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sense and simplicity

Subject: Power Supply DELTA
date September 2011

Theo Heijnen
Consumer Care

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Overview

Supplier: Delta		
Article Id	**Description**	**Remarks**
2722 171 90337	MOD PSL 32 DPS-93BP A B	Blockbuster - 32PFL66X6H/T/M/K /
2722 171 90338	MOD PSL 42 DPS-139AP A B	Sundance - 42PFL74X6/H/T/M/K /
2722 171 90339	MOD PSL 47 DPS-186FP A B	Infinity - 42/47PFL7XX6 / Infinity - 42PDL7906H/T/M/K
2722 171 90311	MOD PSU DPS-300AP-59 A B	58PFL9955H/D & 9956H/T
8204 001 56651	MOD PSL DPS-318AP B	46PFL9706H/T/M/K & 52PFL9606H/T/M/K

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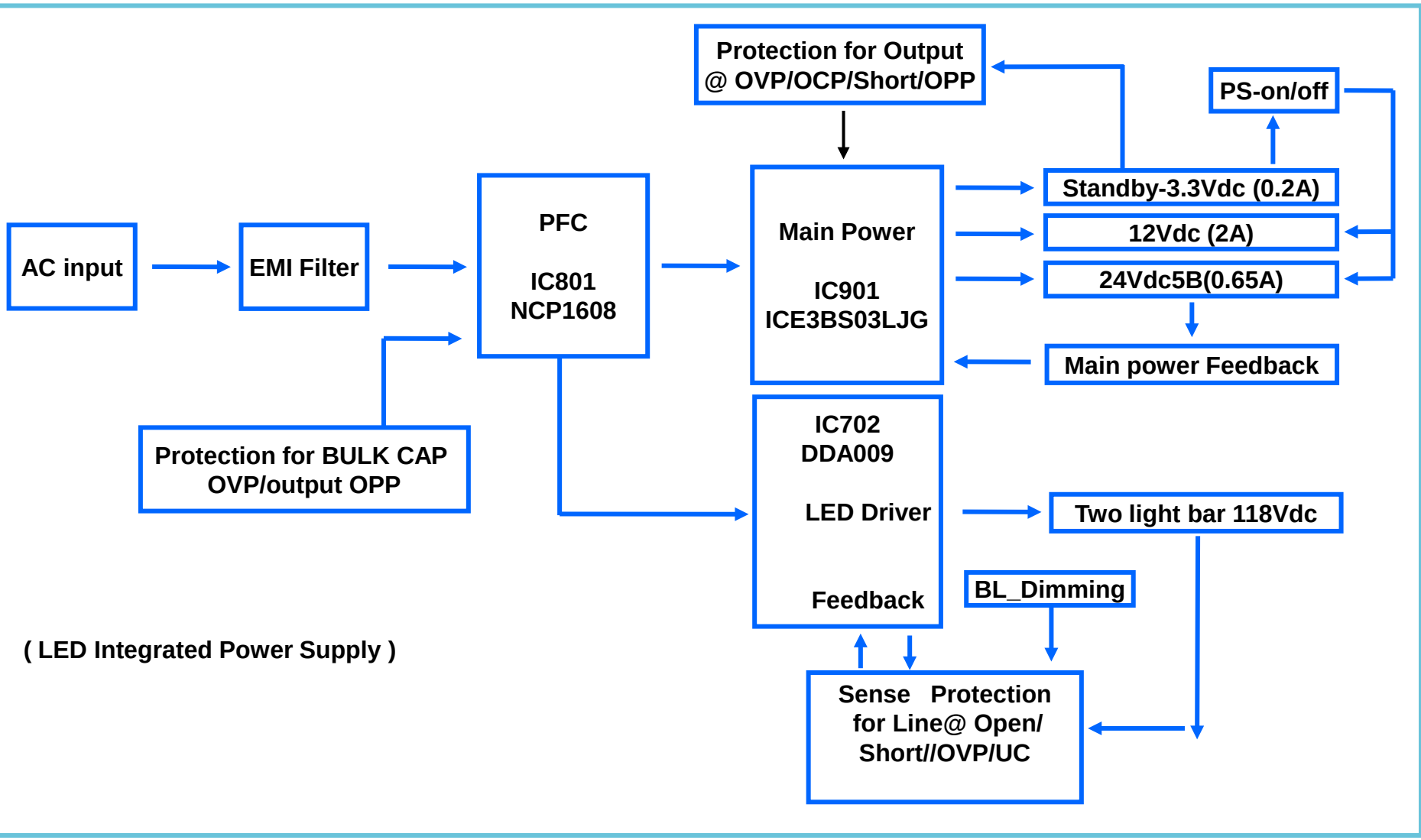
Block Diagram



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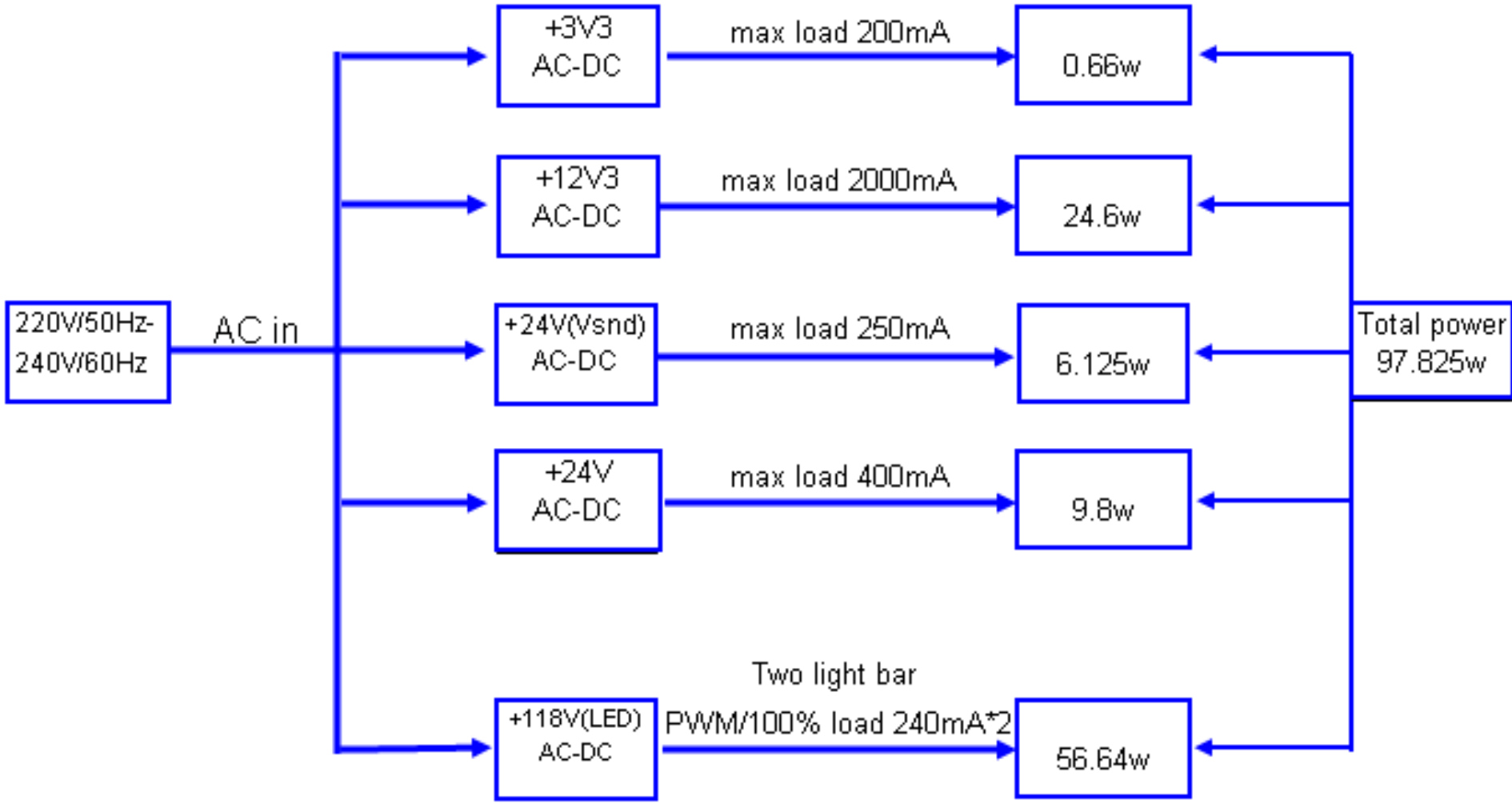
Output & Load condition



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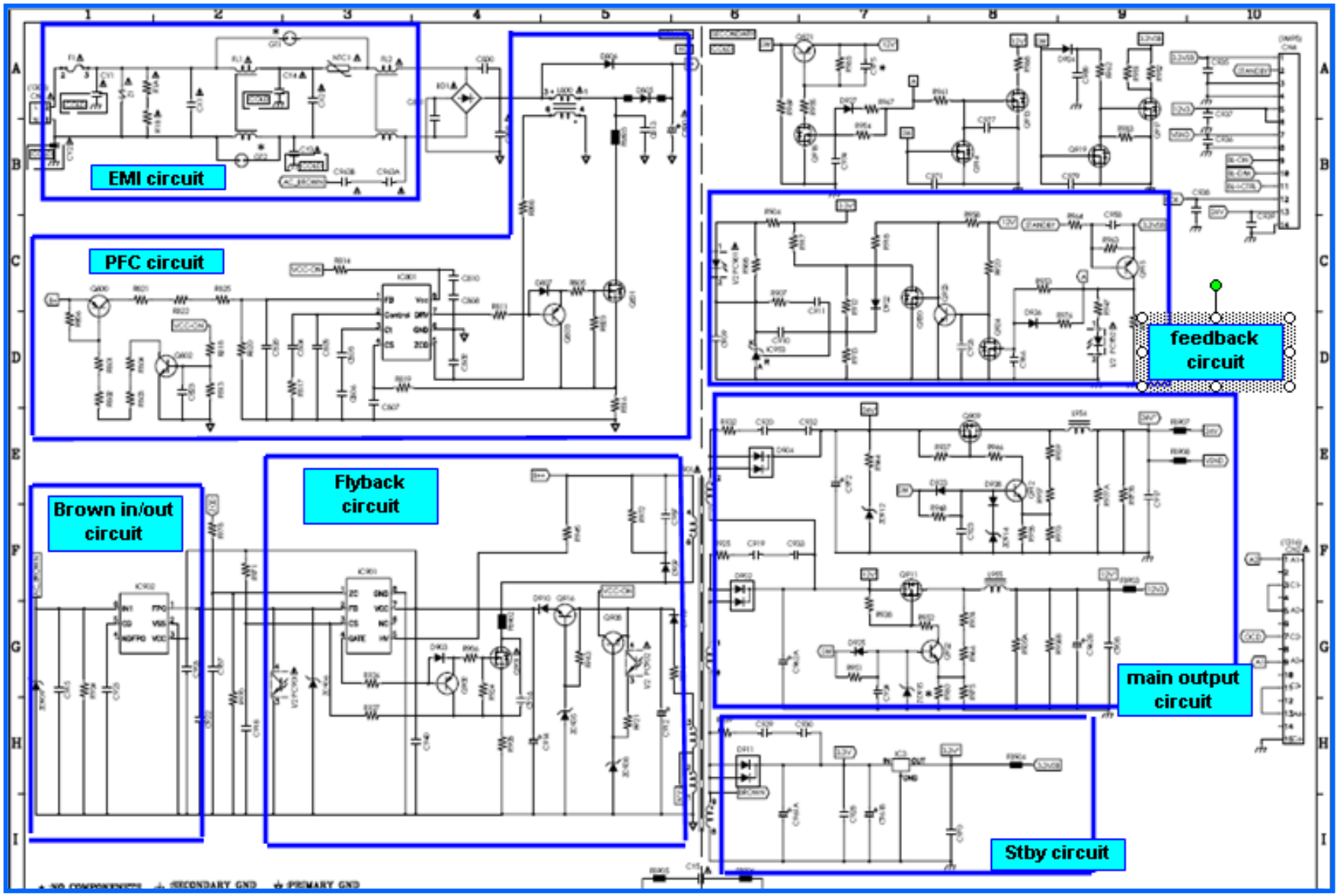
Schematics_1/2



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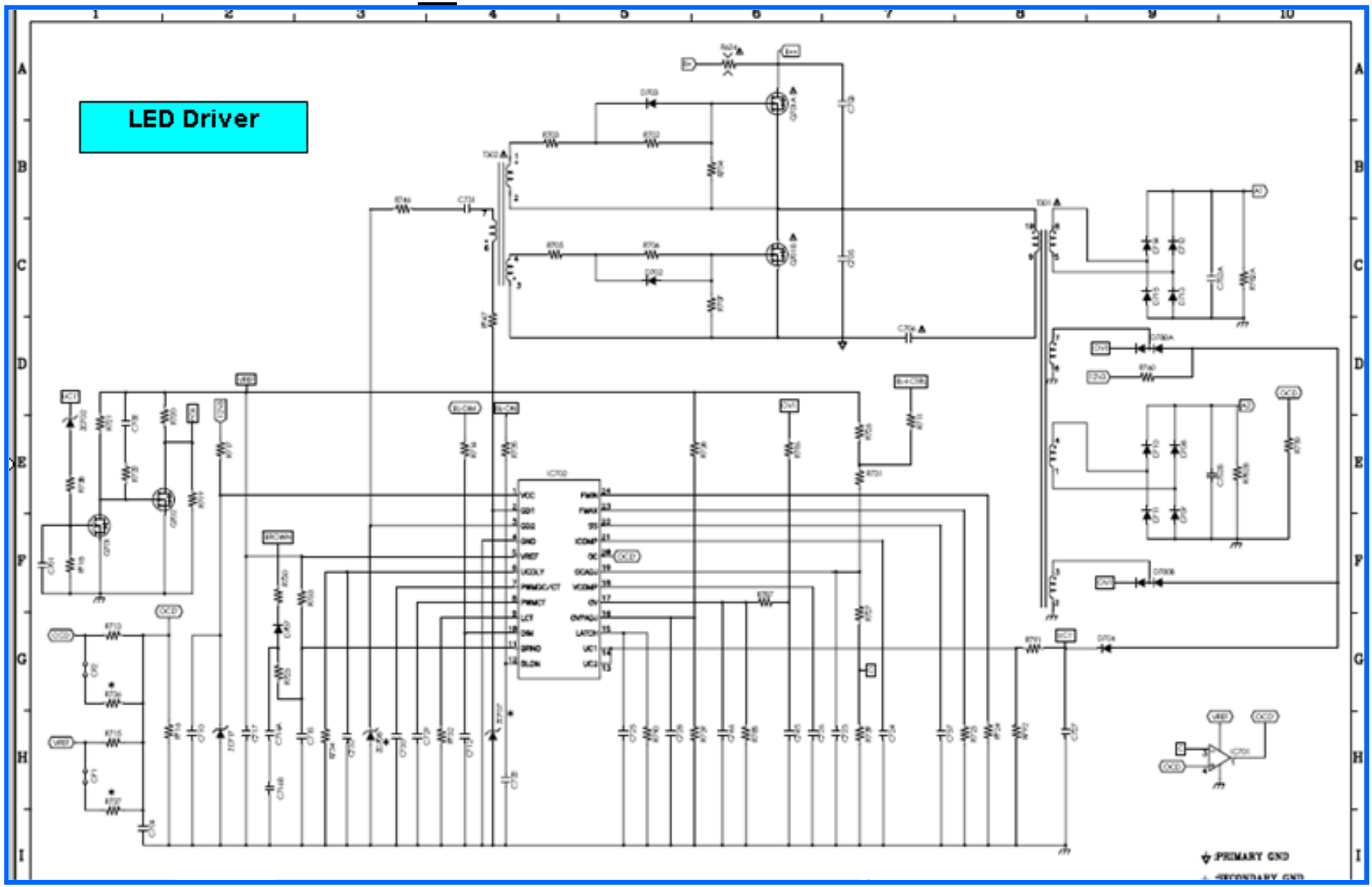
Schematics_2/2



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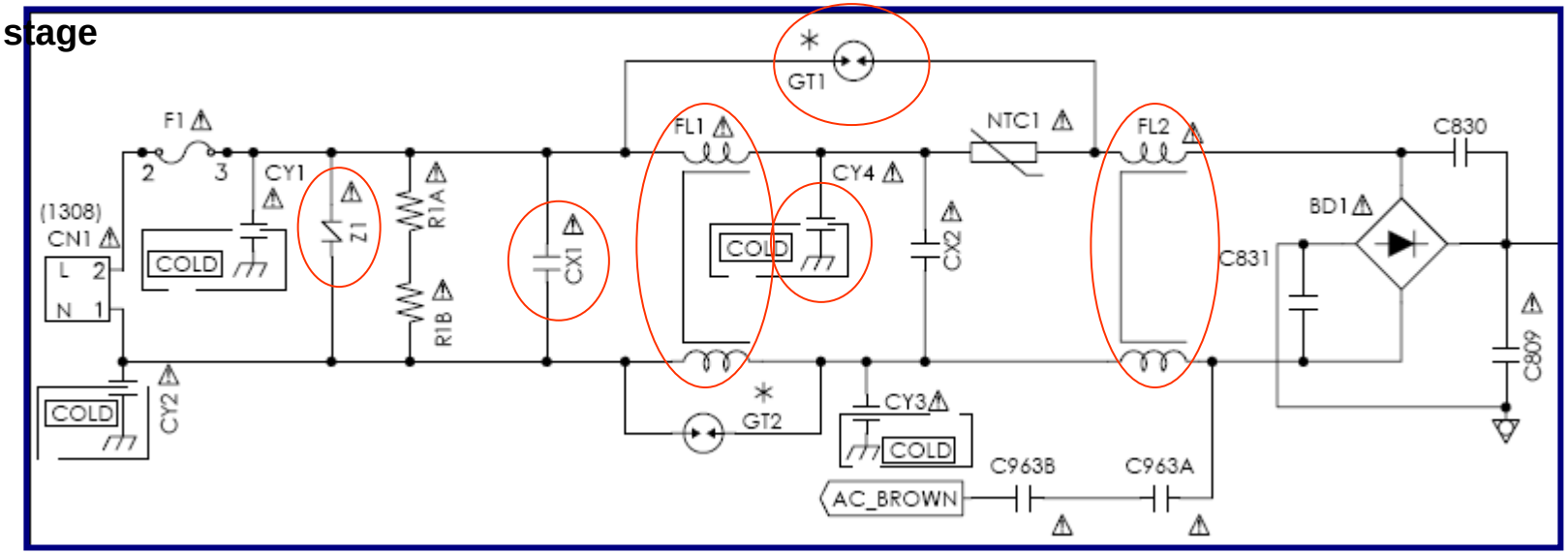
EMI CIRCUIT

EMI stage



Key components for EMI solution: CX1& CX2 FL1 & FL2

Varistor Z1 is used to to protect against high-voltage transients and surges.

NTC1 is a negative temperature coefficient resistor in series with the line to limit the inrush current when PSU first turn on.

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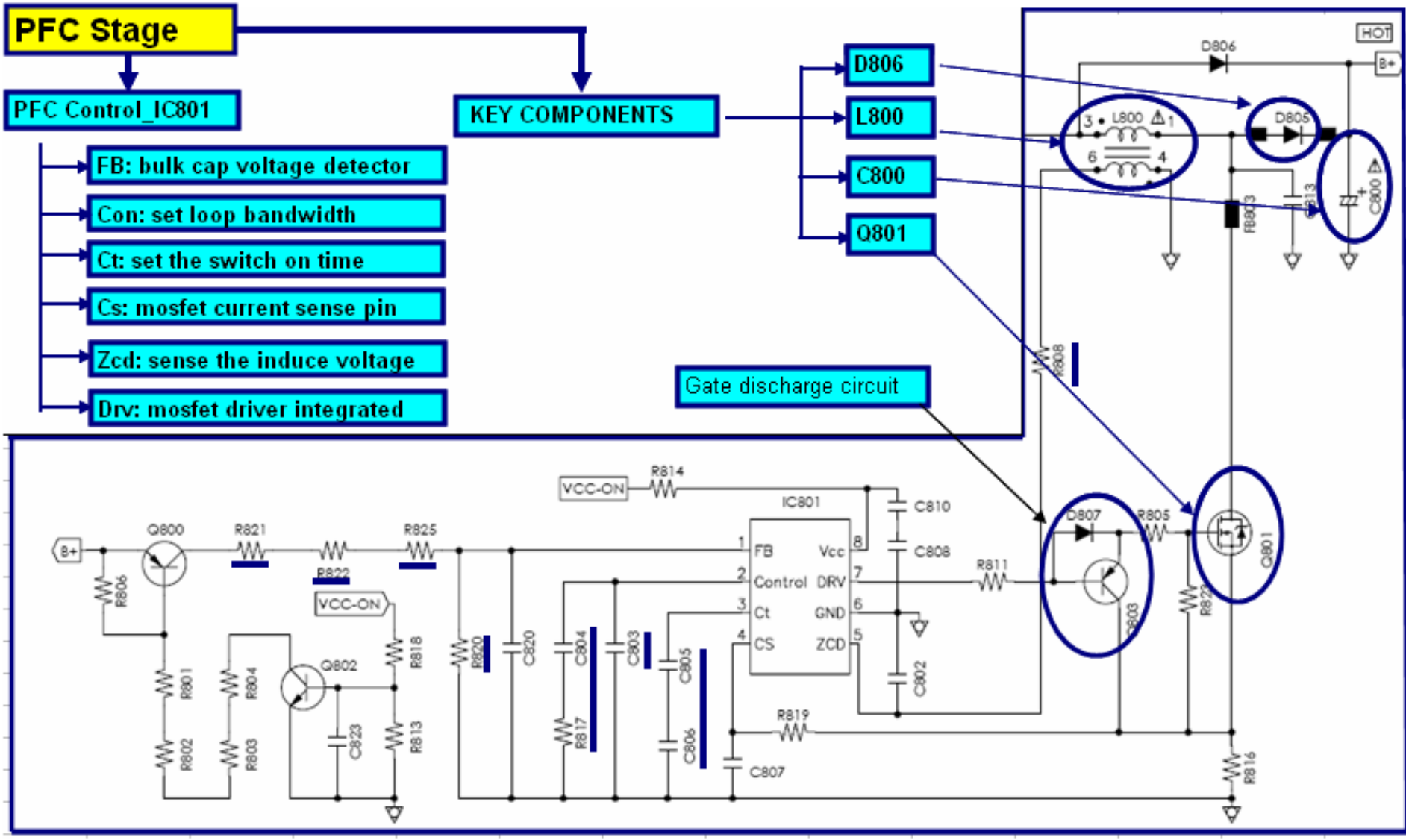
PFC CIRCUIT



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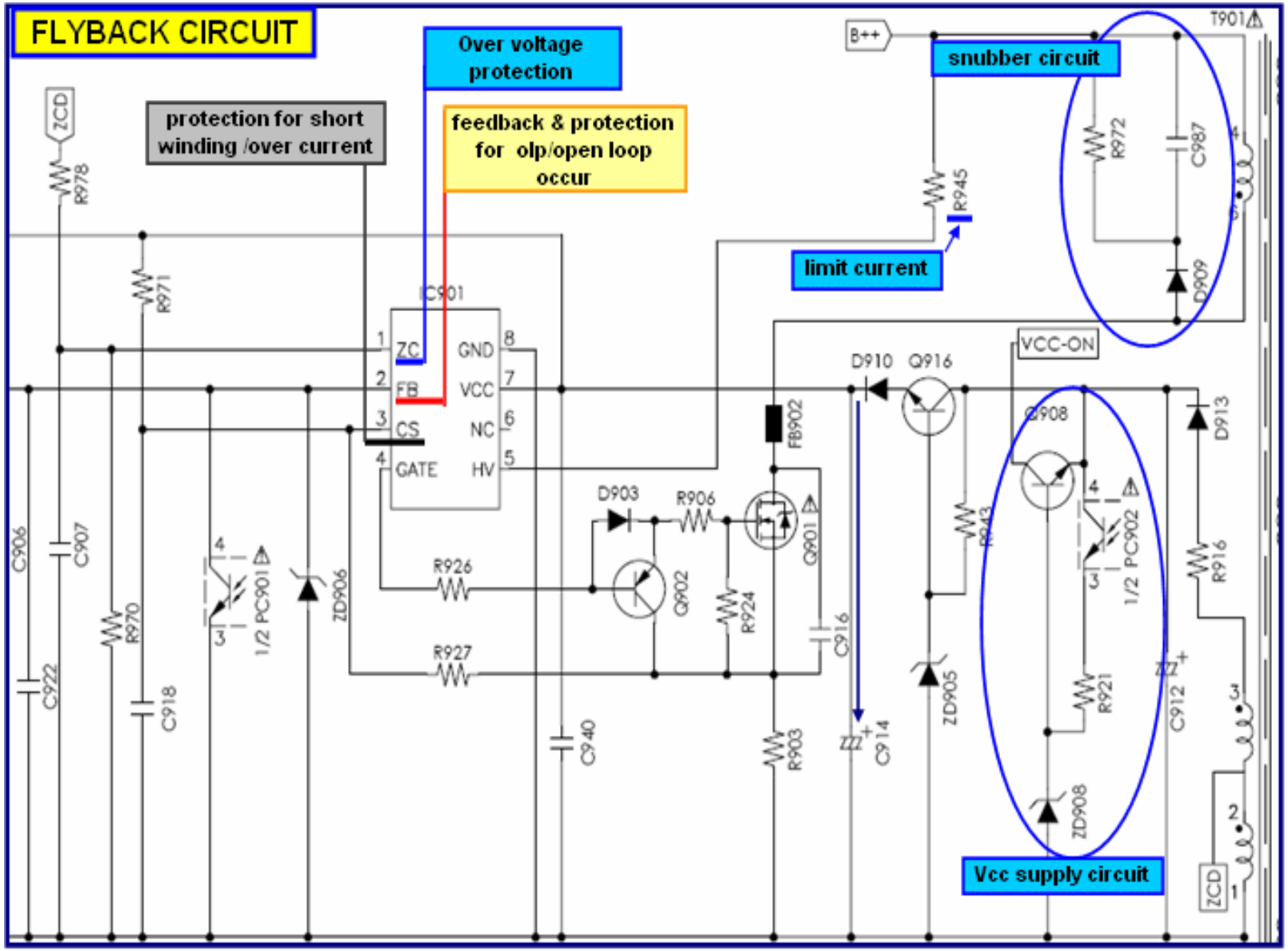
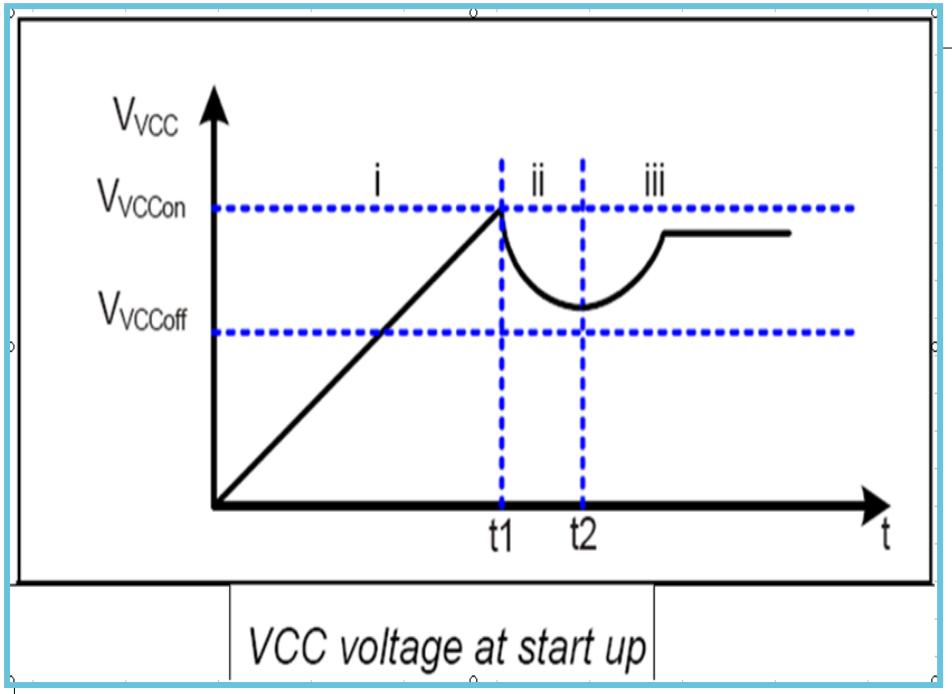
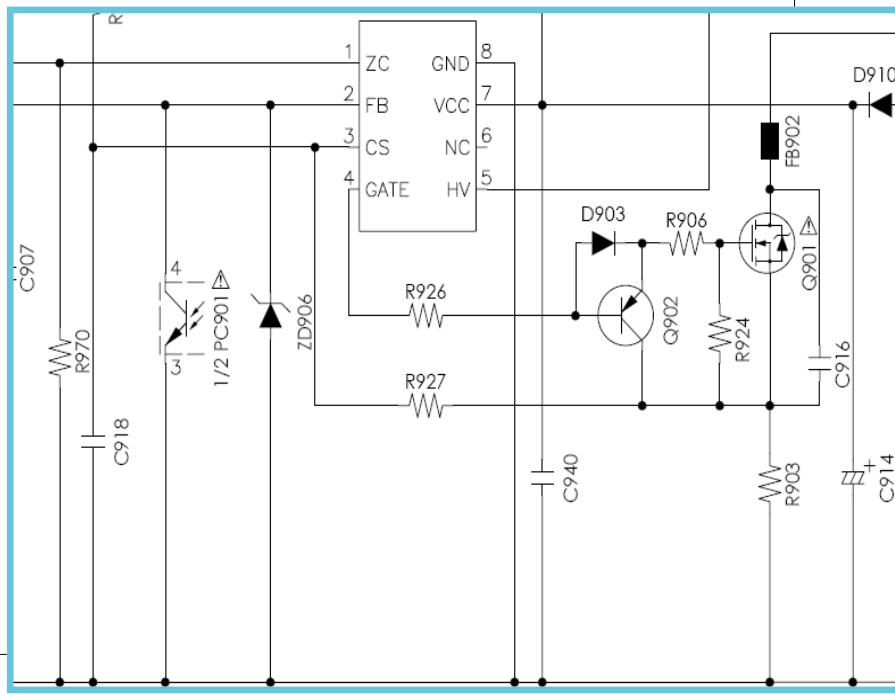
FLYBACK CIRCUIT_1/2



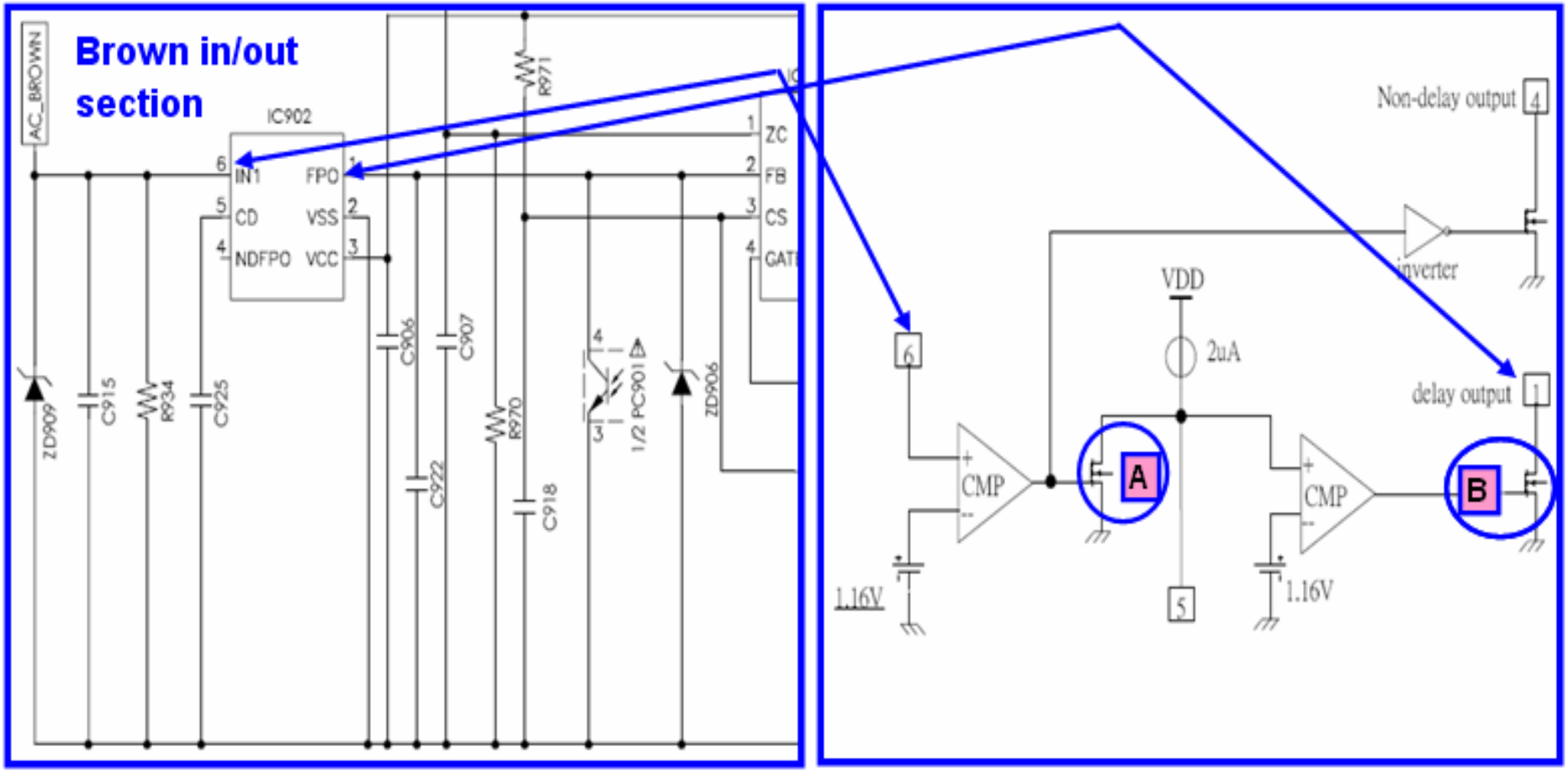
FLYBACK CIRCUIT_2/2



VCC voltage at start up

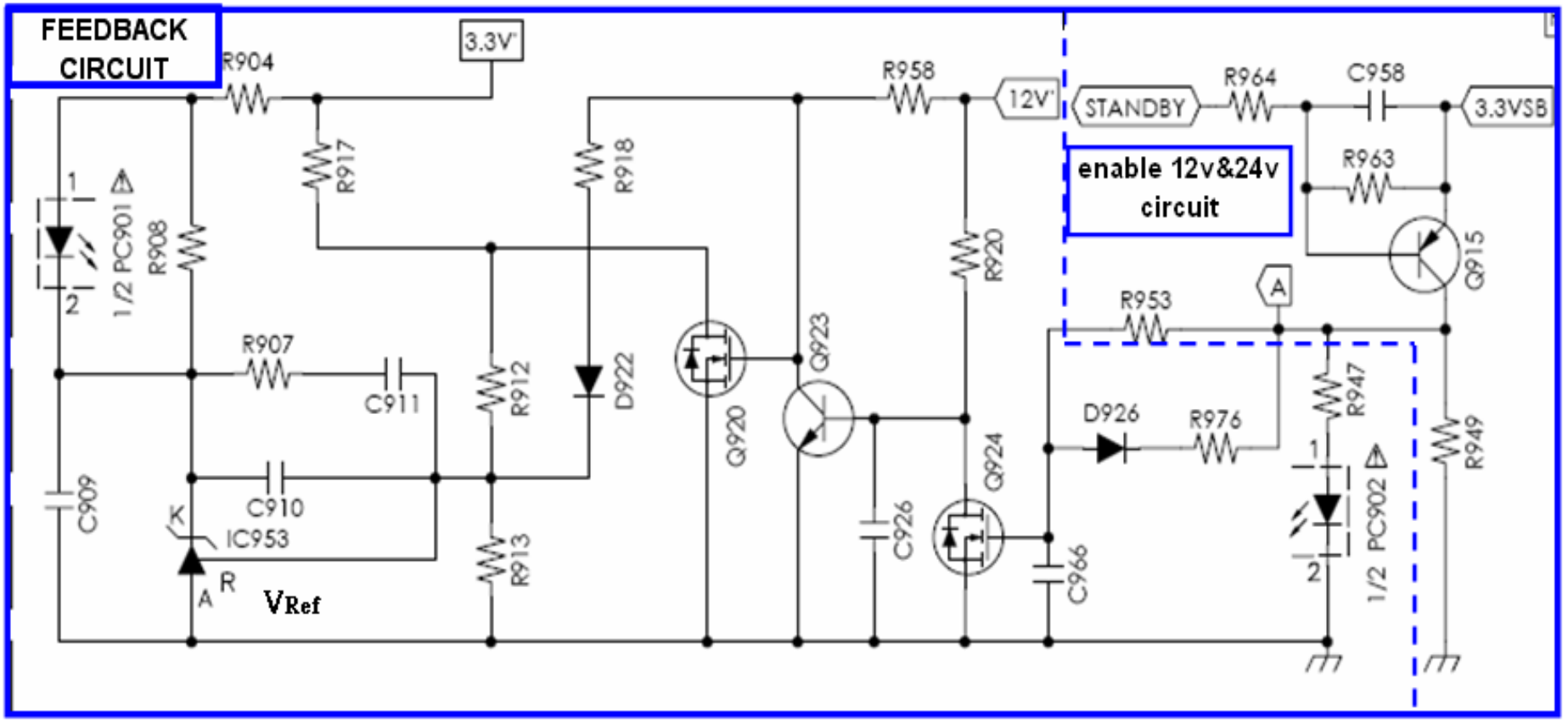


PHILIPS FLYBACK CIRCUIT_2/2



- Notes: IC902 is used to set the AC Brown In/Out point and discharge time. The trigger point is 1.28v for Brown/In and 1.16V for Brown out.

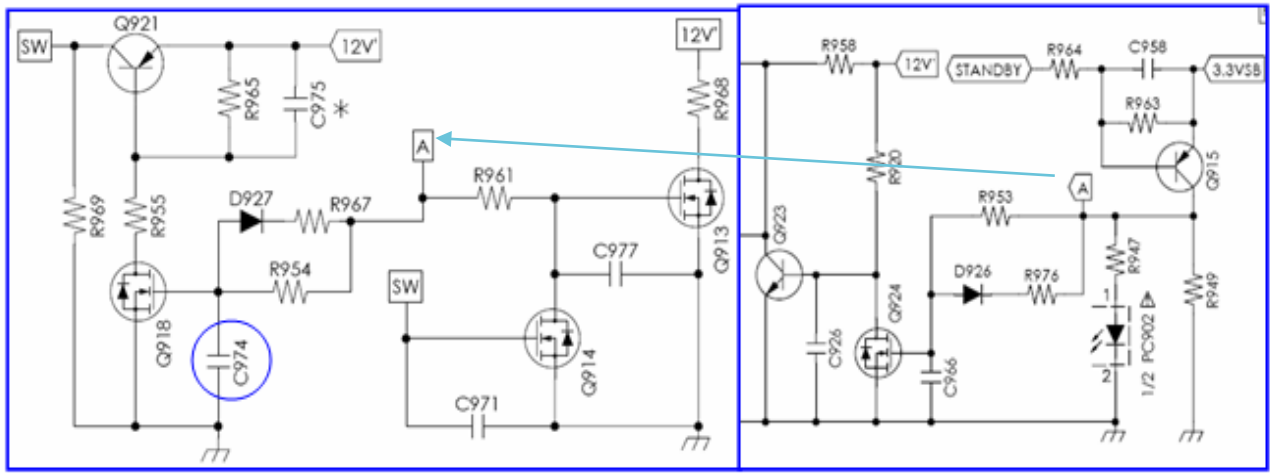
DC_output F/B Circuit

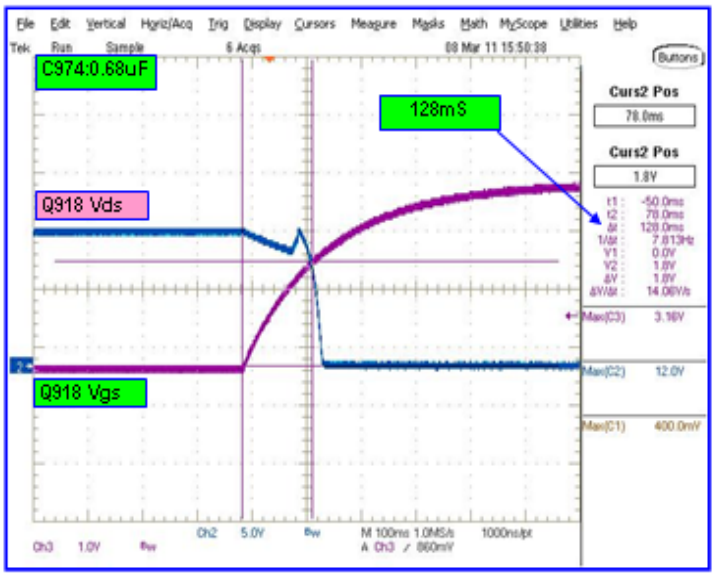


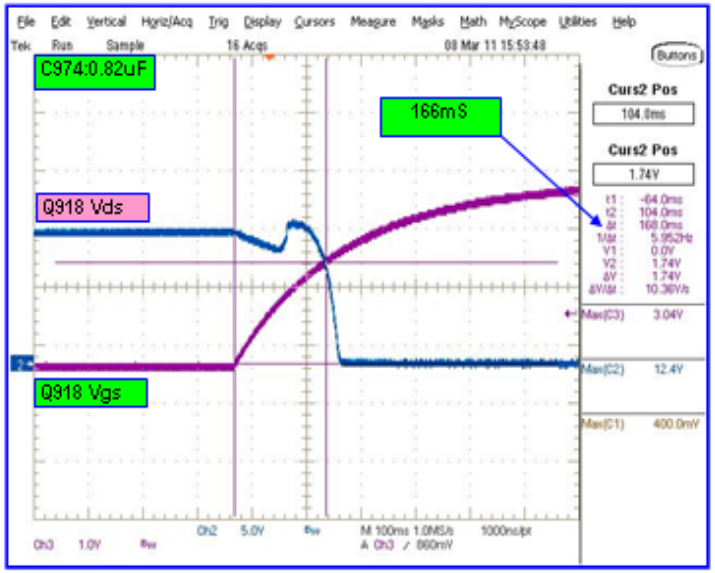
$$V_{out\_3.3V} \doteqdot V_{ref} * (R_{917}+R_{912}+R_{913})/R_{913}$$

$$V_{out\_12V} \doteqdot V_{ref} * (R_{958}+R_{918}+R_{913})/R_{913}+V_{F\_D922}$$

PHILIPS TURN_ON CIRCUIT_1/2



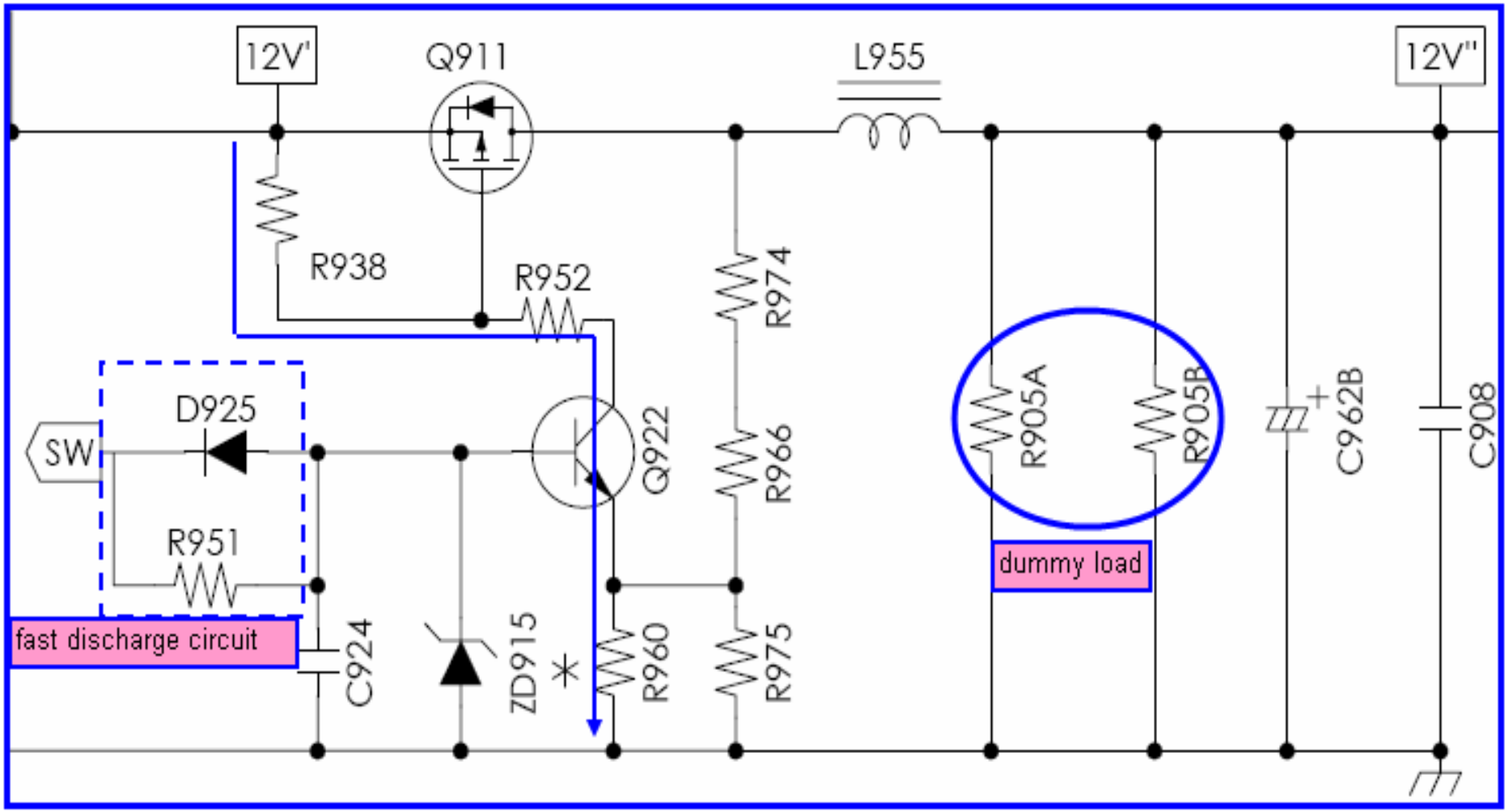




C974 is the key component

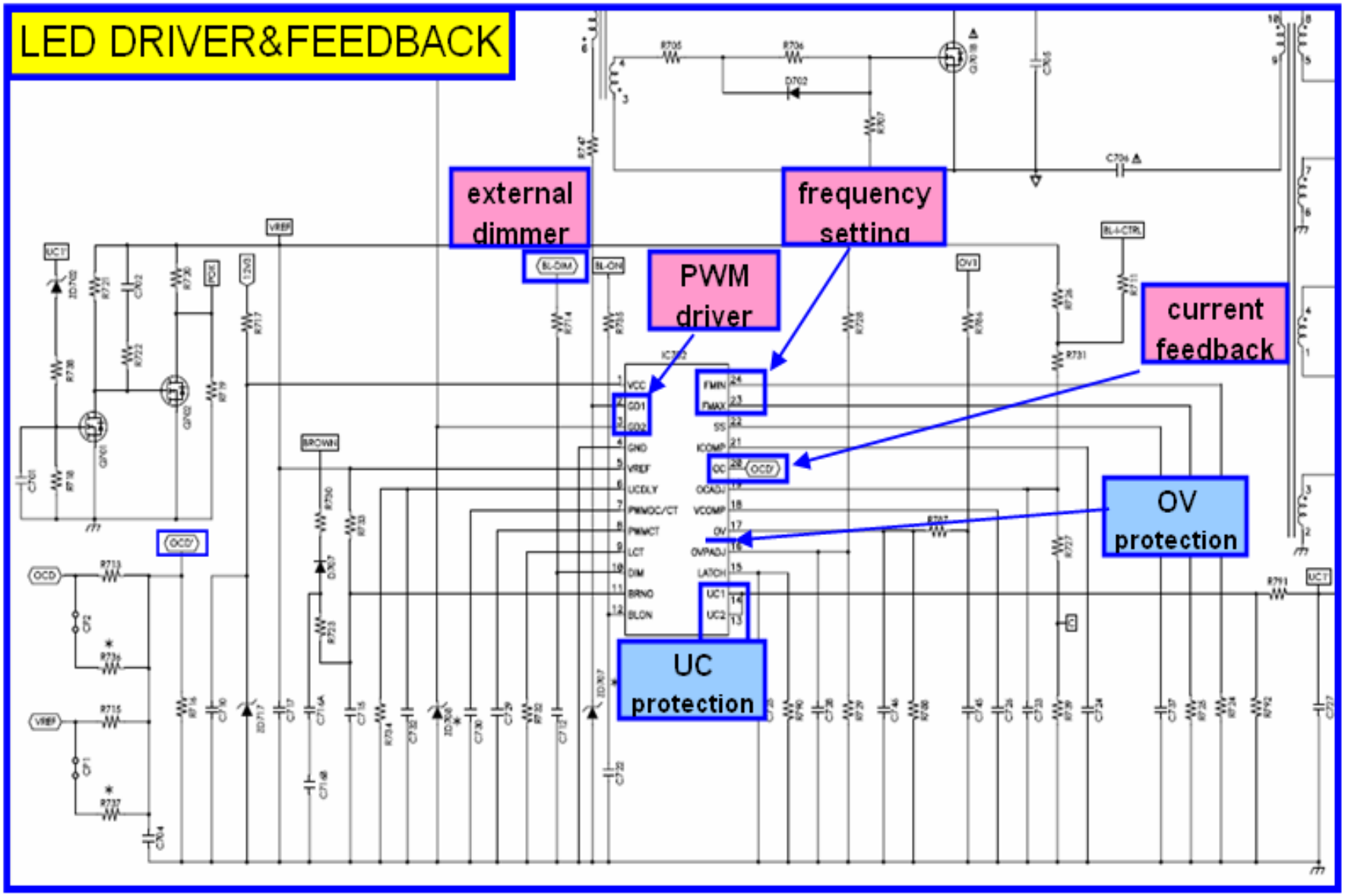
to set main power turn on delay time, because Q918 will not be turned on till the voltage of C974 is charged to V_{GS_TH}.

Power saving circuit

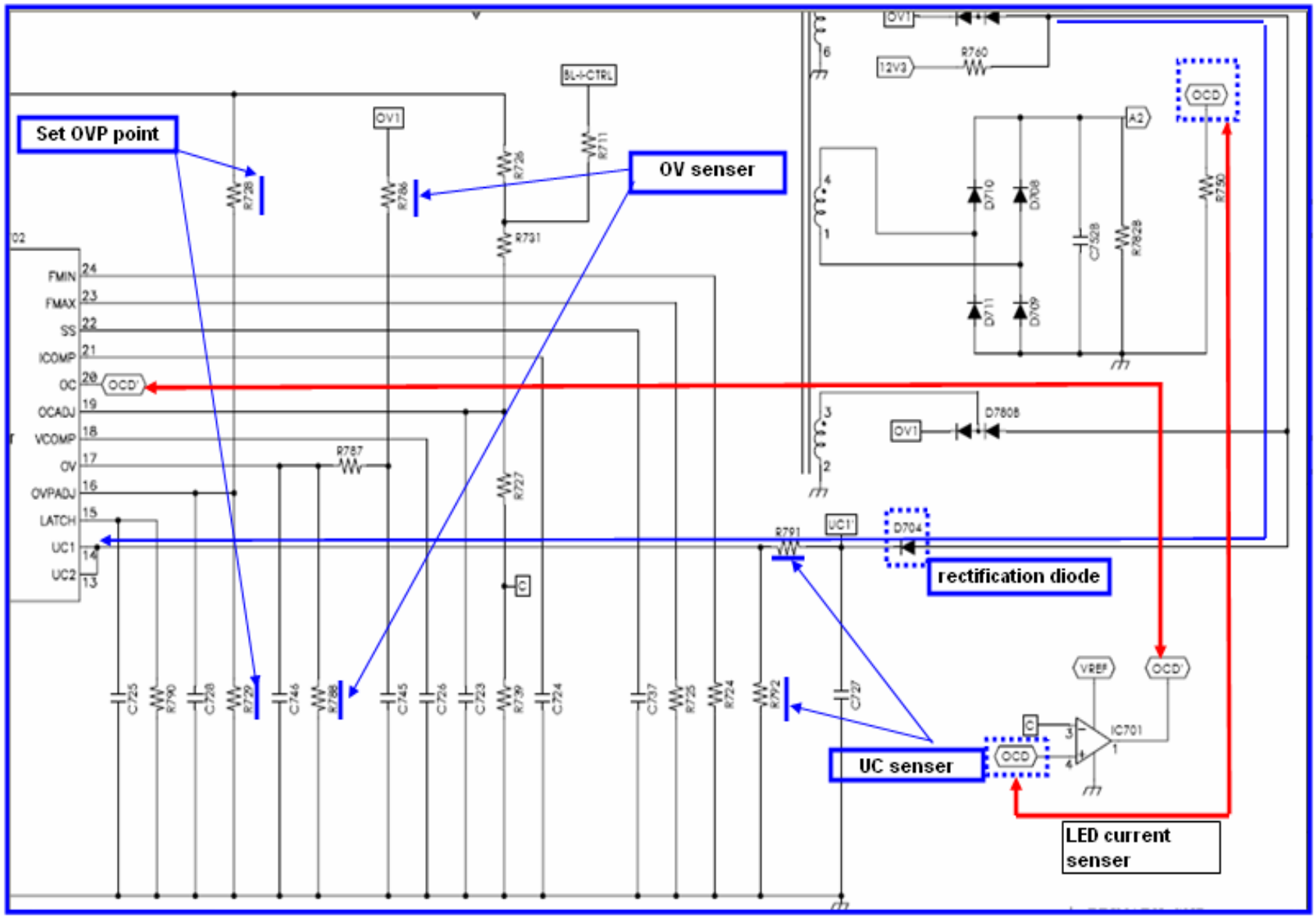


Q911 will be off under standby mode, so that the power saving performance would be better because there's no power loss on R905A/B. R905A/B are used to stabilize the output @ light load condition.

PHILIPS LED DRIVER_1/3



LED DRIVER_2/3



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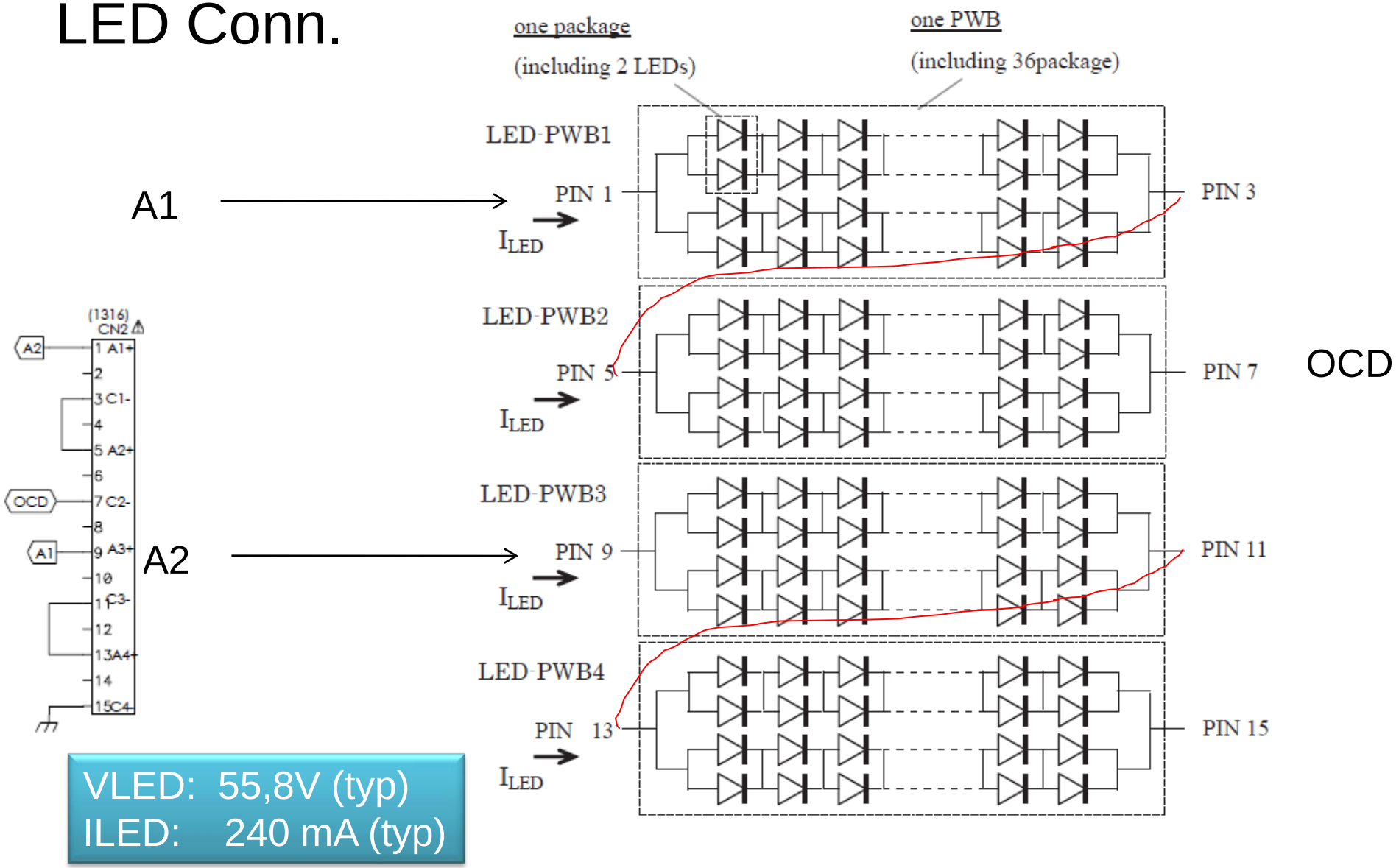
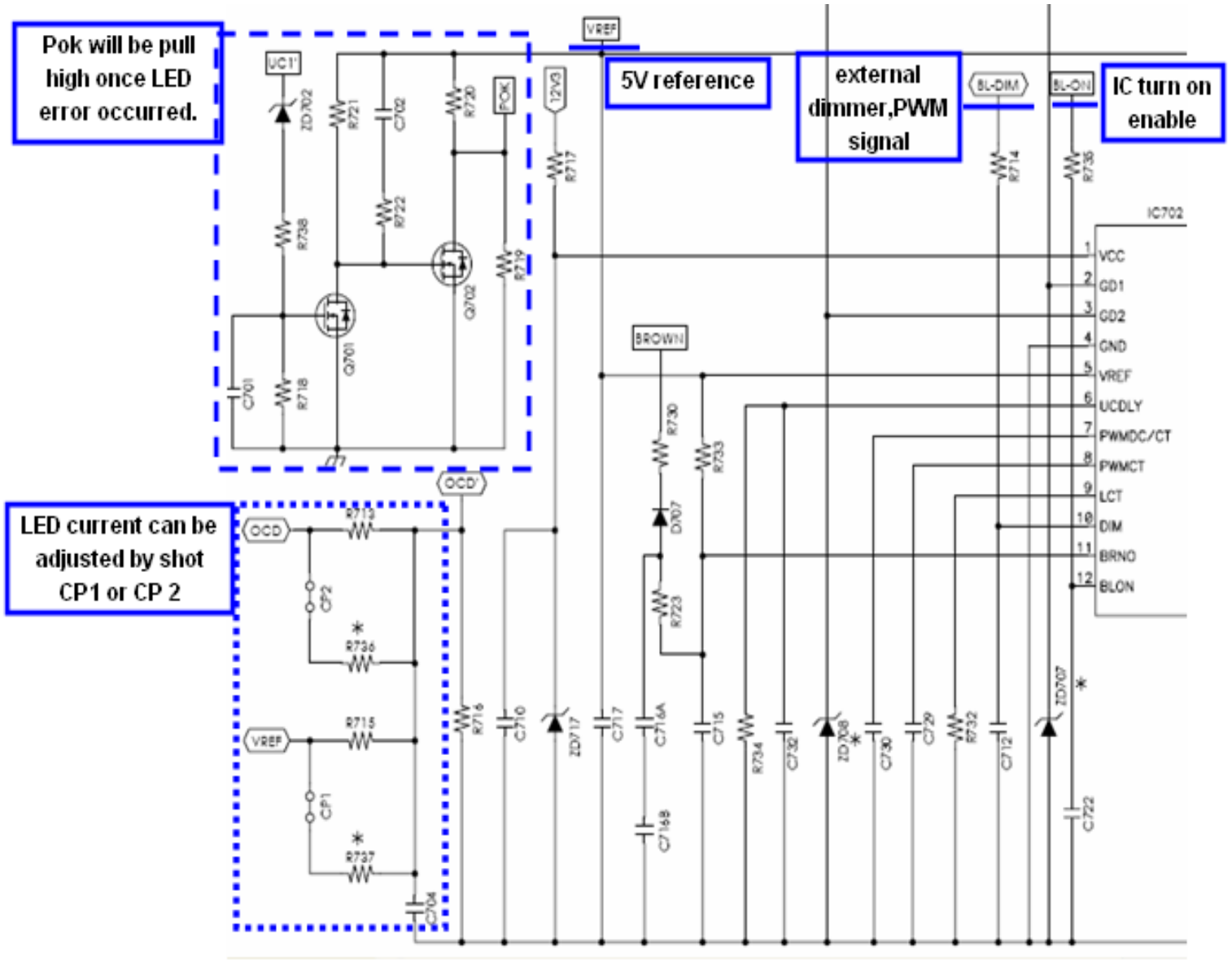
LED Conn.



VLED: 55,8V (typ)
ILED: 240 mA (typ)

PHILIPS LED DRIVER_3/3



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Notes

1. Visual inspection should be the first step you do once received a defect. That's to check components missing/burnt or mechanical damage issues.

2. The second step is, check key components by using digital multimeter. Locations show as below:
   F1/BD1/R945/Q901/Q701A/B……

3. If there's no abnormal found, then we can power up the PSU to check Standby output, enable STANDBY to check main output and BL-ON to check LED

4. Check L800/T901/IC3 if no 3.3Vsb signal

5. If 12v/24v stays low after main power on, check Bulk voltage and IC901, including voltage of VCC/FB, waveforms of Gate/CS pins.

6. As for LED stage, mostly the problem will be founded had relationship with protection such as OC/OV/UC/Brown out, and it's easy to be confirmed by disabling the protection one by one.

7. Never forget that the PSU (Bulk capacitor) must be discharged after power off.

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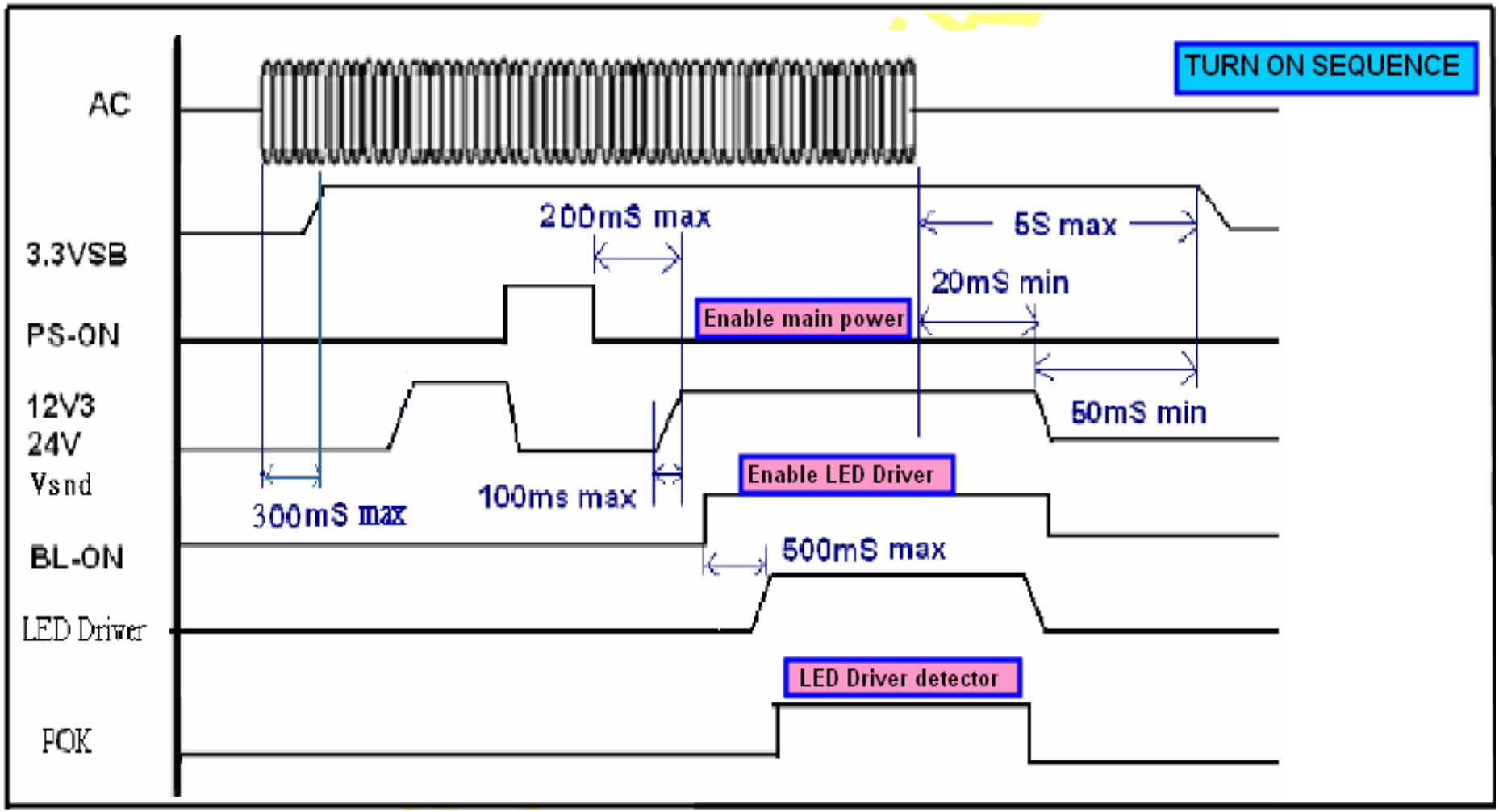
Timing sequence



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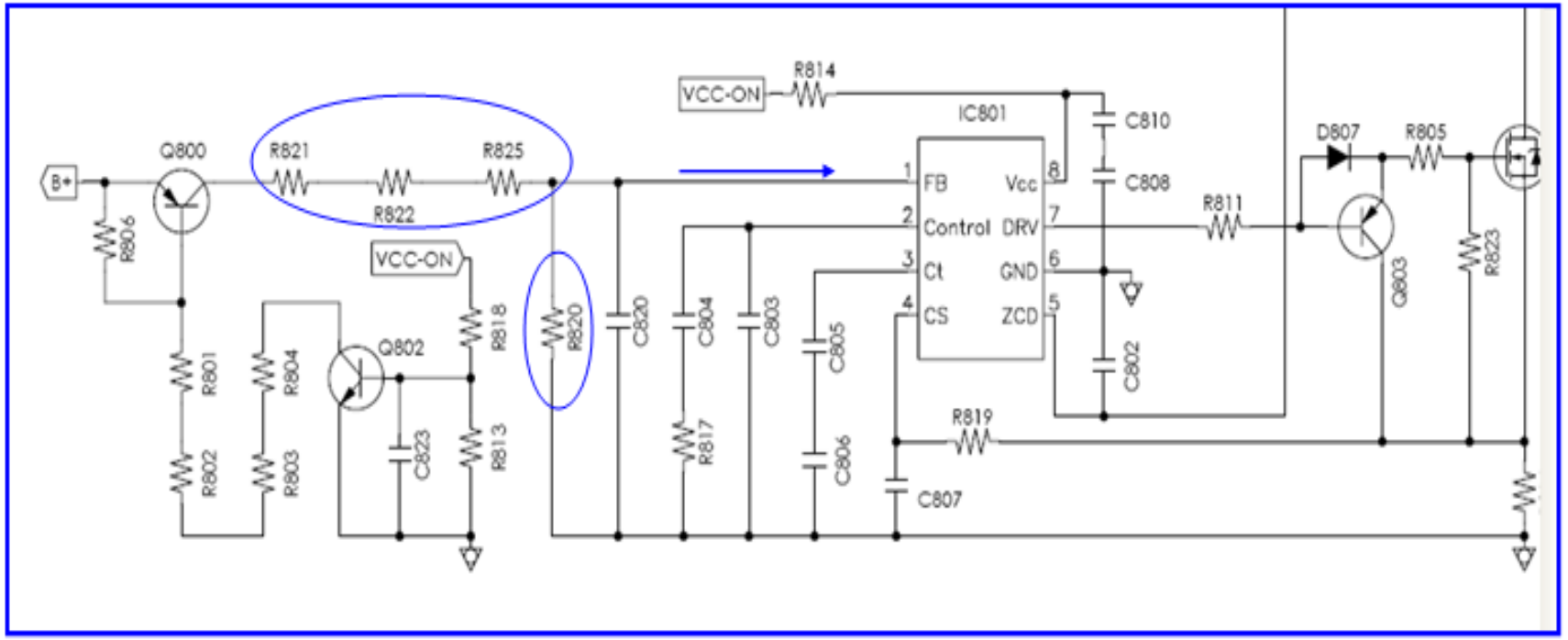
Fault finding circuit instruction_1/9

Fault finding circuit instruction –
OVP function_PFC stage



Note:
An internal comparator connected to IC801 FB pin provides the OVP protection. A resistor divider scales the output voltage to Vref to maintain regulation, IC801 Will be disabled when the pin voltage freater than Vovp. The OVP feature protects the PFC stage against excessive output overshoots that may damage the system.

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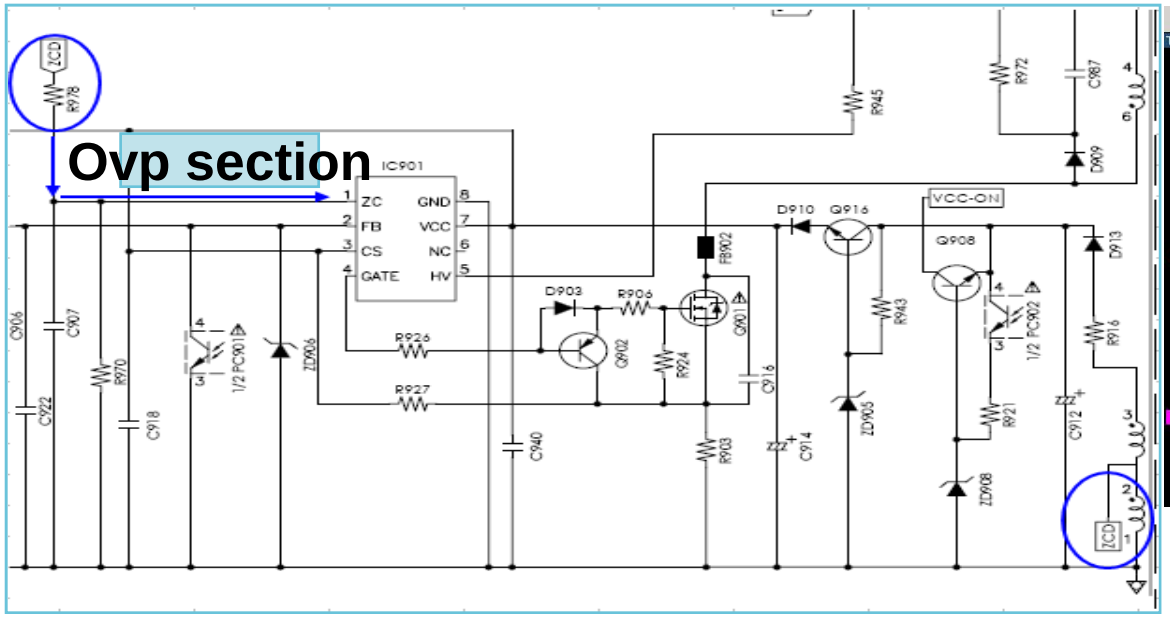
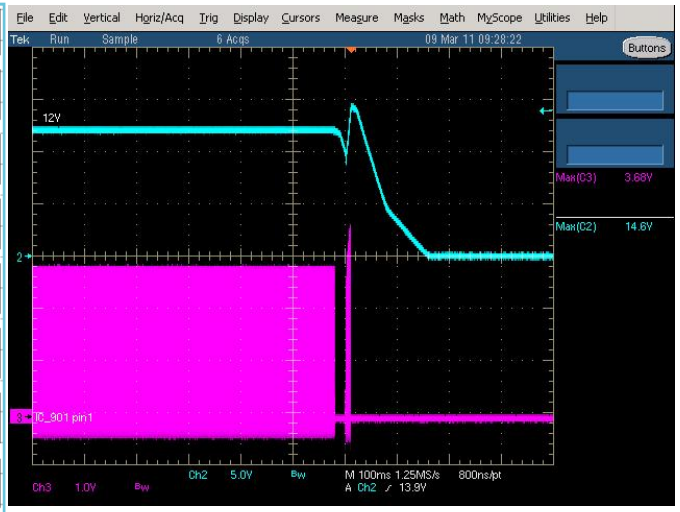
Fault finding circuit instruction_2/9

Fault finding circuit instruction – OVP function_Flyback stage





Note:

The voltage from the auxiliary winding will be applied to IC901 pin 1 after a time delay, there's an internal Zero-Crossing detector used for switch-on determination. By comparing the voltage Vzc with an internal preset threshold which is about 3.7V, the output over voltage detection is realized.

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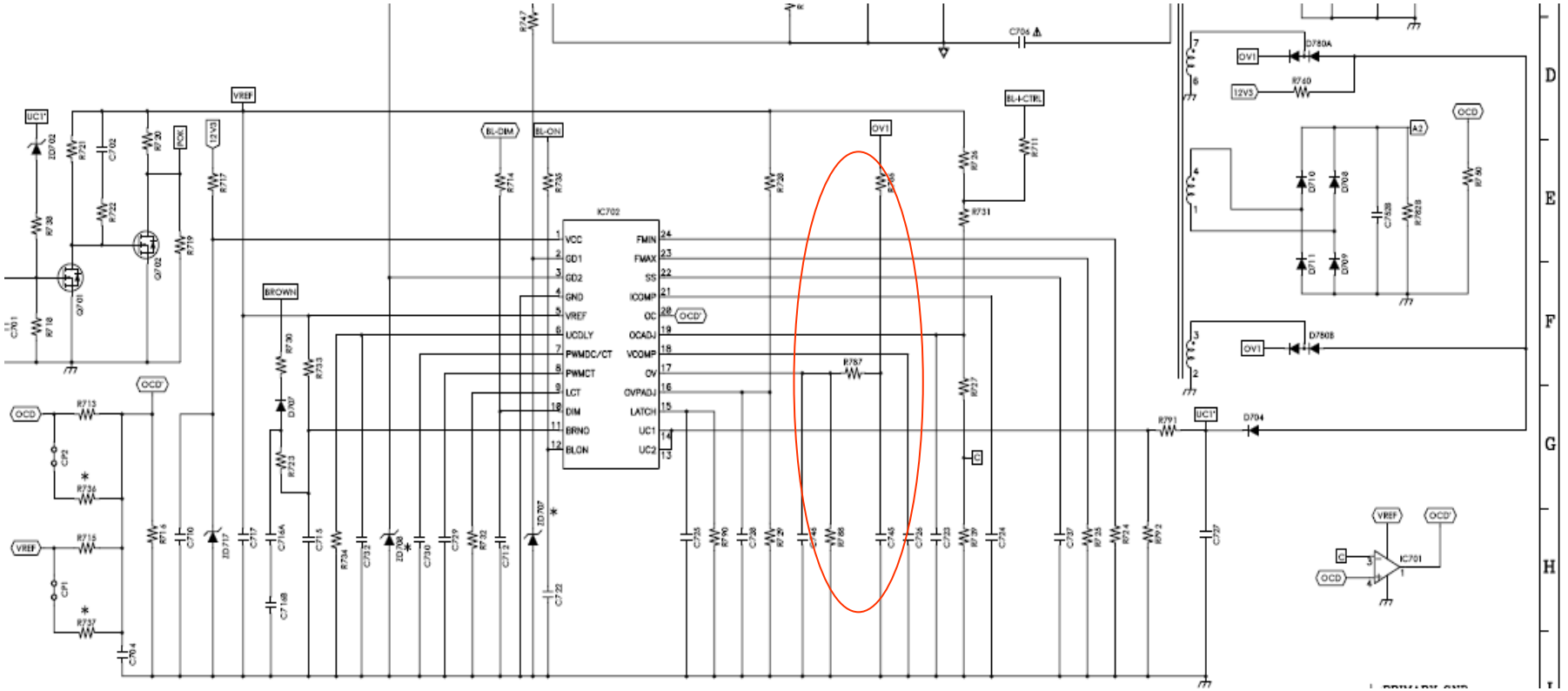
Fault finding circuit instruction_3 / 9

Fault finding circuit instruction – OVP function_ LED driver



Note:

IC702 pin17 is the feedback for the voltage amplifier, connected to the output voltage sense resistor divider(R786/787/788. This signal is compared to an internal 4V voltage amplifier reference to limit output voltage in an over voltage condition or LED string open condition.

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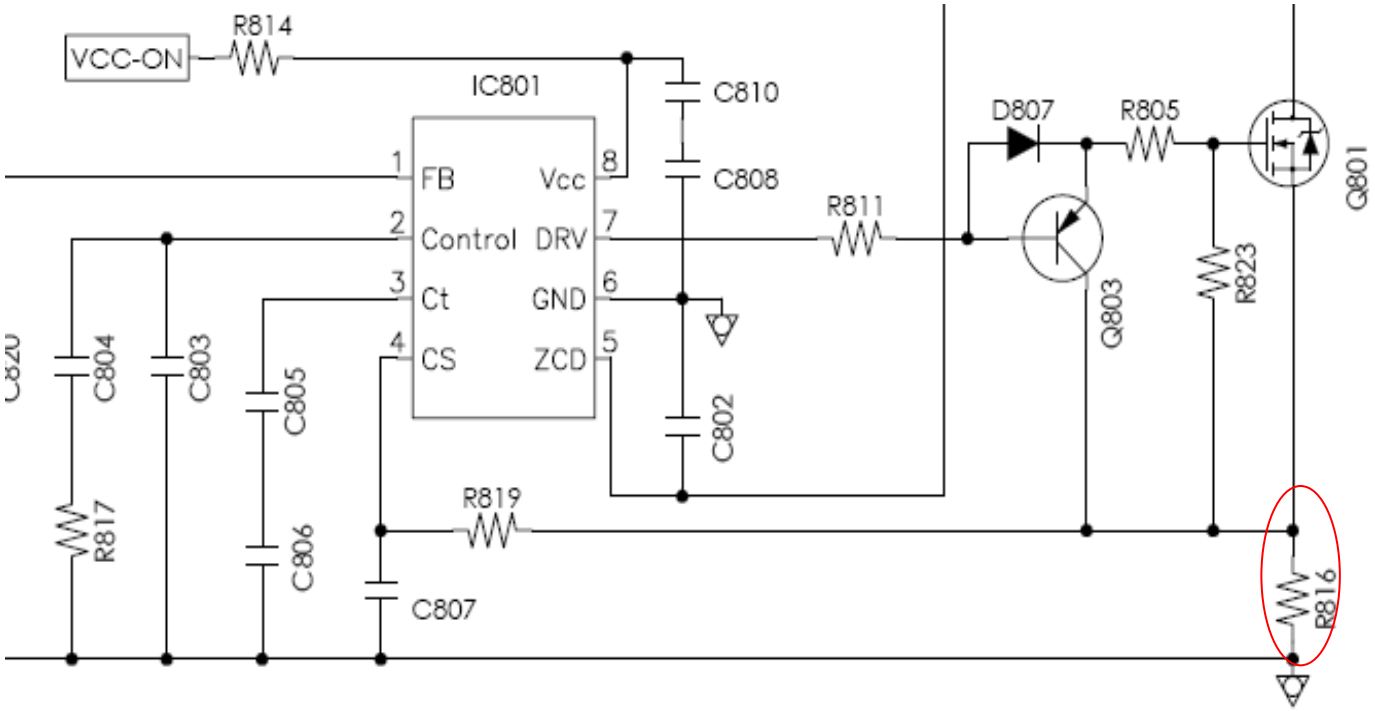
Fault finding circuit instruction_4/9

Fault finding circuit instruction –
OCP function_PFC stage



Note:
The CS pin limits the cycle-by-cycle current through the power switch. When the CS voltage exceeds Vlim which is about 0.5V, the drive turns off. The R816 programs the peak current.

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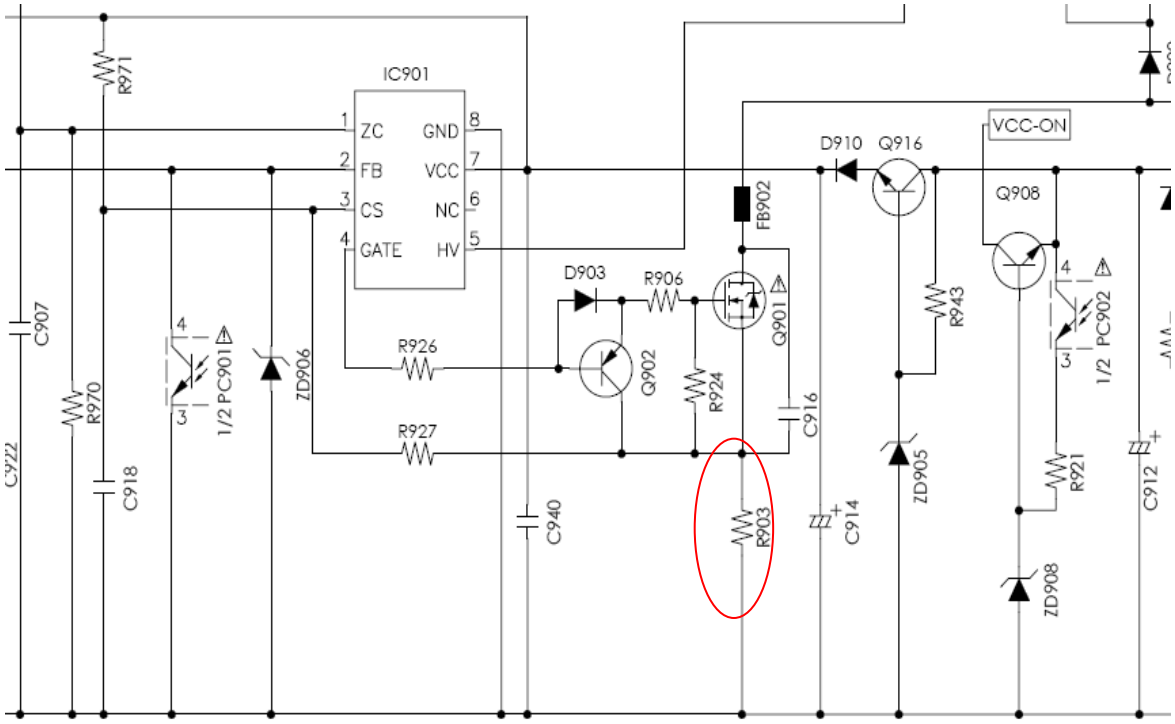
Fault finding circuit instruction_5/9

Fault finding circuit instruction –
OCP function_ FLYBACK stage



Note:

The CS pin limits the cycle-by-cycle current through the power switch. When the CS voltage exceeds Vlim which is about 1V, the drive turns off. The R903 programs the peak current.

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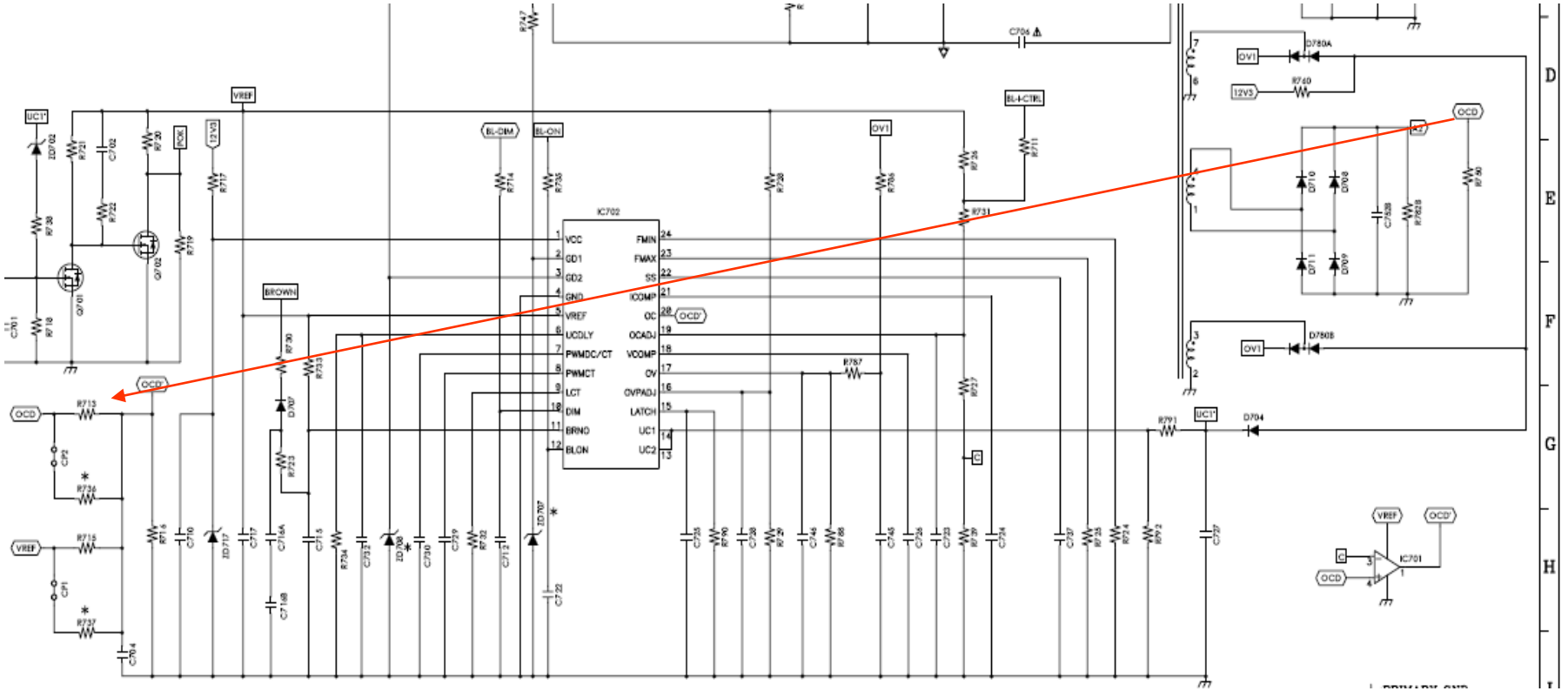
Fault finding circuit instruction_6/9

Fault finding circuit instruction –
OCP function_ LED driver



Note:

Output Current sense Imput monitors the LED current. As for the feedback input for the current amplifer, OC pin is connected to the transformer. This signal is compared to the current reference by the current amplifier to regulate the LED current, the regulation range is limited by the internal clamp (0.7V~2.8V)

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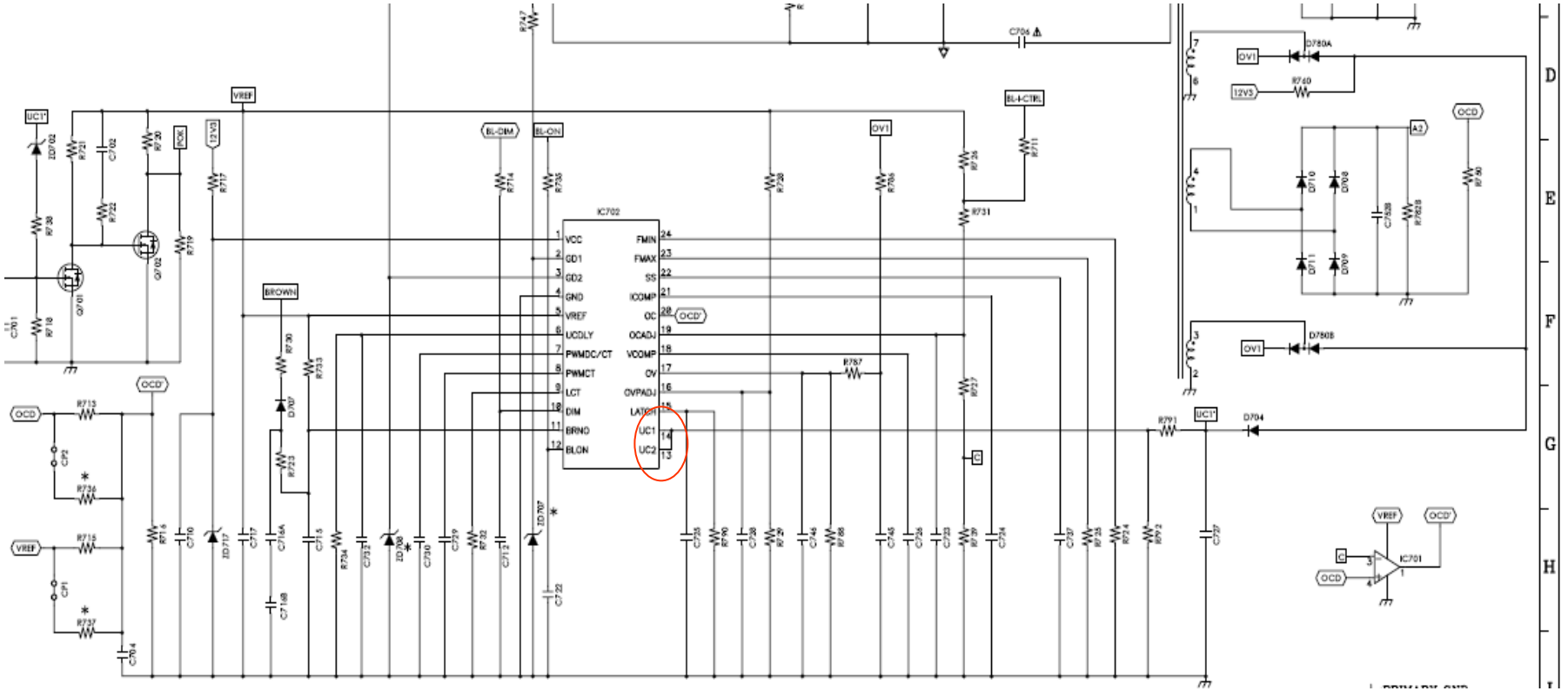
Fault finding circuit instruction_7 / 9

Fault finding circuit instruction –
UC Protect function_ LED driver



Note:

UC1/UC2 pin are used to monitor output current/voltage signal, when the UC1/UC2 voltage is below the OVREF (two times V_{OVPADJ}), a fault condition exists and a 2.5uA current source charges the UCDLY pin, when the UCDLY is above 4.5V a 20uA current source charges the LATCH pin. And the controller will latch off when the LATCH voltage reaches 3V .

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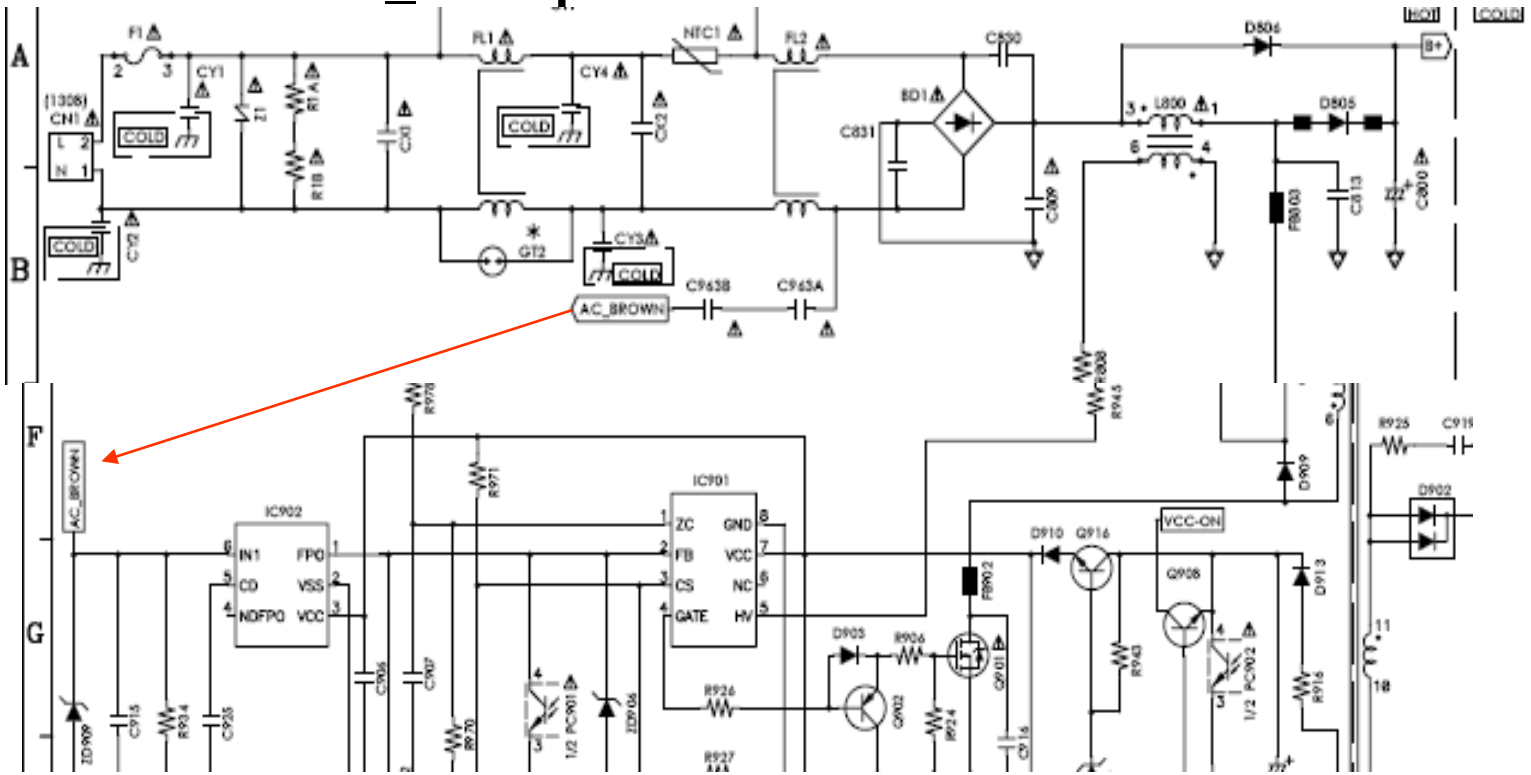
Fault finding circuit instruction_8/9

Fault finding circuit instruction – Brown IN/OUT_AC input



Note:

C963A/C963B/R934/IC902 are used to set Brown in/out point. The PSU will be Disabled if IC902 pin6<1.16V, and enabled if IC902 pin6>1.28V.

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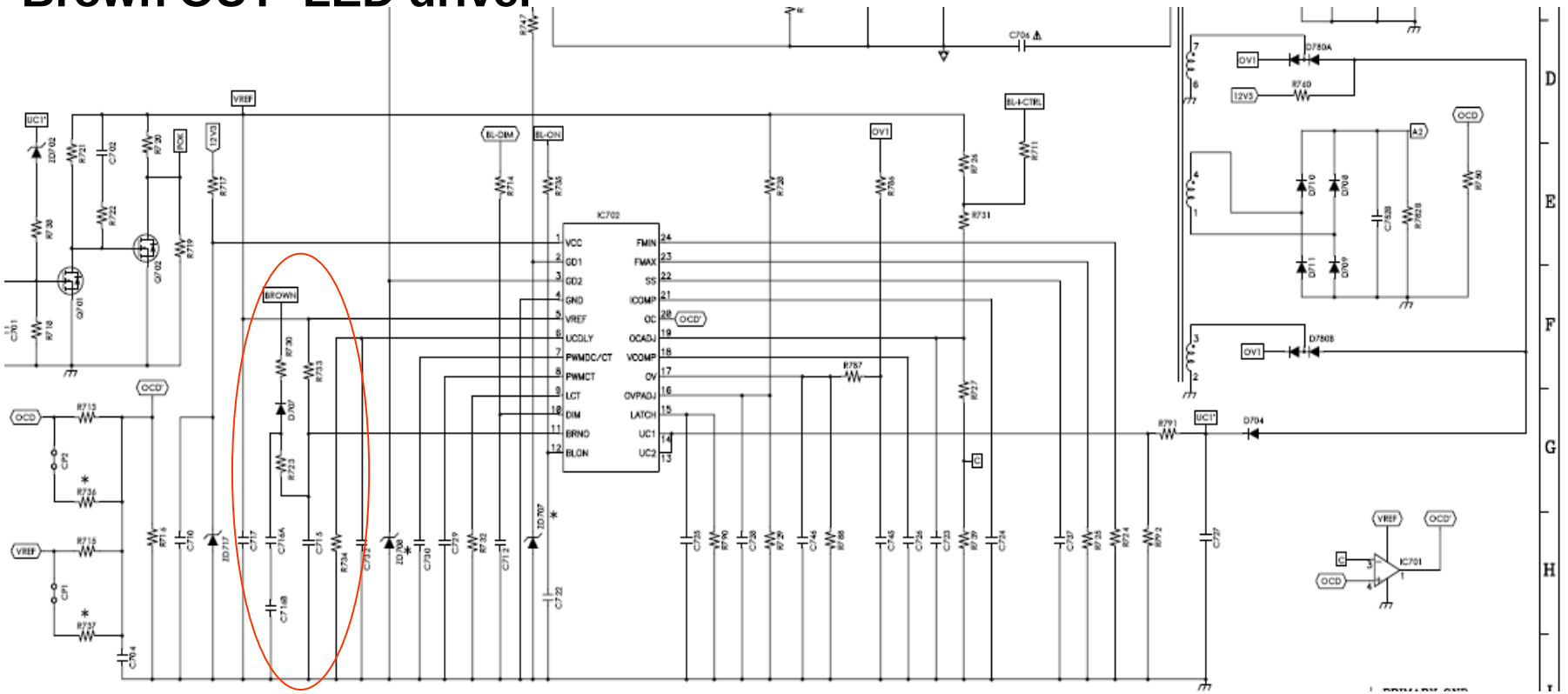
Fault finding circuit instruction_9/9

Fault finding circuit instruction –
Brown OUT LED driver



Note:

BRNO pin is used to detect low BULK voltage condition. The controller will be disabled if BRNO>3V, and enabled if BRNO<2.5V.

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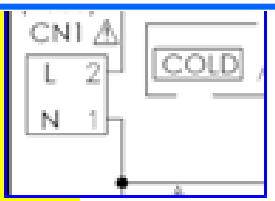
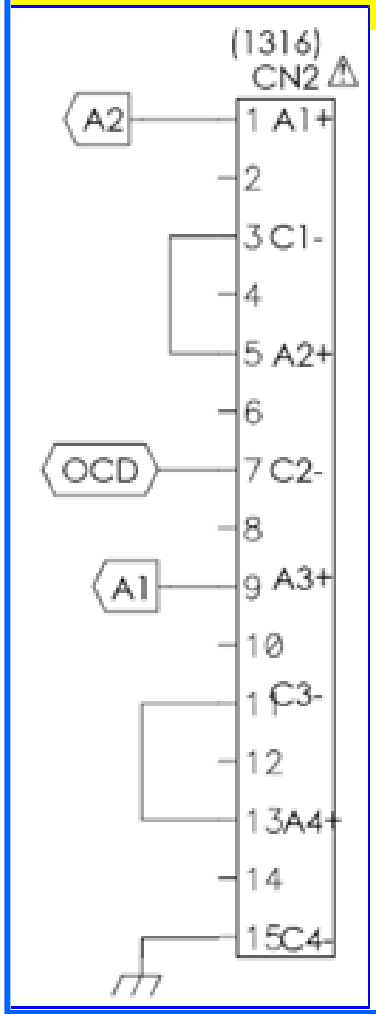
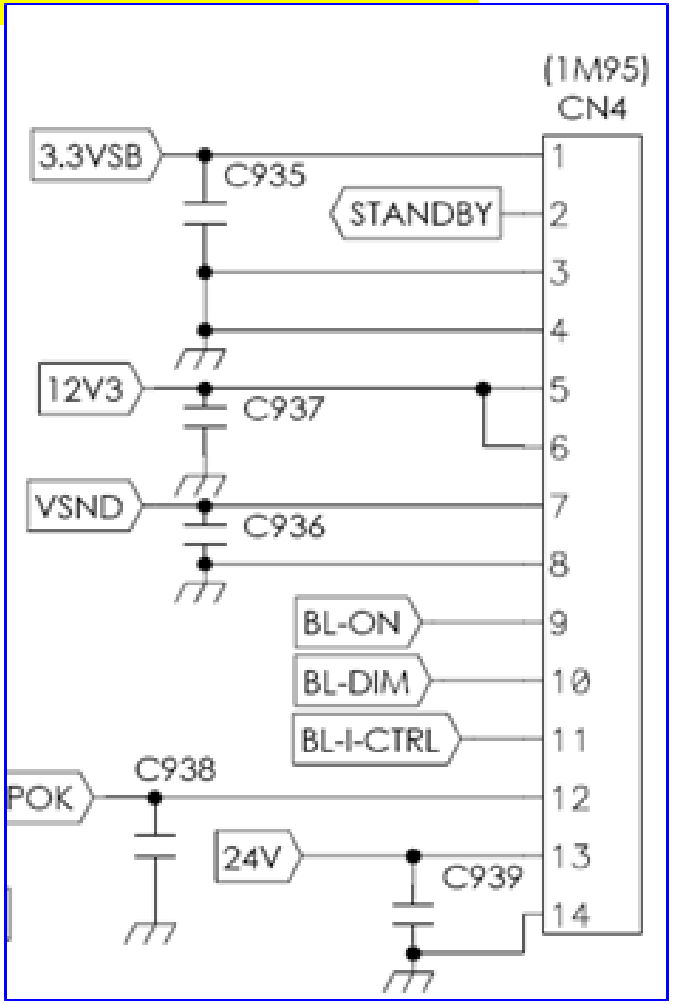
Connector information

Main supply diagram

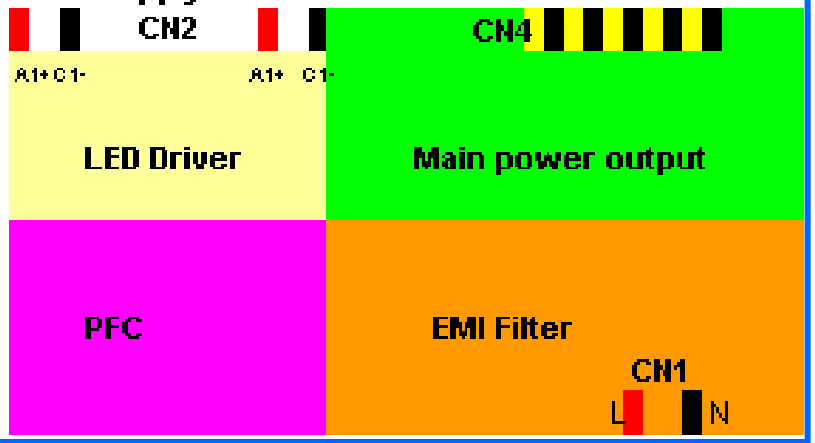






S/N	Item	CN1	CN2	CN4
		1308	1316	1M95
1	Description	Main Input	Display	PSU to SSB
2	Type	S02B-VT(LF)(SN) JST	53426-1510 MOLEX	1-1735446-4 Tyco Electronics
3	No of Pins	2	15	14
4	Assignment			
	Pin 1	N	A1+	3.3VSB
	Pin 2	L	NC	STANDBY
	Pin 3		C1-	GND1
	Pin 4		NC	GND1
	Pin 5		A2+	12V3
	Pin 6		NC	12V3
	Pin 7		C2-	VSND
	Pin 8		NC	GND1
	Pin 9		A3+	BL_ON
	Pin 10		NC	BL_DIM
	Pin 11		C3-	BL_I_CTRL
	Pin 12		NC	POK
	Pin 13		A4+	24V
	Pin 14		NC	GND1
	Pin15		C4-	

Main supply conn overview



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PSU Fault condition & Fall-off sumary

	TABLE:summary of fault condition tests								
	Voltage (V) 0,9 or 1,1 times rated voltage .....:						198-264V		
	Ambient temperature (°C) .....:						25°C		
Fault Condition Test		Observed Components					Mains Voltage (V)	Test Time (min)	Results / Remarks
No.	Fault: Open(O) / Short(S)	Component	Description	Temperature rise (°C)					Ta:Set on then apply fault Tb:Apply fault then set on Tc:Set in stdby then apply fault
				Ta	Tb	Tc			
1	S	C911	Ta&Tb:3.3V(3.26V),12V(8.04V),VSND(17.1V),24V(17.2V),Tc:3.3V(2.74-3.12V)	T901=55.7	T901=55.7	25	264V	15	
2	S	C918	No Output R927/IC901 Blast Q901,IC902,R926,Q902 Damage	25	25	25	198V	15	
3	S	C923	Ta&Tb:No VSND,No 24V,Other Normal Work. Tc:Only STBY	D909=70.2	D909=70.2	25	264V	15	
4	S	C924	Ta&Tb:No 12V,No LED Tc:Only STBY	D909=61.2	D909=61.2	25	198V	15	
5	S	C936	Ta&Tb:No VSND,No 24V,Other Normal Work. Tc:Only STBY	D909=70.2	D909=70.2	25	264V	15	
6	S	C979	Ta&Tb:Only STBY,Q921Damage;Tc:Only STBY	25	25	25	264V	15	
7	S	Q901(D,S)	No Output;IC901,R903 Blast;Q901,Q902,IC902,D903,R926.R927,ZD906 Damage	25	25	25	198V	15	
8	S	ZD908	Ta&Tb:No LED,Q908 Damage,Tc:Only STBY	D909=70.2	D909=70.2	25	198V	15	
9	S	ZD908	Ta&Tb:No LED,Q908 Damage,Tc:Only STBY	D909=70.2	D909=70.2	25	264V	15	

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PSU Fault condition & Fall-off summary

	TABLE:summary of fault condition tests							
	Voltage (V) 0,9 or 1,1 times rated voltage .....:					198-264V		
	Ambient temperature (°C) .....:					25°C		
Fault Condition Test		Observed Components					Mains Voltage (V)	Test Time (min)	Results / Remarks
No.	Fault: Open(O) / Short(S)	Component	Description	Temperature rise (°C)					Ta:Set on then apply fault Tb:Apply fault then set on Tc:Set in stdby then apply fault
				Ta	Tb	Tc			
	S	C802	Ta&Tb:No LED,C809 Have Noise Tc:Only STBY	D909=90.2	D909=90.2	25	198V	15	
1	S	IC801(7,8)	Ta&Tb:No Output F1,Q801 Damage Tc:Only STBY	25	25	25	198V	15	
2	S	Q801(D,G)	No Output F1,IC801 ,Q803,R811 Damage	25	25	25	198V	15	
3	O	R808	Ta&Tb:No LED,Tc:Only STBY,C809 Have Noise	D909=90.2	D909=90.2	25	198V	15	
4	O	R808	Ta&Tb:DC output normal Work C809 Have Noise,LED not in regulationTc:Only STBY	D909=91.3	D909=91.3	25	264V	15	


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