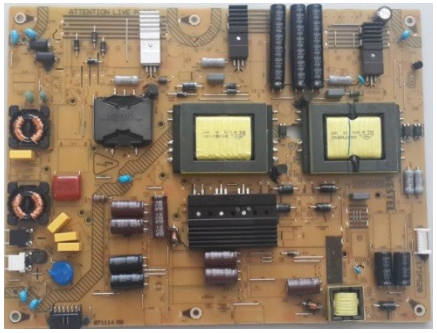
17IPS20R9

Power Board Presentation



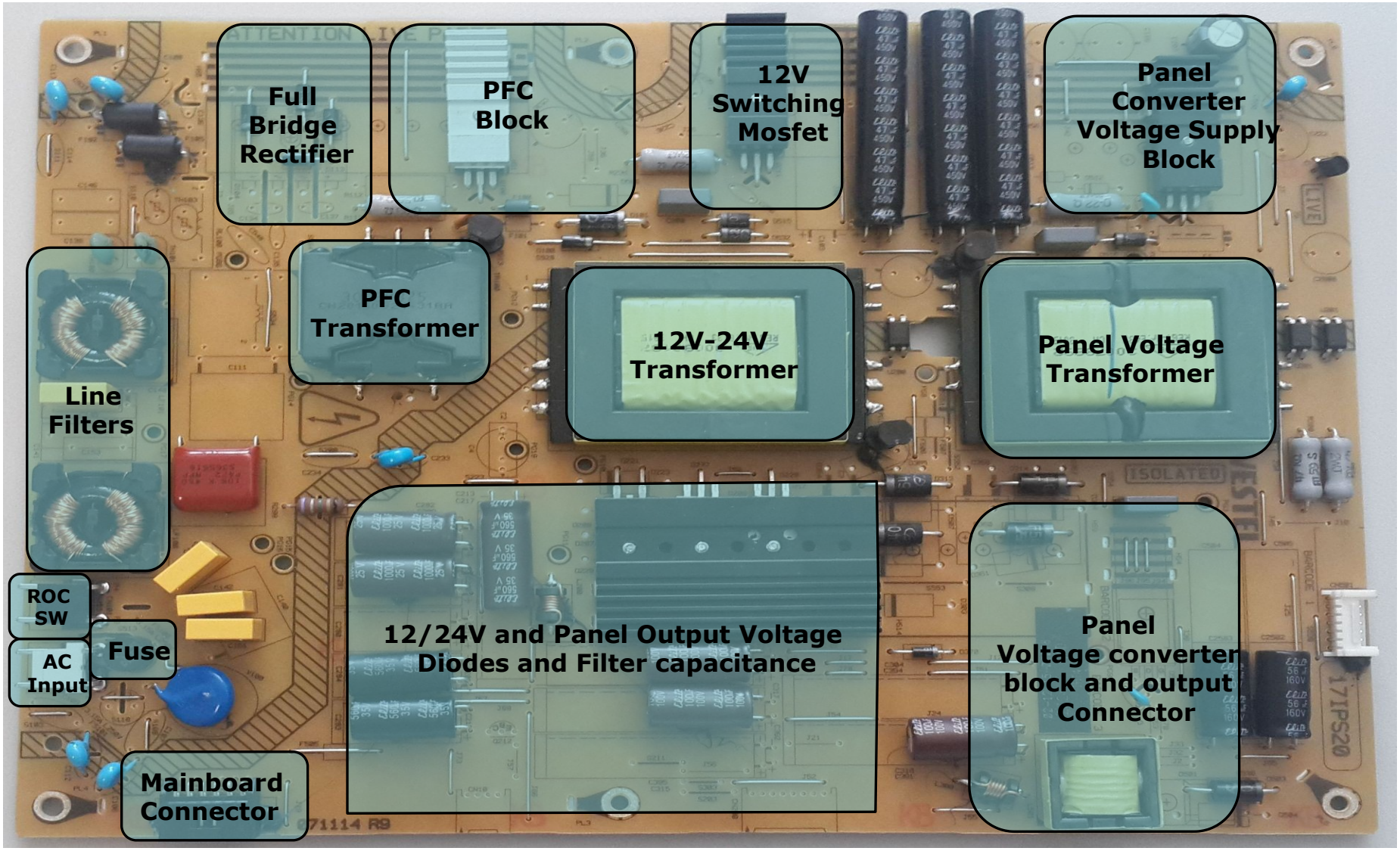
Presenter: ERSİN AKSU

22 February 2016

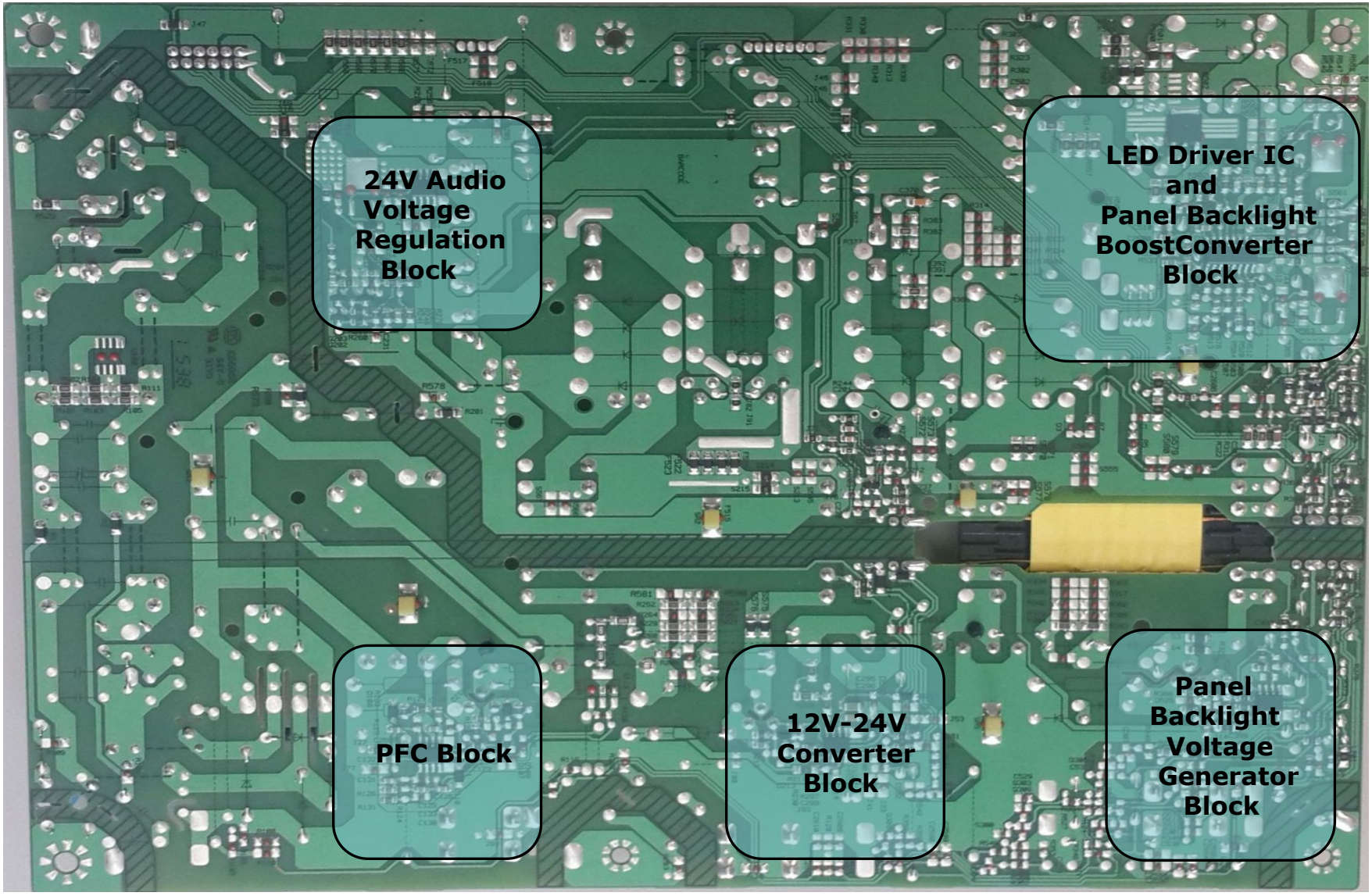
17IPS20R9 Power Board – General Features

- Supported Size : 39” – 55”
- Output Power : 128W (max.)
- Output Voltages : +5V StandBy, 12V, 24V (Opt.), VLED (Panel Supply Voltage)
- Supported Chassis : 17MB82S, 17MB95M, 17MB96, 17MB97, 17MB92, 17MB100, 17MB120.
- Input Voltage : 100V-264V(opt), 170V-264V AC
- Frequency Range : 50Hz – 60Hz
- 17IPS20 includes AC-DC PFC (power factor correction) unit.
- This power board uses two different Quasi resonant converter blocks to produce main board supply voltages and panel converter supply voltage.

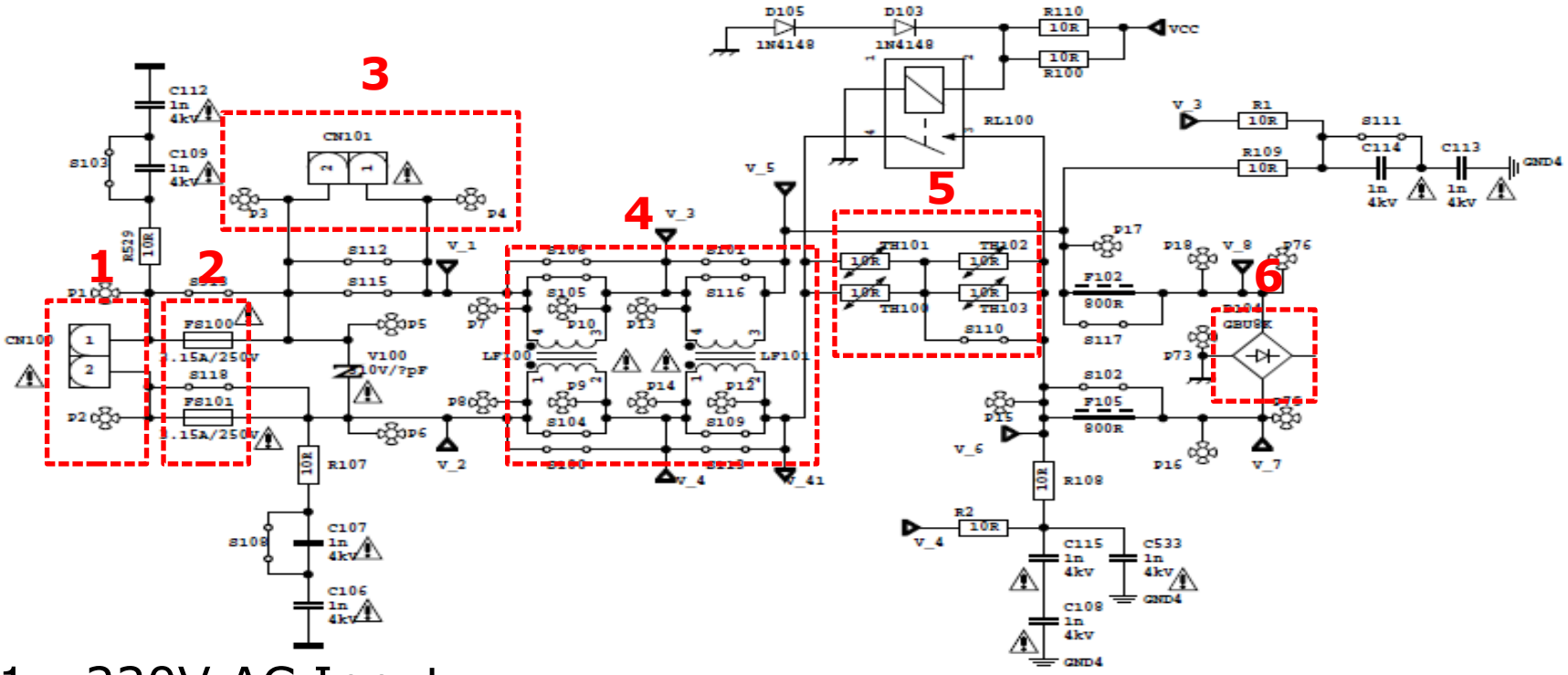
• 17IPS20R9 Power Board – Block Diagram - Top View



- **17IPS20R9 Power Board – Block Diagram-Bottom View**

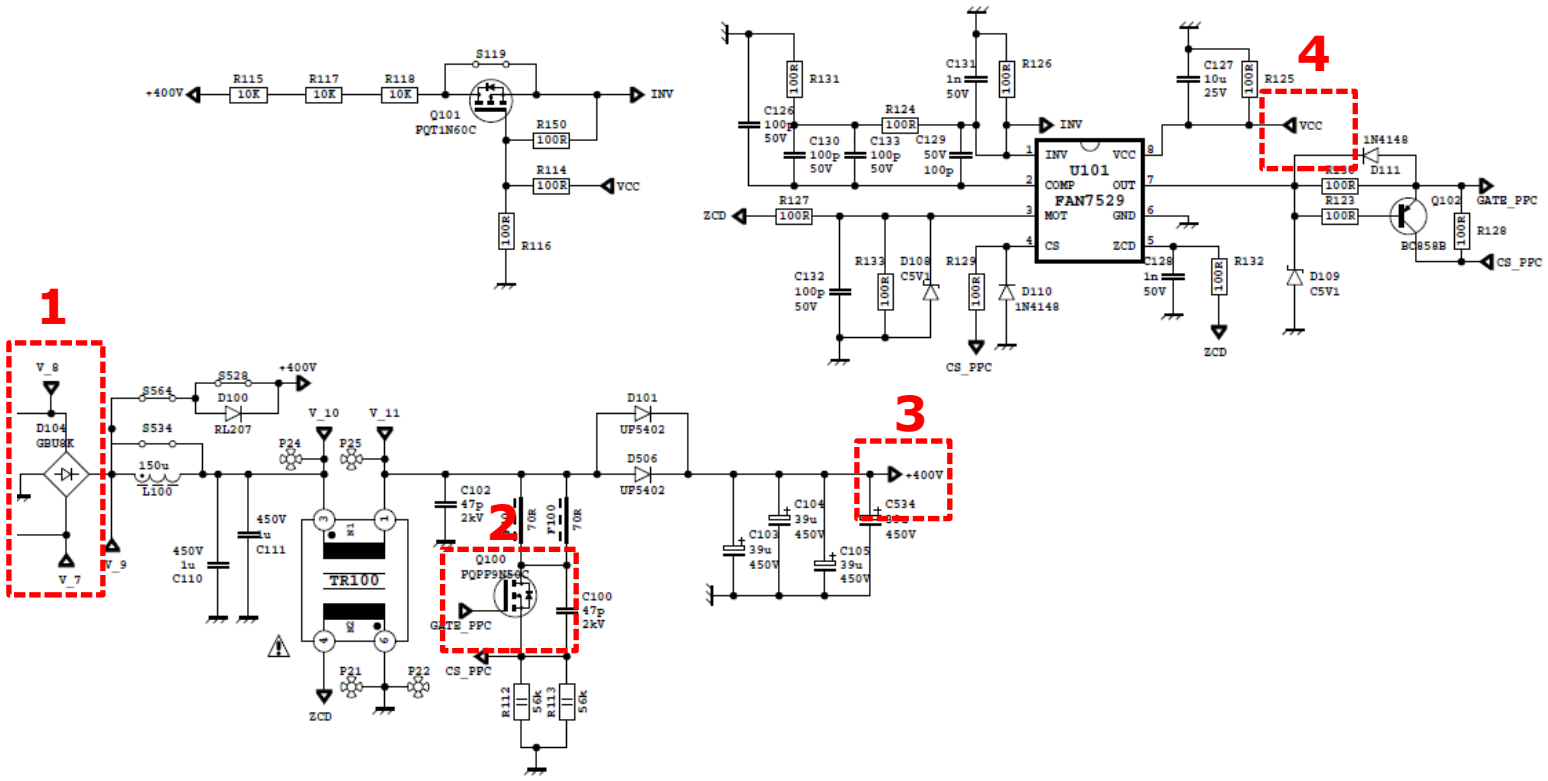


• 17IPS20R9 Power Board – 220V AC INPUT



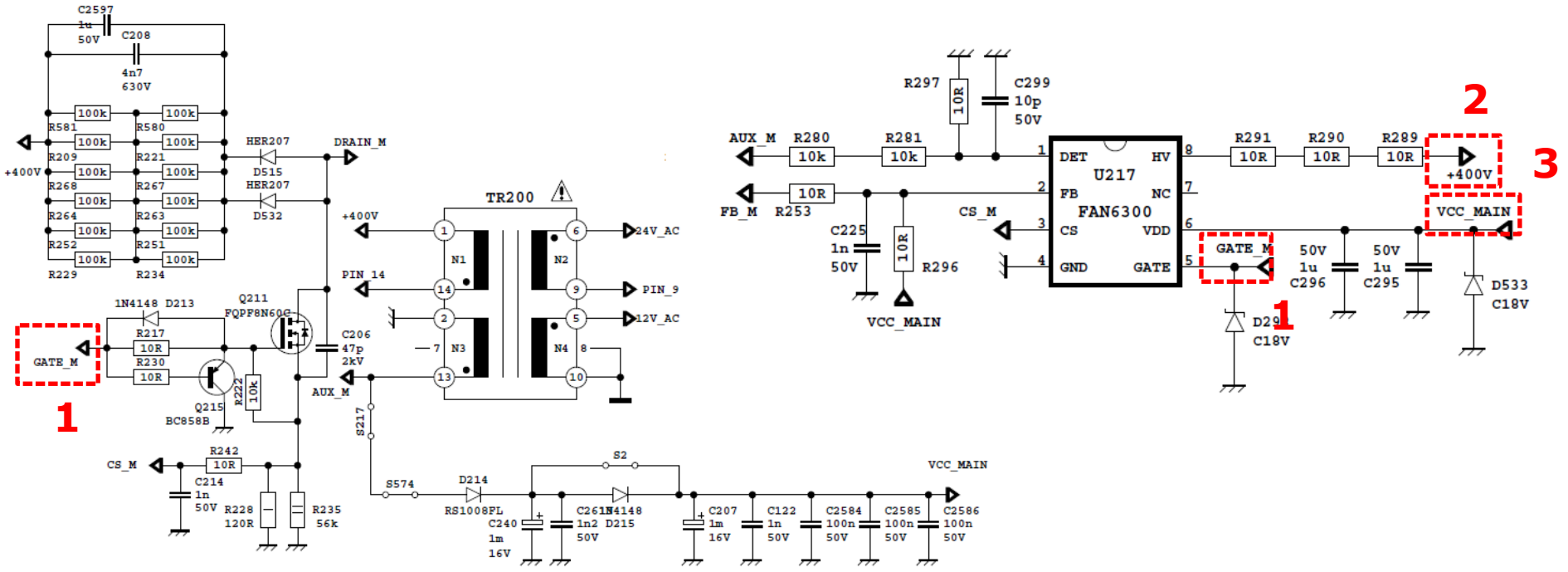
1. 220V AC Input
2. Fuses
3. Optional rocker switch connector
4. Line filters
5. NTC
6. Full Bridge Rectifier Diodes

• 17IPS20R9 Power Board – PFC Circuit



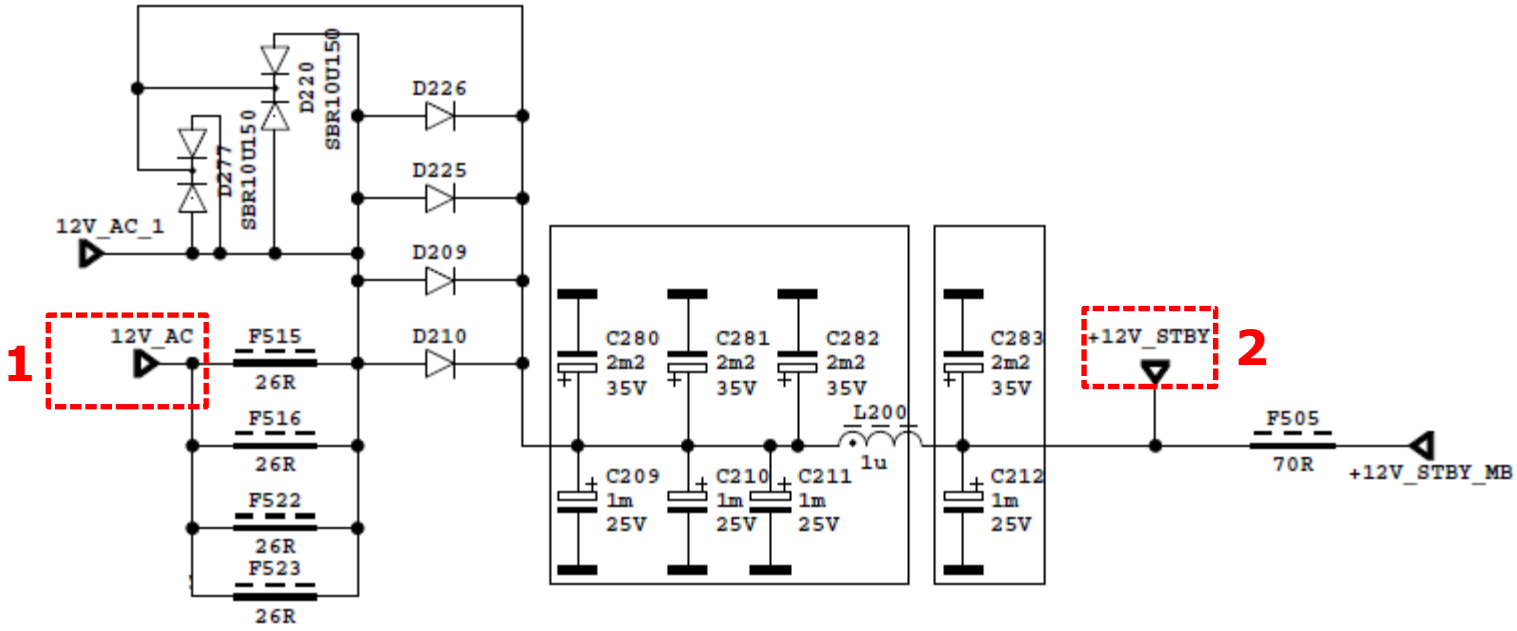
1. Between V7-V8 pins must be 220V AC voltage
2. PWM signal can be measured at this position (*Reference Signals*)
3. About 400V DC at operating mode, 310V DC standby mode.
4. U101 supply voltage can be measured from 8th pin, it is about 18V

• 17IPS20R9 Power Board – 12V Quasi Resonant Circuit-1



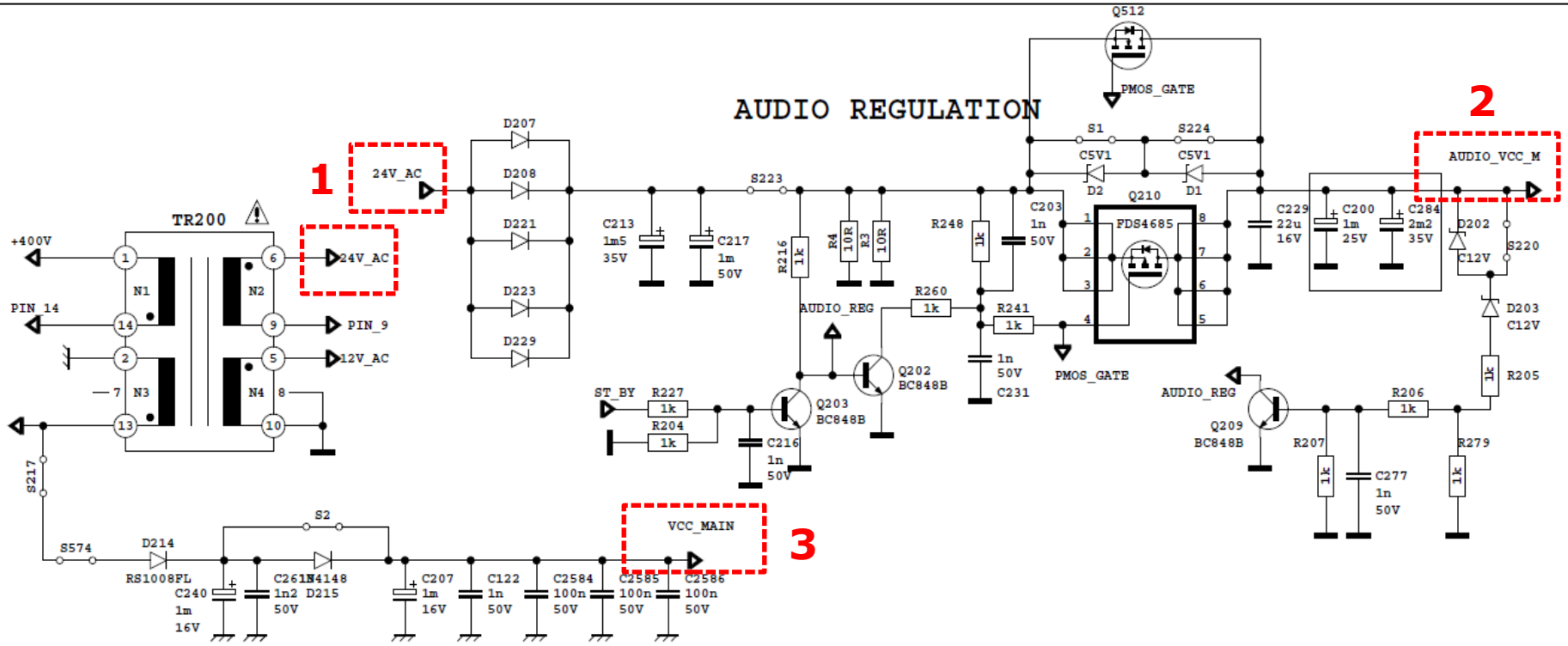
1. Gate_M signal can be measured from this position and 5th pin of U217 IC
2. About 400V PFC voltage is measured on HV pins of U217 (*operating mode*)
3. U217 supply voltage can be measured from 6th pin, that is about 18V.

• 17IPS20R9 Power Board – 12V Quasi Resonant Circuit-2



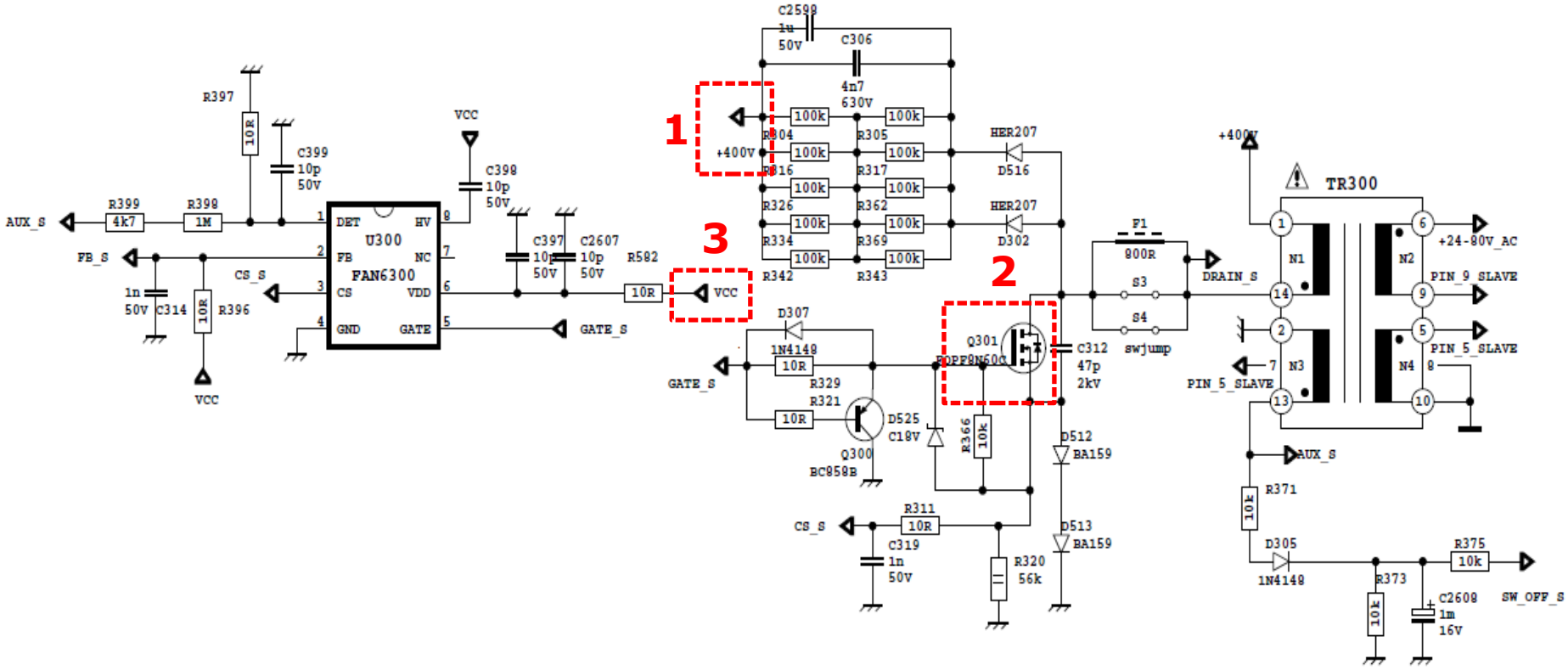
1. Unrectified 12V Output of TR200 Transformer
2. Rectified 12V voltage can be measured from point 2. This voltage is also stand-by voltage for main boards.

• 17IPS20R9 Power Board – 24V Quasi Resonant Circuit



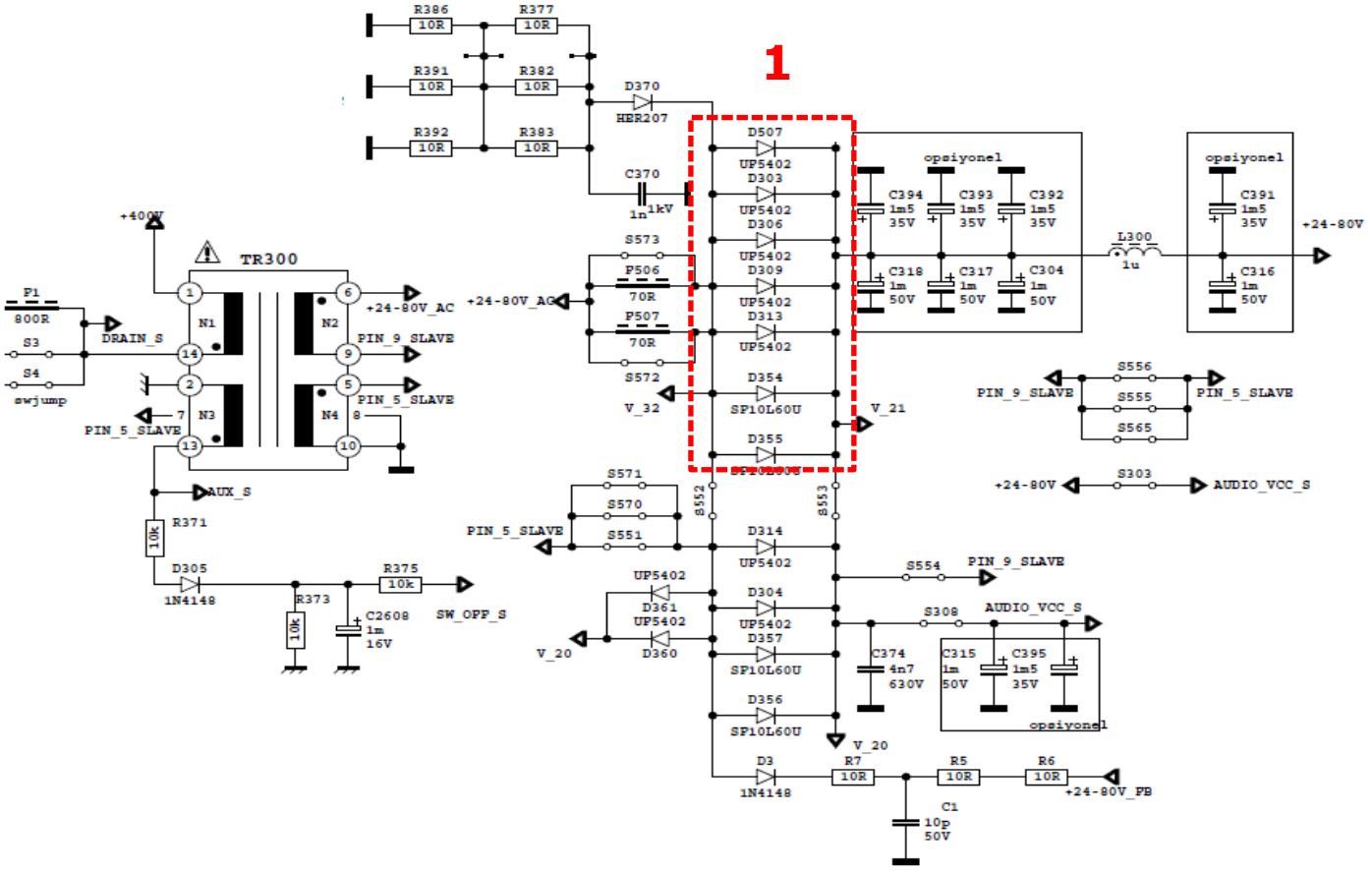
1. Unrectified 24V AC signal can be measured from this pin.
2. Rectified and regulated 24V signal must be measured from this pin, it is used for audio supply voltage.
3. Also TR200 generates supply voltage for primer side ICs.

• 17IPS20R9 Power Board – 80/120V Quasi Resonant Circuit-1



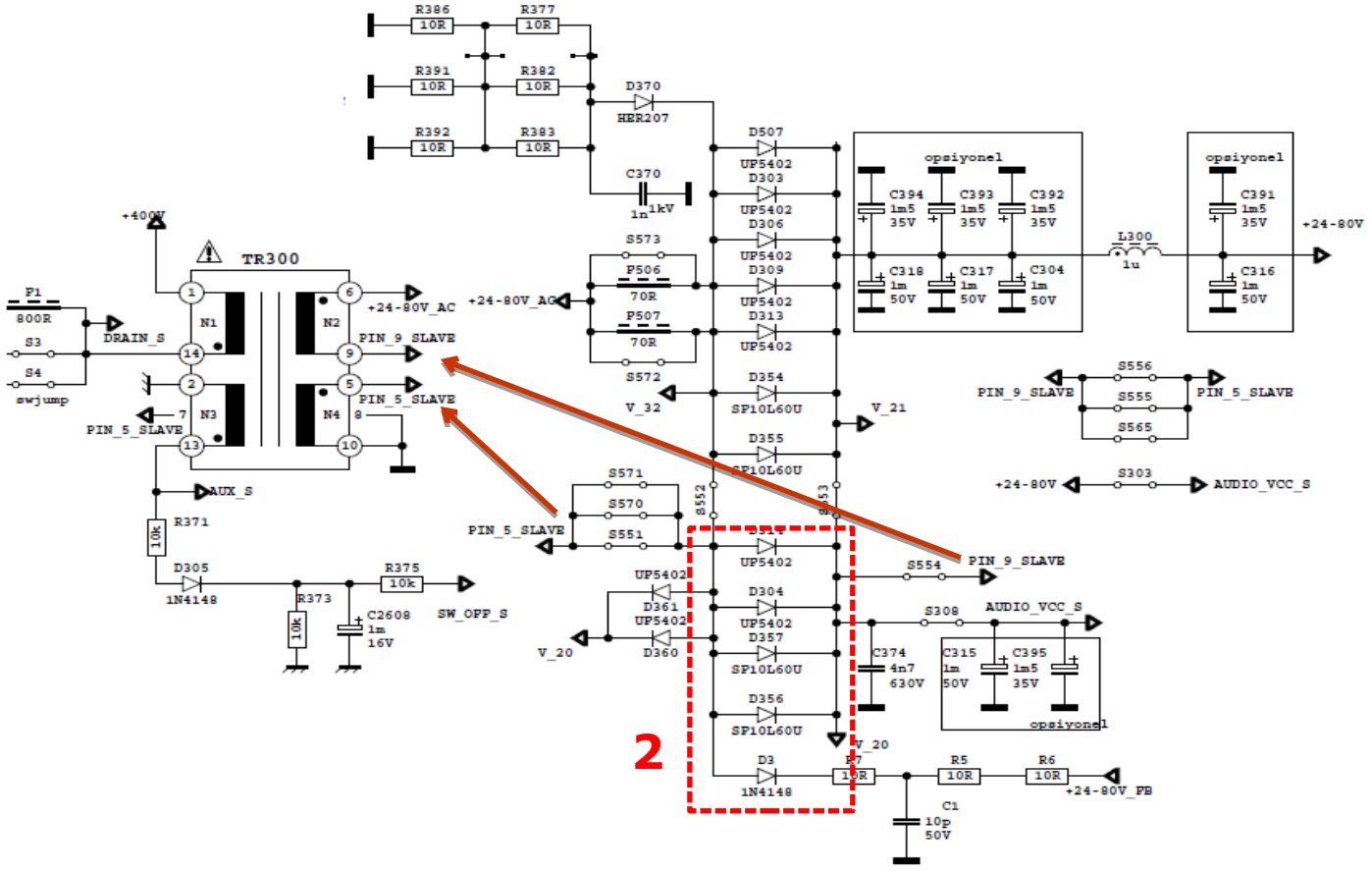
1. TR300/TR301 transformer just generates panel backlight supply voltage. This block only works while PFC is active.
2. Q301 is the switching mosfet controlled by U300 (*Reference Signals*)
3. U300 supply voltage can be measured from 6th pin, is about 18V.

• 17IPS20R9 Power Board – 80/120V Quasi Resonant Circuit-2



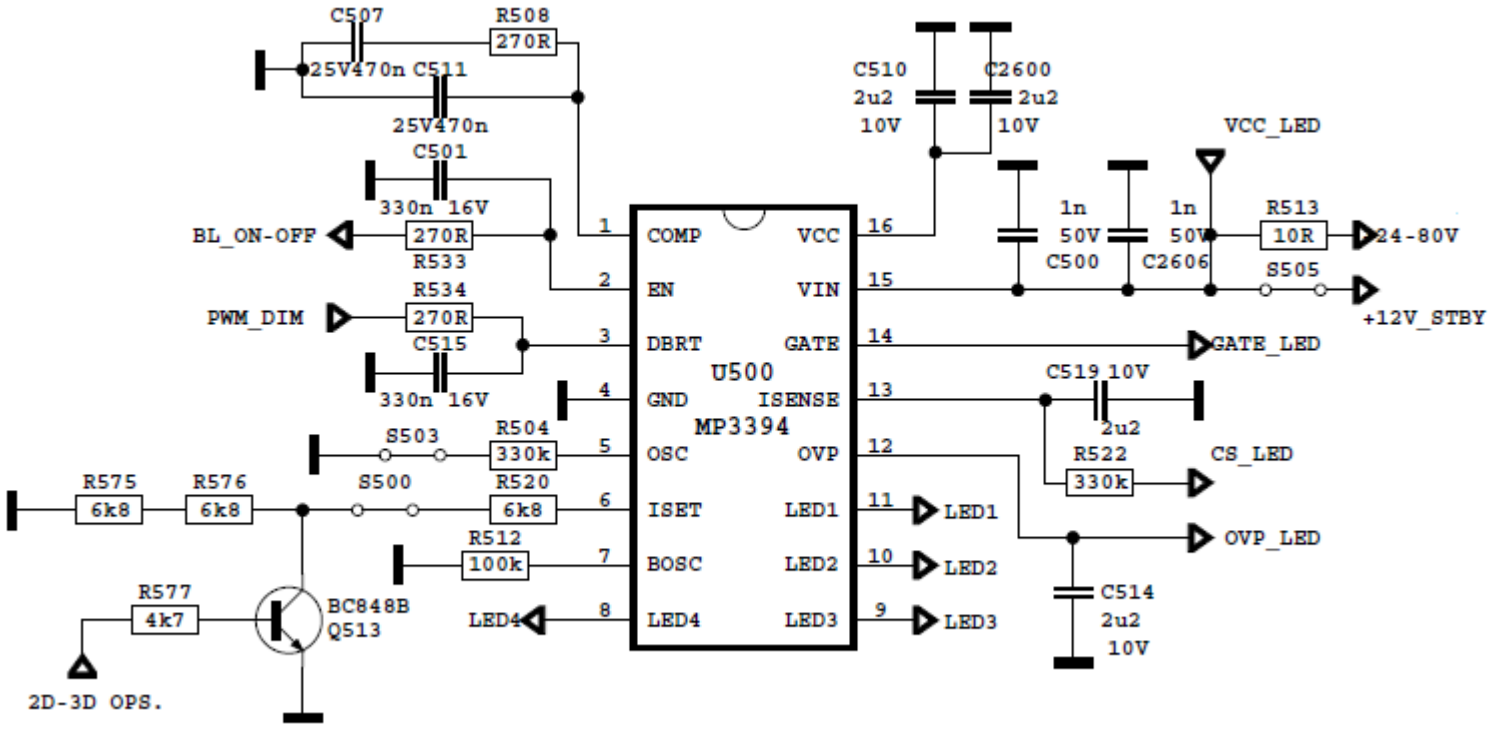
1. The output of TR300 transformer is rectified by parallel diodes and regulated by capacitors and L300 coil. As a result of this, between 80-120V can be measured at this point.

• 17IPS20R9 Power Board – 80/120V Quasi Resonant Circuit-3



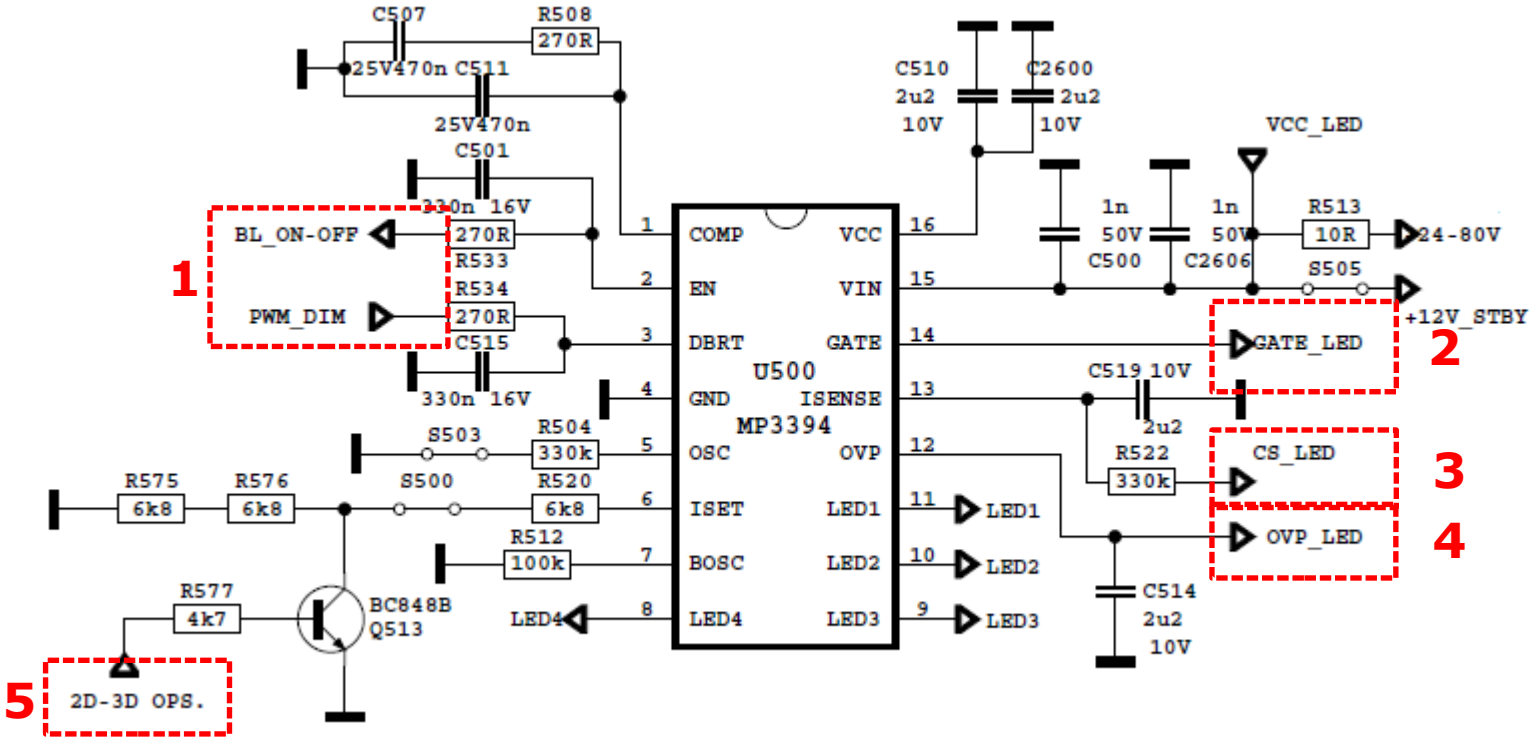
2. These diodes are connected between TR300 secondary winding to reduce reverse peak voltage

• 17IPS20R9 Power Board – Led Driver IC



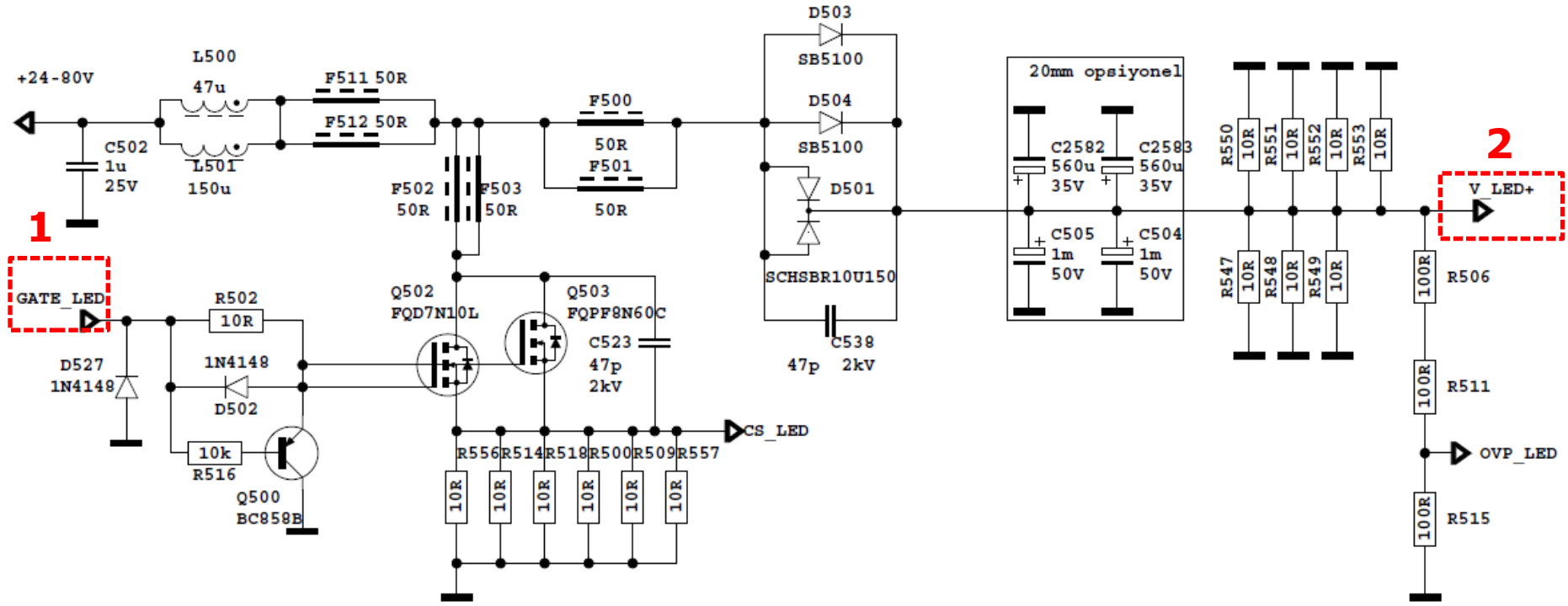
- 4-Channels, Max 200mA/Channel LED Driver
- Open and Short LED Protection
- Programmable Over-Voltage Protection
- Under Voltage Lockout

- **17IPS20R9 Power Board – Led Driver IC**



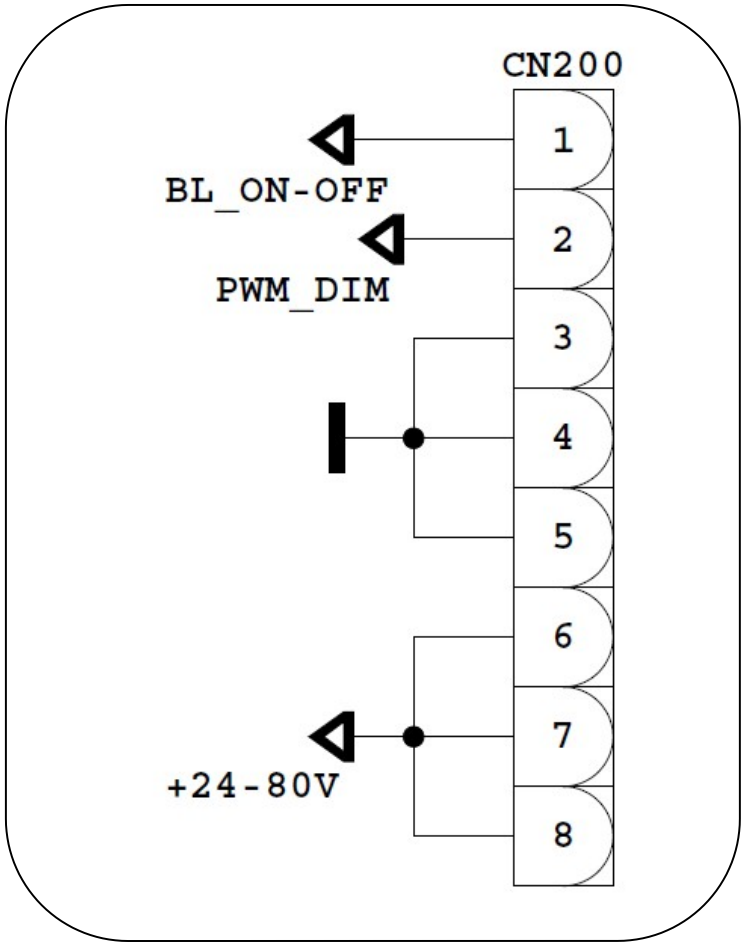
1. Backlight on-off and backlight dimming signals.
2. Boost converter switcihing pin.
3. CS_LED arranges the current that flows to LEDs.
4. OVP_LED is the over voltage protection signal.
5. 3D Current Boost control pin (X1.6).

- **17IPS20R9 Power Board – Led Driver IC**

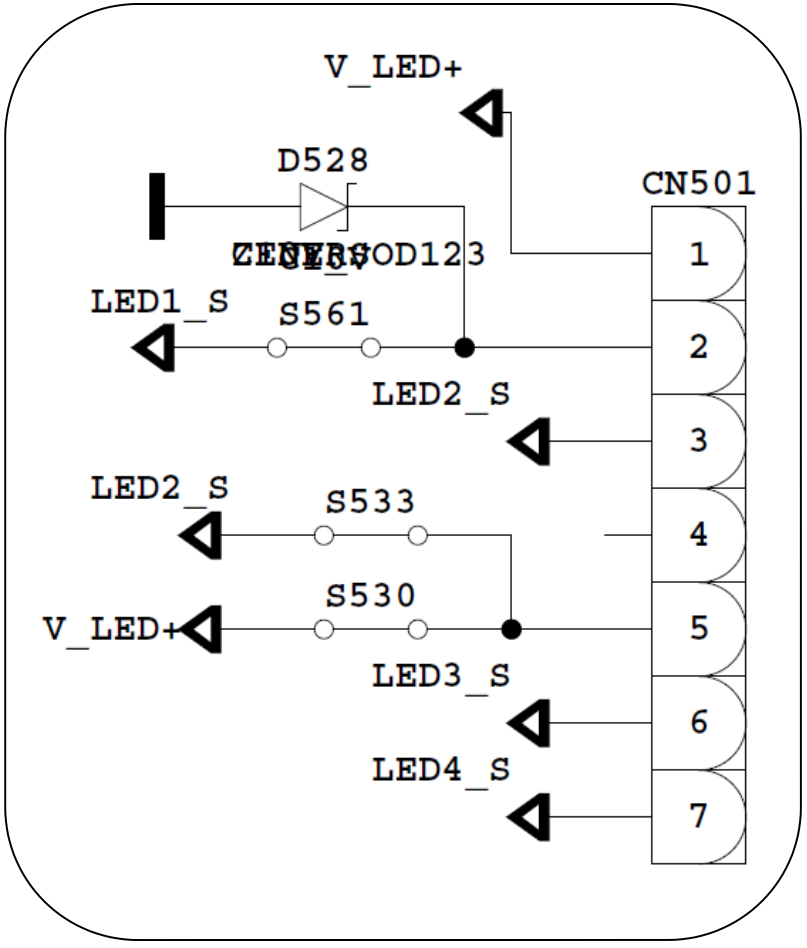


1. Boost converter switching signal can be measured from this point, it switches Q502 (or Q503) mosfet. After the mosfets, current sense resistors adjusts current capacity to limit max. Power.
2. Boost converter generates panel supply voltage. It can be mesured from that point also traced by LED driver IC, for reference OVP voltage arranges.

- **17IPS20R9 Power Board – Panel-Power**

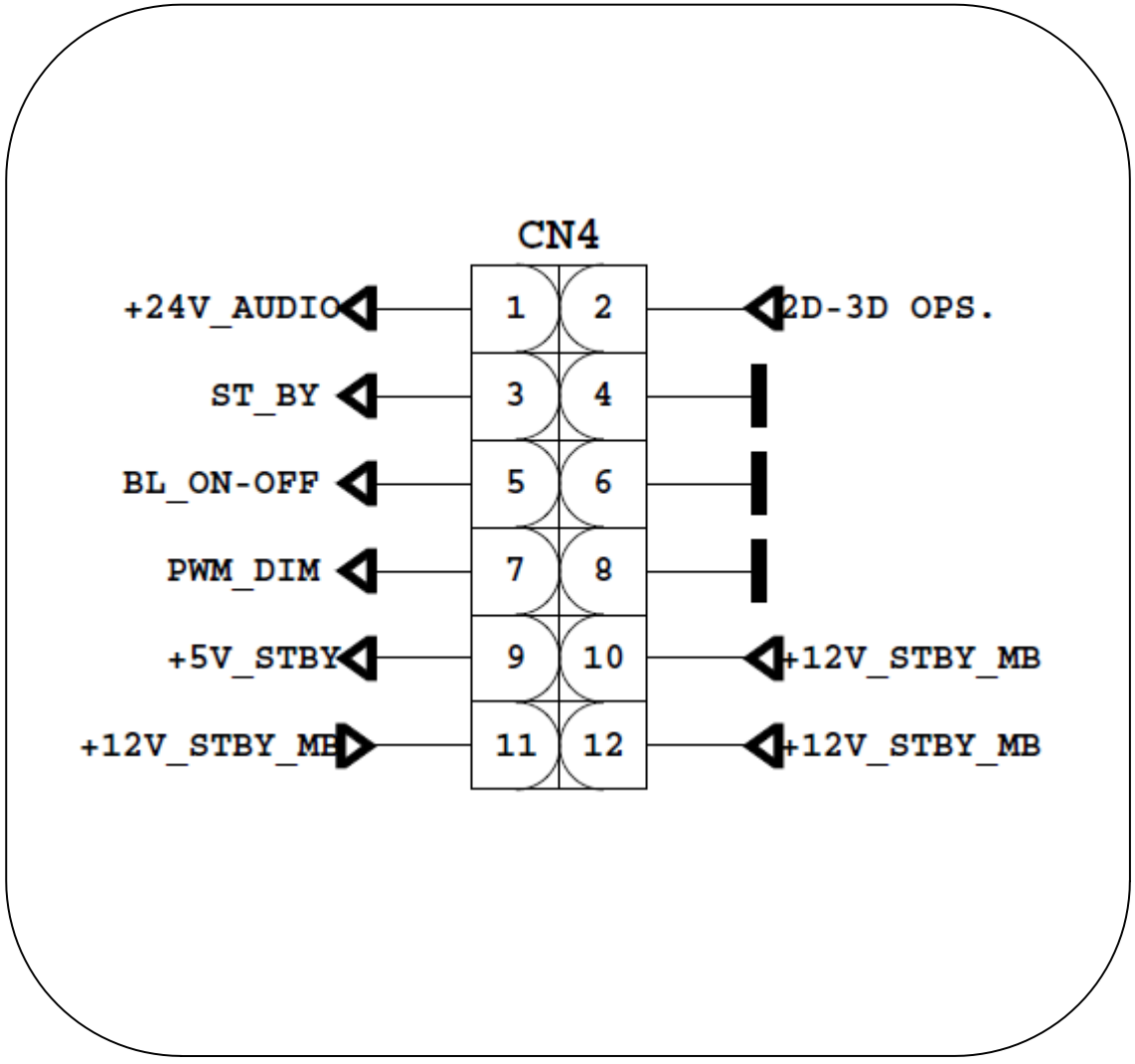


For Module Panel



For BMS Panel

• 17IPS20R9 Power Board – Mainboard-Power

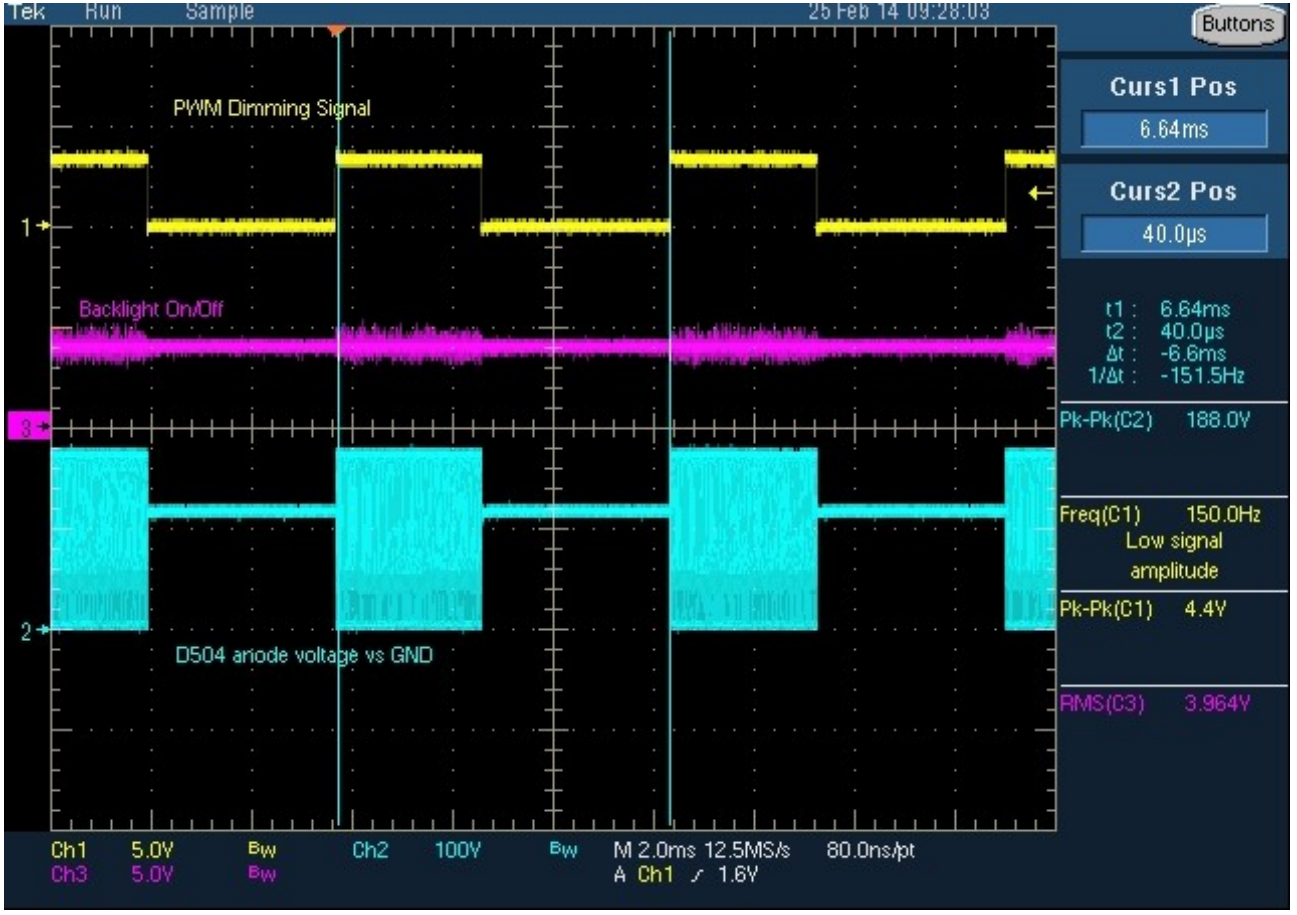


• 17IPS20R9 Power Board – Reference Signals

17IPS20R9
Power Board
Backlight on-off,
Dimming and Anode of
D504 signals for
Medium Backlight
Level.
(TimeDiv 2µS)

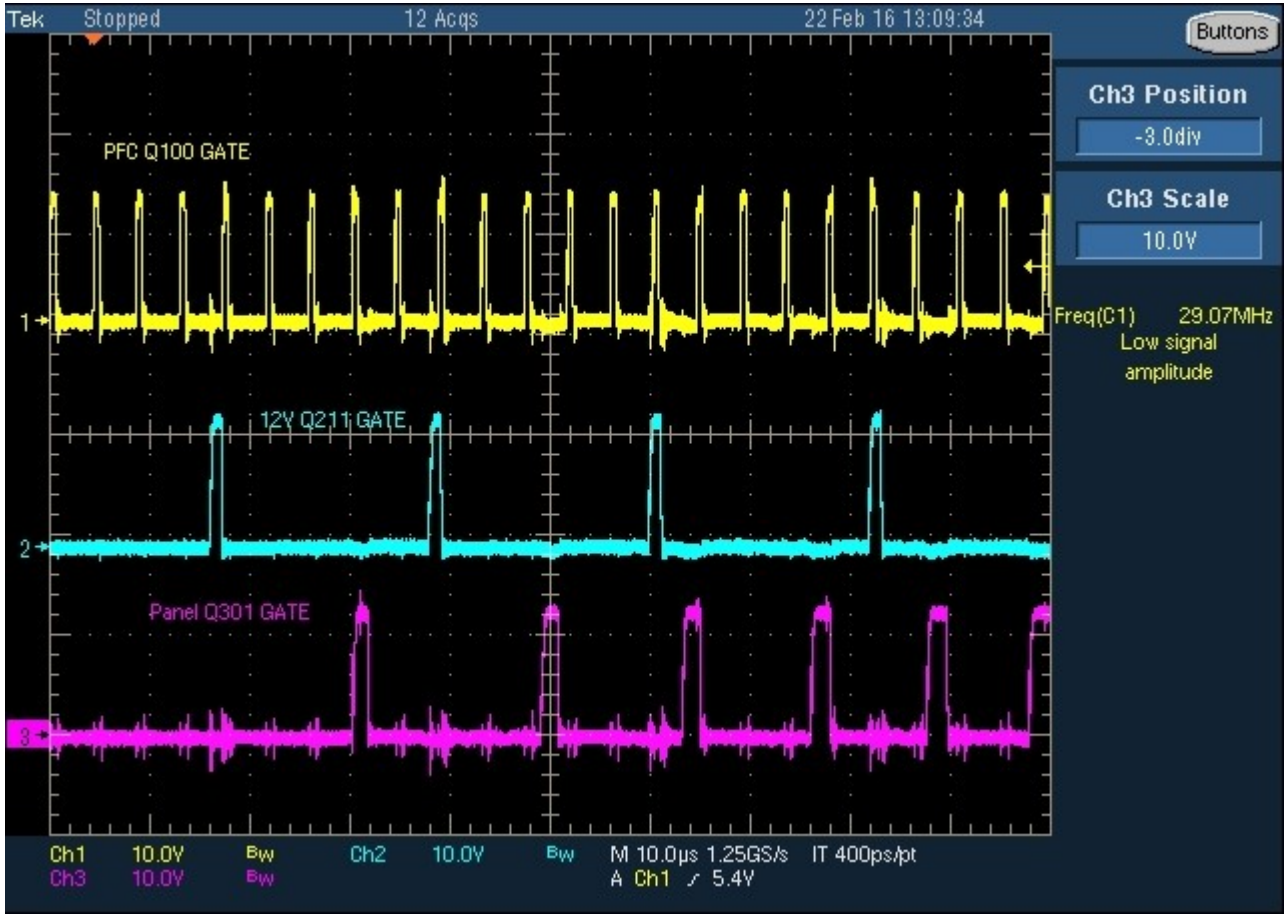
• 17IPS20R9 Power Board – Reference Signals

17IPS20R9
Power Board
Led Driver IC Switching Signal vs dimming, and backlight on/off Wave Form.
(TimeDiv 2mS)



• 17IPS20R9 Power Board – Reference Signals

17IPS20R9
Power Board
PFC(Q100),
12V(Q211) and
Panel backlight supply
(Q301) mosfet switching
Gate Signals.



• 17IPS20R9 Power Board – Reference Signals

17IPS20R9
Power Board
PFC(Q100),
12V(Q211) and
Panel backlight supply
(Q301) mosfet switching
Drain Signals.

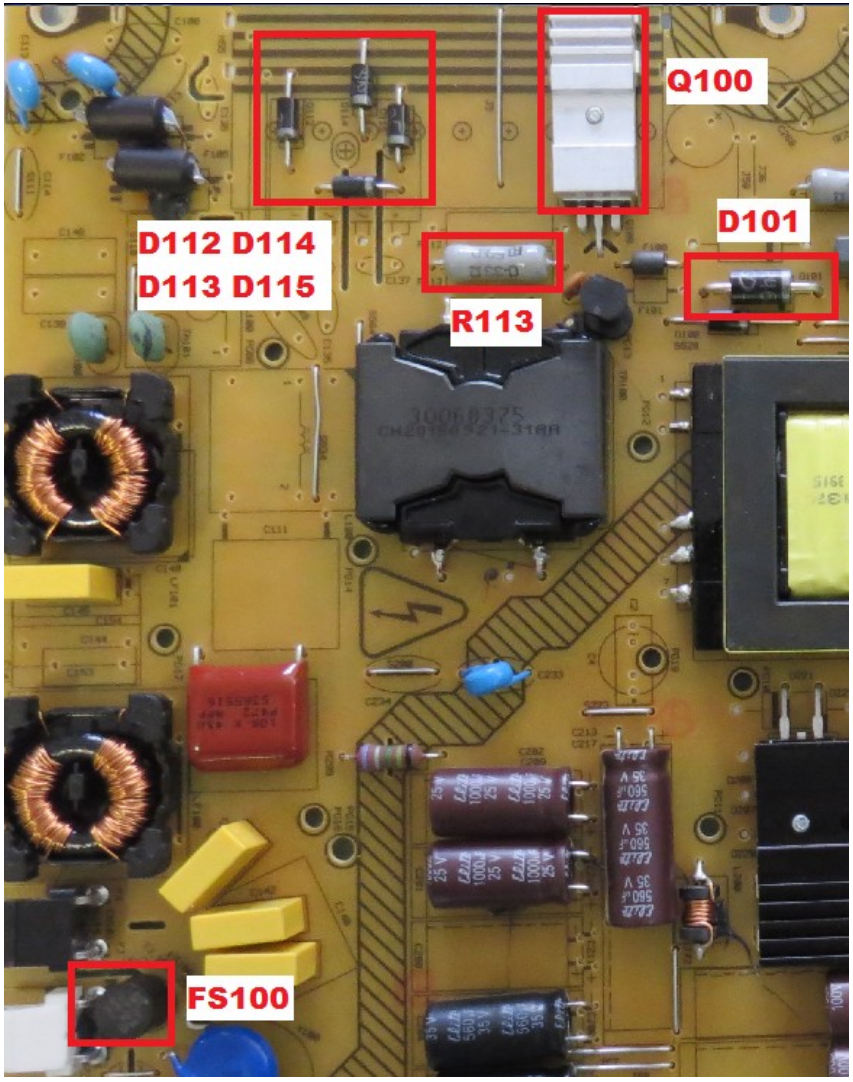
• 17IPS20R9 Power Board – Trouble Shooting & Solution

Problem 1: TV is not working, there is no voltage on the bulk capacitors

Check

- FS100 fuse
- D112-D113-D114-D115 full bridge rectifiers diodes
- D101 PFC diodes,
- R113 current sense resistor
- Q100 fuse are ok or broken.

➢ Before repair the broken component check the power MOSFET if short curcuit or not.



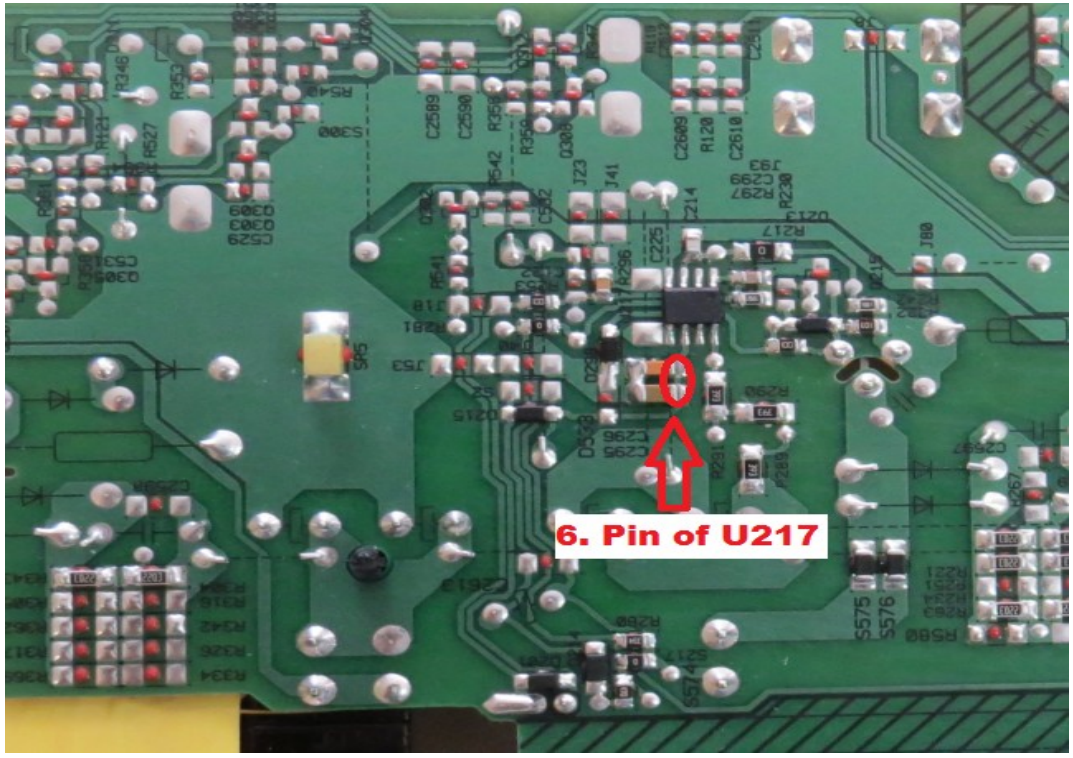
- **17IPS20R9 Power Board – Trouble Shooting & Solution**

Problem 2: TV is not working, there is 310V voltage on the bulk capacitors

- Check U217 Vcc (6.)pin of 12V switching SMPS IC is ok or broken.

Normally must be measured around 730KΩ (VDD vs Ground).

➢ After checking current sense resistor R235 and Q211 MOSFET, replace the IC.

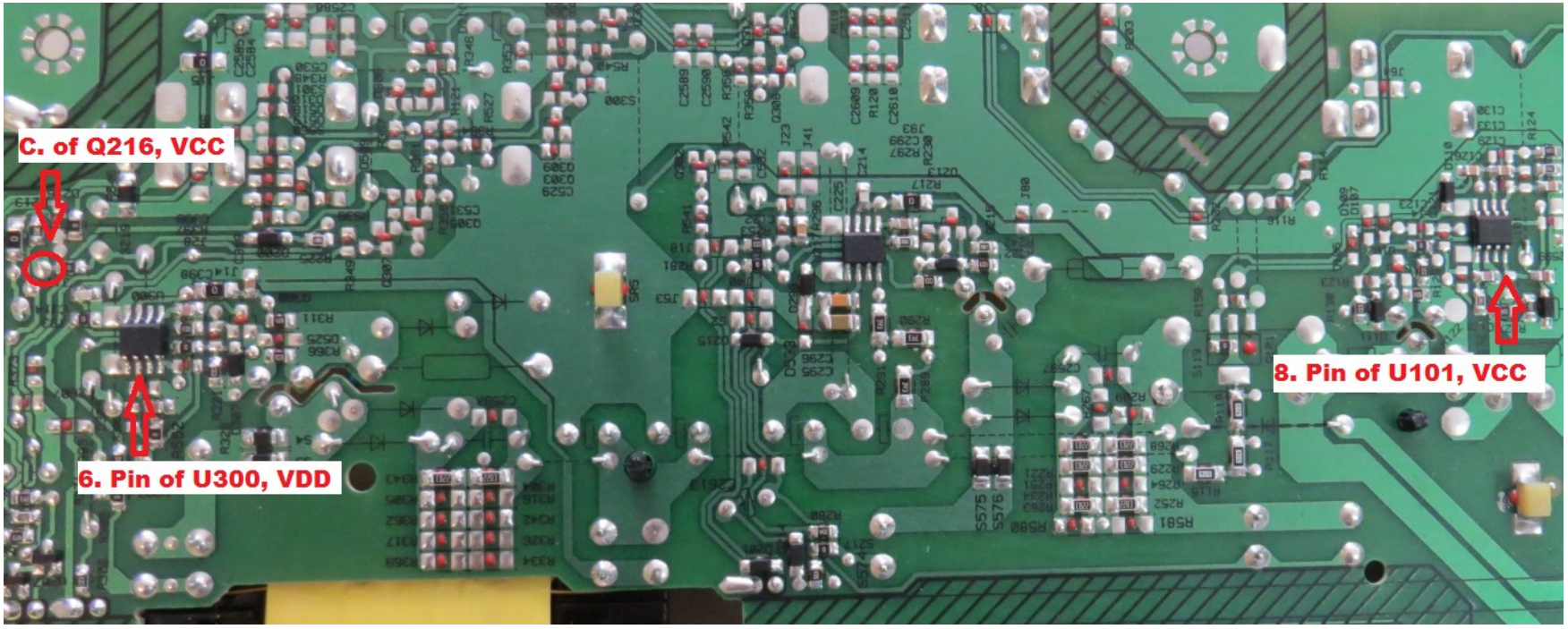


• 17IPS20R9 Power Board – Trouble Shooting & Solution

Problem 2: TV is not working, there is 310V voltage on the bulk capacitors

- Check supply voltage PFC IC(U101) and U300 are about 18V or not. (While ST_BY pins is low).

➢ Damaged IC may cause dropping IC supply voltage, replace IC's If you measure low resistance (or low voltage) on the supply pins.

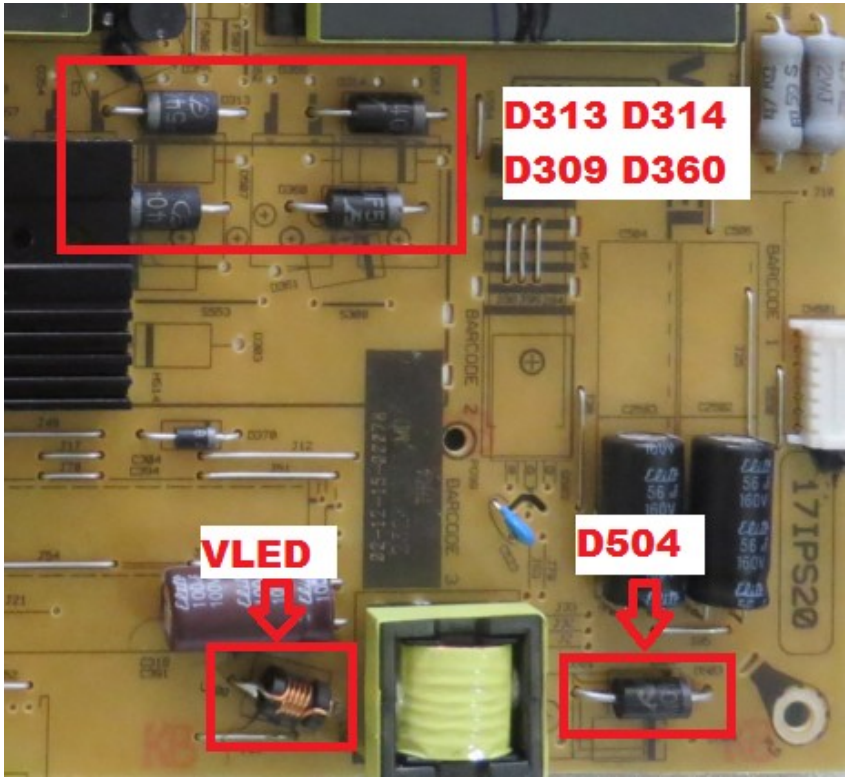


- **17IPS20R9 Power Board – Trouble Shooting & Solution**

Problem 3: TV is working but there is no backlight.

- If there is no voltage before LED driver boost converter Check D309,D313 D314 and D360 also U300 Quasi resonant converter are ok or broken

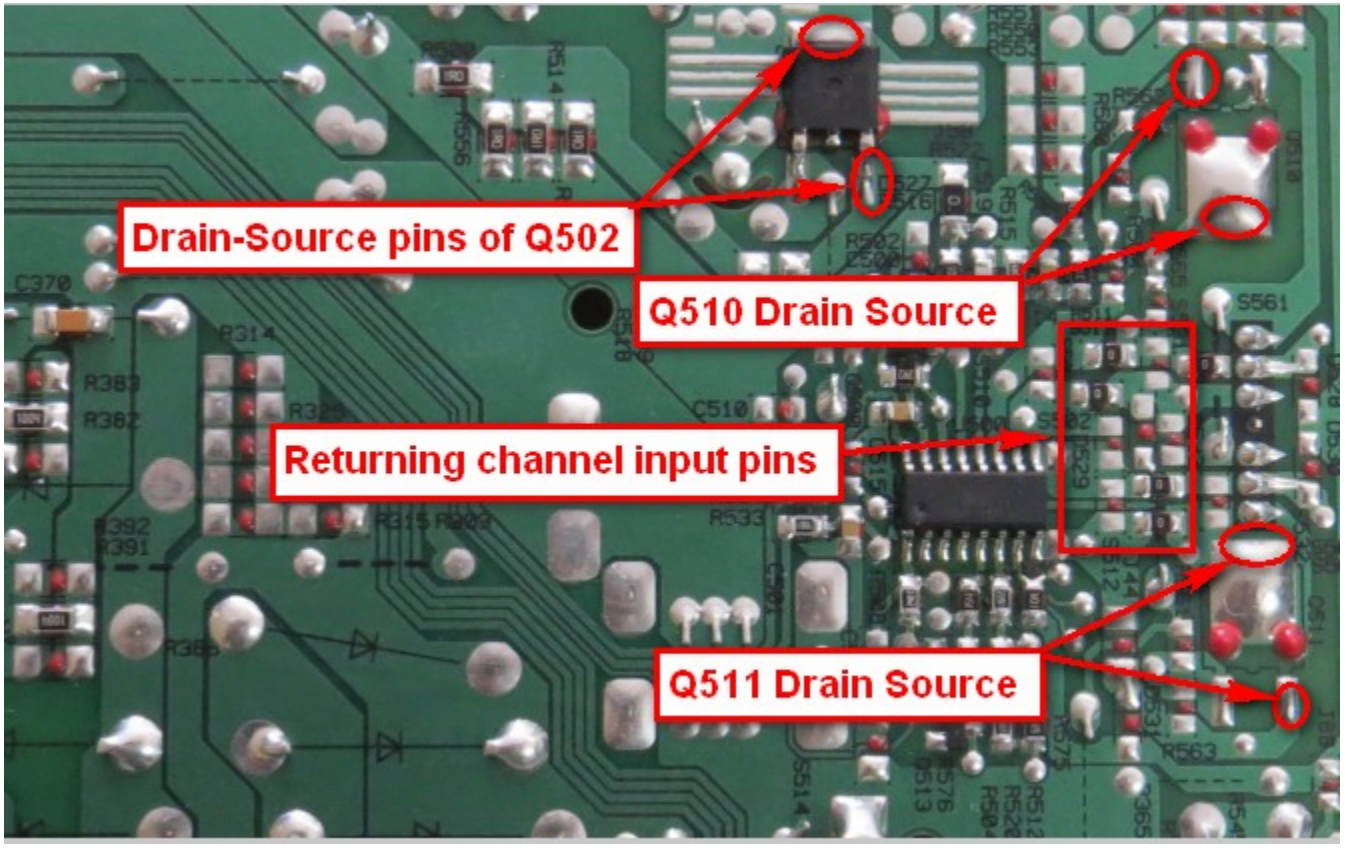
- If there is voltage before LED driver boost converter. Check D504 that boost converter output is ok or broken.



• 17IPS20R9 Power Board – Trouble Shooting & Solution

Problem 3: TV is working but there is no backlight.

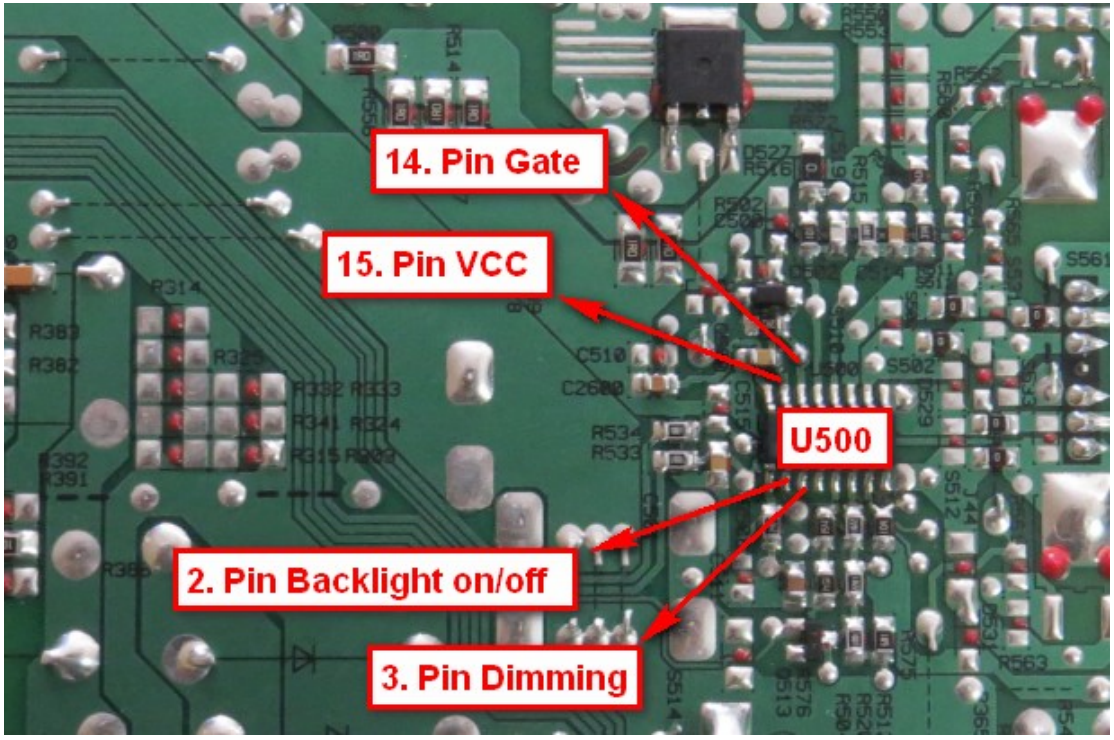
- Check Q502 mosfet is ok or broken.
- If there are Q510-Q511 mosfets, Check between drain-source pins, otherwise, check the return channel input pins. Must be measured high impedance



• 17IPS20R9 Power Board – Trouble Shooting & Solution

Problem 3: TV is working but there is no backlight.
There is 80-120V before LED driver boost converter.

- Check LED Driver IC(U500) supply voltage is about 12V or not. if it is broken, VCC and GND are short circuit each other.
- Check Dimming Signal that is PWM and Backlight on-off signal
- Check gate signal of IC500, about 220kHz.



THANK YOU

ERSİN AKSU
Vestel Application Engineering Department

22 FEBRUARY 2016