

Technical Guide

Model No. LCD-201803

2018 - LCD TV

Ver. 1.0



Circuit Operation and Troubleshoot

Panasonic[®]

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Revision History

Version	Issued/Revised date	Revised content
Ver. 1.0	29th. Mar. 2018	First version

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3-3. SOS Protection Circuit and Troubleshoot of Power Problem

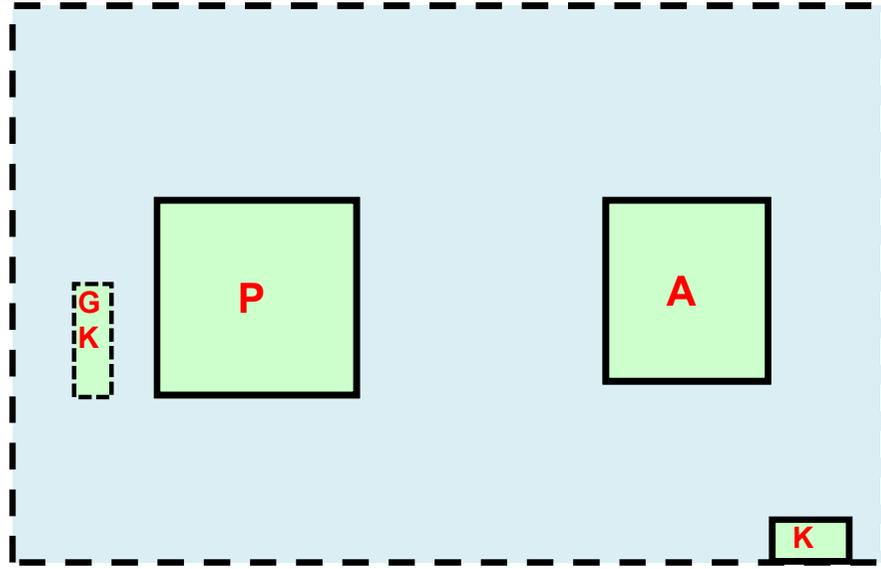
4.Rear Cover Disassemble and Assemble

1. Board Layout

Board Layout -1

49/43/32/24FS***/F4**, 40FS***/F4** (Europe and Oceania)

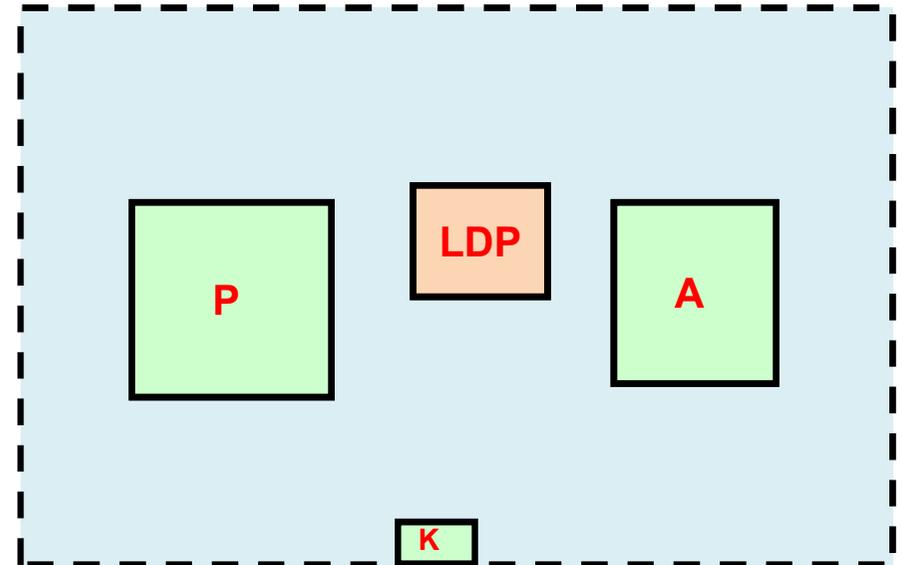
55/49/43/40FX6**/FX7**



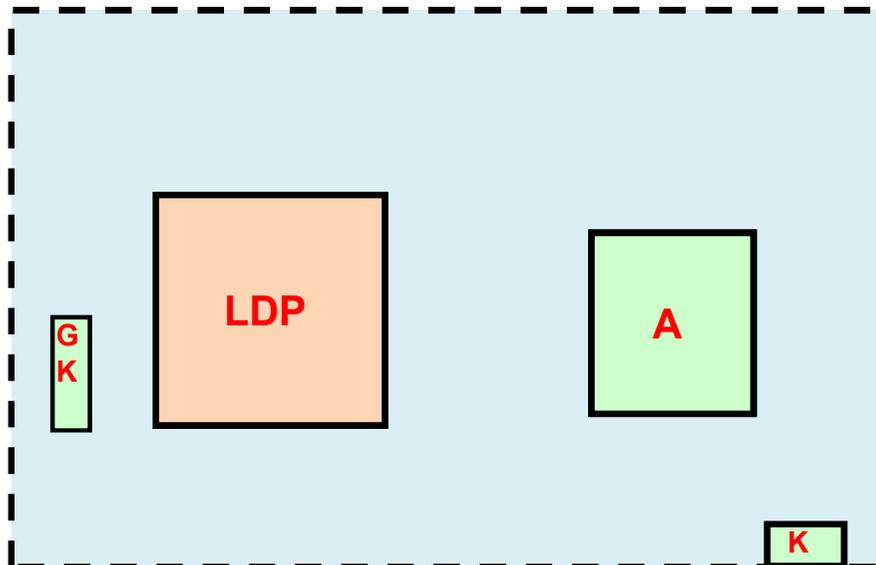
The presence of GK board is depend on the model and region.

50FS***

65FX6**, 75FX7**



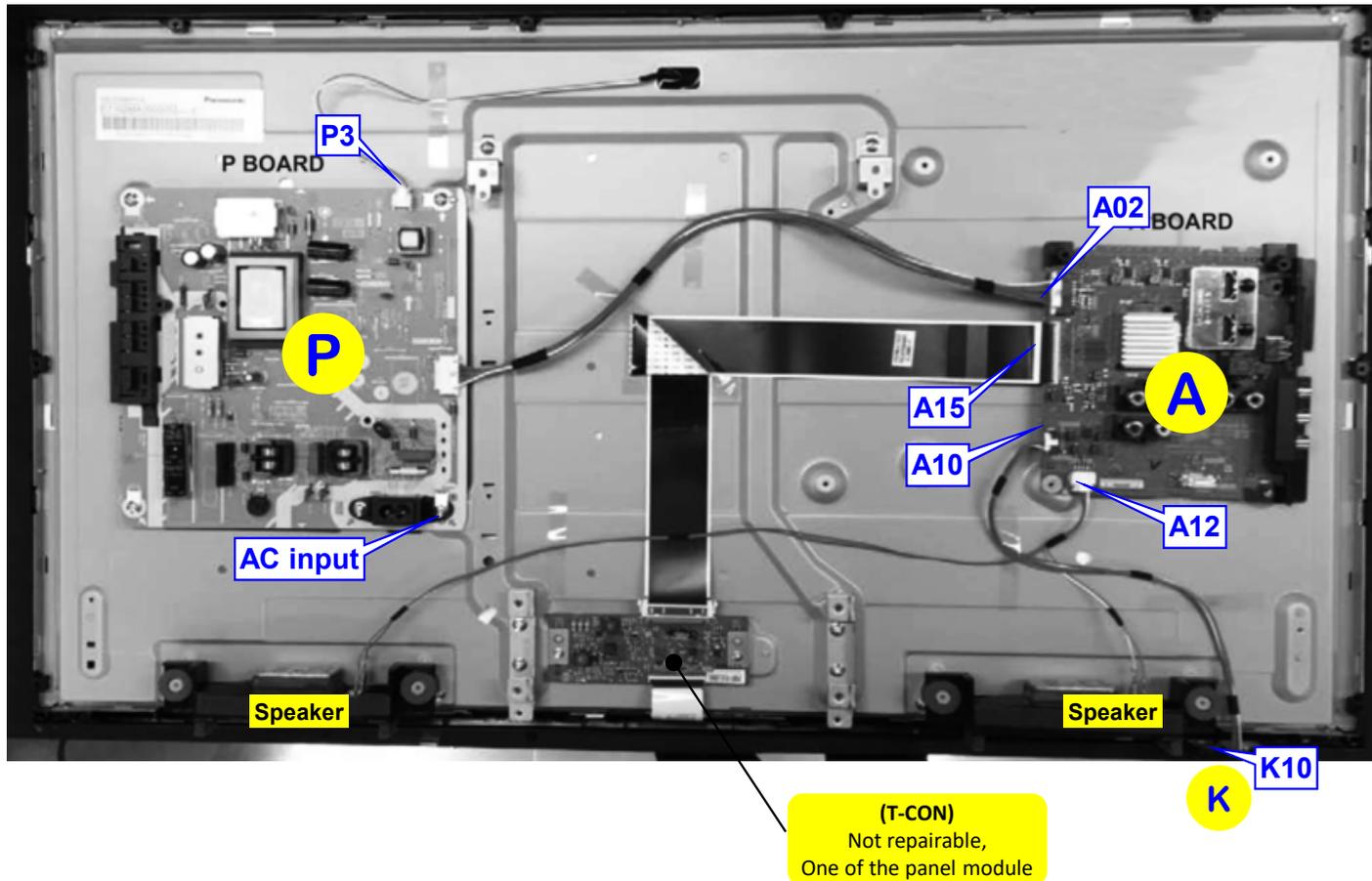
40FS***/F4** (Latin and Asia)



Board Layout -2

(A+P)

(32F400)

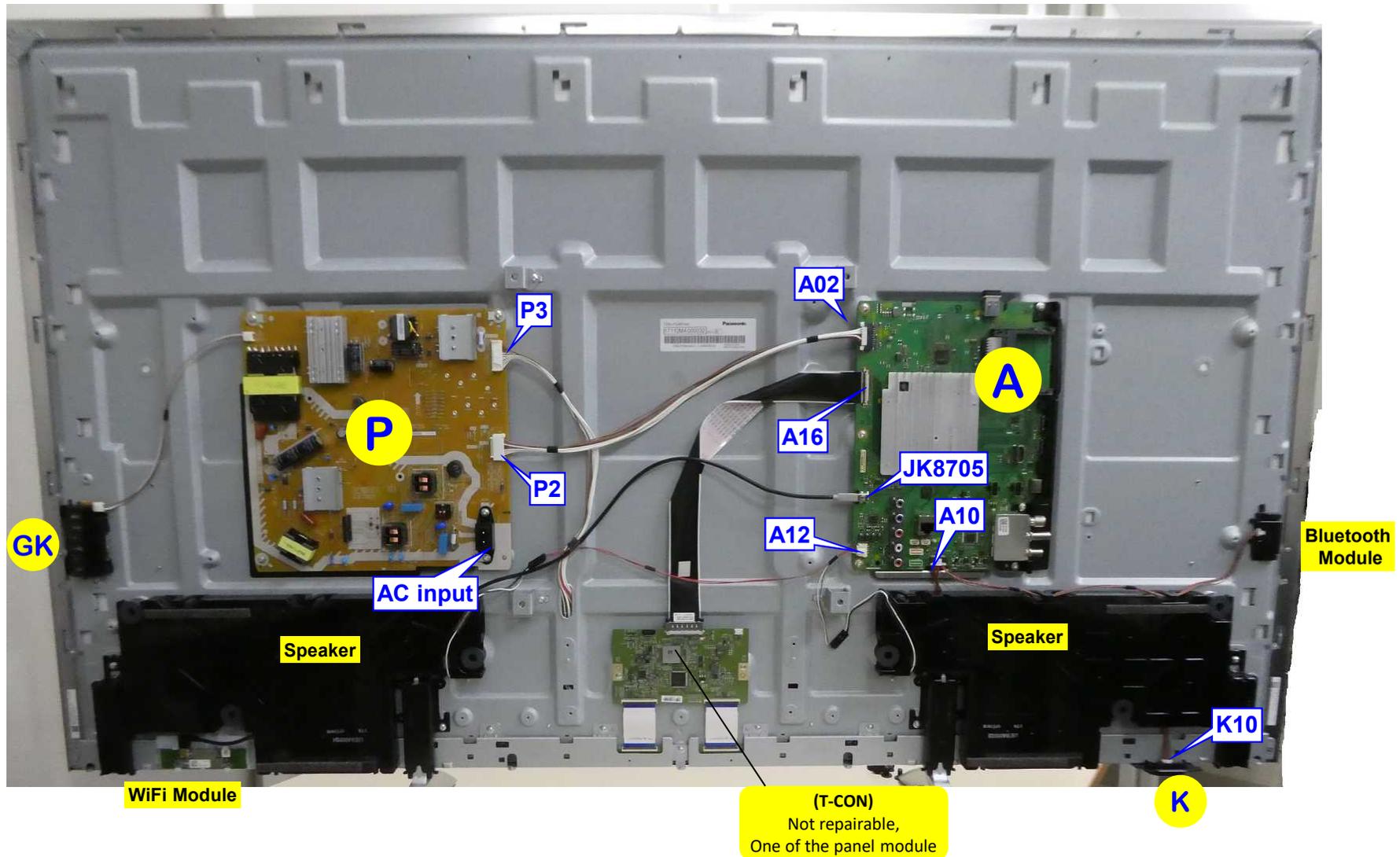


Board Name	Function
A-Board	Main Board
P-Board	Power supply, Backlight Drive, Power key, Control key
K-Board	Remote Receiver, Power LED

Board Layout -3

(A+P)

(55FX700)



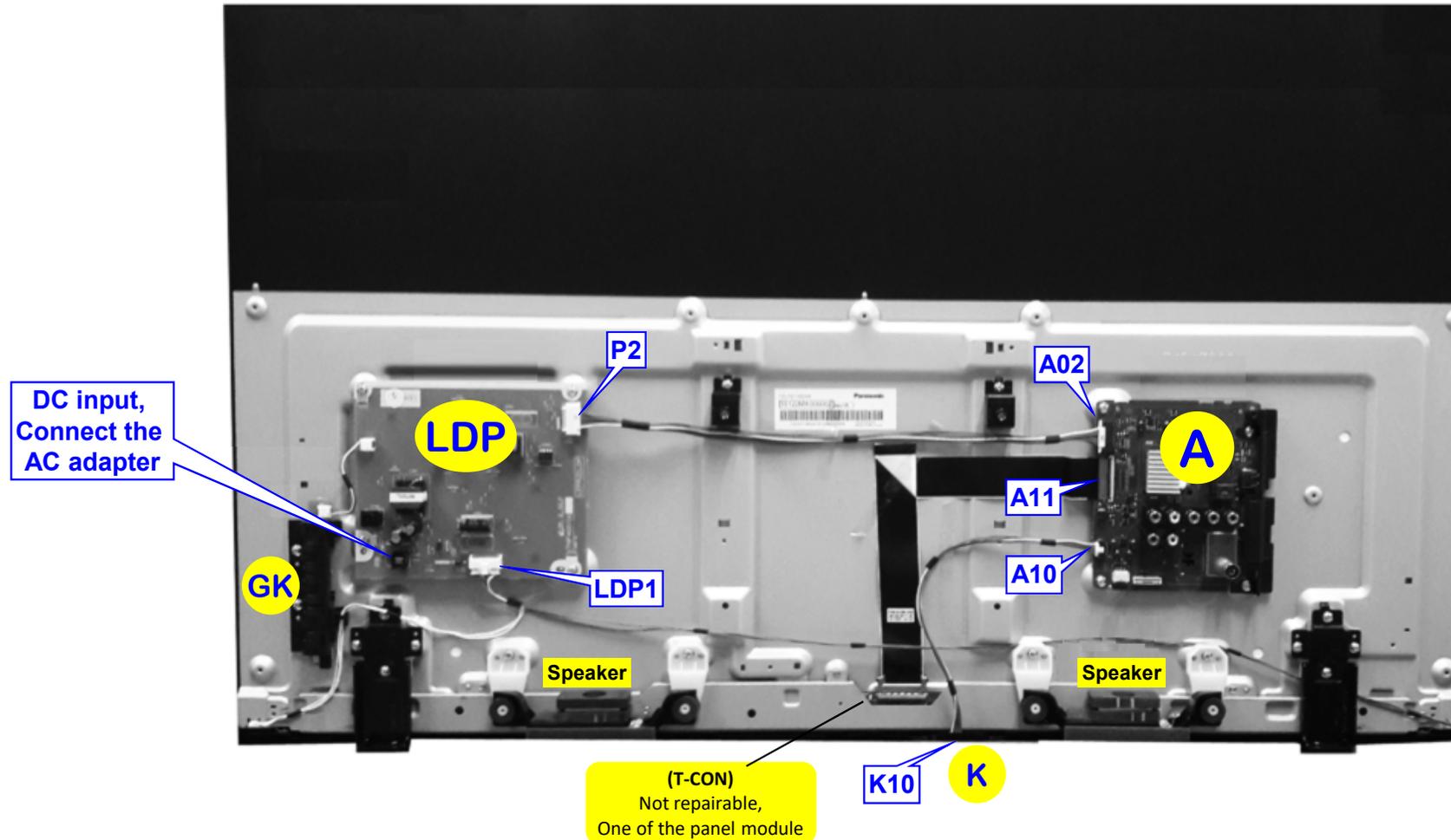
Board Name	Function
A-Board	Main Board
P-Board	Power supply, Backlight Drive

Board Name	Function
K-Board	Remote Receiver, Power LED
GK-Board	Power key, Control key

Board Layout -4

(A+LDP)

(40F400)

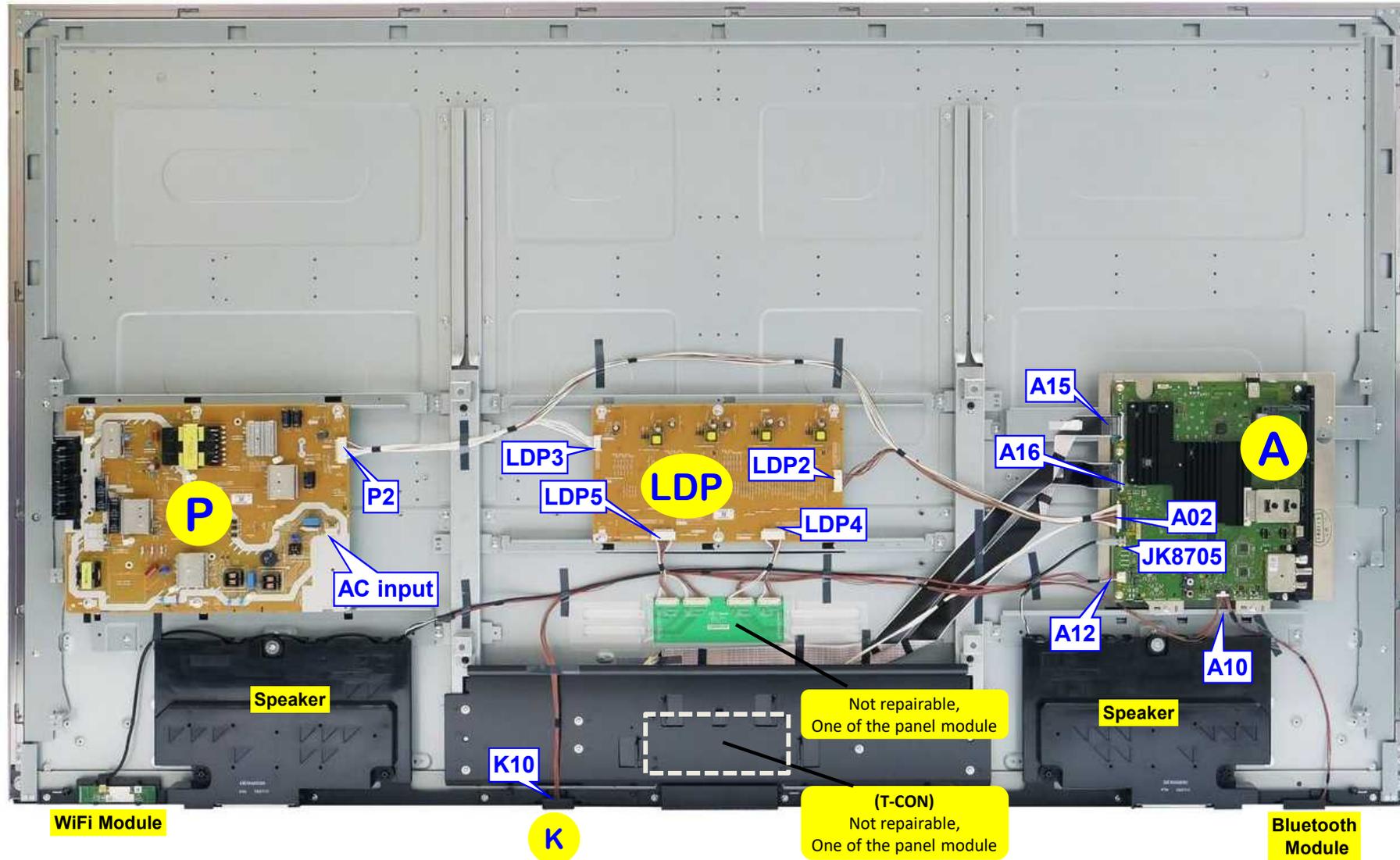


Board Name	Function
A-Board	Main Board
P-Board	Power supply, Backlight Drive, Power key, Control key
K-Board	Remote Receiver, LED

Board Layout -5

(A+P+LDP)

(75FX750)



Board Name	Function
A-Board	Main Board
P-Board	Power supply for Signal Process

Board Name	Function
LDP-Board	Power supply for Backlight Drive
K-Board	Remote Receiver, Power LED

Board Structure

	F4**	FS5**	FX6** (4K)	FX7** (4K)	
24inch	A+P		---	---	
32inch	A+P	A+P	---	---	
40inch	A+P (Oceania)	A+P (Europe/Oceania)	A+P	A+P	
	A+LDP +DC adaptor (Asia/Latin)	A+LDP +DC adaptor (Asia/Latin)			
43inch	A+P		A+P	A+P	
49inch	A+P		A+P	A+P	
50inch	---	A+P+LDP	---	---	
55inch	---	---	A+P	A+P	
65inch	---	---	A+P+LDP		
75inch	---	---	---	A+P+LDP	

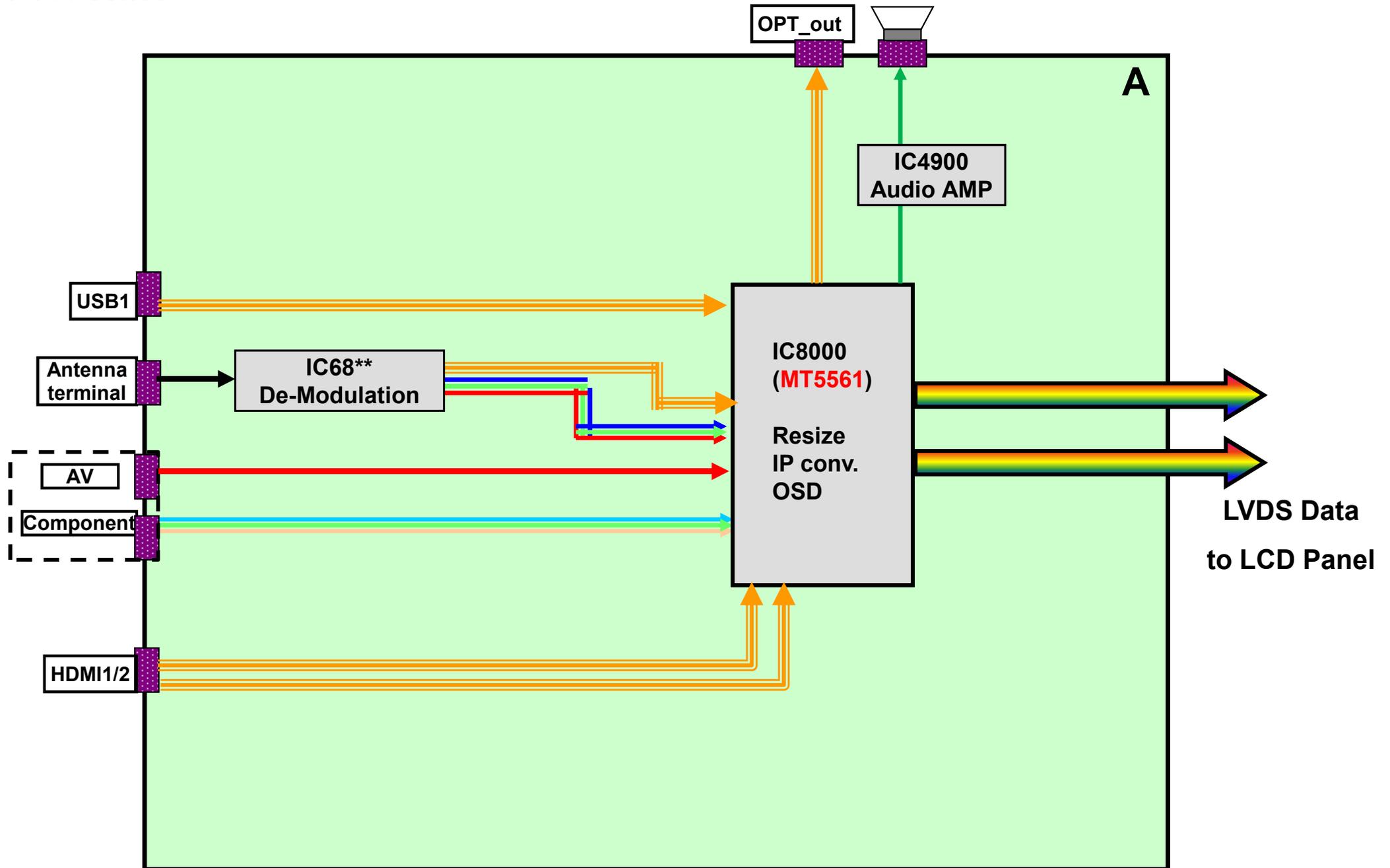
Except K, GK boards

2. Signal Processing

2-1. Signal Flow

Video/Audio Signal Process - 1

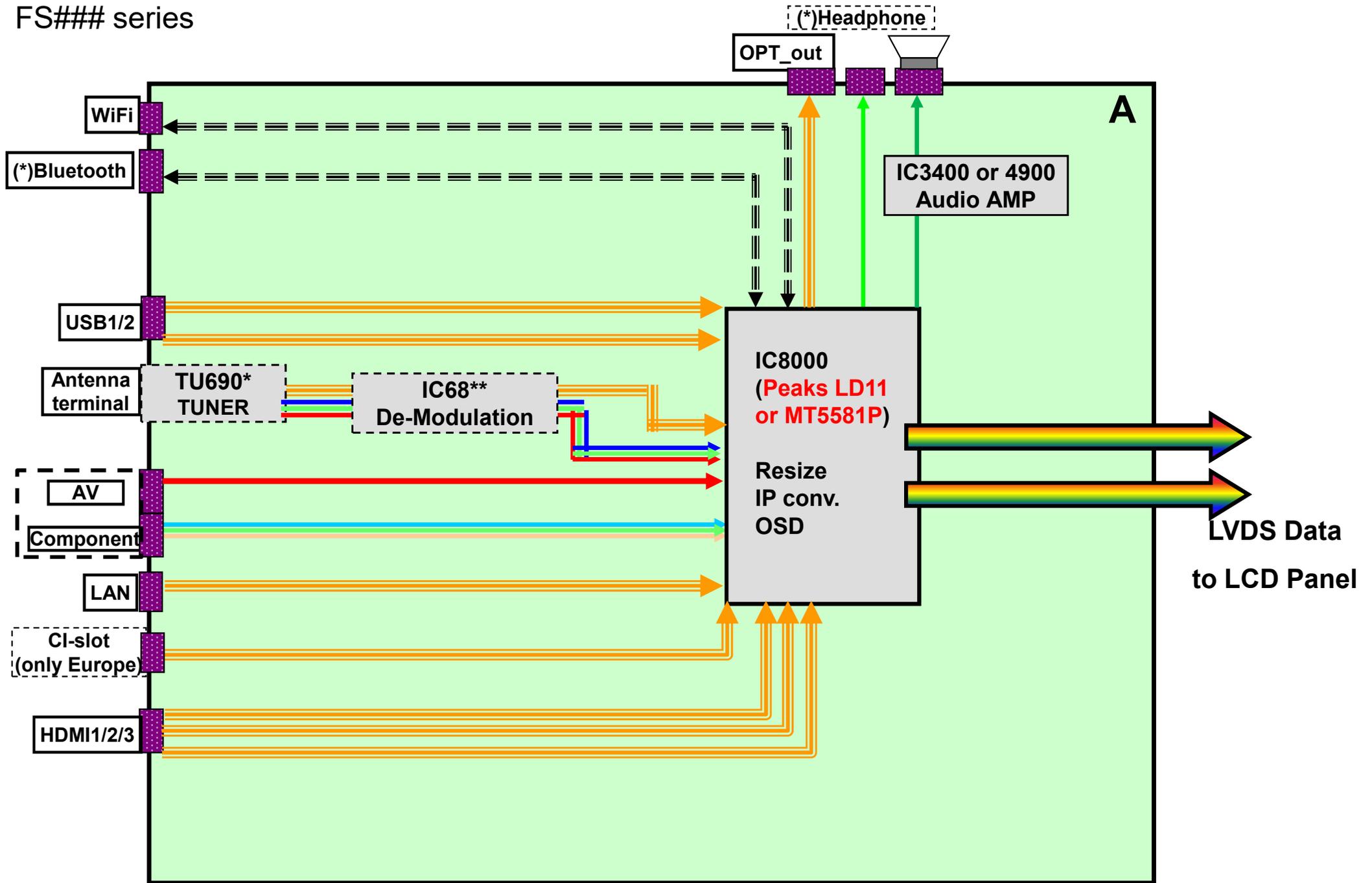
F4## series



The input terminals are different by the models or countries.

Video/Audio Signal Process - 2

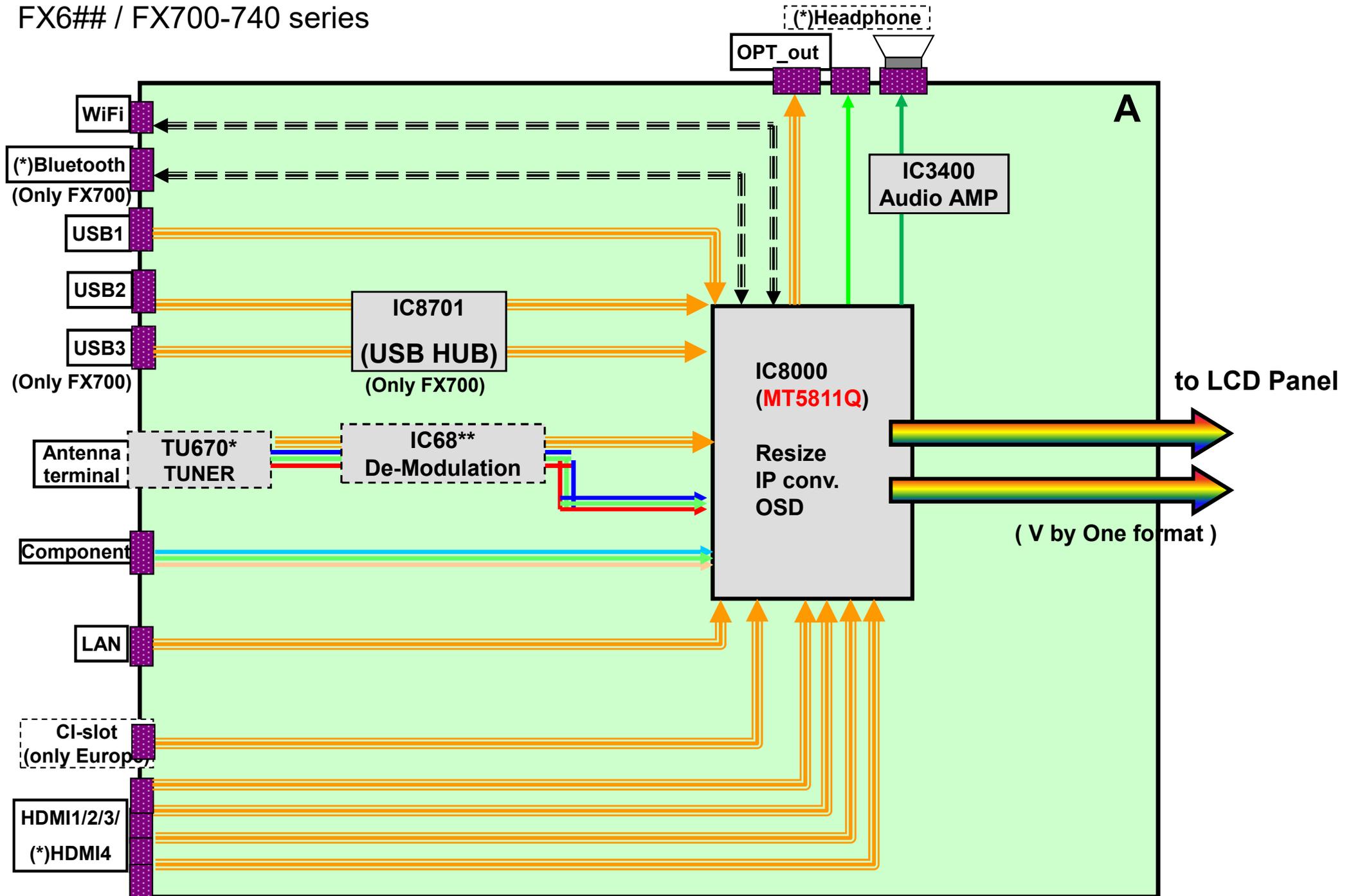
FS### series



(*) The input terminals are different by the models or countries.

Video/Audio Signal Process - 3

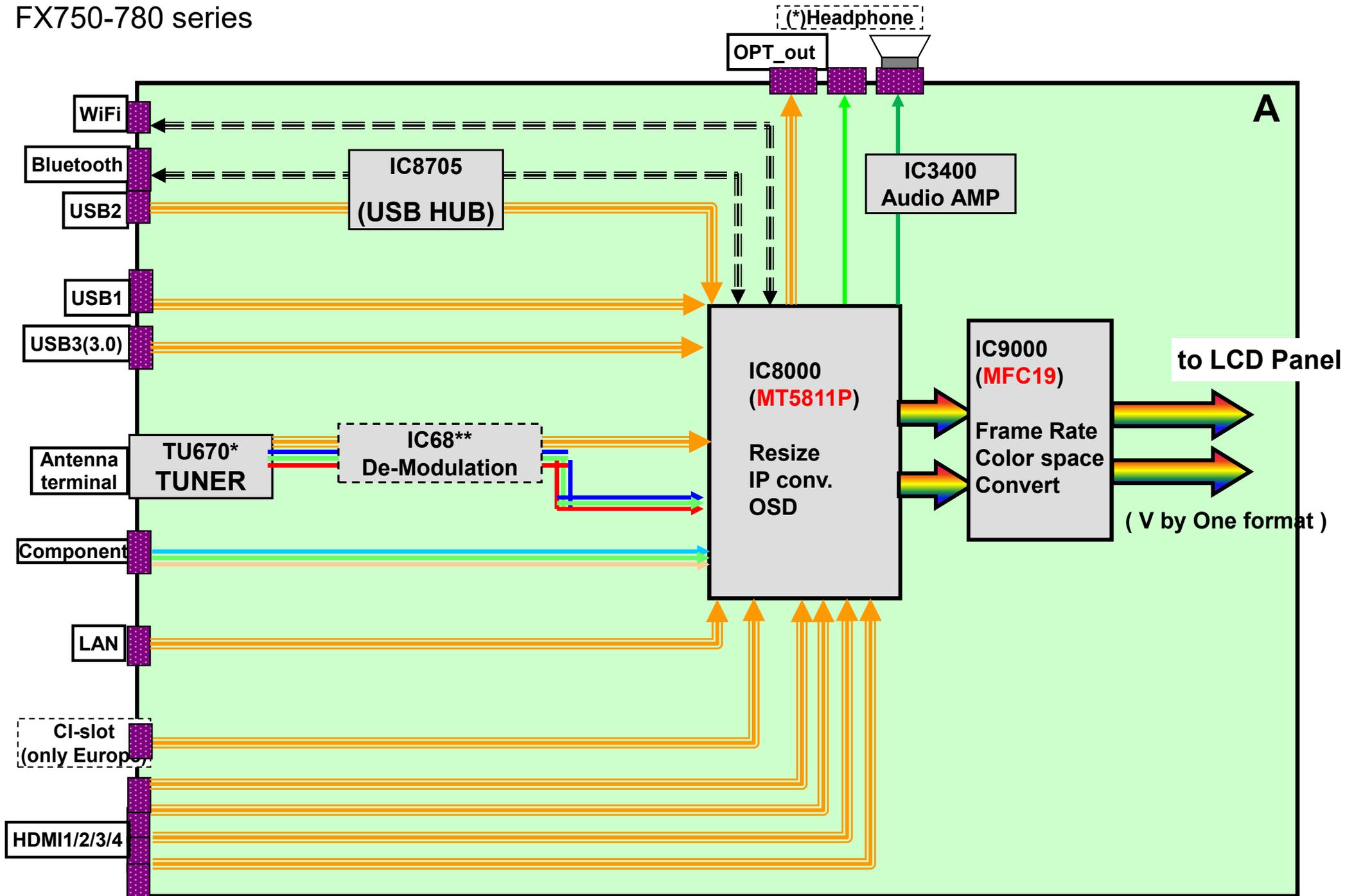
FX6## / FX700-740 series



(*) The input terminals are different by the models or countries.

Video/Audio Signal Process - 4

FX750-780 series



(*) The input terminals are different by the models or countries.

2-2. Troubleshoot of Picture Problem

Troubleshoot for Picture Problem

<LCD Panel Test Mode> :When abnormal picture is displayed, troubleshoot by the test pattern in LCD module.
If the picture is no problem, A board must be defective.
If the picture is also abnormal, LCD panel module must be defective. Just in case, confirm the flat cable connection between A board and T-CON board.

How to enter :

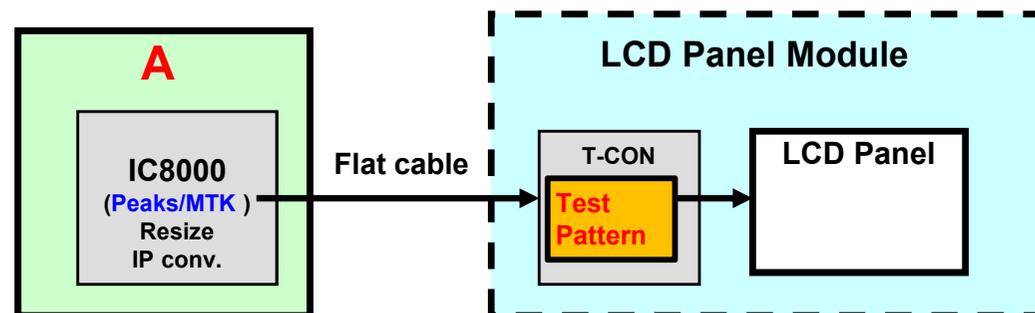
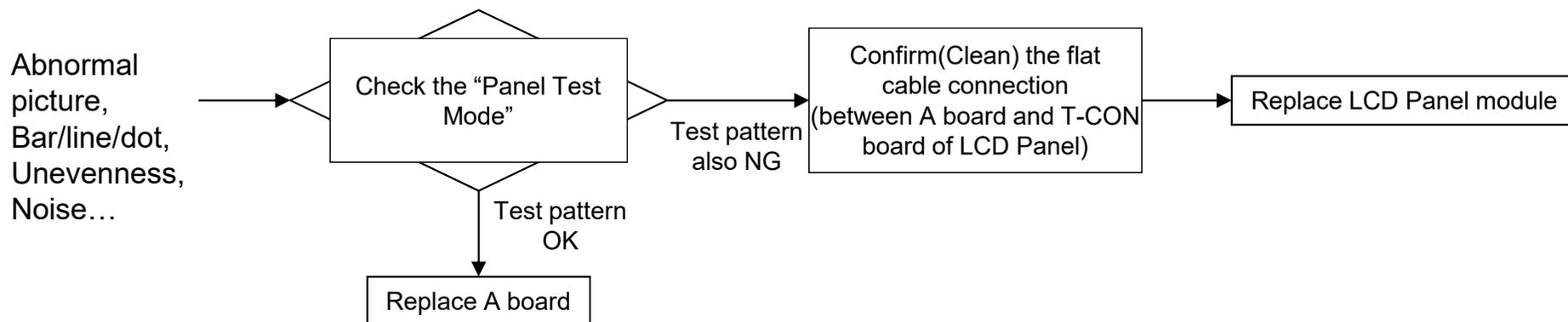
While pressing "volume(-)" button of the TV unit,
press "Yellow" button of the remote control 3 times within 2 seconds.

How to exit :

Switch off the TV unit

#)The test pattern is created by the circuit in LCD Panel Module(T-CON board).

Some patterns are automatically changed.
The patterns are depend on the LCD panel.



Troubleshoot for Picture/Sound Problem

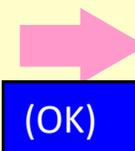
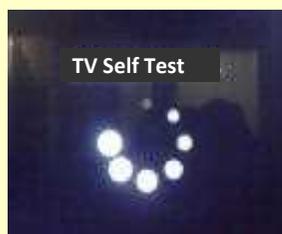
<TV Self Test> : Customers also can check the picture and sound by internal data.

If the picture and sound is no problem, the reason of trouble is mostly not a TV.

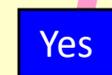
How to display :

Menu → HELP → TV Self Test

#)The test pattern and test sound are created by the main IC on the A board.



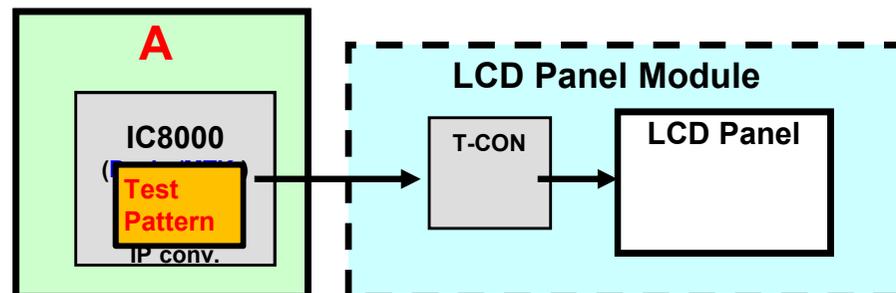
- 1) During this indication "Self Check of Service Mode" is working at the background.
- 2) If NG, indication is shown.
A board defective
- 3) If All OK, it shifts to picture and sound test.



1. Antenna level low
2. Connection mistake
3. Input devices NG
4. Input select mistake

TV unit defective.
(A board, Panel or Speaker)

***) F400/410 series do not support.**



System Information

You can check some information in Help menu.
MENU → Help → System information

System Information

Software Version : 3003-10000-0200a0600019
Status1 : 0e 0201-0003 0000-0800
Status2 : 0028-123-0012c8 0035-034-651g
Status3 : 00-000000-F000
Status4 : A00025-0000033-00000
Status5 : 00000-10000 17d010ff
Status6 : 03166502-1000030
Status7 : 00000-0751
Status8 : 00014-00014-00001-00001
HDAVI Control : 5

These list is different from the models.

(There are lower items for leader models.)

Software version = 3003 – 10000 - 00200a060019
 (Main – STBY – FRC)
 ver. 3.003 , 1.000, 0.200a06, 0.0019
 * FRC version is only for high grade models

Status1 : model ID

Status2 : 0028-123-0012c8 0035-034-651g
 LSI (Package-Release-data ver), AQ (Package-Release-data ver)

Status3 : 00 = Bad block in NAND Flash
 00 = Main SOC Reboot counter
 00 = System crash counter
 00 = Emergency(SOS) counter
 F000 = NAND maker ID

Status4 : A = Power on period(A<=100hrs, B<=200hrs, C>200hrs)
 00025 = Power on time (hours)
 0000033 = power on counter
 00000 = (Fixed)

Status5 : 0 = SOS history (Latest)
 0 = SOS history (last time)
 0 = SOS history (last but one)
 0 = SOS history (2nd time after shipping)
 0 = SOS history (1st time after shipping)
 1 = Self-check (0=never self check,
 1= factory Self check by pressing “MENU”
 2=indication Self check by pressing “Blue (or OK)”
 0000 = (Fixed)
 17d010ff = Panel ID

Status6 : Main SOC EEPROM version , STM EEPROM version

Status7 : STM ROMCOR version , AJAX CE version

Status8 : 00014= Starting Count of Panel Maintenance-1
 (for OLED) 00014= Completed Count of Panel Maintenance-1
 00001= Starting Count of Panel Maintenance-2
 00001= Completed Count of Panel Maintenance-2

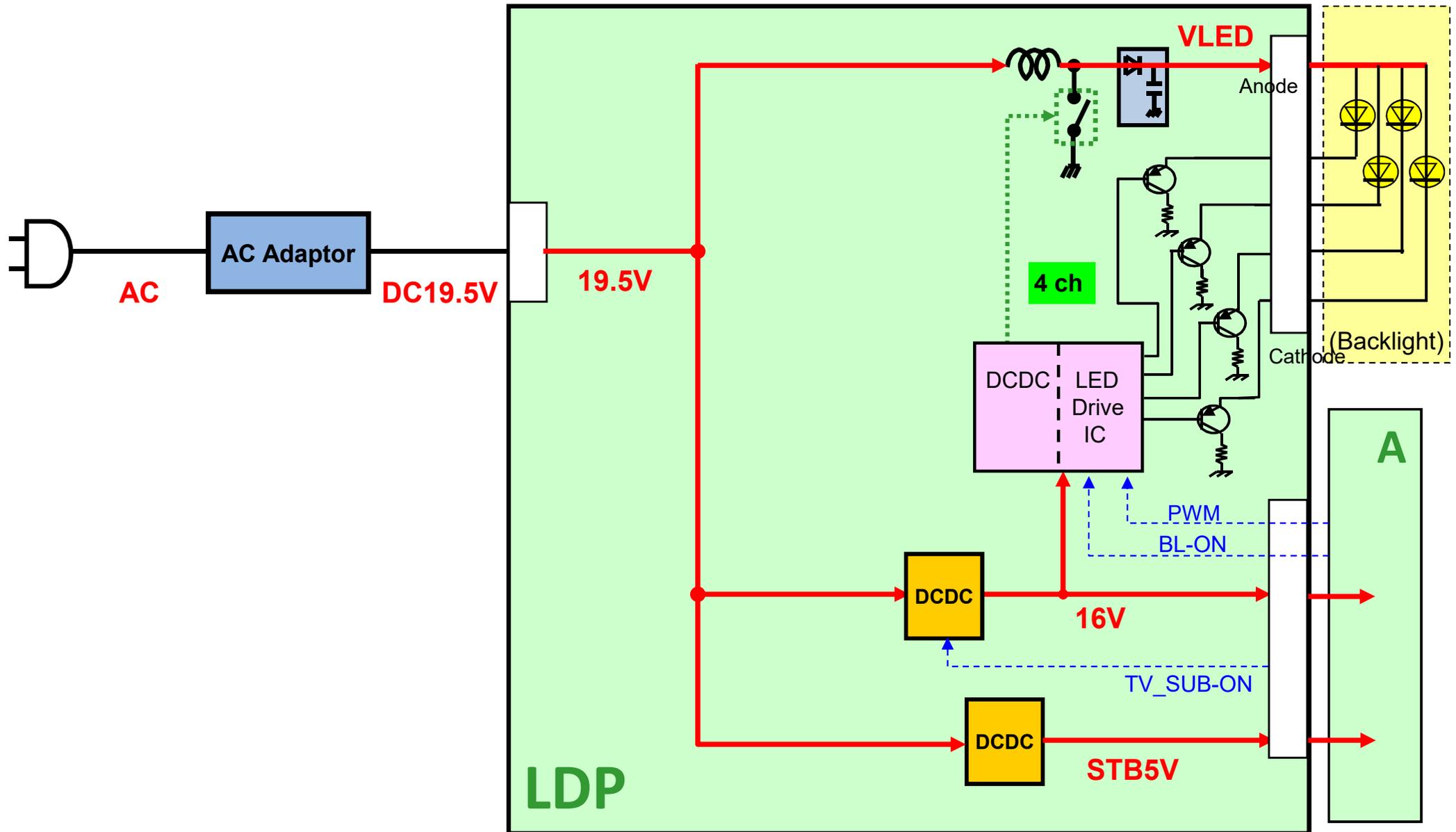
HDAVI version : 5 = Viera Link version

3. Power Supply

3-1. Power Board Structure

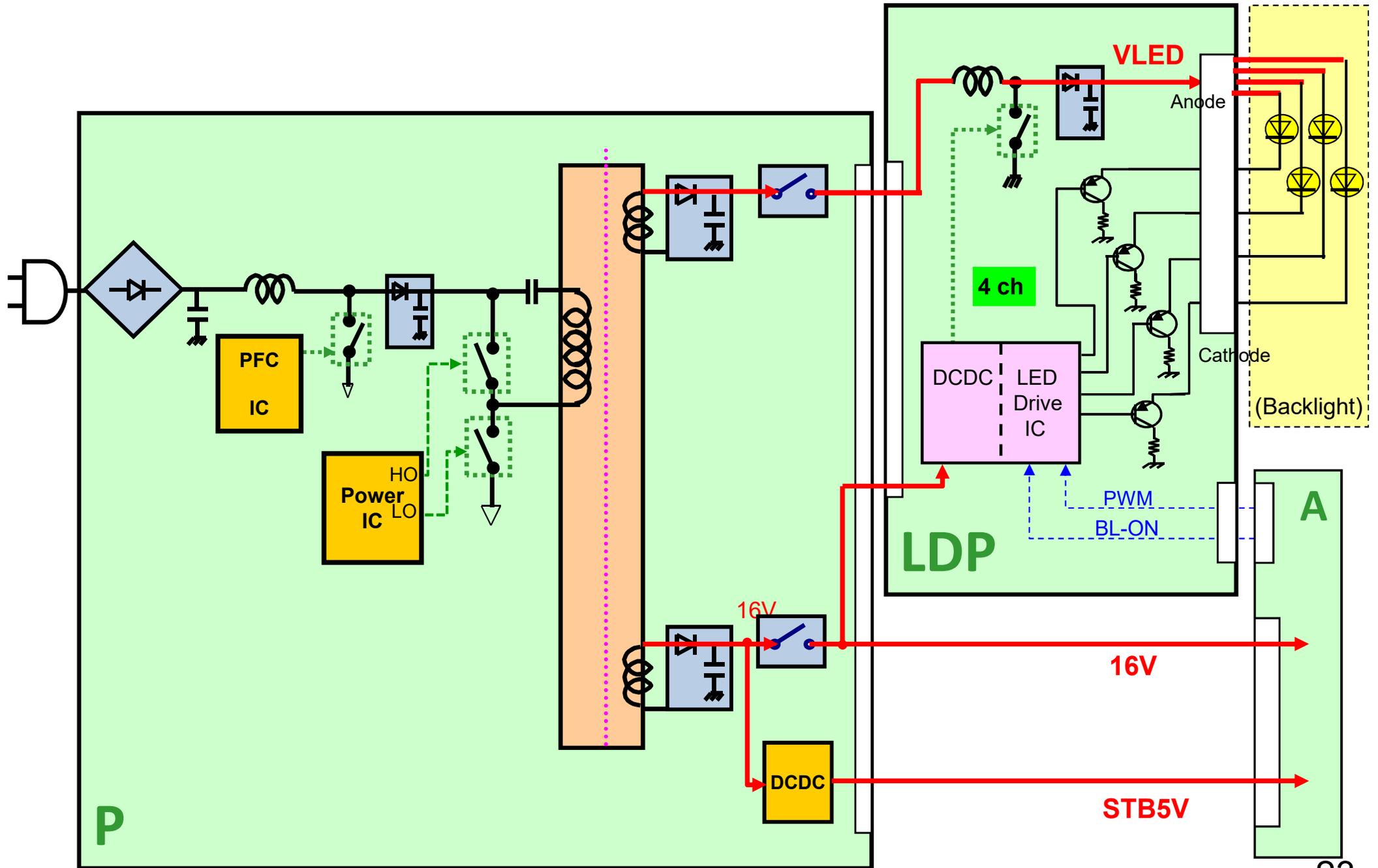
Power Board Structure -2 (LDP Board only)

< LDP > (only TH/TC-40F4##/40FS### , except Europe/Oceania)



Power Board Structure -3 (P+LDP Boards)

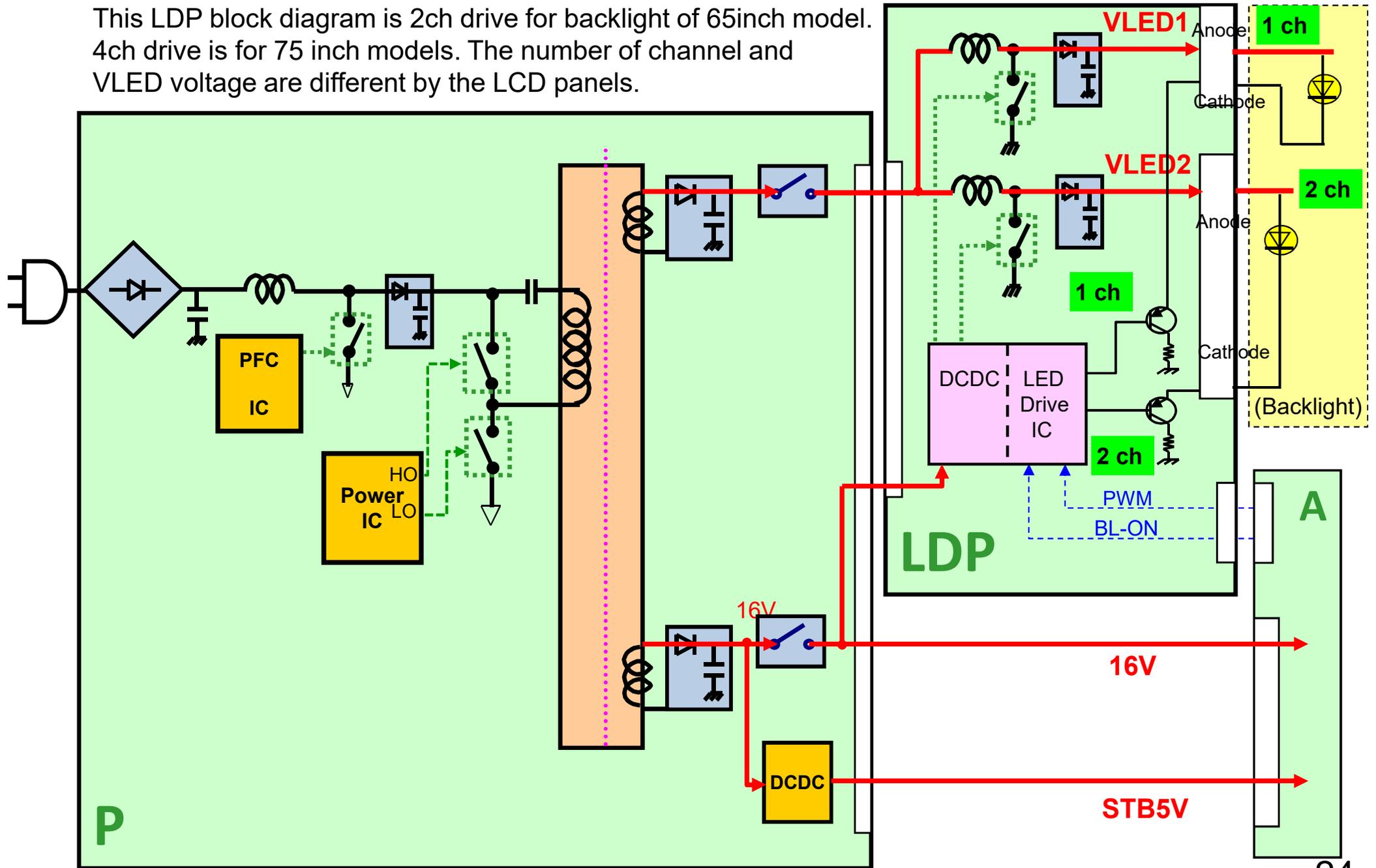
< P + LDP > (only 50FS500**)



Power Board Structure -4 (P+LDP Boards)

< P + LDP > (only 65FX6**/75FX7**)

This LDP block diagram is 2ch drive for backlight of 65inch model. 4ch drive is for 75 inch models. The number of channel and VLED voltage are different by the LCD panels.

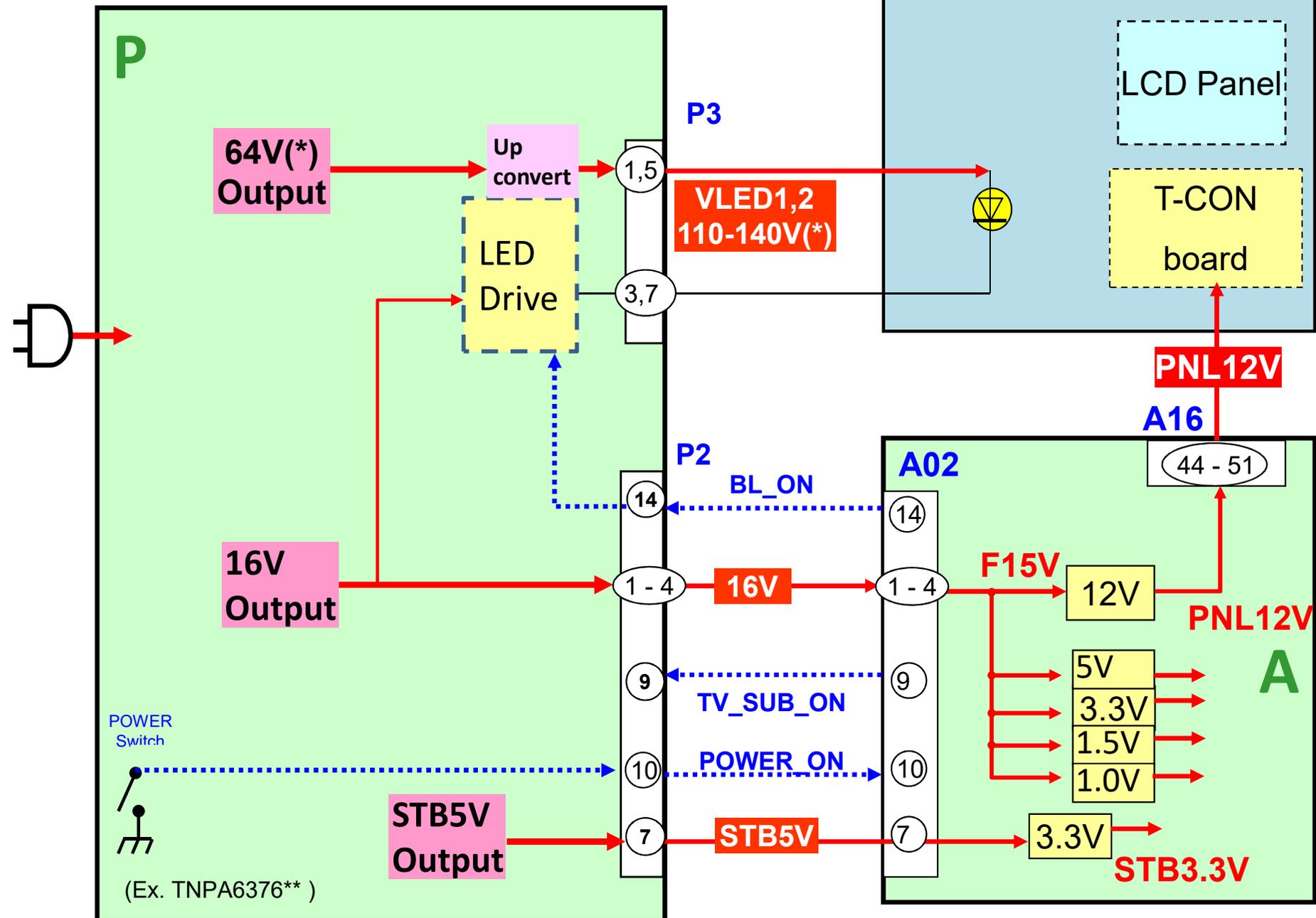


3-2. Stand by / Start up Operation

The explanation is for the case of “Power Board Structure -1 (P board only, ex.55FX600)”, but “LDP, P+LDP, P+PB” cases are basically same start up operation.

Ex. 55FX600** series

(Each models are different pin allocation but operation is same.)

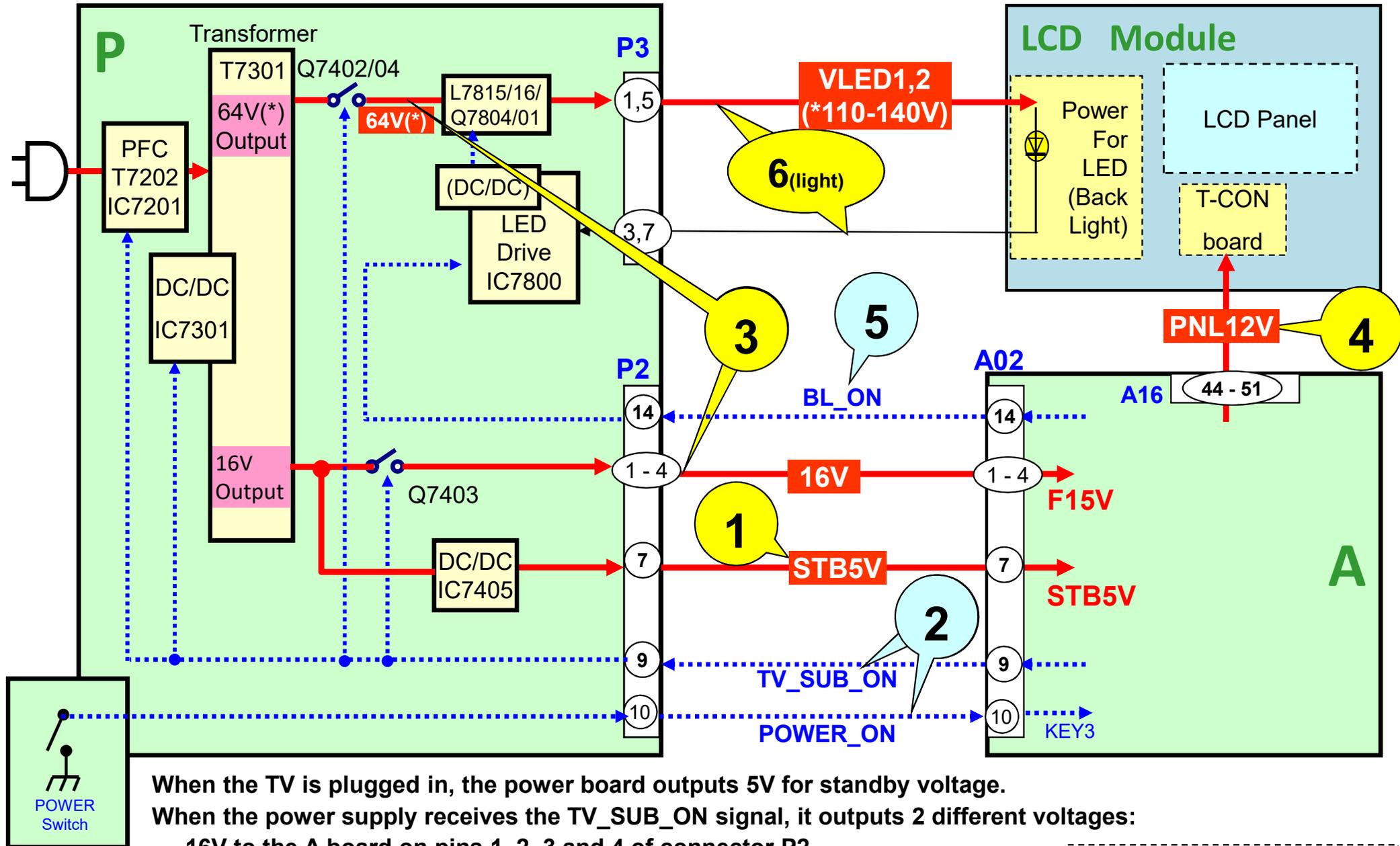


(*)The DC level is different by the LCD panel.

Start up Operation-1

<A+P>

Ex. 55FX600** series (Each models are different pin allocation but operation is same.)



When the TV is plugged in, the power board outputs 5V for standby voltage.

When the power supply receives the TV_SUB_ON signal, it outputs 2 different voltages:

16V to the A board on pins 1, 2, 3 and 4 of connector P2.

64V(*) to the LED backlight drive part.

After A board is ready to display, it outputs Backlight_on command to P board.

P board output 110-140V(*) to the backlight of LCD panel on pins 3 and 7 of connector P3

(*)The DC level is different by the LCD panel.

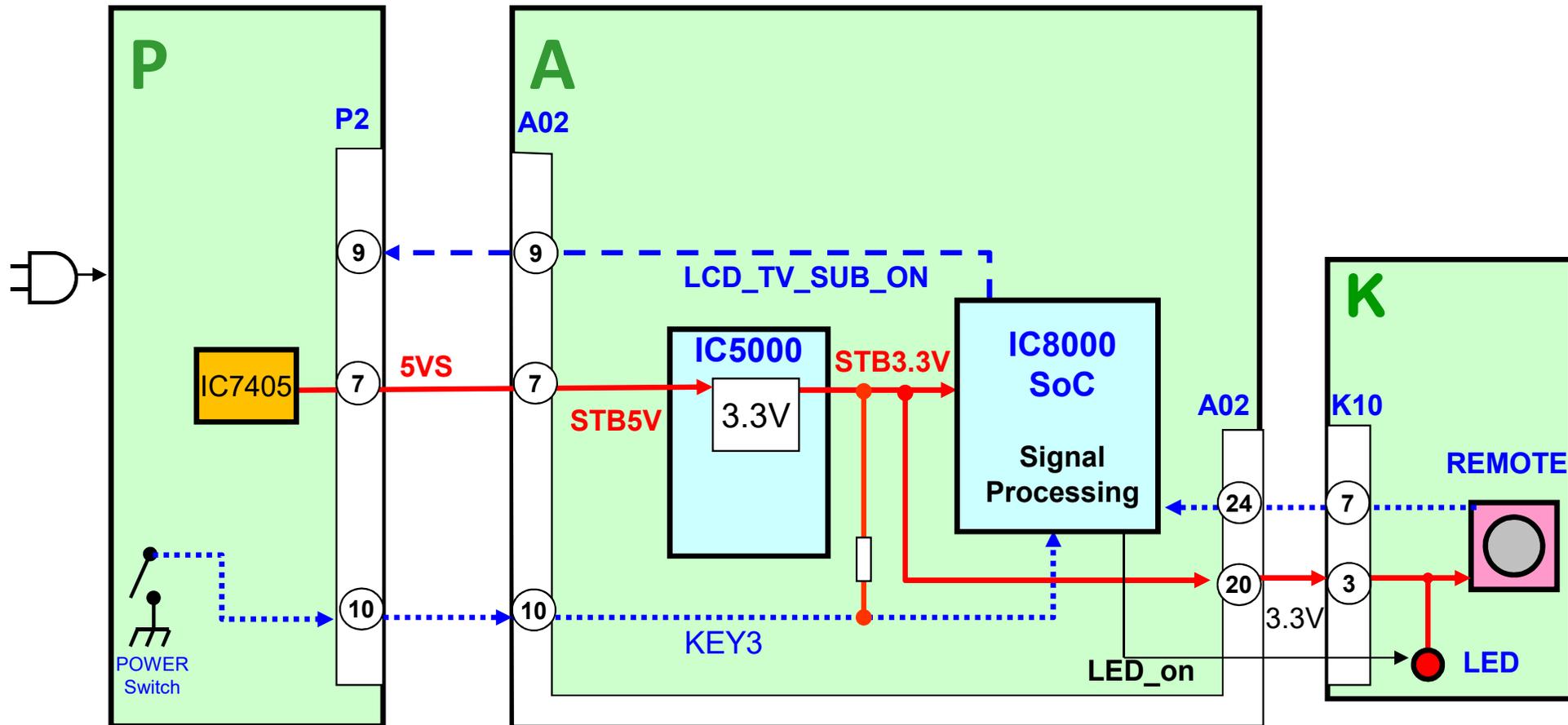
< from AC plug in to **1** : P board >

When the TV is plugged in, the rectifier start to produce DC voltage which leads through PFC circuit directly to the power switches Q7301, Q7302. (PFC circuit IC7201 does not operate at this moment.) Besides this DC voltage is provided also for D7104, D7105 which provide start voltage to pin 1 of power supply IC 7301. When the voltage on pin 1 rise up to predefined value IC7301 starts supplying of switching pulses for Q7301, Q7302. Due to this current starts to lead through winding of T7301 which starts to generate output voltages. One of these voltages VCC is used for power supplying of the IC 7301 to its pin 10.

When the power supply starts up, the 16V is providing by D7406,07/C7424. This voltage leads to IC7405, which is 5 volts DCDC converter.

This voltage (STB5V) is provided to A board via connector P2 pin7. So if the TV is plugged in, STB5V is provided to A board without trigger signal.

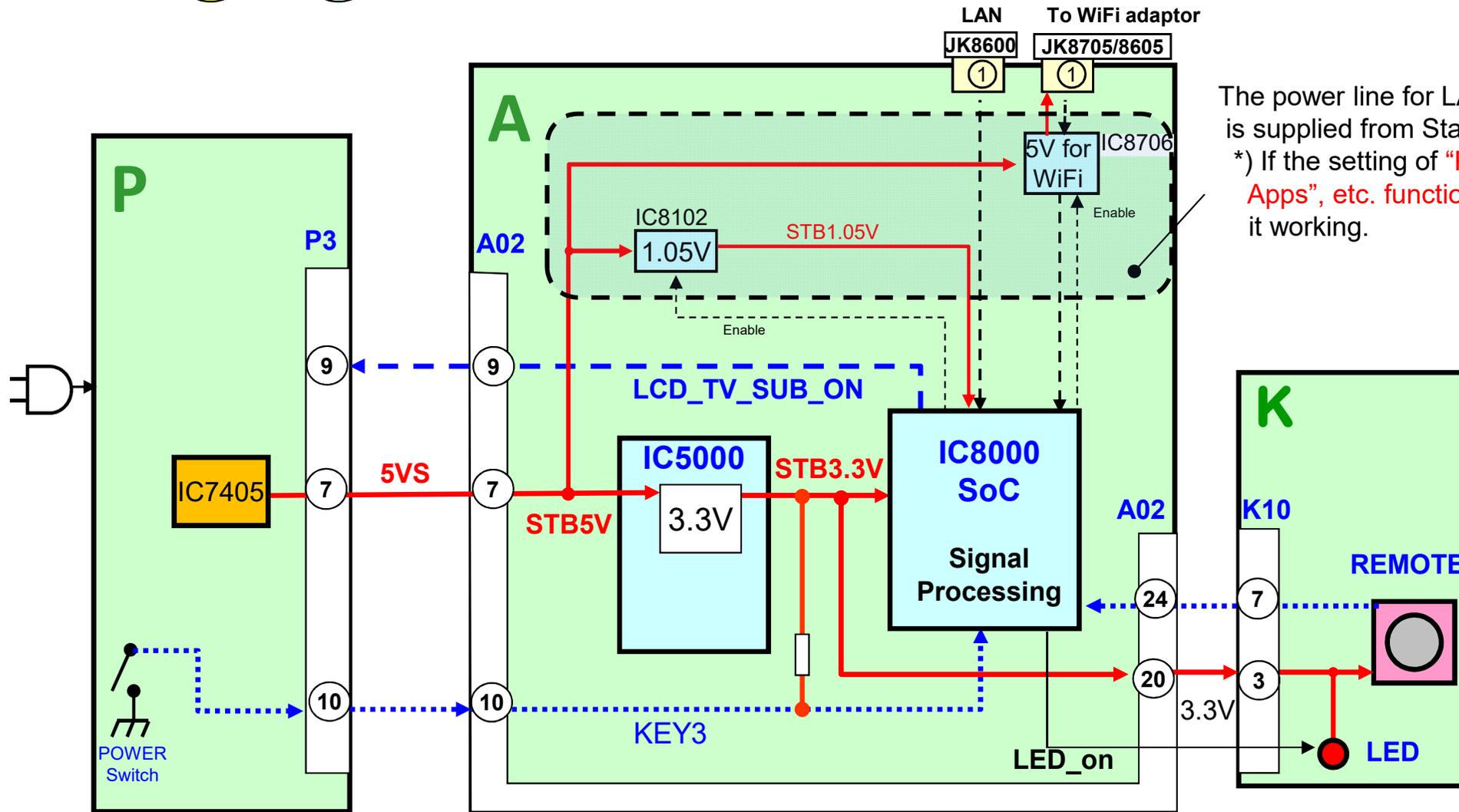
< from ① to ② : A board > Ex. 55FX600** series



(Each models are different pin allocation but operation is same.)

	OFF (It can receive only Power SW)	Standby (It can receive Power SW, Remote, Viera Link and so on)
North America	(Automatically) →	Power LED: OFF
Except North America	Power LED: OFF Power SW on →	Power LED: RED

< from ① to ② : A board >



The power line for LAN/WiFi is supplied from Standby power.
 *) If the setting of "Power on by Apps", etc. function is enable, it working.

	OFF (It can receive only Power SW)	Standby (It can receive Power SW, Remote, Viera Link and so on)
North America	Power LED: OFF (Automatically) →	Power LED: OFF
Except North America	Power LED: OFF Power SW on →	Power LED: RED

< from ① to ② : A board >

The STB5V from pin7 of connector P2 is applied to the Analog ASIC (IC5000) for supplying power to the Main CPU (IC8000) on the A board. The Analog ASIC (IC5000) converts the STB5V to STB3.3V. This voltage energize and prepare the microprocessor (CPU) for program execution. The STB3.3V from the Analog ASIC (IC5000) is also applied to the remote control receiver and the power LED on the K board through connector A02/K10.

When the Power Switch on, the key3 signal is grounded. (#1)

The IC8000 lights on the RED LED and is ready to power on the TV by receiving the Power switch on, Remote on, Viera Link and so on. This is a standby state.

(#1)Only North America model: Power switch on is no need, automatically this procedure is operated after the TV is plugged in. But the RED LED does not light.

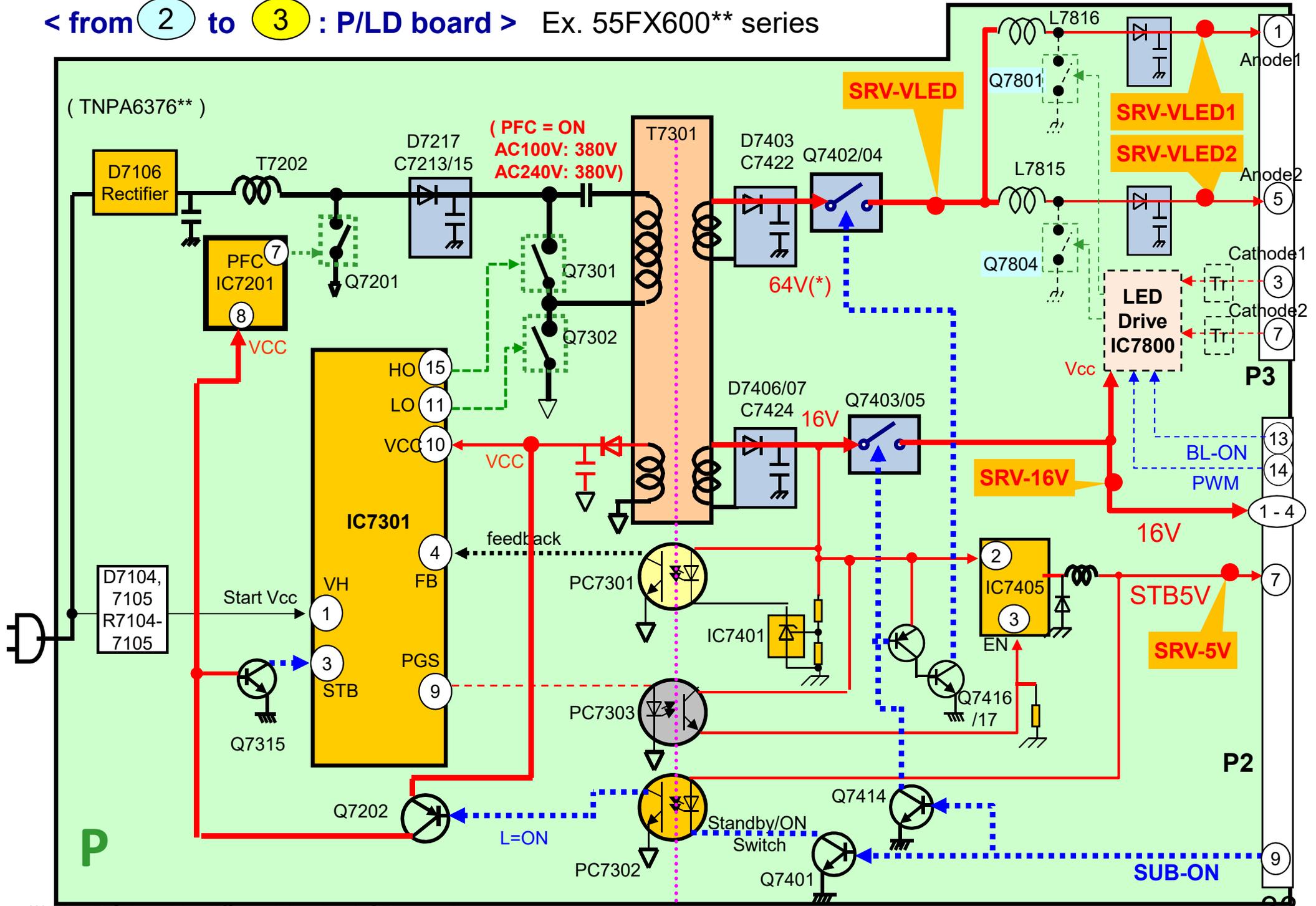
When the power on command from the power switch, the remote control and so on is provided to IC8000, IC8000 first outputs the “TV_SUB_ON” command. The “TV_SUB_ON” command is provided to power board via pin 9 of connector P2.

(*) Just after transition to Stand-by mode, the TV_SUB_ON(16V) output for few minutes.
(North America model : 10s)

Start up Operation-6

<A+P>

< from 2 to 3 : P/LD board > Ex. 55FX600** series



(*) The DC level is different by the LCD panel.

< from 2 to 3 : P board >

When the power board receives the TV_SUB_ON signal from IC8000 via pin 9 of connector P2, it outputs 2 different voltages:

16V to the A board on pins 1, 2, 3 and 4 of connector P2.

64V(*) to the LED drive part.

TV_SUB_ON command is carried to the primary side by PC7302. This voltage is leaded to Q7202 which provide power supply VCC of PFC circuit. The PFC starts to operate. Besides this voltage to go to Q7315 which provide the mode change signal to pin 3 of IC7301. The operation of the IC 7301 changes the switching frequency from standby state to working state because of providing high power current.

Output voltages from transformer T7301 start rising up until the moment when IC7401 started to operate. This IC measures the 16V line output in the secondary side. The output of this IC is provided by PC7301 to pin 4 of IC7301. IC7301 adjust the switching frequency by this feedback signal.

The TV_SUB_ON signal also switches on the Q7402/03/04/05 to provide output voltages (16V and 64V(*)). The 64V(*) is provided to the LED Backlight Drive. The 16V is provided to the A board.

(*)The DC level is different by the LCD panel.

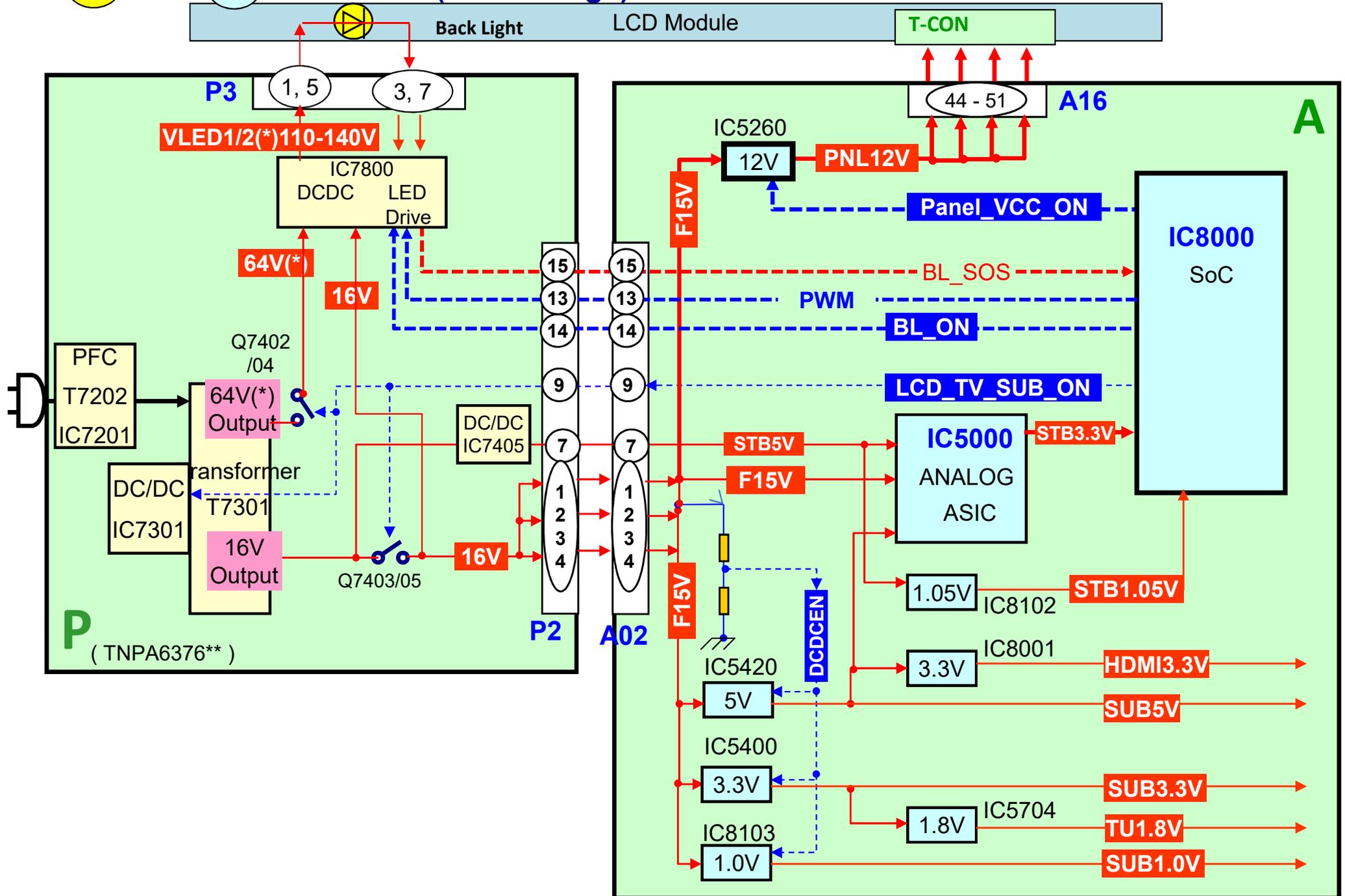
< 3 : A board (SUB voltage) >

The 16V(F15V) from the P board via pin1-4 of connector A02 is applied to Analog ASIC IC5000 and ICs (Voltage regulators) on the A board to generate the SUB-Voltages used for signal processing operation.

: SUB1.0V, 1.8V, 3.3V, 5V and HDMI3.3V, TU1.8V

Each voltage regulators start up by high state of DCDCEN signal which is pull up to F15V. So F15V is provided to A board, each SUB-voltage regulator ICs start output.

< 4 and 5 : A board (PNL voltage) >



(*)The DC level is different by the LCD panel.

< 4 and 5 : A board (PNL voltage) >

The F15V is also used to generate the PNL-Voltage on A board. IC8000 outputs the Panel VCC On signal. IC5260 starts generating the PNL12V by this signal. The PNL12V is provided to T-con circuit of the LCD Module.

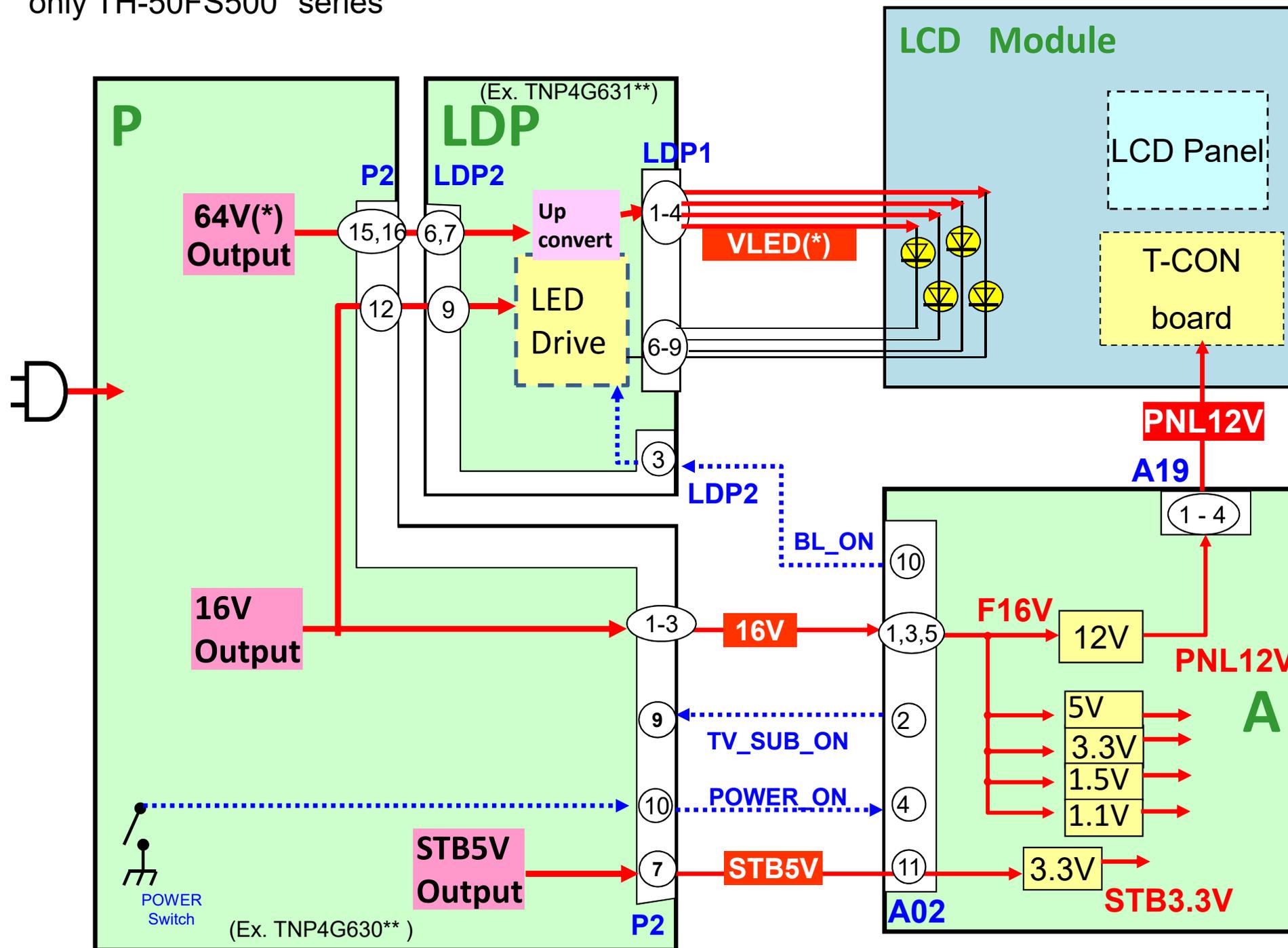
< 6 : P board (backlight drive) >

After that, IC8000 outputs the BL_ON command to the P board. The BL_ON command turns on the IC7800 for LED backlight drive. Then the 64V rise up over 110V(*) and output to the backlight on the LCD panel. The backlight starts lighting by PWM signals, and LCD panel displays the pictures.

If the backlight drive circuit does not work normally, the BL_SOS signal is informed to the IC8000. At that time, IC8000 stops outputting the TV_SUB_ON signal and blinks the red LED 1 times.

(*)The DC level is different by the LCD panel.

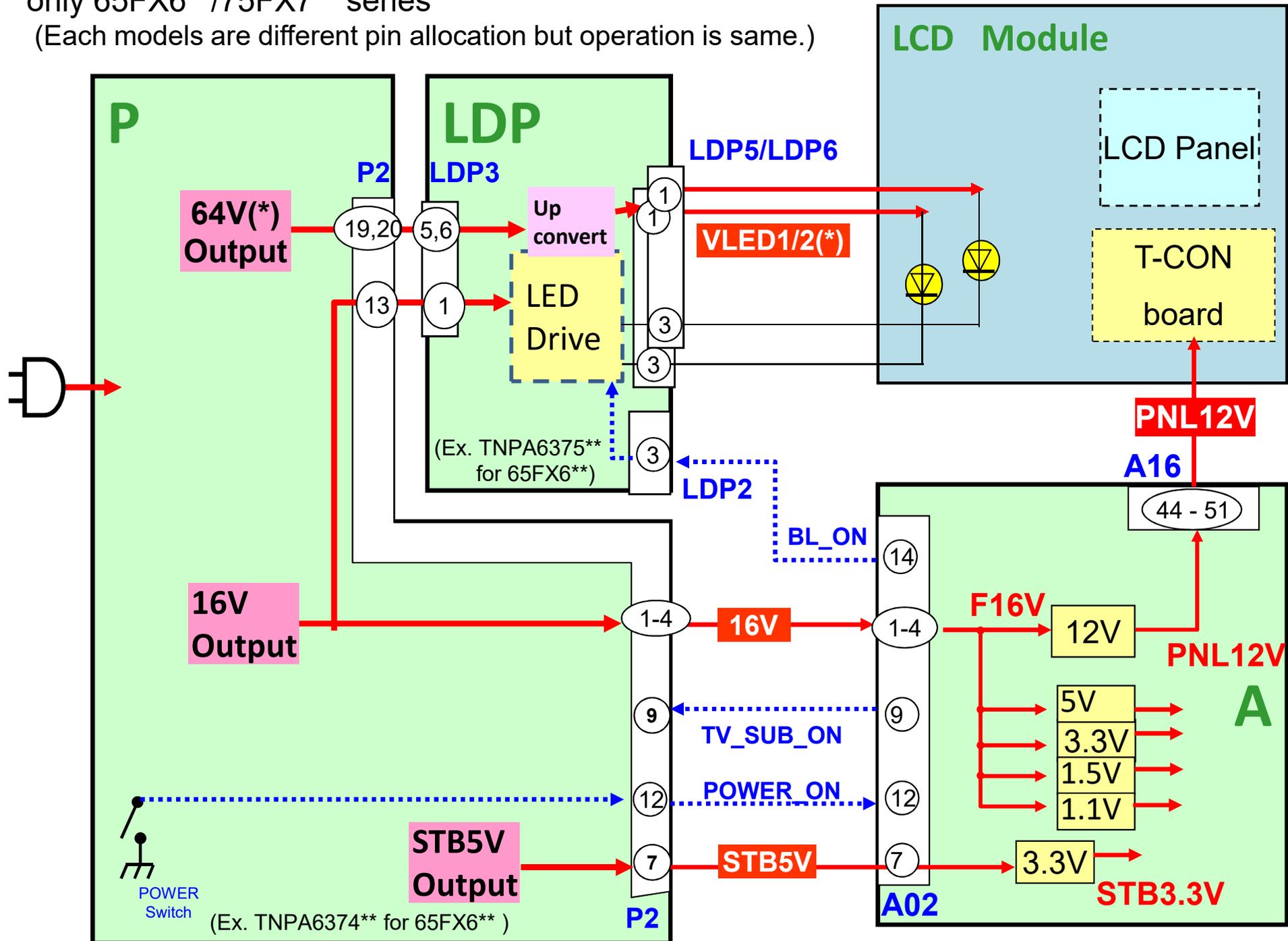
only TH-50FS500* series



(*)The DC level is different by the LCD panel.

only 65FX6**/75FX7** series

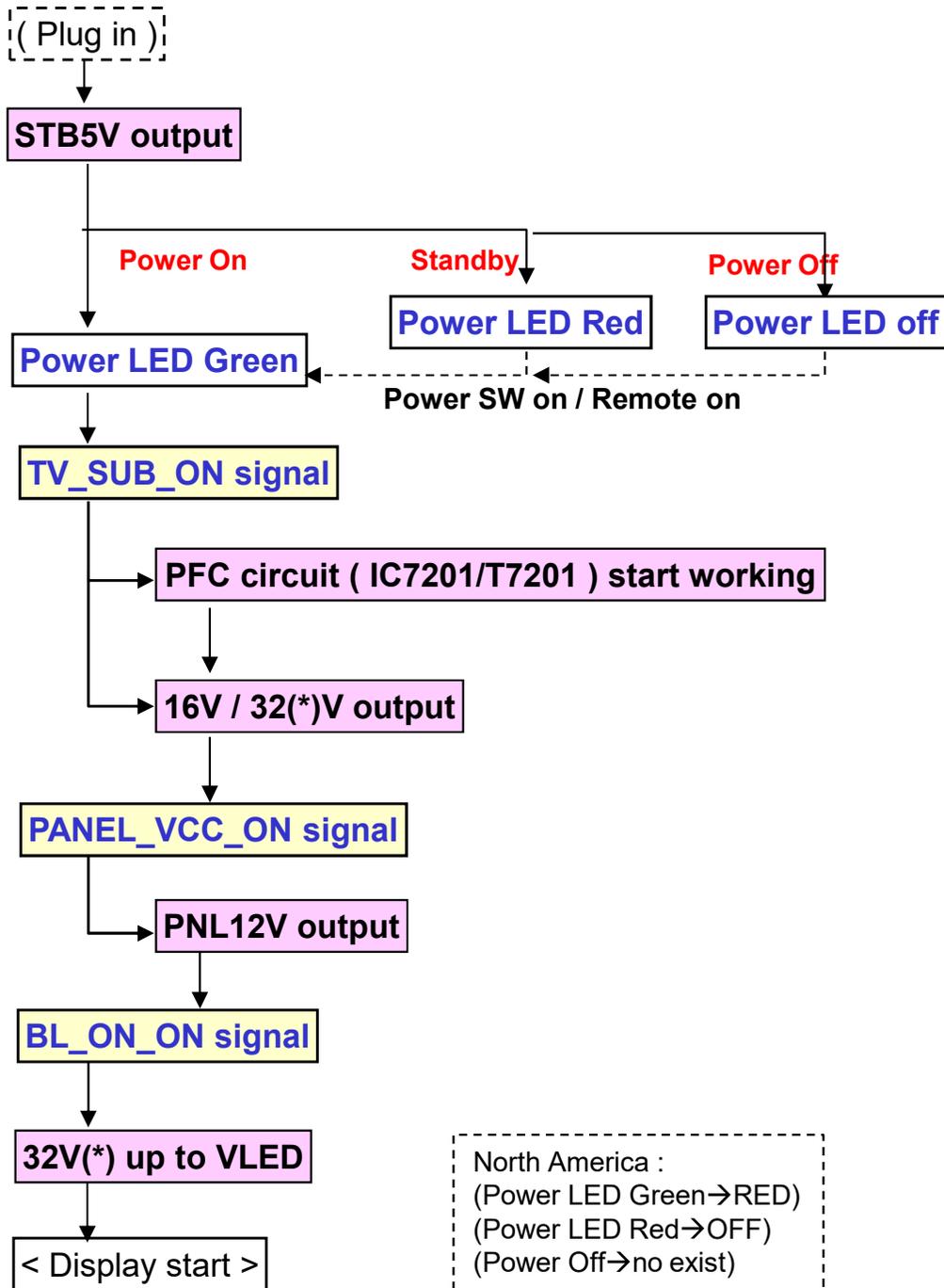
(Each models are different pin allocation but operation is same.)



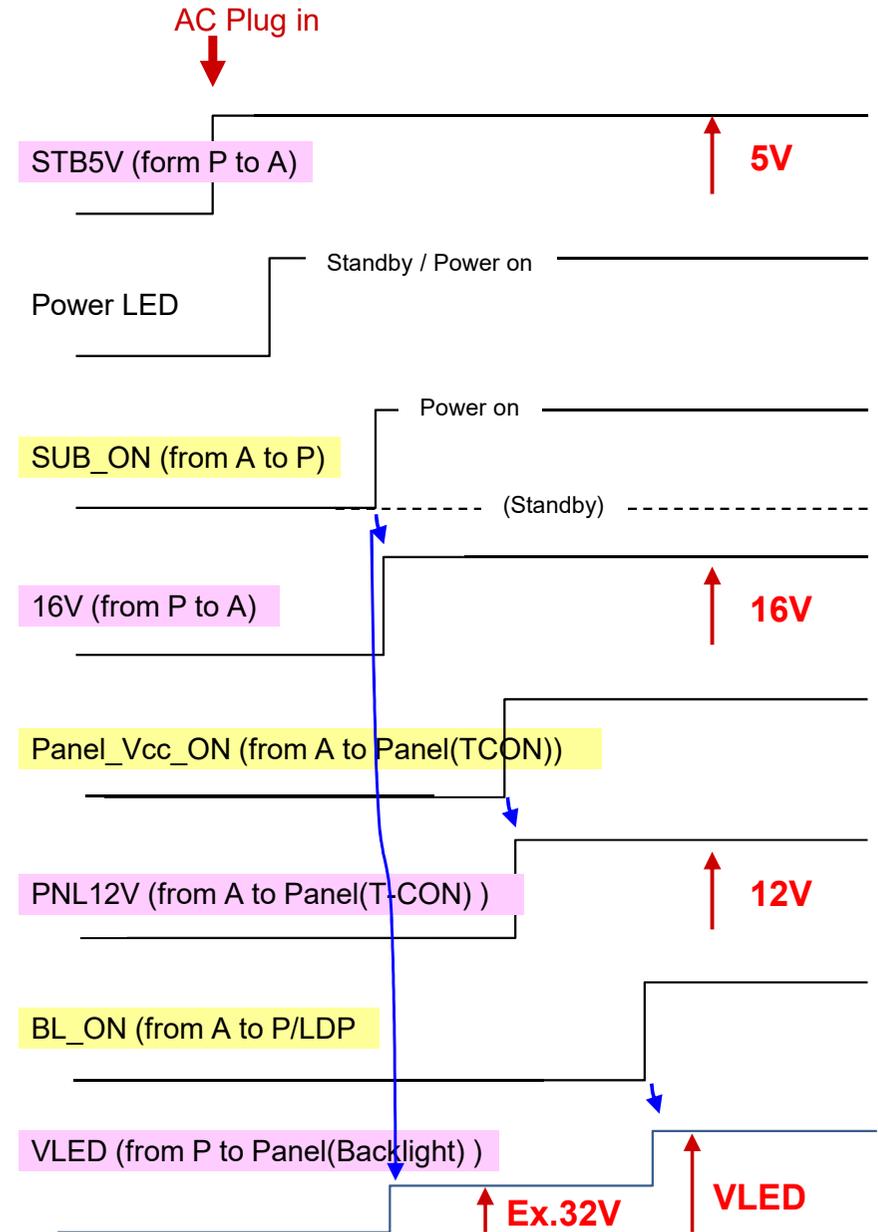
(*)The DC level is different by the LCD panel.

Simple Power On Sequence (F Series)

< F4 series >



(*) The DC level is different by the LCD panel.

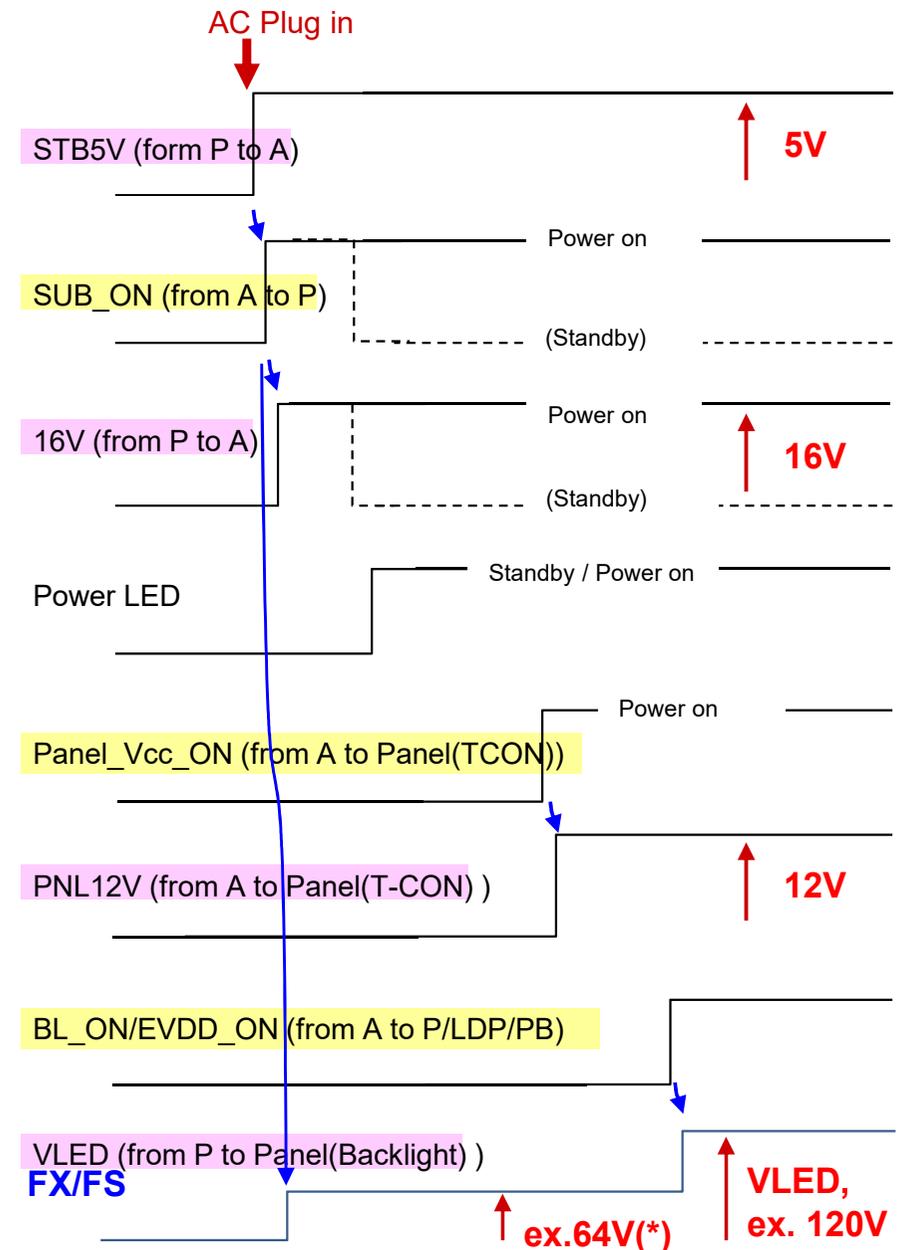
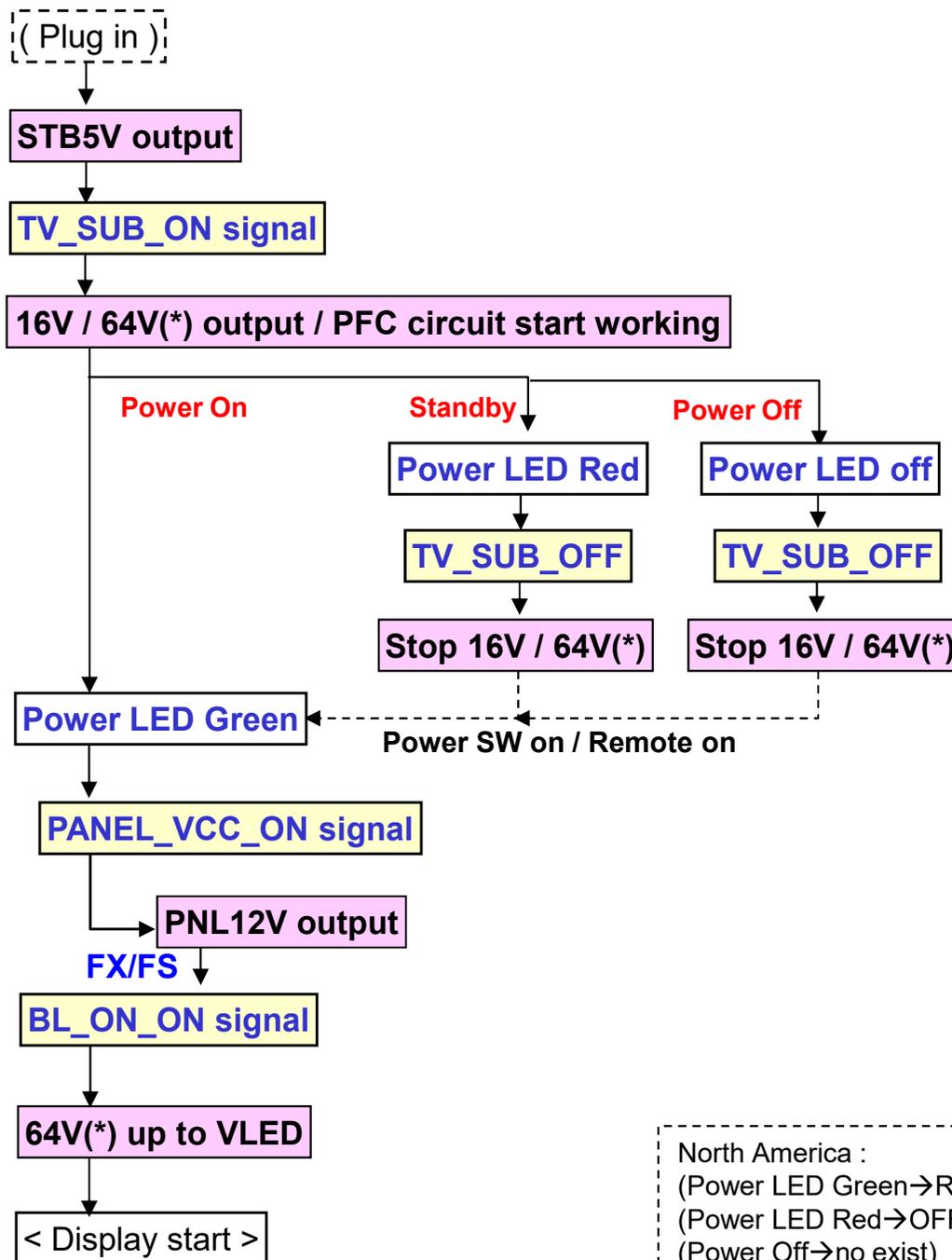


Simple Power On Sequence (FX/FS Series)

< FX/FS series >

Also 16V is necessary before Power LED.

(*) The DC level is different by the LCD panel.



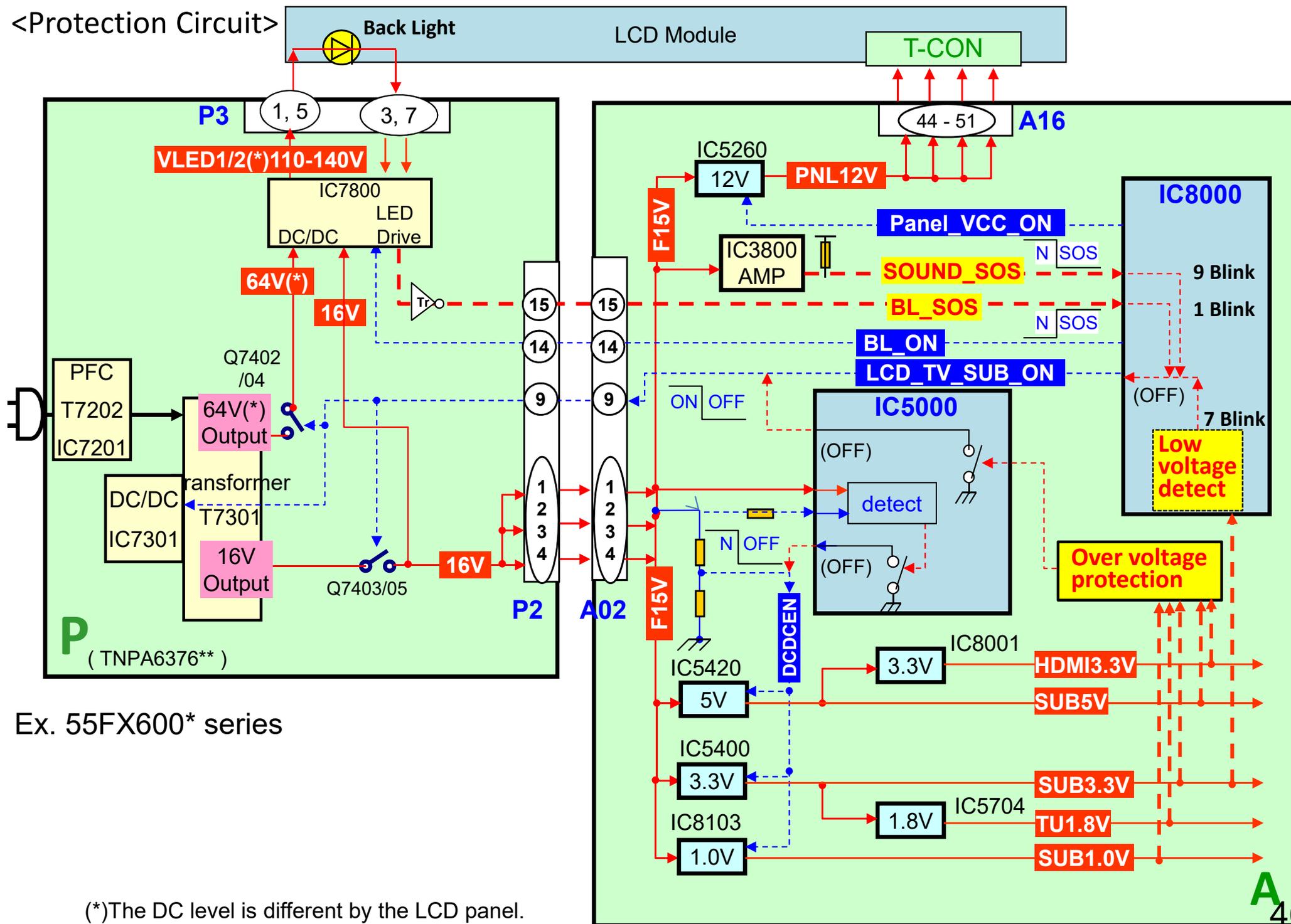
3-3. SOS Protection Circuit and Troubleshoot of Power Problem

LED Blinking Summary

When an abnormality occurs in the unit, the “SOS Detect” circuit is triggered and the TV shuts down. Shut down means that the unit turns off the TV_SUB_ON signal. The power LED on the front panel will flash a pattern indicating the circuit area that has detected an abnormality.

name Detect content	Blinking Time					Estimated Defect Board
	Model MT5561 (F4**)	Peaks LD11 (Asia/Latin FS***)	MT5581P (Euro FS***)	MT5811Q (FX6**/ 700-740)	MT5811P (FX750- 800)	
BL_SOS (LED driver)	1	1 (occurred several sec later after power on)	1	1	1	Panel/P /PB
Power on problem (Error F15V/SUB3.3V voltage)	---	quick 1 (occurred soon after power on)	---	---	---	P/A
Power on problem (Error SUB5V/1.5V/1.1V voltage)	---	quick 3	---	---	---	P/A
Memory (eMMC) read problem	---	quick 2, 4	---	---	---	A
No voltage SUB3.3V (after wake up once)	7	7	7	7	7	A
Audio amplifier: SOUND_SOS	9	9	9	9	9	A/ speaker
FRC_SOS (IC9000)	---	---	---	---	10	A
Emergency SOS	13	13	13	13	13	A

<Protection Circuit>



LED blinks	Detail error	Board may defect
1	BL_SOS (LED driver)	Panel / P

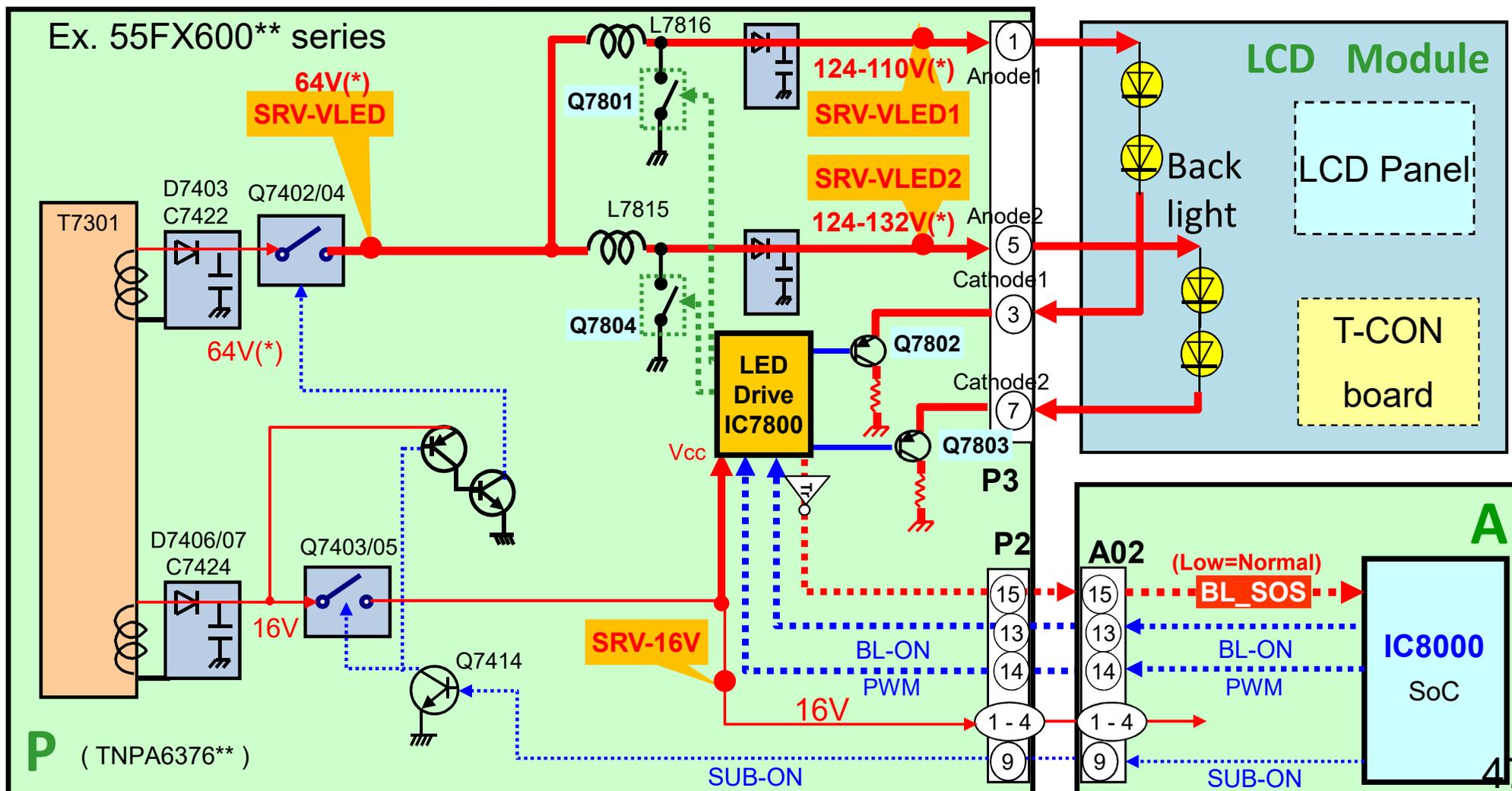
If the IC7800 detects

(*)VLED : The DC level is different by the LCD panel.

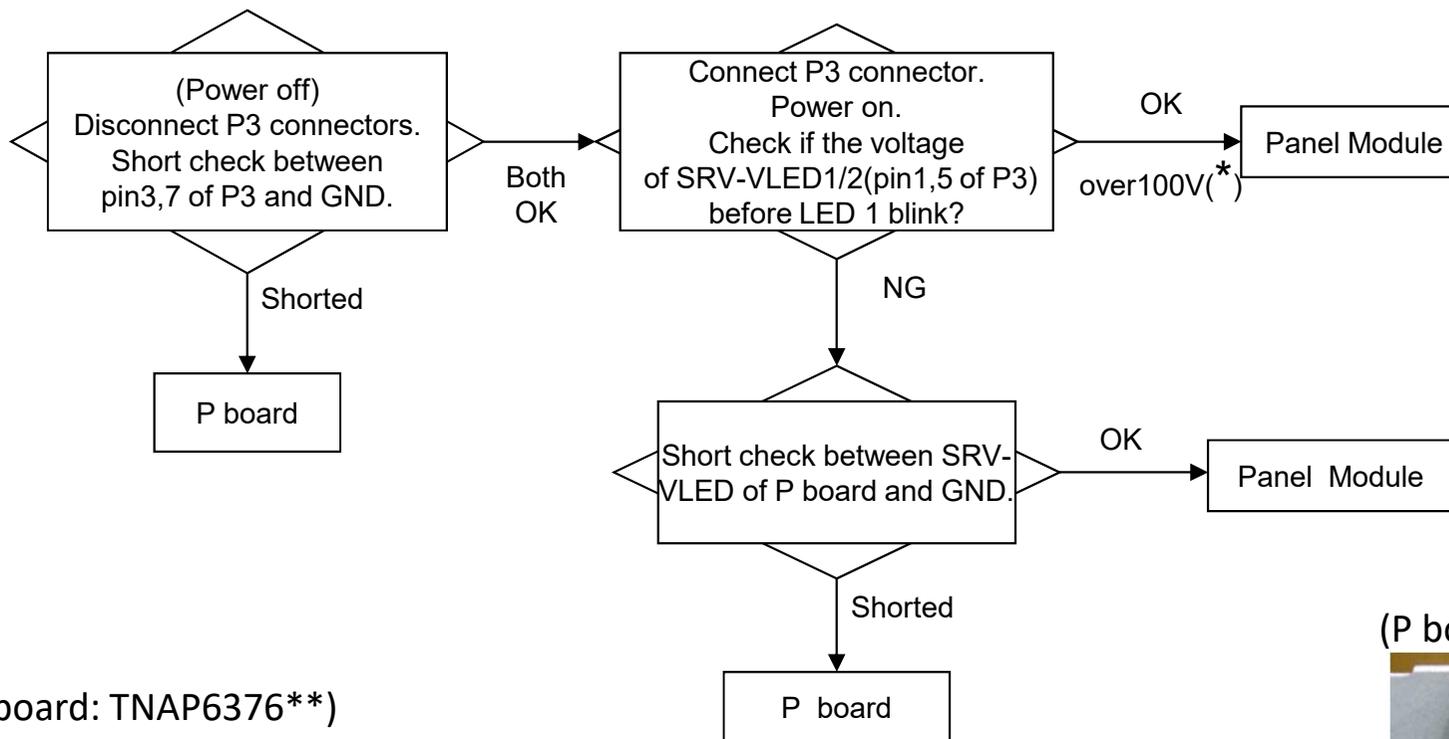
1.abnormal current of backlight LEDs (= Backlight LED broken or Low(No) VLED voltage)

2.abnormal DC/DC power supply of IC7800 (does not rise up the VLED voltage)

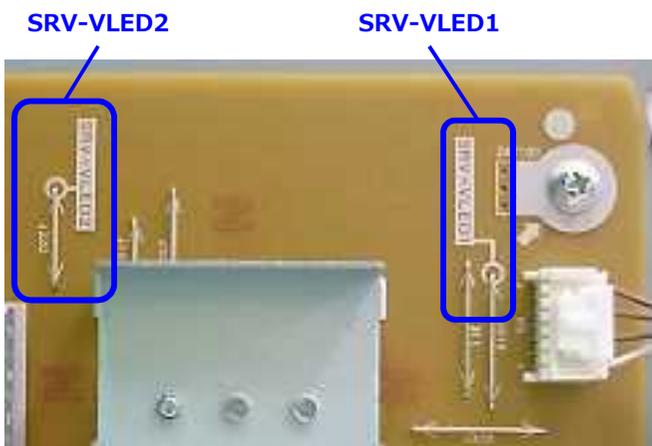
or the IC7800 does not work (No Vcc or No BL_ON/PWM signal or defect itself),
the IC7800 output BL_SOS signal to IC8000 → LED blink 1 time.



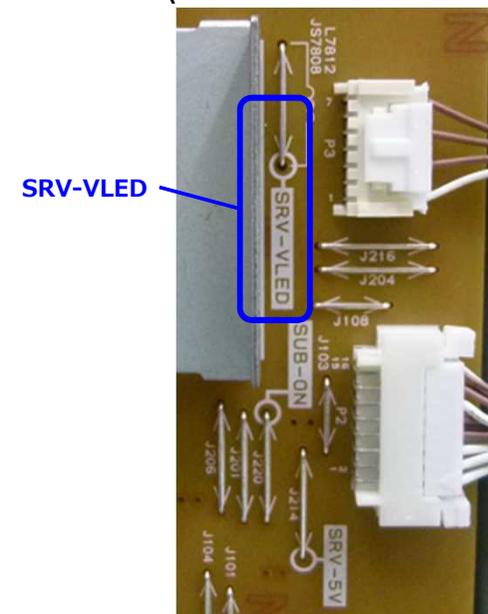
Ex. 55FX600* series



(P board: TNAP6376**)



(P board: TNAP6376**)



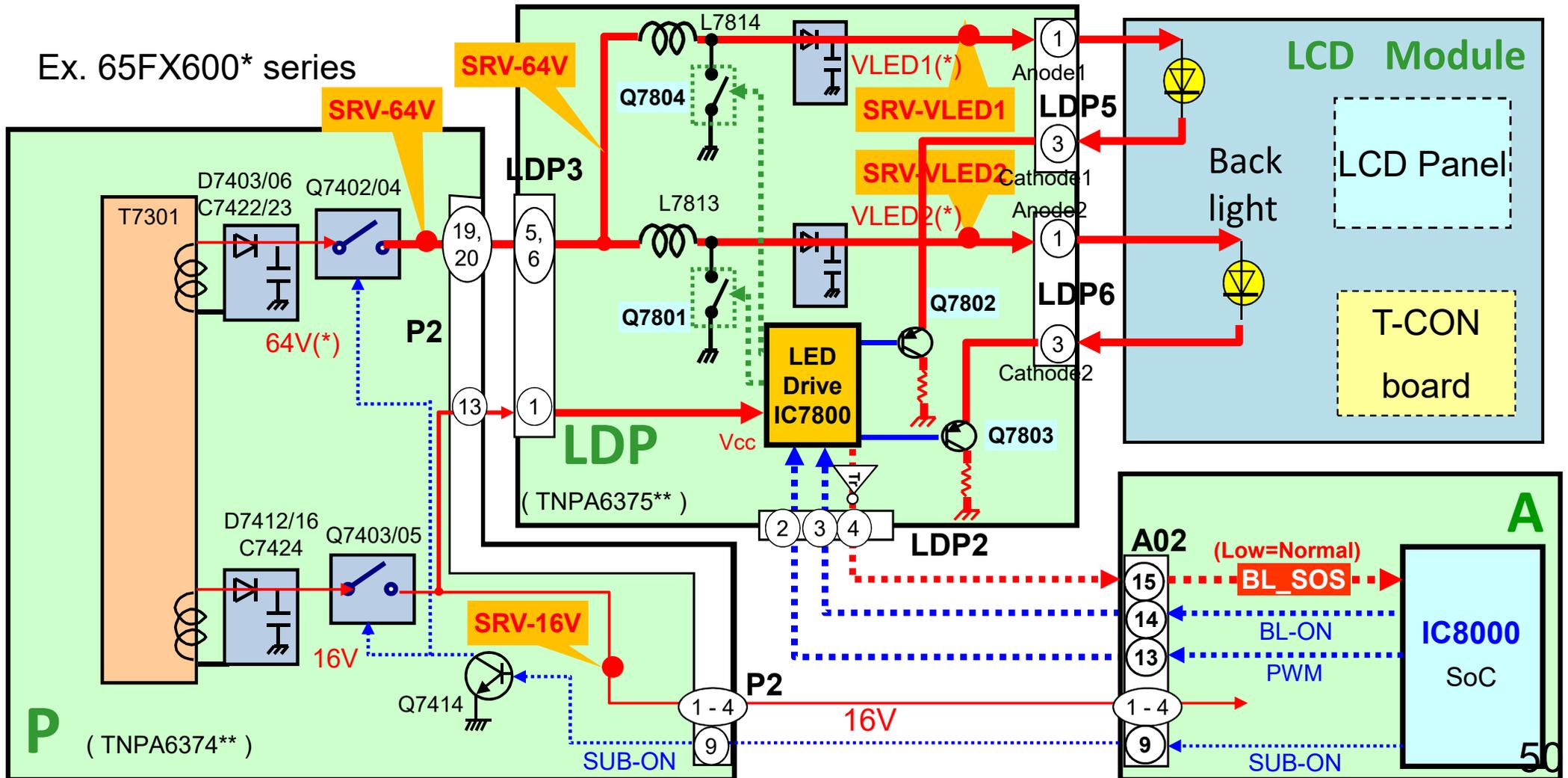
(*)VLED : The DC level is different by the model (LCD panel).

LED blinks	Detail error	Board may defect
1	BL_SOS (LED driver)	Panel / LDP / P

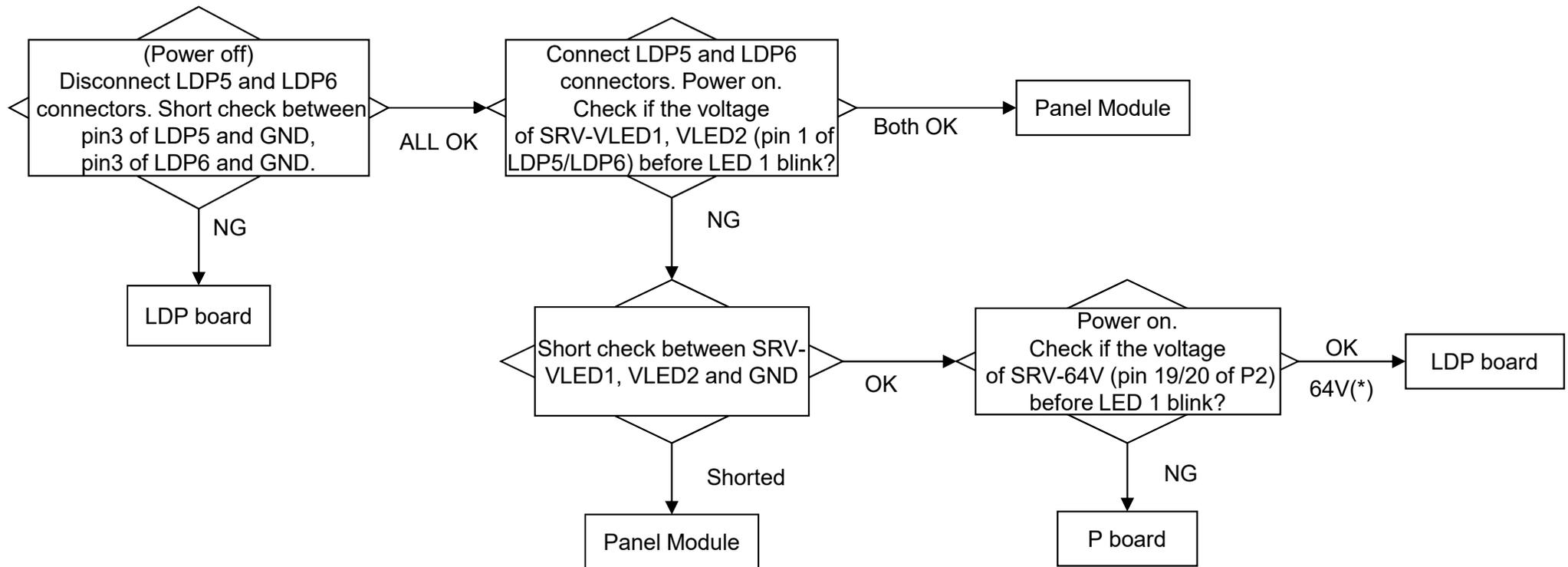
If the IC7800 detects

(*)VLED : The DC level is different by the LCD panel.

- 1.abnormal current of backlight LEDs (= Backlight LED broken or Low(No) VLED voltage)
 - 2.abnormal DC/DC power supply of IC7800 (does not rise up the VLED voltage)
- or the IC7800 does not work (No Vcc or No BL_ON/PWM signal or defect itself),
the IC7800 output BL_SOS signal to IC8000 → LED blink 1 time.



Ex. 65FX600* series



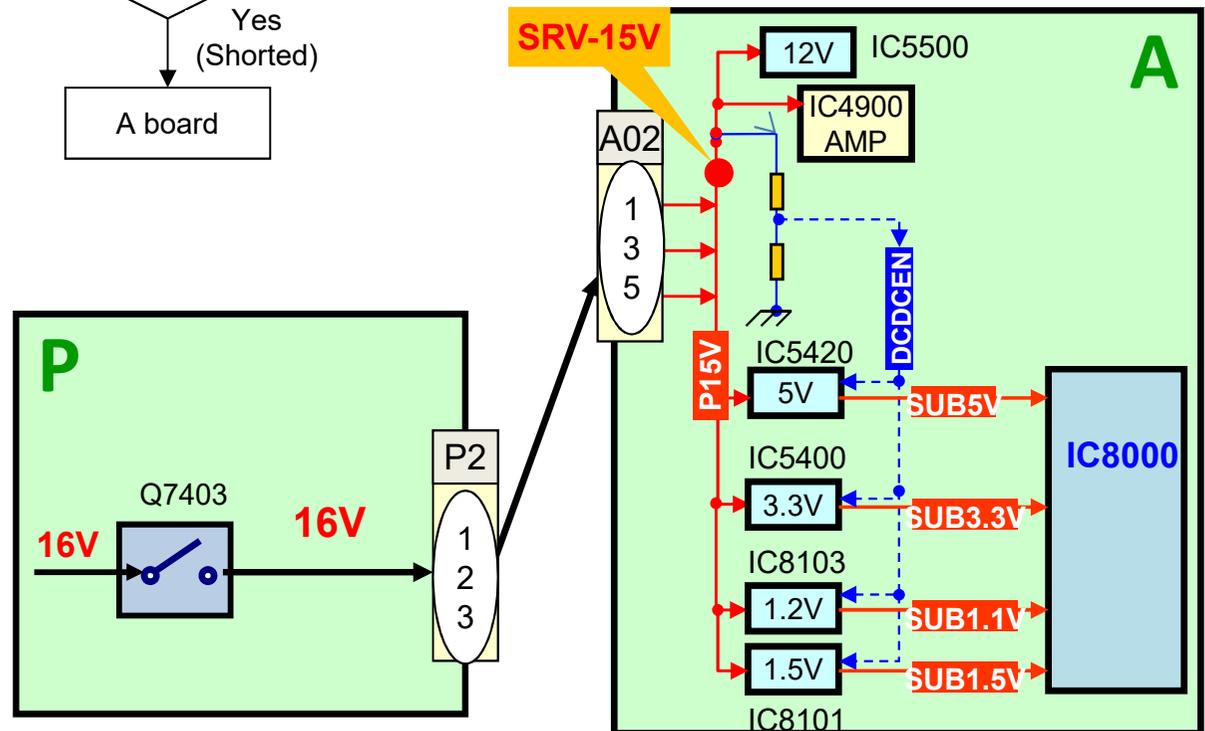
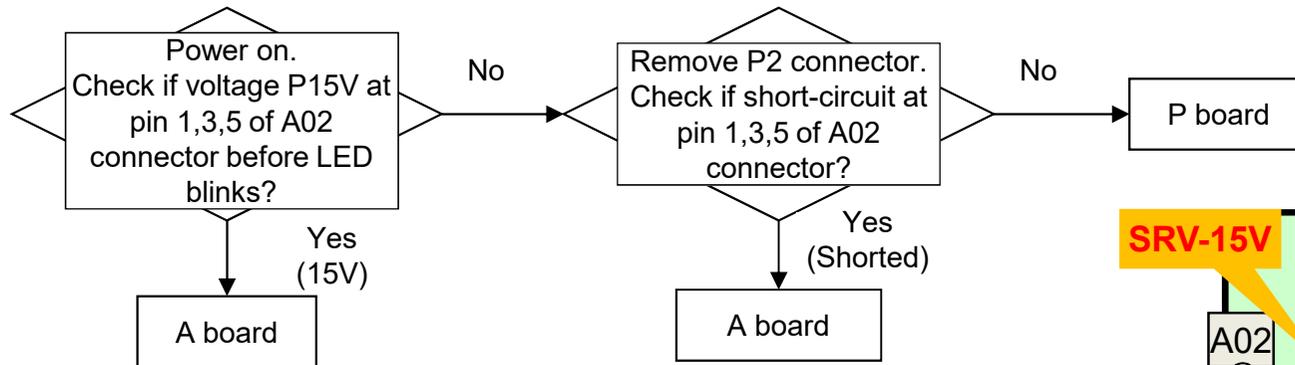
(*)VLED : The DC level is different by the LCD panel.

Troubleshooting for LED Blinking (Quick 1 / 3 time blink)

LED blinks	Detail error	Board may defect
Quick 1 / 3 (only for Asia/Latin FS5**)	Power on problem (No F15V/SUB3.3V/SUB1.5V voltage)	P/A

**F15V(16V) is supplied from P board. If the F15V /SUB voltage is not supplied
→ LED blinks quickly 1 or 3 times.**

Ex. TH-**FS500* series

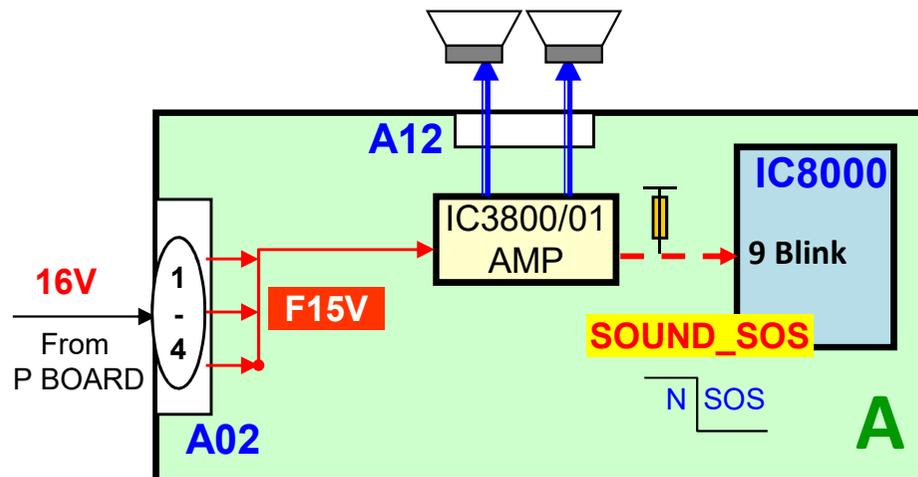
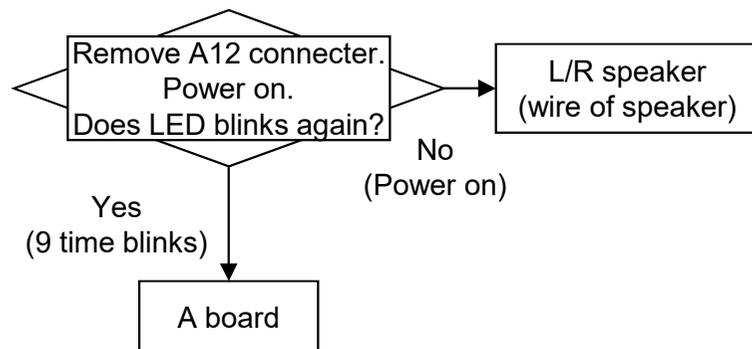


Troubleshooting for LED Blinking (9 time blink)

LED blinks	Detail error	Board may defect
9	Audio amplifier: SOUND_SOS	A/Speaker

Audio amplifier is sourced power F15V from P board. If the amplifier work abnormally (may due to short-circuit or overload), the SOUND_SOS signal will go low level and be detected by IC8001 → LED blinks 9 times.

Ex. 55FX600*



Troubleshooting for LED Blinking (2/4/7/10/13/16 time blink)

LED blinks	Detail error	Board may defect
Quick 2 / 4 (only Asia/Latin FS5**)	Memory (eMMC: IC8900) read problem	A (eMMC / Nand Flash)
7	No voltage SUB3.3V detected	A
10 (only FX750-780 series)	FRC_SOS (Initialization of IC9000)	A (IC9000)
13	Emergency SOS	A (eMMC / Nand Flash)

Quick 2 / 4 blinks is problem about memory access (IC8900 or IC8000)

7 blinks is problem about the power line of SUB3.3V.

10 blinks is problem about initialization of FRC IC (IC9000).

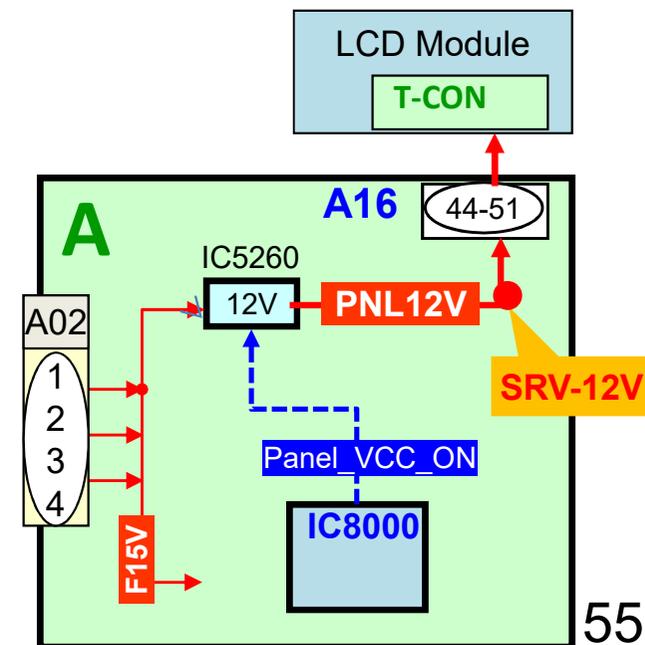
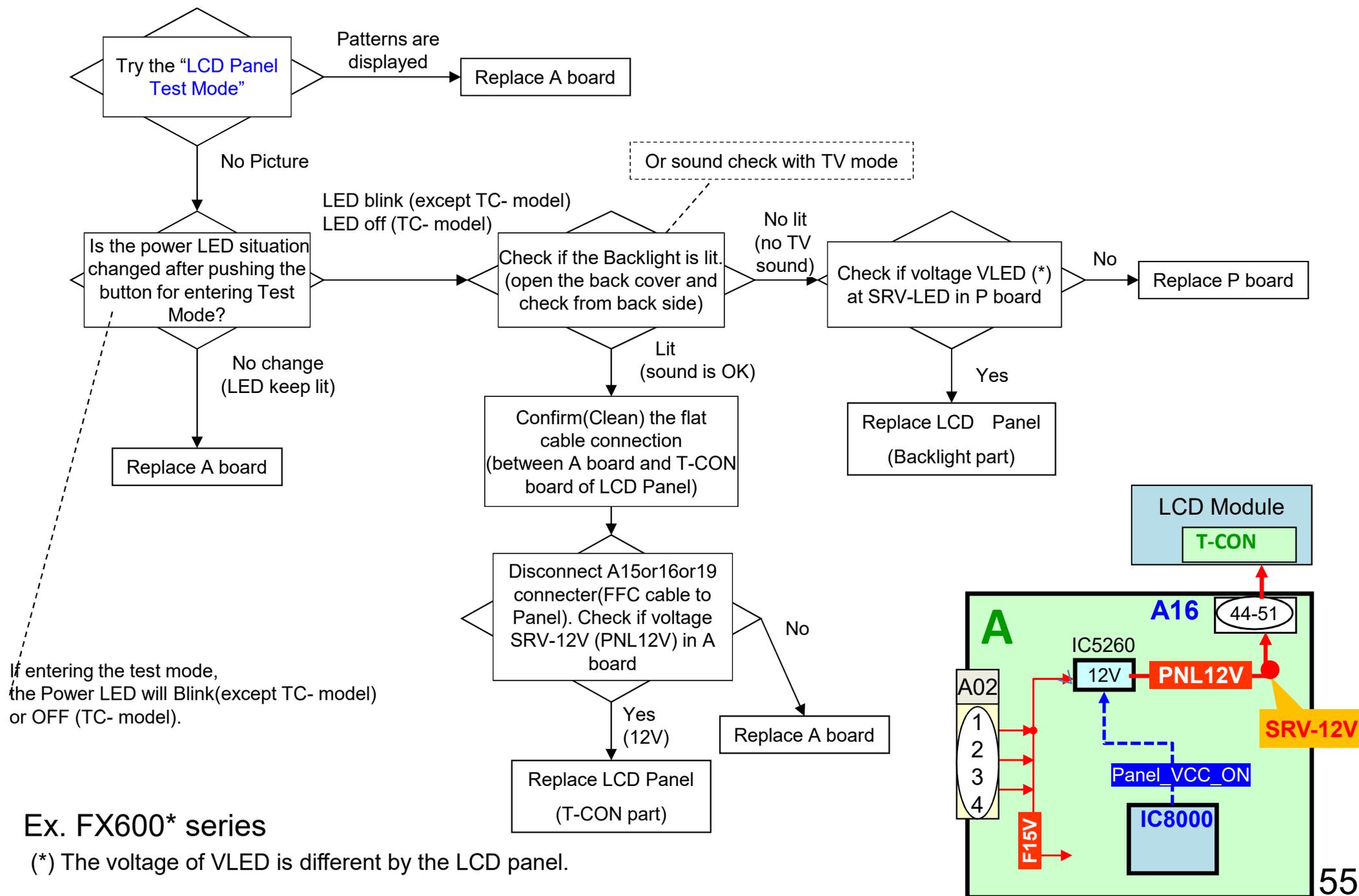
13 blinks is problem about IC8000 and software issue.

(mostly case the memory (eMMC / NAND Flash) IC problem)

IN THESE CASES, A BOARD DEFECTS

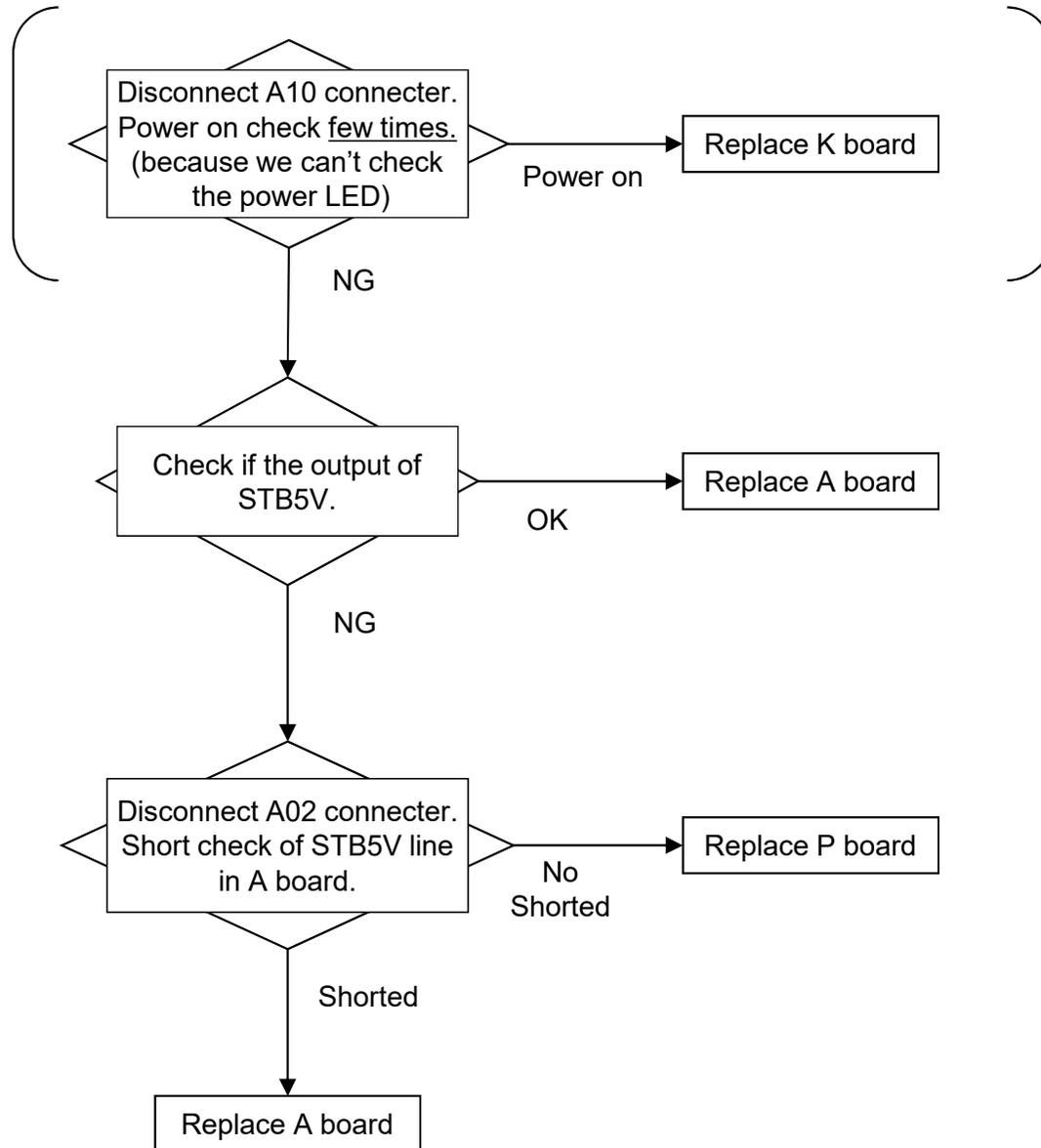
Troubleshooting for No Picture and No OSD (Power LED is lit = No blinking)

< F4/FS/FX series > Refer to the block diagram of "Troubleshooting for LED Blinking (1 time blink)" page



Troubleshooting for No Power On (Power LED is off = No blinking) -1

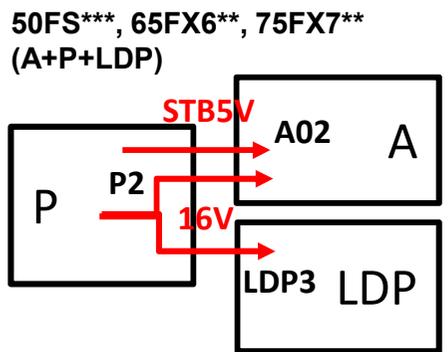
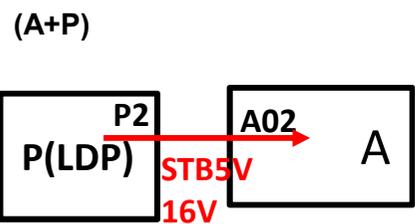
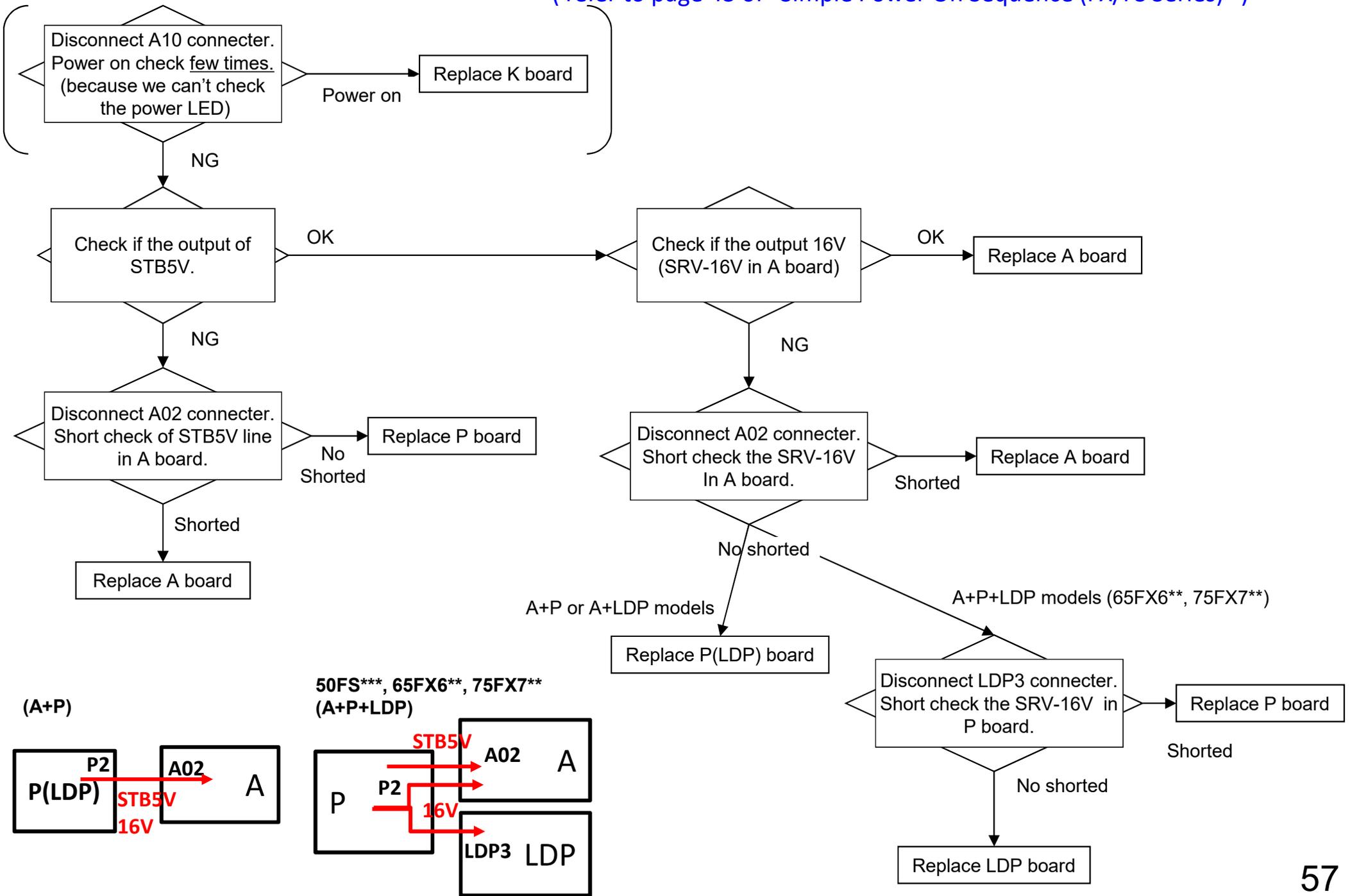
< F4 series >



Troubleshooting for No Power On (Power LED is off = No blinking) -2

Both of STB5V and 16V are necessary before lighting power LED.
 (refer to page 43 of "Simple Power On Sequence (FX/FS Series)")

< FX/FS series >



4. Rear Cover Disassemble and Assemble

Rear Cover Disassemble / Assemble -1

From design concept, the rear cover structure for some model is changed. The screws are decreased and there are hooks on the rear cover.

Target model : 65/55/49FX700-73# , 740 for Oceania (75/43 inch is same as previous model)

<Disassemble>



1. Remove the terminal cover and all screws for rear cover.
*There are screws on the bottom side also.

*There are some screws on the bottom side also. The number is depend on the size. Refer to next page.



2. Pull the bottom of rear cover towards yourself.

Slide downward

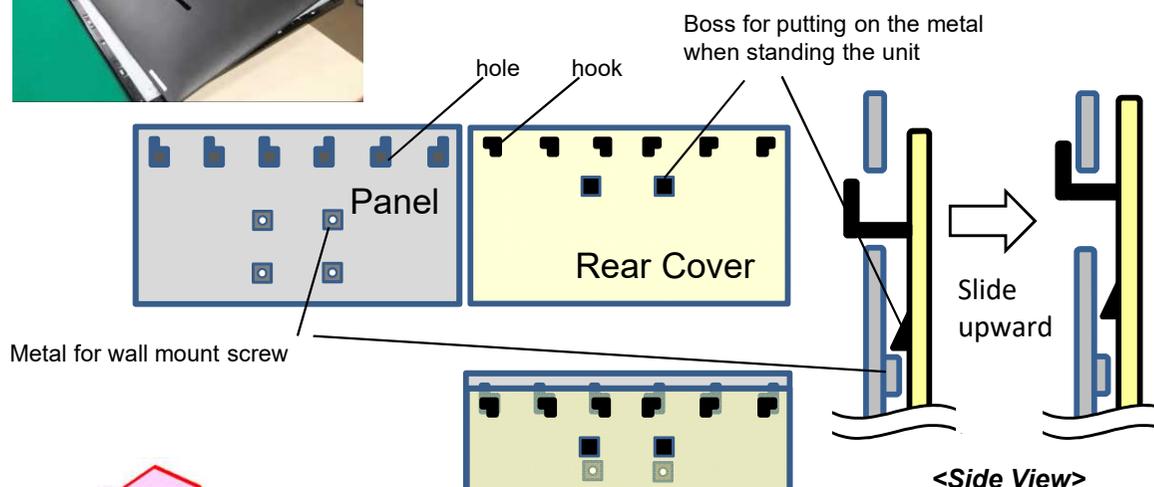


3. Slide the rear cover downward direction then remove the rear cover.

<Assemble>



1. Put the rear cover shift from top edge, adjust the hook of rear cover to the hole of the panel.



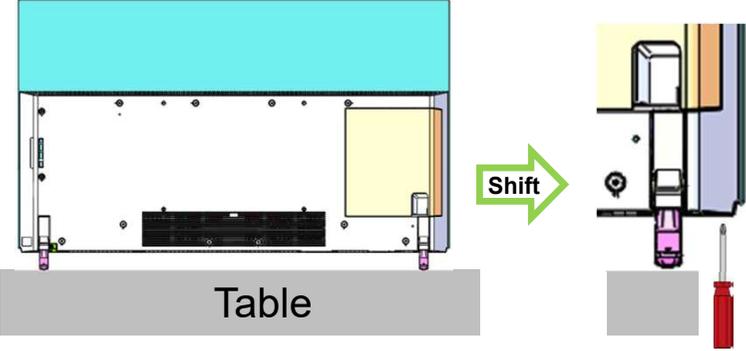
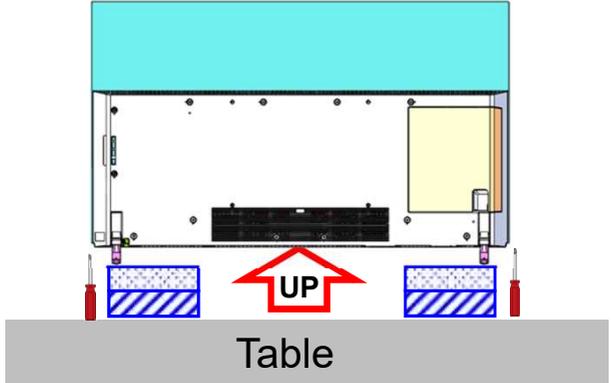
2. Slide the rear cover to the top end of the panel at right side and left side.



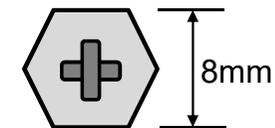
3. Push the circumference of rear cover and fit it. Check that there is no floating and fix all the screws.

Rear Cover Disassemble / Assemble -2

How to remove the bottom screws

Example1	<p>Lay down on the table</p> 
Example2	<p>Use ratchet type driver/wrench</p> <p>under 50mm</p> 
Example3	<p>Shift to the edge of the table</p> 
Example4	<p>Insert objects that become step between unit and the table</p> 

Bottom Screw Type



M3x8
(Head Hexagon)

*) The product pictures and drawing is for explanation. It is not 2018 model.

Rear Cover Disassemble / Assemble -3

From design concept, the rear cover structure for some model is changed. The screws are decreased and there are hooks on the rear cover.

Target model : 49/43FX6## (other inch is same as previous model)

<Disassemble>

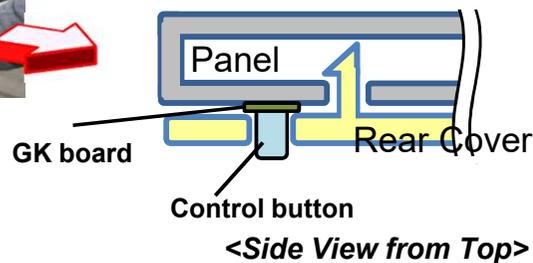


1. Remove all screws for rear cover.



2. Pull the bottom of rear cover towards yourself.

*The left side is hard a little because of hook next of the control buttons.



3. Lift the rear cover up and remove it.

*It is hard a little. Refer to right structure drawing

<Assemble>



1. Fit the top side of rear cover.



2. Push the circumference of rear cover and right side of control button and fit it.

Check that there is no floating all circumference and fix all the screws.

Push also next to control button

