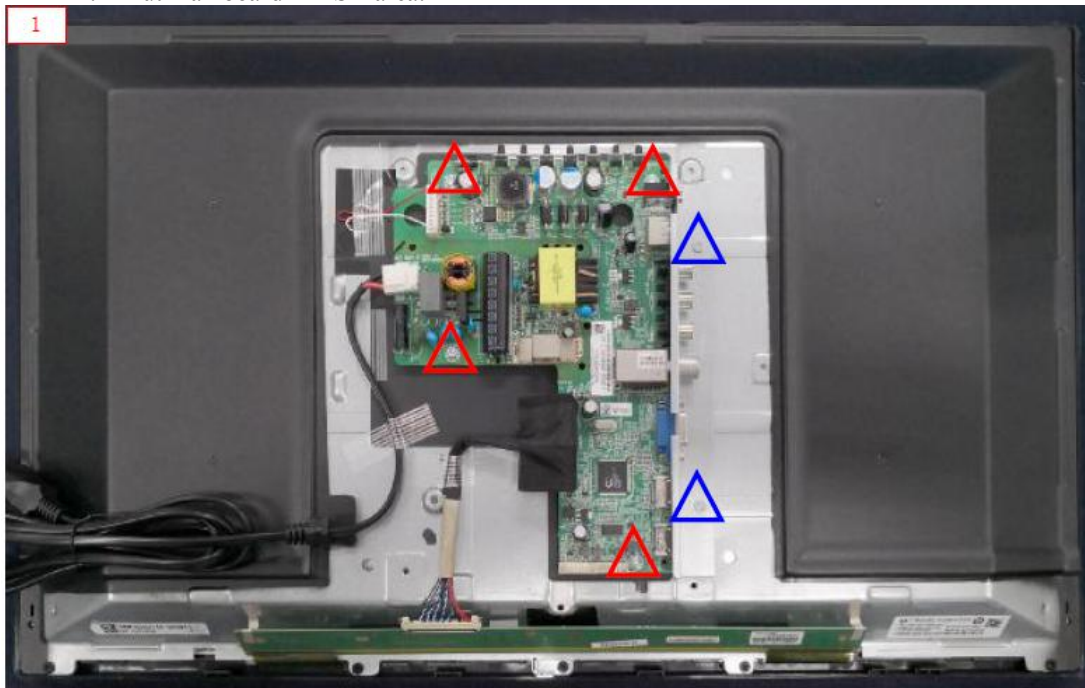
### 3.2.5 Disassemble TV-2

1. As Figure 1 show,unplug LVDS wire from PCB board.
2. As Figure 1 show,unplug backlight wire and power cord from mainboard.
3. Take down power cord,put it in material box.





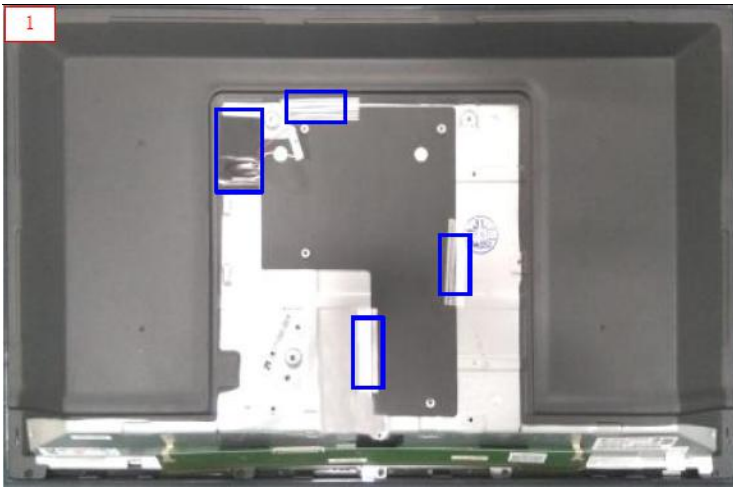
### 3.2.6 Disassemble TV-3

1. Use electric screwdriver to unlock 4PCS  $\Phi M3 \times 7mm$  screws from mainboard. Figure 1 
2. Use electric screwdriver to unlock 2PCS  $\Phi 3 \times 3mm$  screws from side baffle. Figure 1 
3. Put removed screws in the material box.
4. Put mainboard in ESD area.



### 3.2.6 Disassemble TV-4

1. Tear off fiber tape,take down mylar film and put in material box.. Figure 1 
2. Use 1PCS fiber tape to fix backlight wire on the back plate,as figure show. Figure 2 



### 3.2.6 LCD Panel

1. Remove the SSB as described earlier.
2. Remove the PSU as described earlier.
3. Remove the keyboard control panel as described earlier.
4. Remove the stand bracket as described earlier.
5. Remove the IR/LED as described earlier.
6. Remove the fixations screws that fix the metal clamps to the front bezel. Take out those clamps.
7. Remove all other metal parts not belonging to the panel.
8. Lift the LCD Panel from the bezel.

When defective, replace the whole unit.

## 4. Service Modes

### Factory Mode

#### Purpose

- To perform extended alignments.

Press “Menu”+”1999” to enter into factory mode:

Primary menu	Secondary menu	Value,remark
ADC ADJUST	MDOE	VGA,YPBPR,Selection
	R-GAIN	Front-end gain adjustment
	G-GAIN	
	B-GAIN	
	R-OFFSET	Clamp level adjustment
	G-OFFSET	
	B-OFFSET	
	AUTO ADC	ADC automatically adjust
PICTURE MODE	Input Source	Source Selection
	MODE	Dynamic/Standard/Soft/User
	BRIGHTNESS	BRIGHTNESS
	CONTRAST	CONTRAST
	COLOR	COLOR
	SHARPNESS	SHARPNESS
	TINT	TINT
	Copy all	No function
W/B ADJUST	inputsource	Source Selection
	TEMPERATURE	Cool, Standard, Warm
	R-GAIN	White level adjustment
	G-GAIN	
	B-GAIN	
	R-OFFSET	Black level adjustment
	G-OFFSET	
	B-OFFSET	
	Copy all	No function
SSC SETTING	MIU Enable	DDR spectrum enable
	MIU0 Span	Exhibition frequently wide
	MIU Step	Spread spectrum step
	LVDS enable	LVDS spectrum enable
	LVDS Span	Exhibition frequently wide
	LVDS Step	Spread spectrum step
	LVDS swing	LVDS swing
Spectral set	2HOUR OFF	2hours power off enable
	WDT	Watch dog on/off
	White pattern	White pattern selection
	Restore user default	Factory reset
	PVR RECORDALL	PVR Record on/off
	Power	Power mode selection
	Mirror	Mirror function selection
	Ageing mode	Ageing mode enable
VIF	Vif 1	Vif set
	Vif 2	Vif set
	Vif 3	Vif set
Qmap adjsut	PQ setting	
PEQ	PEQsetting	
OverScan	Overscan resolution	Reselution select
	Overscan hsize	Adjust overscan H size
	Overscan hposition	Adjust overscan H position
	Overscan vsize	Adjust overscan V size
	Overscan vposition	Adjust overscal V position
other	Test pattern	

	UART DEBUG	DEBUG ON/OFF
	HDMI CEC/ARC	CEC/ARC ON/OFF
	Backlight	Adjust backlight
CI+ key usb upgrade	CI+ key usb upgrade	
SW information	SW information	
Non-linear	MODE	Feature Selection
	OSD 0	Curve adjustment
	OSD 25	
	OSD 50	
	OSD 75	
	OSD 100	
Channel table1	KTC factory Frequecy table set	
CI factory setting	No function	
Channel table2	KTC factory Frequecy table set	
Channel dvbt	KTC factory Frequecy table set	

## 5. Software Upgrading and Panel Code

### 5.1 Software Upgrading

#### 5.1.1 Software upgrade tools and materials

- \* Personal computer (WINDOWS XP or WINDOW7 32 bit operating system,USB2.0)
- \* AC100~240V power supply and power cord
- \* ISP burning board
- \* ISP burning board driver
- \* ISP Tool V4.5.2.8.SZ.exe
- \* VGA wire
- \* USB flash disk (2.0 version, Capacity not more than 8G)
- \* Mainboard software

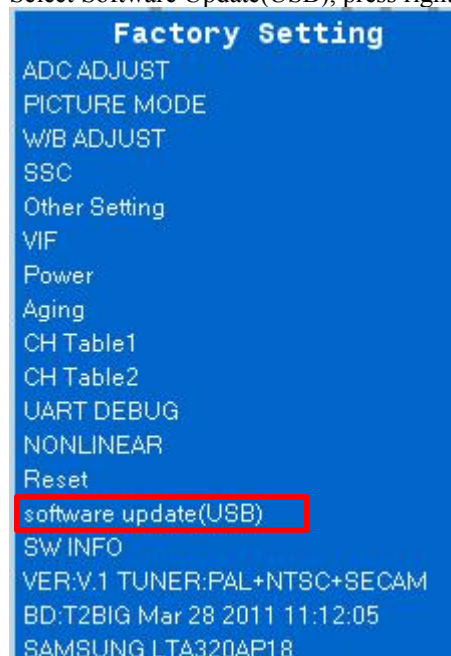
#### 5.1.2 Operations and procedure of software upgrading:

- (1). Changed the file name to "MERGE.bin", then store software in the FAT32 format blank U disk.
- (2). Insert USB flash disk into the USB upgrade port, upgrade the software according to the following the operating instructions::

**Method 1** (Method 1 will not erase the original EDID and HDCP KEY on mainboard. Easy operation, you only need one U disk to upgrade. So we require customer use this way to upgrade. ) :

- ①. Start the machine and wait the normal picture display, press the MENU button on the remote control, will be popping up the main menu, press the 8202 number keys and enter the Factory Setting menu.
- ②. Press up/down keys to move the cursor to "software update(USB)" function menu, then press right key to select "YES", to implement USB upgrade command:
  - a. After prompt "File system init error", means that the machine have found USB device, but did not find the needing Record the R/G/B-GAIN and R/B/G-OFFSET value under the YPbPr(SD) and YPbPr(HD) mode, to be replaced the recorded value after the machine software upgrade
  - upgrade software, please check the software name is correct or format the U disk again and then copy software.
  - b. After prompt "USB Connect Detect fail", means that the machine does not find USB device, check if the USB device has been inserted into, or change another U disk and try again.
- ③. Display percentage progress prompts and about 10 seconds later, the machine black screen and restart automatically, means that the machine complete the upgrade process, turn off the machine first, then pull out the U disk.

Select Software Update(USB), press right key or OK key to enter.

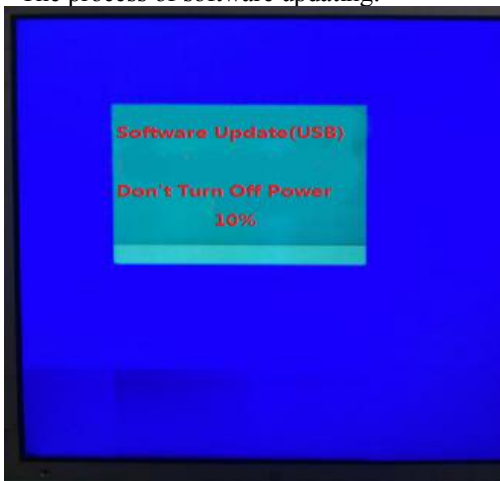




Software update menu will pop up when press confirm key, then select “Yes” to confirm:



The process of software updating:



**Method 2:** Keep pressing VOL+ and CH+ keys on the machine panel, power on the machine, the standby light flashes quickly after about 5 seconds, standby light goes out and turn into lighting after about a minute, means that upgrade is Completed.

(3). Notices:

- ①. When the machine Upgrading (U disk light flash), do not remove U disk or switch off the power, otherwise it will destroy the software and lead can not upgrade.
- ②. The machine must be power off when inserted or pulled out U disk, to avoid damaging U disk or machine.
- ③. Because of compatibility between machine and U disk, some machines will not flicker during upgrading. Please change U disk (The capacity of U disk is not more than 2G) or use method 1 to upgrade.
- ④. If the display screen can't display menu normally, it cannot use "method 1" to upgrade, you can use Mstar ISP Tools to upgrade except method 1 and method 2.

## 5.2 Panel Code

Press the following key sequence on a standard RC transmitter: “1999” directly followed by MENU, can see the panel type information from factory menu, see the Panel PN from the configuration table

CTN ALT BOM#	Panel Type	Panel PN
24PHA4003S/70	K236WDK3-MH180A1	7422-236CMK-335AK051-F

## 6. Circuit Descriptions

### 6.1 Implementation

The 4003S is covered by TSUMV56 platform. The major deltas versus its predecessor support DVB-T, with multi-media, Video out  
The MSD6306 chassis comes with the following stylings:

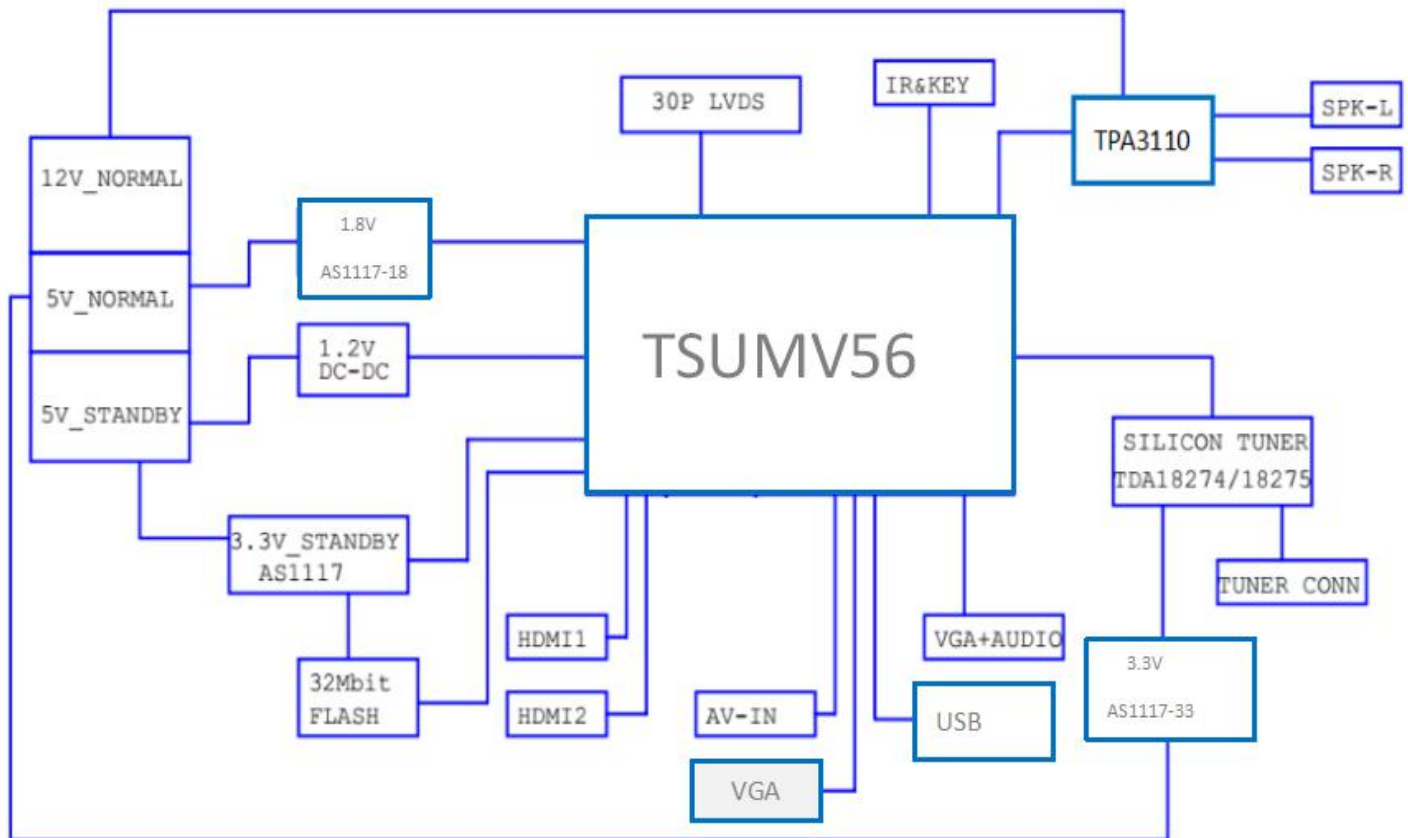
- Series 4003S 24PHA4003S/70

#### 6.1.1 Implementation

Key components of this chassis are:

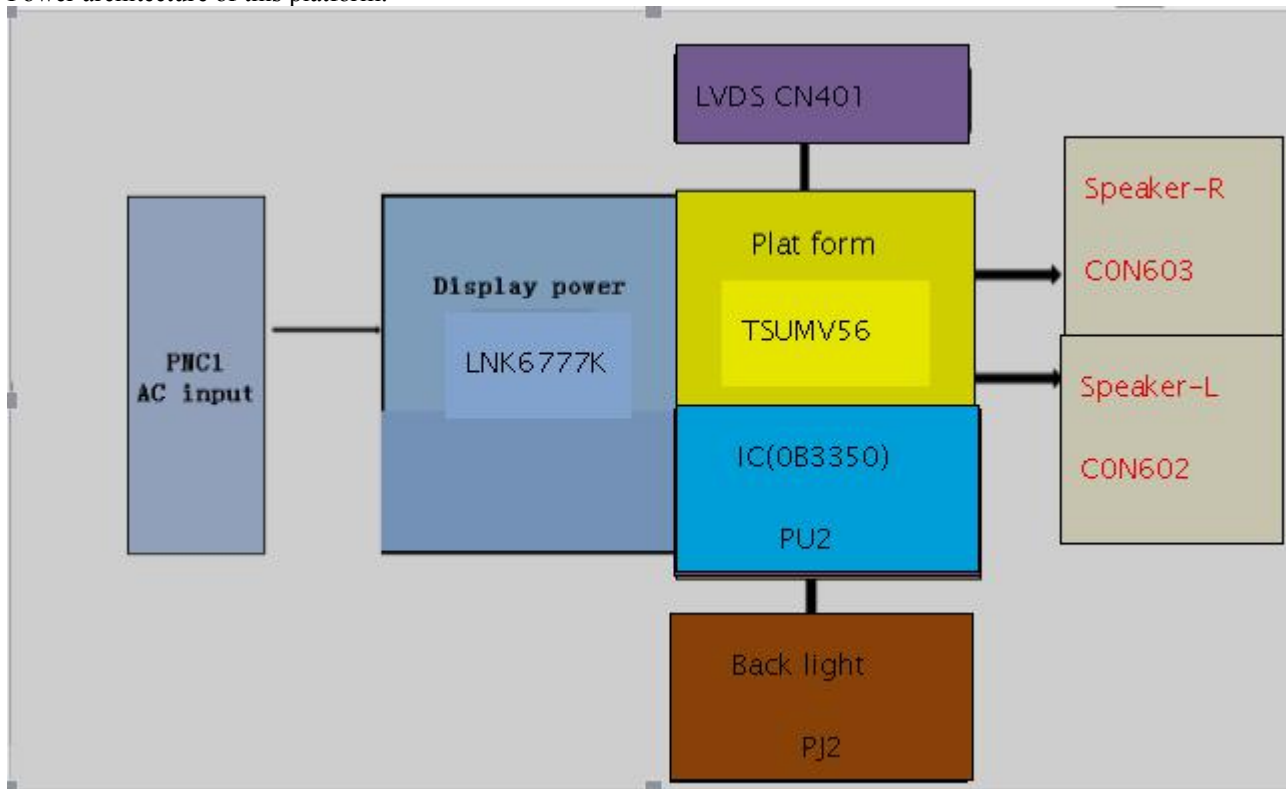
- TUNER POWER AS1117-33
- VDDC POWER
- TSUMV56-T4C1
- 3.3V STANDBY AS1117 -33
- 64 Mbit SPI FLASH
- HDMI1 ARC
- HDMI2 PORT

#### 6.1.2 Block diagram



## 6.2 Power Supply

Power architecture of this platform.



### 6.2.1 Power Supply Unit

All power supplies are a black box for Service. When defective, a new board must be ordered and the defective one must be returned, unless the main fuse of the board is broken. Always replace a defective fuse with one with the correct specifications! This part is available in the regular market.

Consult the Philips Service web portal for the order codes of the boards.

Important delta's with the platform are:

- New power architecture for LED backlight
- “Boost”-signal is now a PWM-signal + continuous variable

The control signals are:

- PS-ON
- Lamp “on/off”
- DIM (PWM) (not for PSDL)

In this manual, no detailed information is available because of design protection issues.

- +12 output (on-mode)
- +12V\_audio (audio AMP power)
- Output to the display; in case of
  - IPB: High voltage to the LCD panel
  - PSL and PSLS (LED-driver outputs)
  - PSDL (high frequent) AC-current.

### 6.2.2 Diversity

The diversity in power supply units is mainly determined by the diversity in displays.

The following displays can be distinguished:

- CCFL/EEFL backlight: power panel is conventional IPB

- 
- LED backlight:
  - side-view LED without scanning: PSL power panel
  - side-view LED with scanning: PSLS power panel
  - direct-view LED without 2D-dimming: PSL power panel
  - direct-view LED with 2D-dimming: PSDL power panel.

**PSL** stands for **P**ower **S**upply with integrated **L**ED-drivers.

**PSLS** stands for a **P**ower **S**upply with integrated **L**ED-drivers with added **S**canning functionality (added microcontroller).

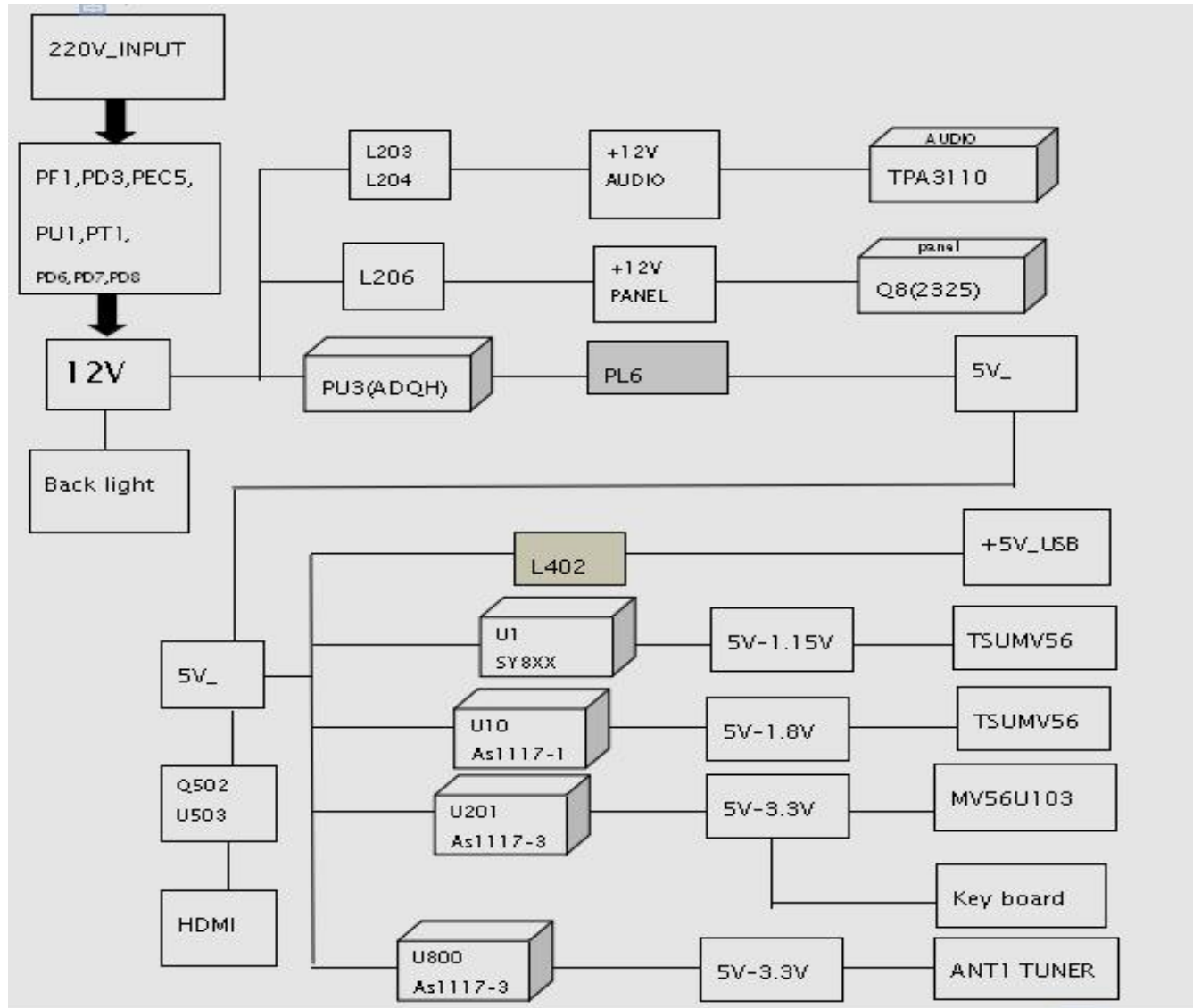
**PSDL** stands for a **P**ower **S**upply for **D**irect-view **L**ED backlight with 2D-dimming.

### 6.3 DC/DC Converters

The on-board DC/DC converters deliver the following voltages(depending on set execution):

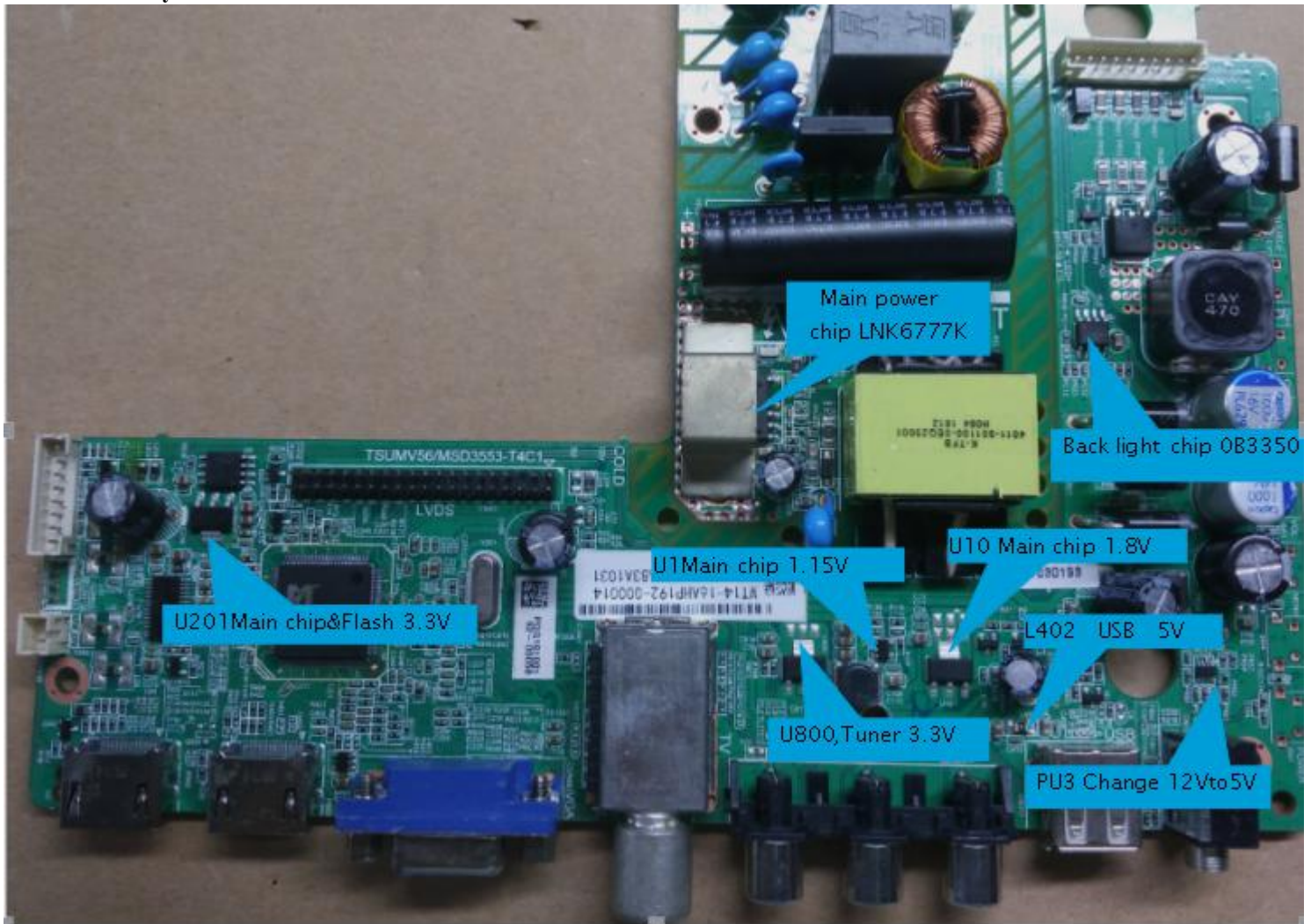
- +3V5-SB, permanent voltage for the Stand-by Power system
- +3V3-STANDBY, voltage for IR/Key board
- +12V, input from the power supply for the panel common(active mode)
- +12V, input from the power supply for LNB supply
- +3V3-FLASH, voltage for FLASH when TV on
- +3.3VA\_T2, +1.2V\_T2 voltage for Demodulator IC channel decoder
- TUNER\_3V3, supply voltage for tuner
- +5V-SW, input intermediate supply voltage for USB Power
- +12V-AUDIO1 for the AUDIO AMP
- +1.8V-Main chip

### 6.3.1 Power tree





### 6.3.2 Power layout SSB



### 6.4 Front-End Analogue and DVB-C, DVB-T; reception

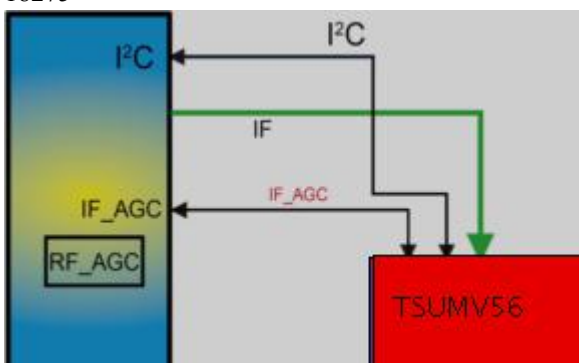
#### 6.4.1 DVB-C part

The Front-End for analogue tuner consist of the following key components:

- SCALER TSUMV56 Processor
- TUNER 18275

Below find a block diagram of the front-end application for DVB-C part.

18275



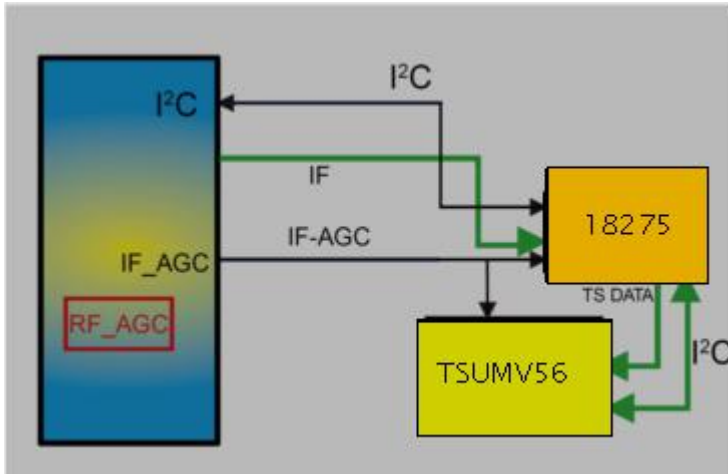
#### 6.4.2 DTB-T2 part

The Front-End for DVT part consist of the following key components:

- TUNER 18275
- SCALER TSUMV56

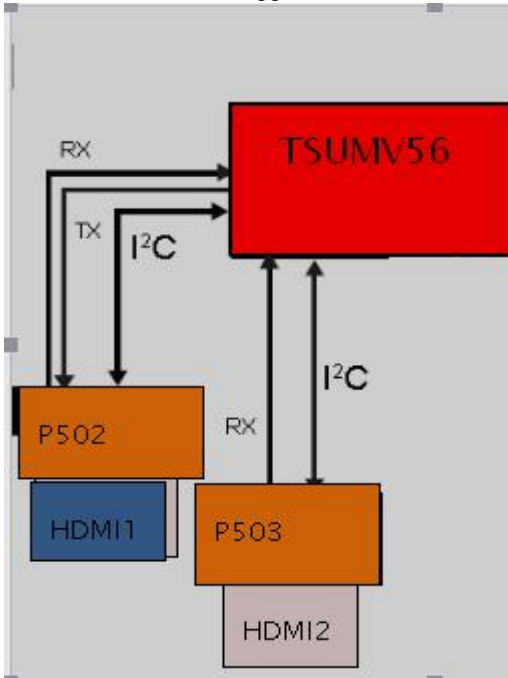
Below find a block diagram of the front-end application for DTV part.

18275



## 6.5 HDMI

Refer to below for the application.



The following HDMI connector can be used:

- HDMI 2: HDMI input ( TV digital interface support HDCP)
- HDMI 1: HDM IMHL input ( TV digital interface support)
- +5V detection mechanism
- Stable clock detection mechanism
- HPD control
- Sync detection
- TMDS output control
- CEC control
- ARC control
- MHL control

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## 6.6 Video and Audio Processing - TSUMV56

The TSUMV56 is the main audio and video processor (or System-on-Chip) for this platform. It has the following features:

1. Worldwide multi-standard analog TV demodulator
2. PAL/SECAM/DVB-T/DVB-T2 /DVB-C demodulators
3. 1920\*1080@60Hz direct drive
4. Powerful CPU core
5. A transport de-multiplexer
7. A multi-standard video decoder
8. Rich format audio codec
10. HDMI1:receiver
11. MHL input
12. 2D converter
14. PWM dimming (LED backlight)
15. Two-link LVDS,

### 1 OVERVIEW

**The World-Leading Audio/Video Technology:** The TSUMV56 supports Full MPEG2/4/H.264 video decoder standards, and JPEG. The TSUMV56 family consists of a DTV front-end demodulator, a backend decoder and a TV controller and offers high integration for advanced applications. It integrates a transport de-multiplexer, a high definition video decoder, an audio decoder, a -link LVDS transmitter, and a NTSC/PAL/SECAM TV decoder. The TSUMV56 enables consumer electronics manufacturers to build high quality, low cost and feature-rich DTV. The TSUMV56 also supports MediaTek MDDiTM de-interlace solution which can reach very smooth picture quality for motions. The special color processing technology provides a natural, deep colors and true studio quality video. Moreover, . The TSUMV56 family has built-in high resolution and high-quality audio codec.

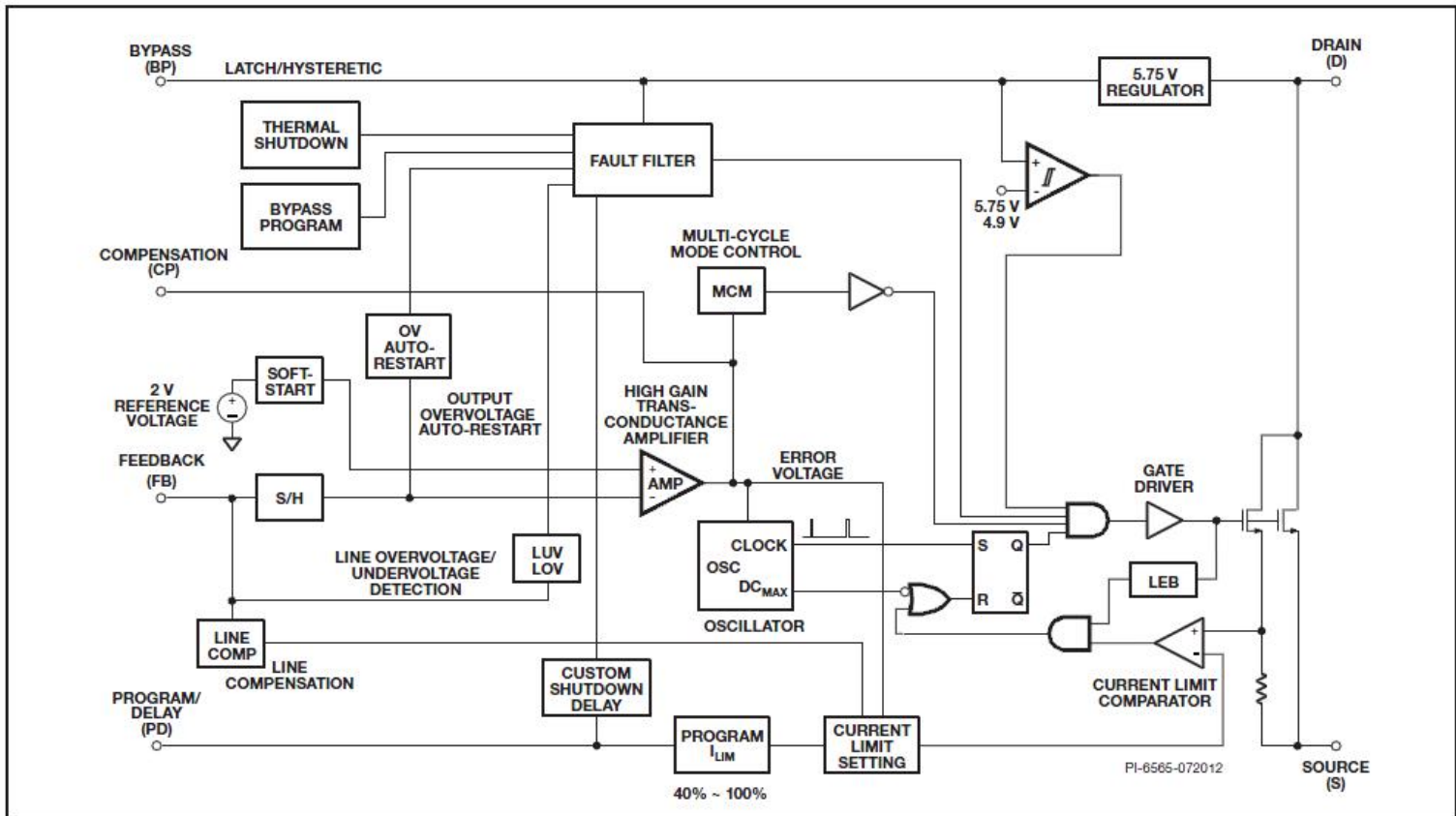
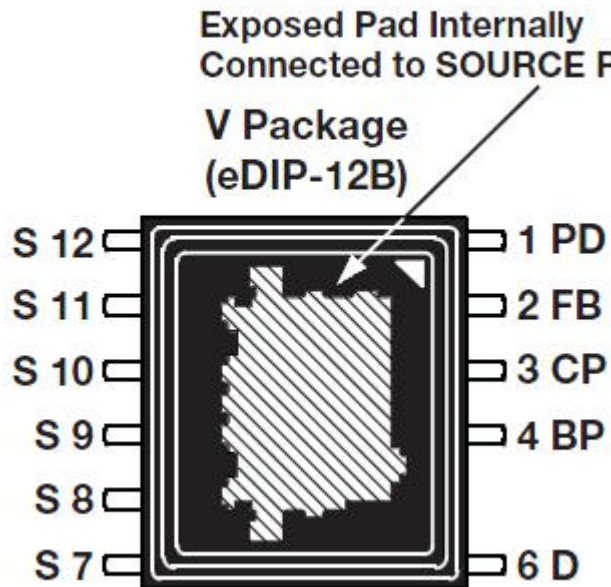
**Rich Features for High Value Products:** The TSUMV56 family enables true single-chip experience. It integrates high-quality HDMI1.4, high speed VGA ADC, a-link LVDS, USB2.0 receiver, and ATSC/DVB-T/DVBC/DTMB/ISDB-T demodulators.

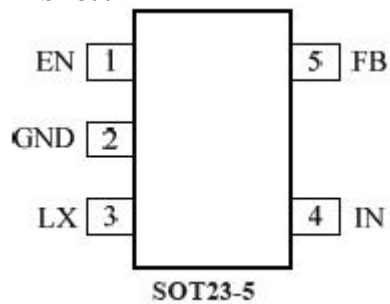
**All New FHD@60Hz Experience:** The TSUMV56 family provides consumers with FHD 60Hz direct drive.

**WW Common Platform Capability:** The TSUMV56 family supports ATSC, DVB-T, DVB-C, and ISDB-T demodulation functions. It reserves transport stream inputs for external demodulators for other countries or areas. TV maker can easily port the same UI to worldwide TV models. First-class adjacent and co-channel rejection capability grants excellent reception. Professional error-concealment provides stable, smooth and mosaic-free video quality.

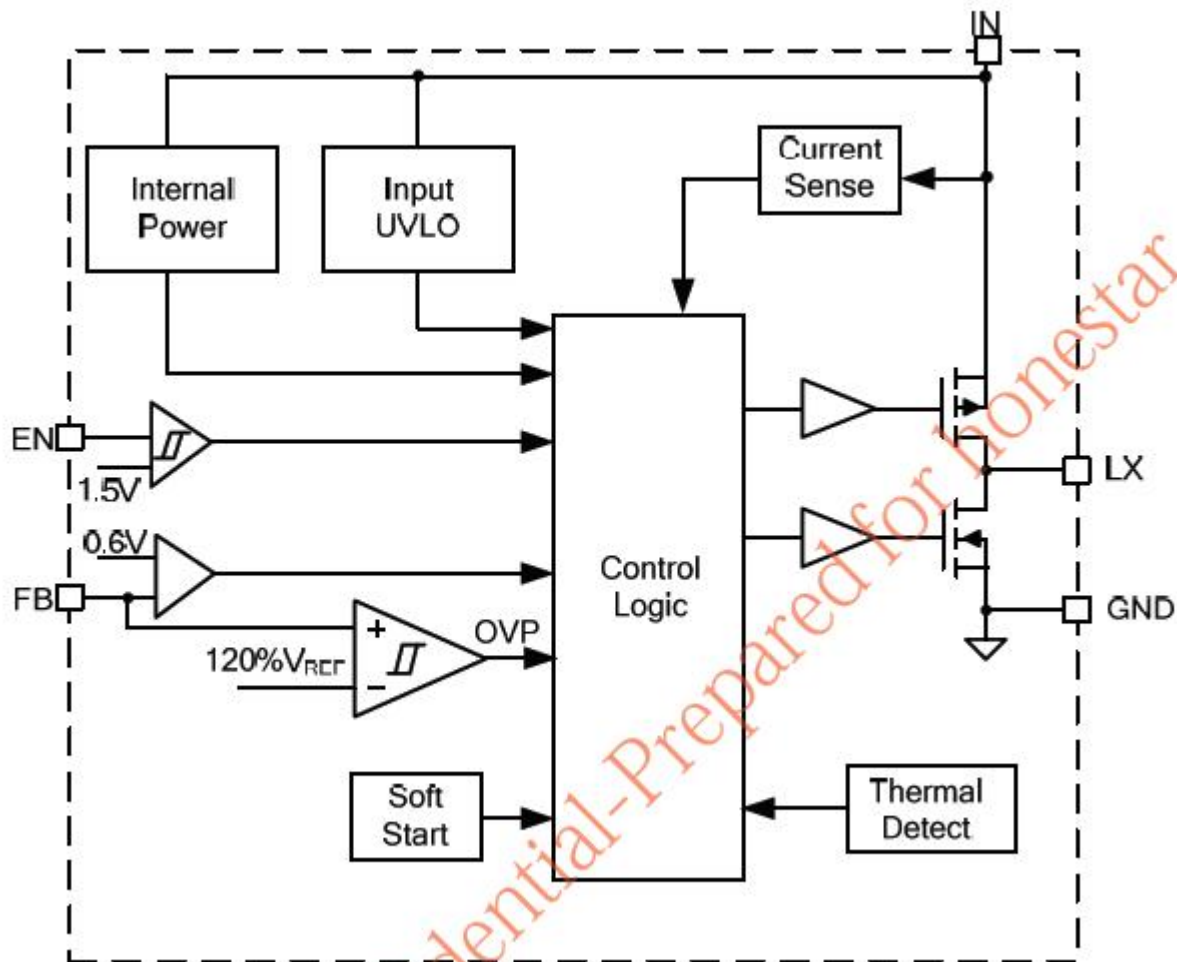
## 7. IC Data Sheets

### 7.1 LNK6777K



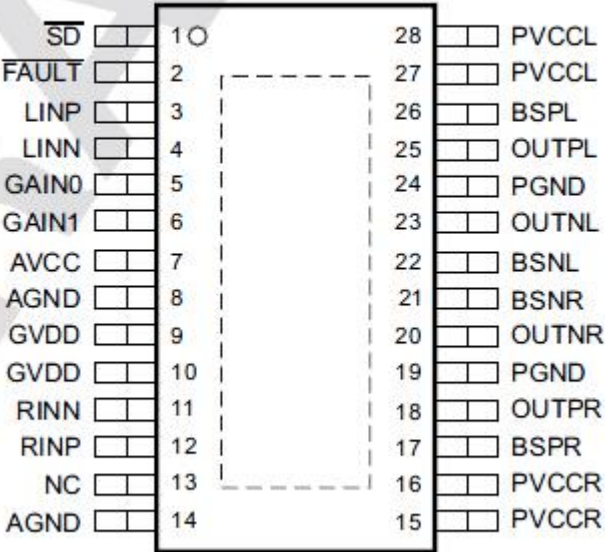


## Block Diagram

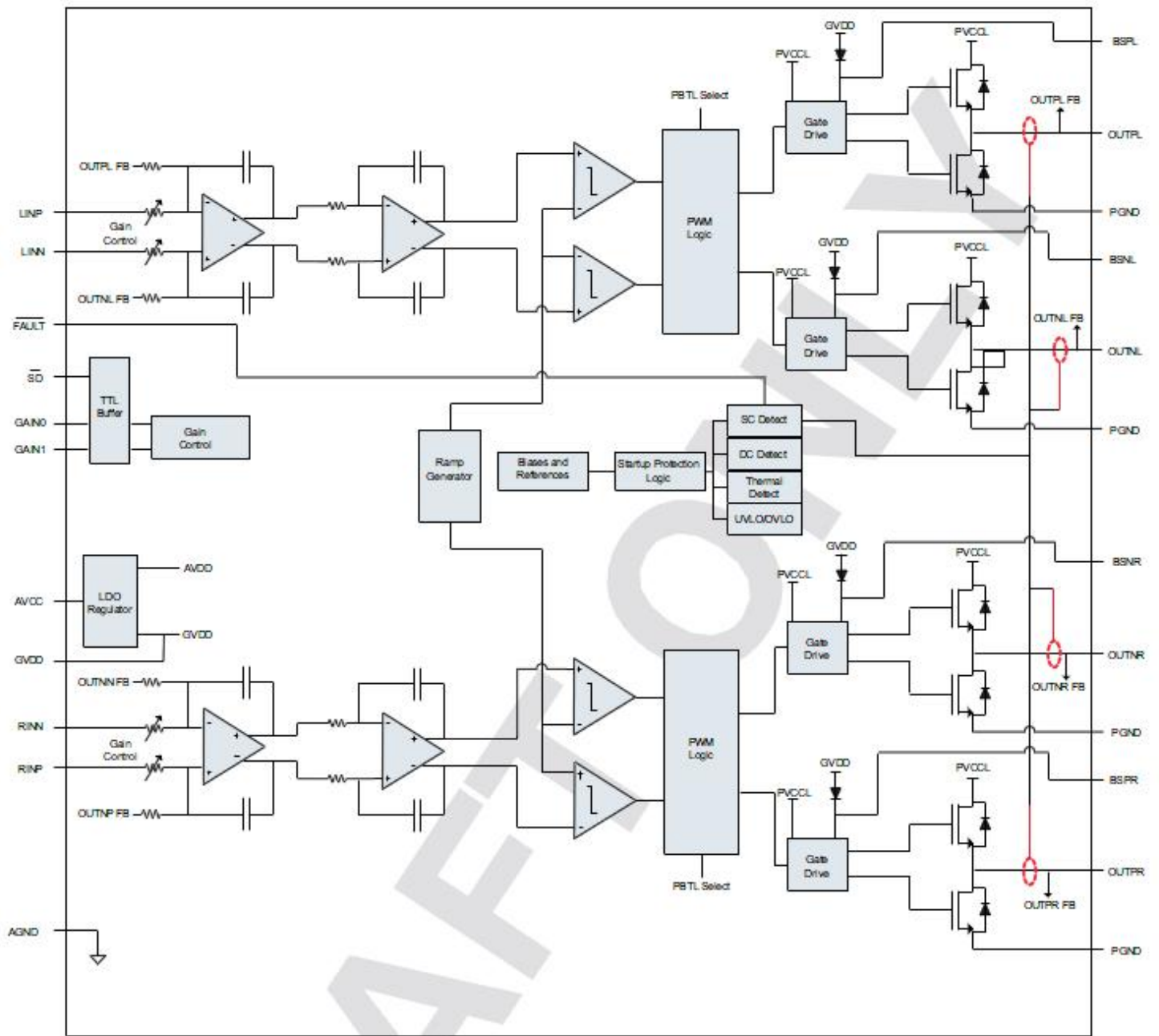




PWP (TSSOP) PACKAGE  
(TOP VIEW)



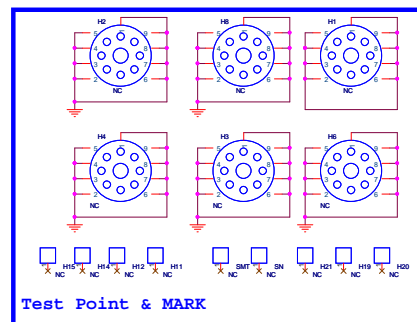
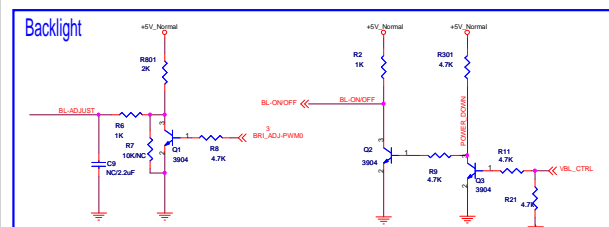
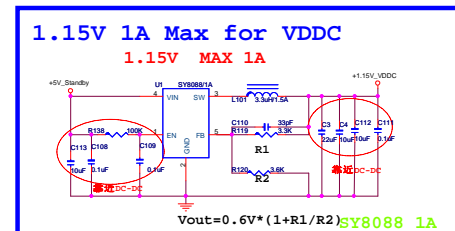
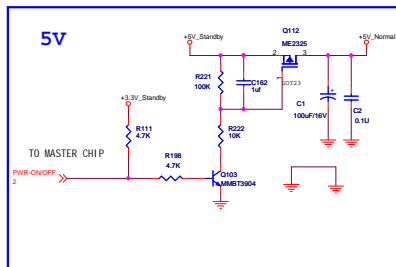
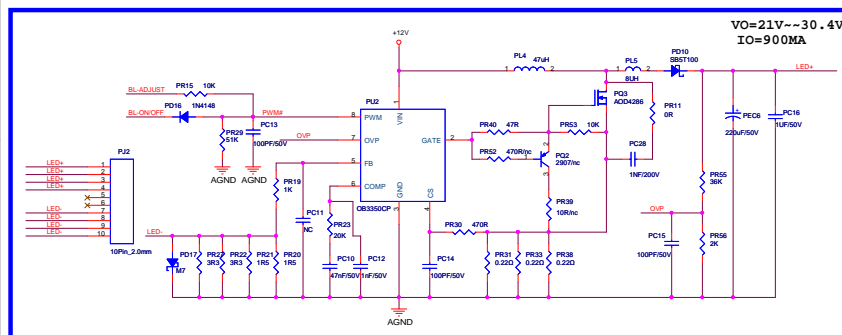
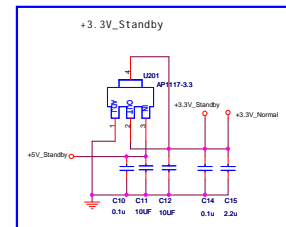
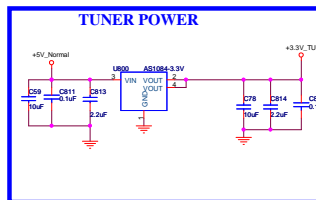
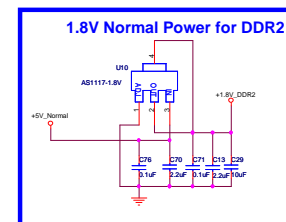
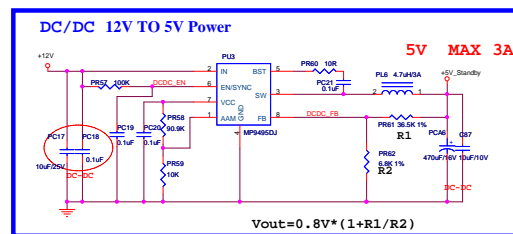
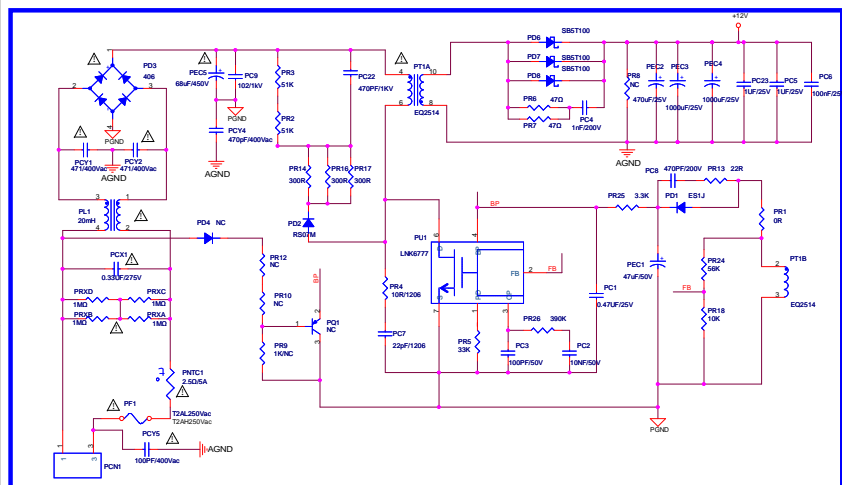
## FUNCTIONAL BLOCK DIAGRAM

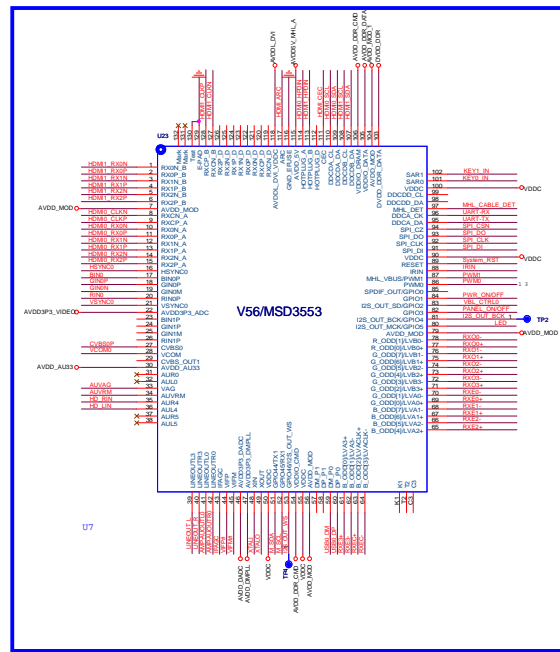
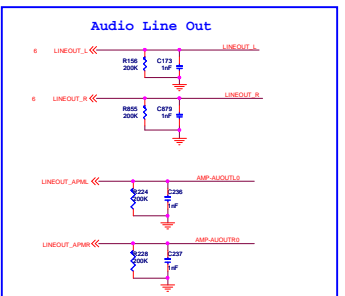
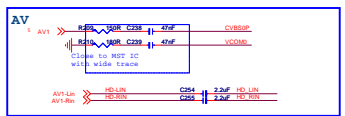
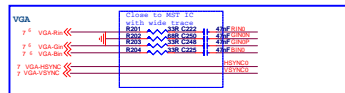
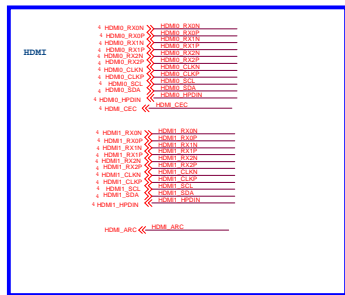


8. Circuit Diagrams

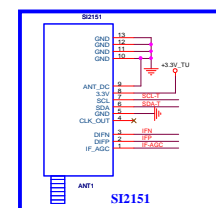
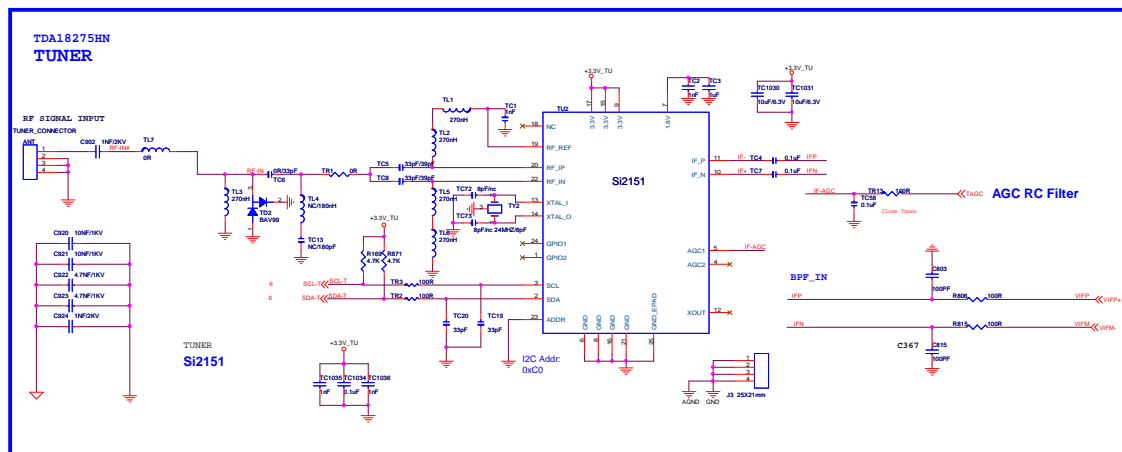
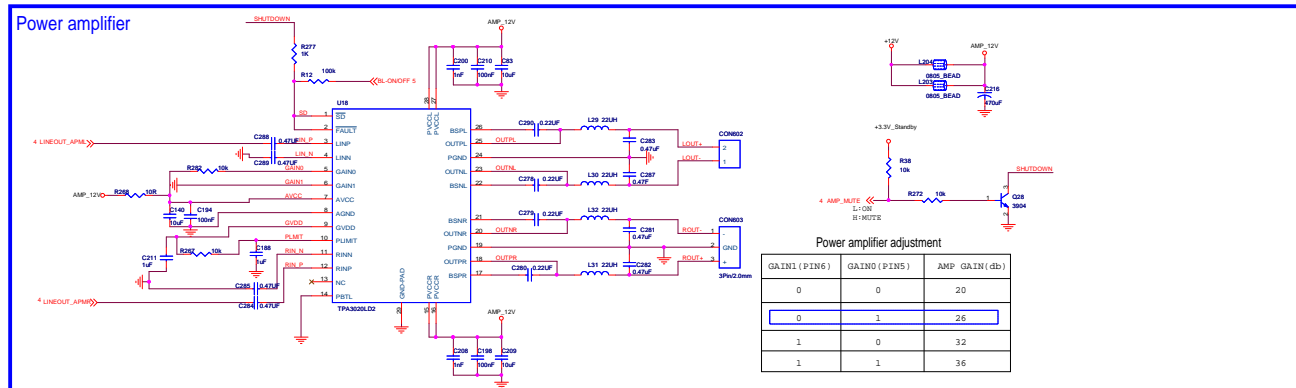
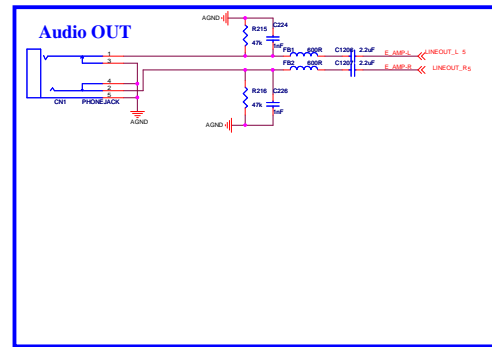
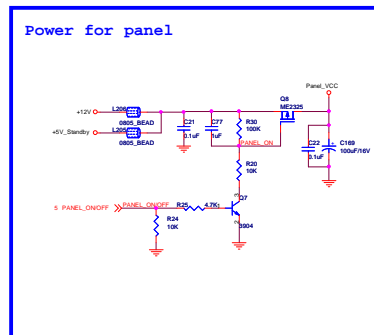
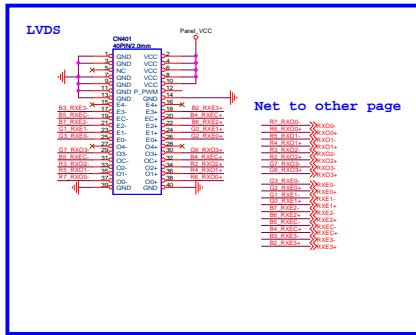
TSUMV56 / MSD3553-T4C1

date	change list
2016-11-21	V3.0

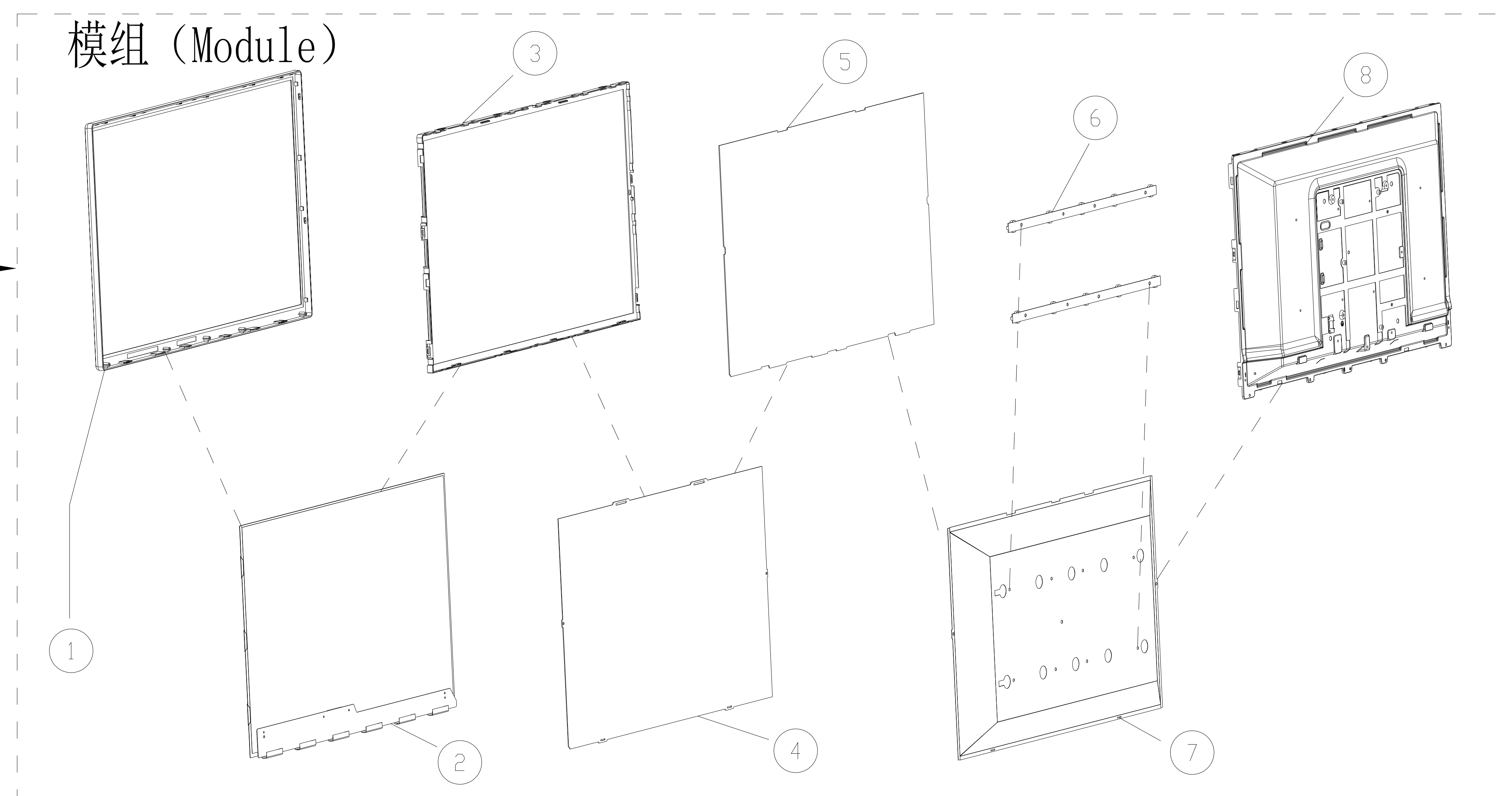
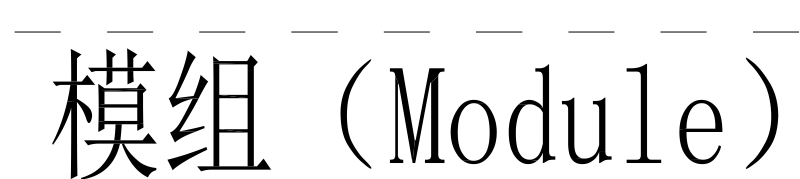
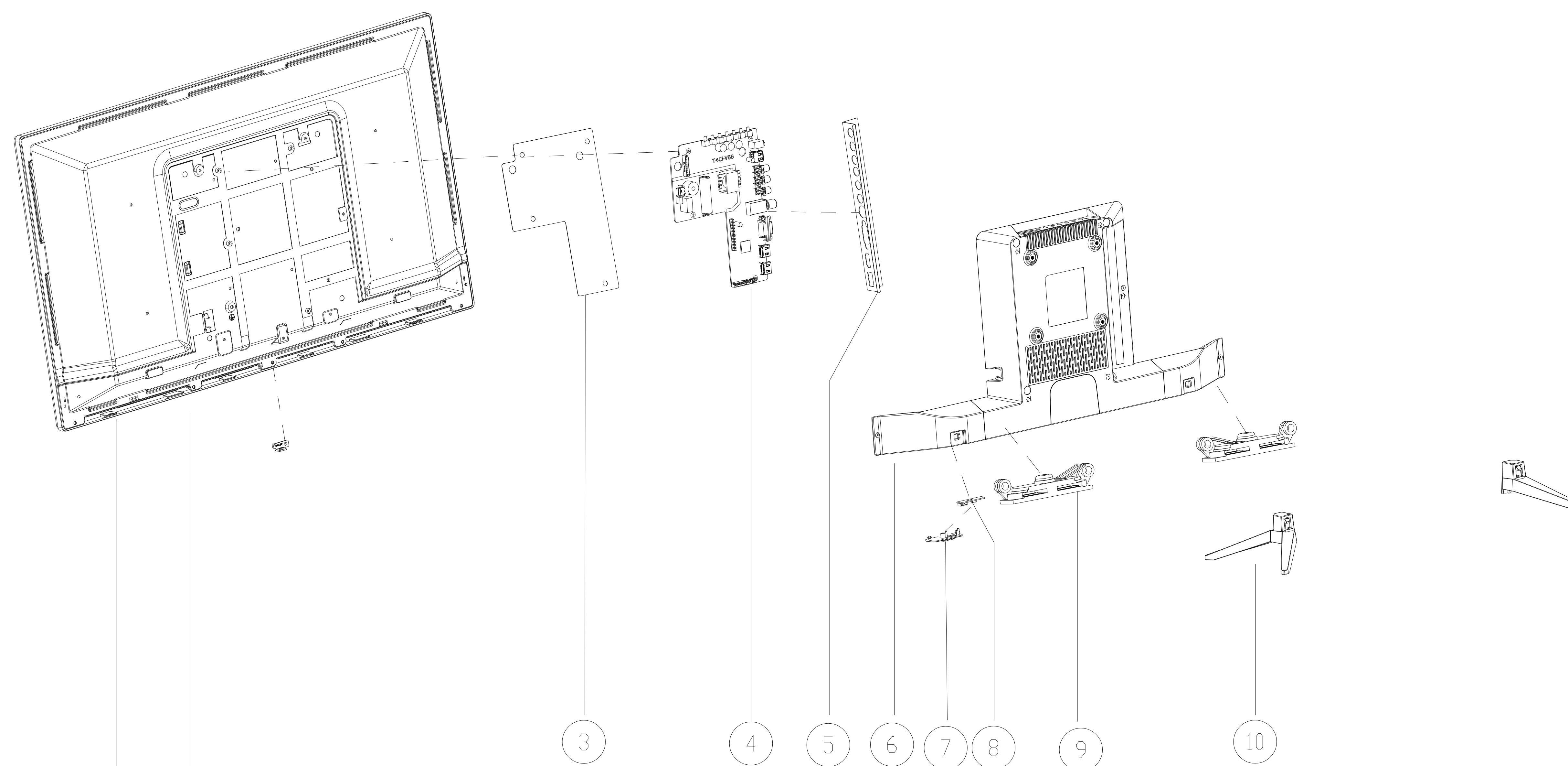












11	30	Bezel Plastic Front	7001-2400K3-0U7FLP01	1
10	50L/50R	Base	7003-24L82F-1U70LO01 7003-24L82F-1U70RO01	1/1
9	1184	Speaker	7711-288285-02000011	2
8	36	Remote control receive window	7034-5500C2-40001114	1
7	1056	IR board	9015-1120K3-01031021	1
6	40	Plastic back cover	7002-2400K3-24B00001	1
5		IO plate	7111-24L81F-42121911	1
4	1052I	Mainboard	9011-114A4A-A63A1651	1
3		Mylar Film	7912-423050-030R0514	1
2		Hardware support		0
1	1050	Module (panel)	7422-236CMK-335AK051-F	1

Detail for whole structure				
No.	Location	Name	Vendor PN	QTY

X.± .200		X°.± 0.050		24K3 (配T4C1-V56) 爆炸图 24K3 (T4C1-V56) Explosive View		<div>KTC®</div> <div>深圳市康冠技术有限公司</div> <div>SHENZHEN KTC TECHNOLOGY CO.,Ltd</div>				
.X± .100		.X°.± 0.010				料号	材质	日期	2018-04-23	
.XX± .01		.XX°.± 0.005		批准	审核					
.XXX± .005		.XXX°.± 0.002				绘图	余宏浩	MM	1:1	1/1
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