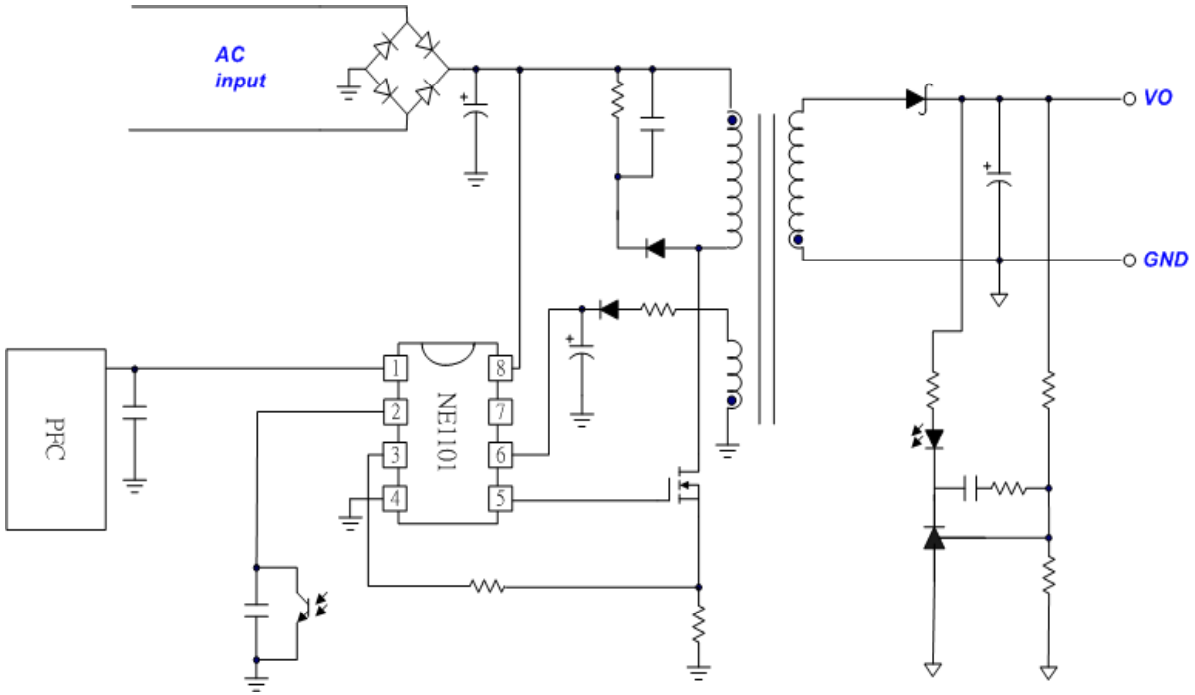
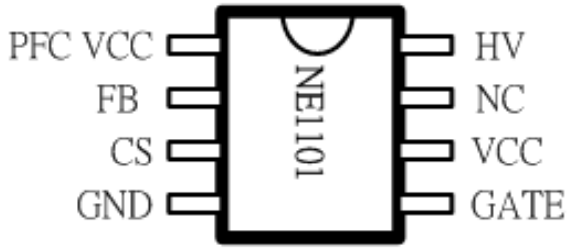
NE1101 Green Mode PWM Operation Description

NE1101 Green Mode PWM Controller

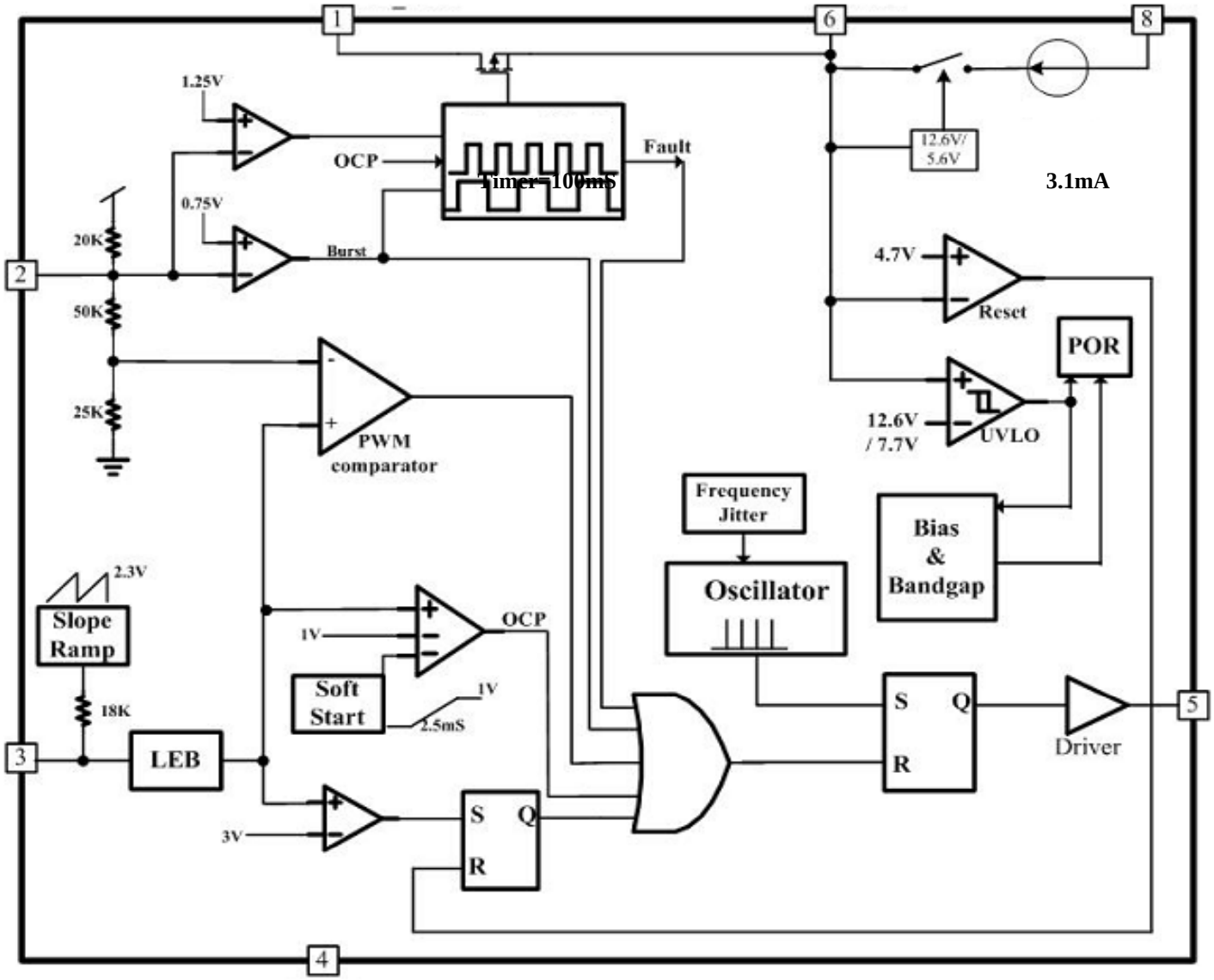
- **Features**
- Current mode control with Internal slope compensation
- High-Voltage startup current source
- Peak current limited Burst-Cycle for no audile noise
- Internal 2.5mS softstart
- Internal 200nS Leading Edge Blanking
- Cycle-by-Cycle current limit
- +500mA/-800mA gate drive capability
- Fixed 65KHz (NE1101B) or 100KHz (NE1101A) frequency
- Frequency Jittering for EMI reduction
- Latched protection
- Over Temperature, over load protections
- Automatic PFC bias supply output
- Drop in replacement for NCP1230
- Pin compatible with LD757X, LD7560 except pin 1



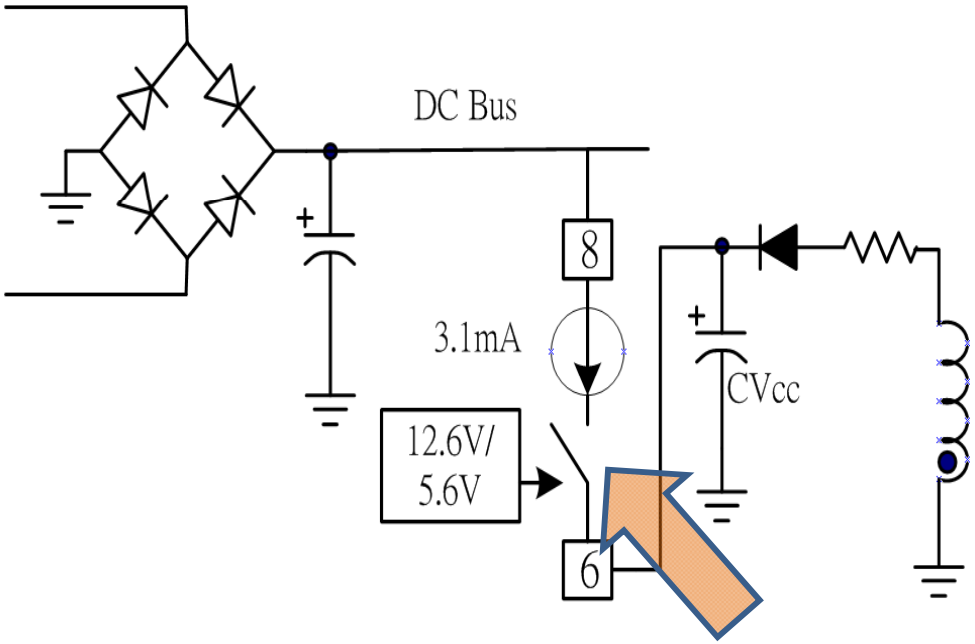
- **Applications**
- AC adaptor
- LCD monitor, LCD TV
- Standby Power
- Settop Box, Networking pow
- Open frame power



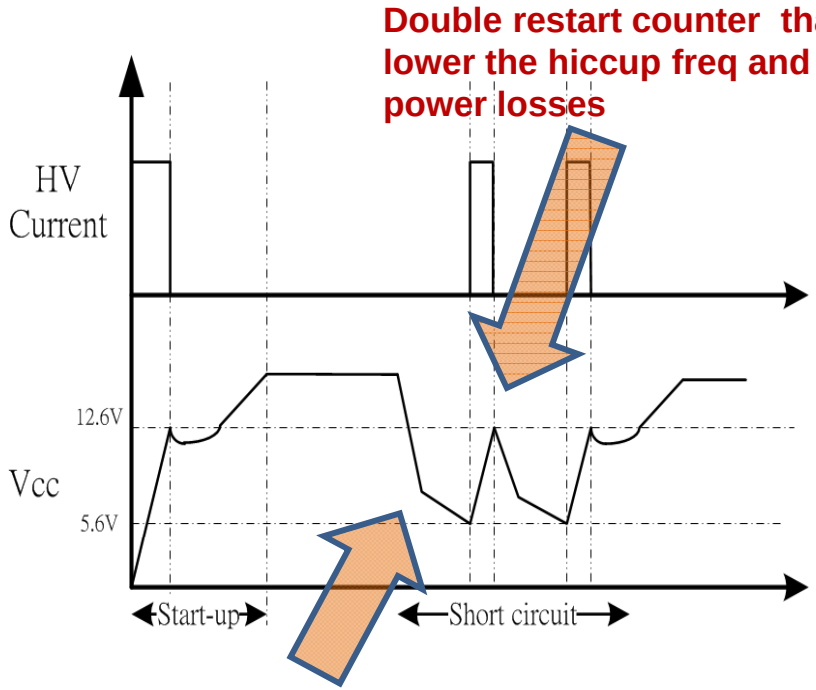
NE1101 Internal Block Diagram



HV Startup Circuit



500V switch that reduces Power dissipation in startup circuit



Double restart counter that lower the hiccup freq and power losses

Two stages Vcc discharge rate, for extended restart period

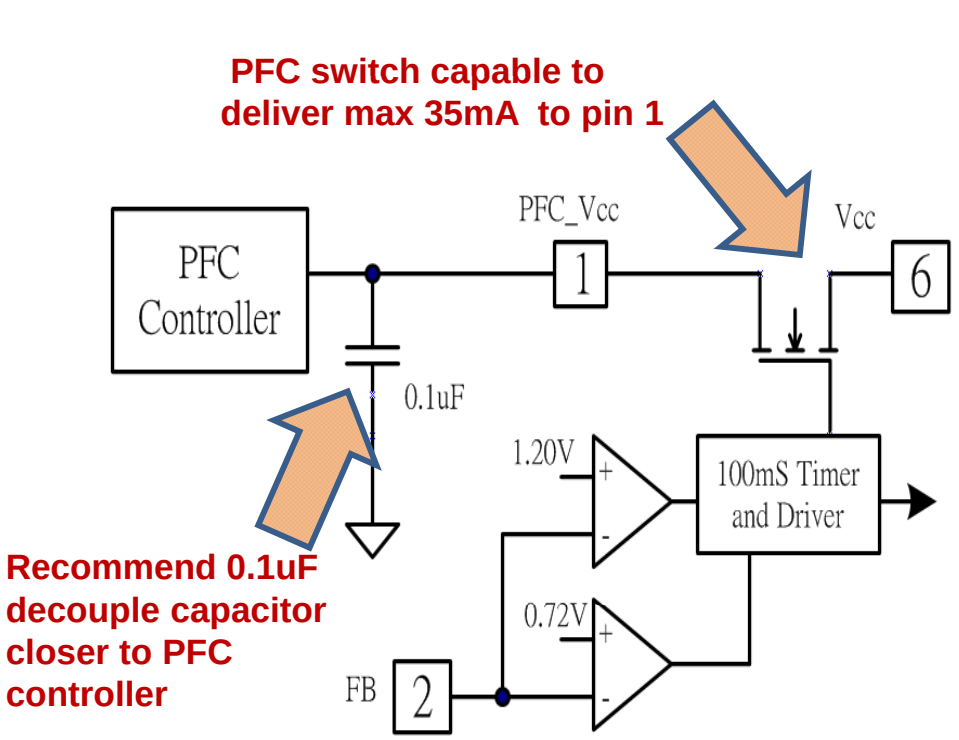
a) When DC applied to HV, HV switch turns on, Vcc cap charged up by 3.1mA current source till Vcc reaches 12.5V UVLO

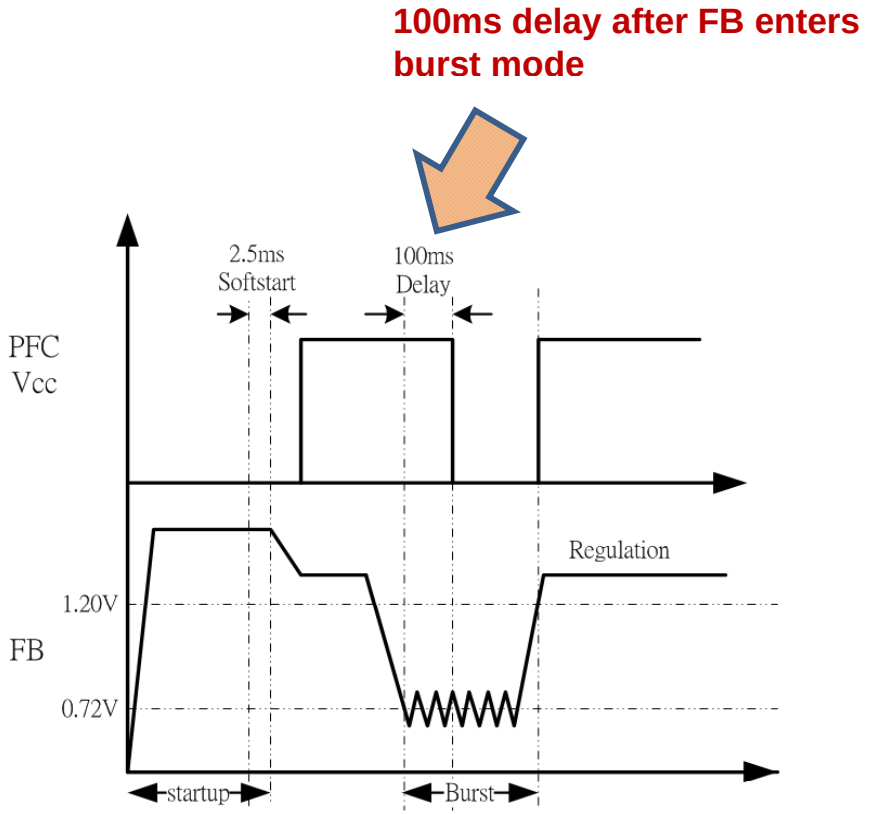
b) Controller powers up and performs a 2.5mS softstart

c) Power supply enters regulation

d) Extended restart period due to two stages Vcc discharge rate and double restart counter

PFC_Vcc Output





a) Automatic PFC bias output that reduces component count and cost

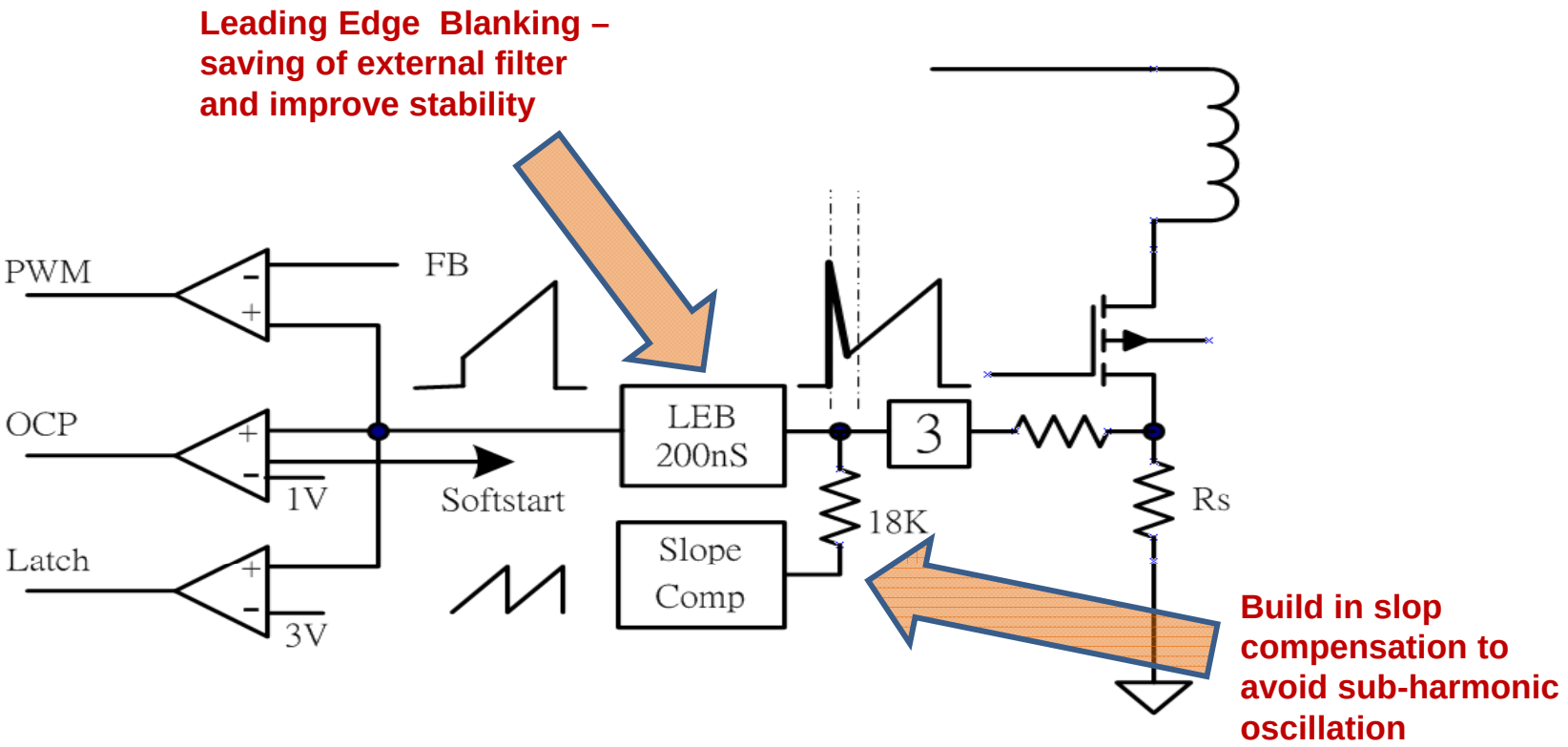
b) PFC bias is disable during softstart till output enter regulation

c) When FB enters burst, PFC bias terminated after 100ms delay

d) When Load resumes, PFC bias turns ON when FB exits burst mode at 1.20V

e) PFC_Vcc pin can be left floating if not use

Current Sense

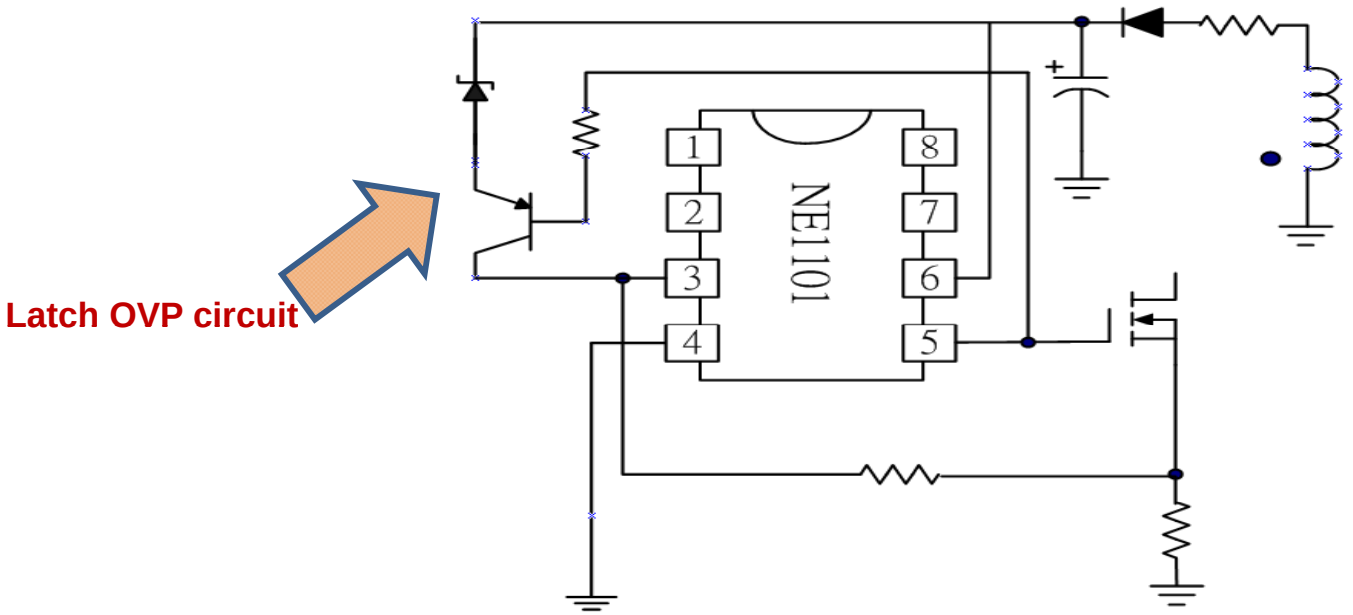


a) CS internally clamped to 1V

b) During startup, the Softstart circuit overrides the CS pin 1V limit and ramps the current limit voltage from zero to 1V in 2.5ms

c) Slope compensation is added to CS via 18K resistor to avoid sub-harmonic oscillation when operate >50% duty cycle

Latch Protection

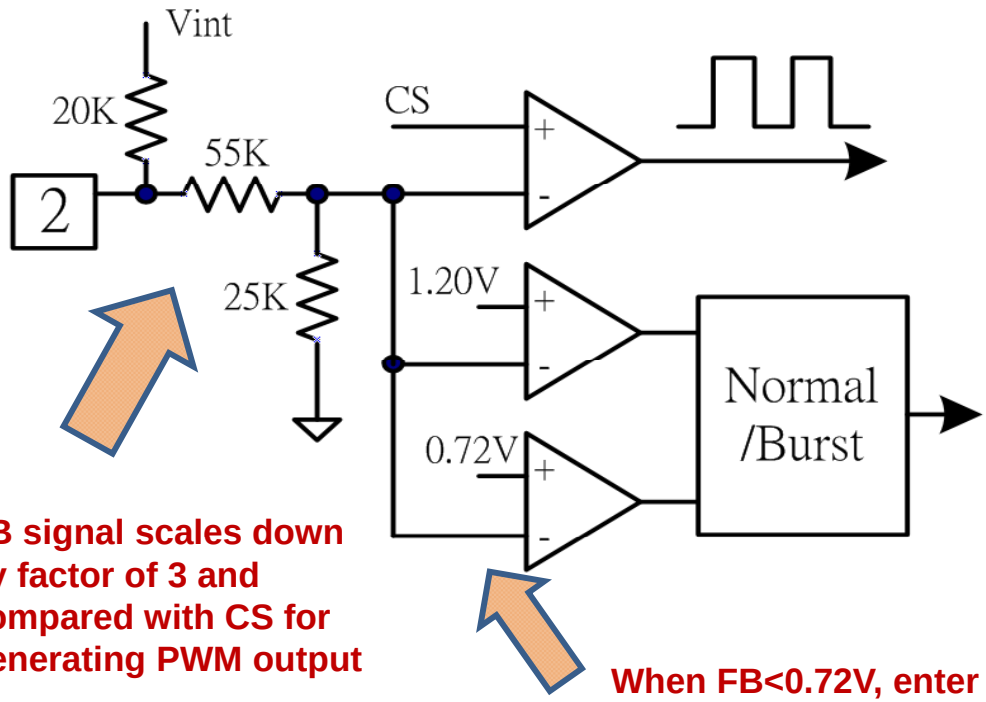


a) Spreads EMI spectrum and lower the noise amplitudes

b) Cost saving on EMI components and pcb space

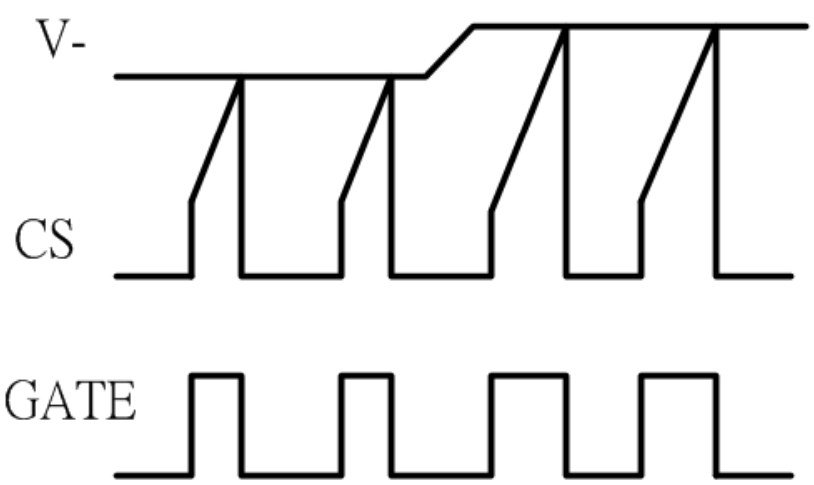
c) Jittering is disabled during Burst

Feedback FB



FB signal scales down by factor of 3 and compared with CS for generating PWM output

When FB<0.72V, enter burst, when FB>1,20V, exit burst



a) NE1101A/B makes use of FB voltage to determine loading condition

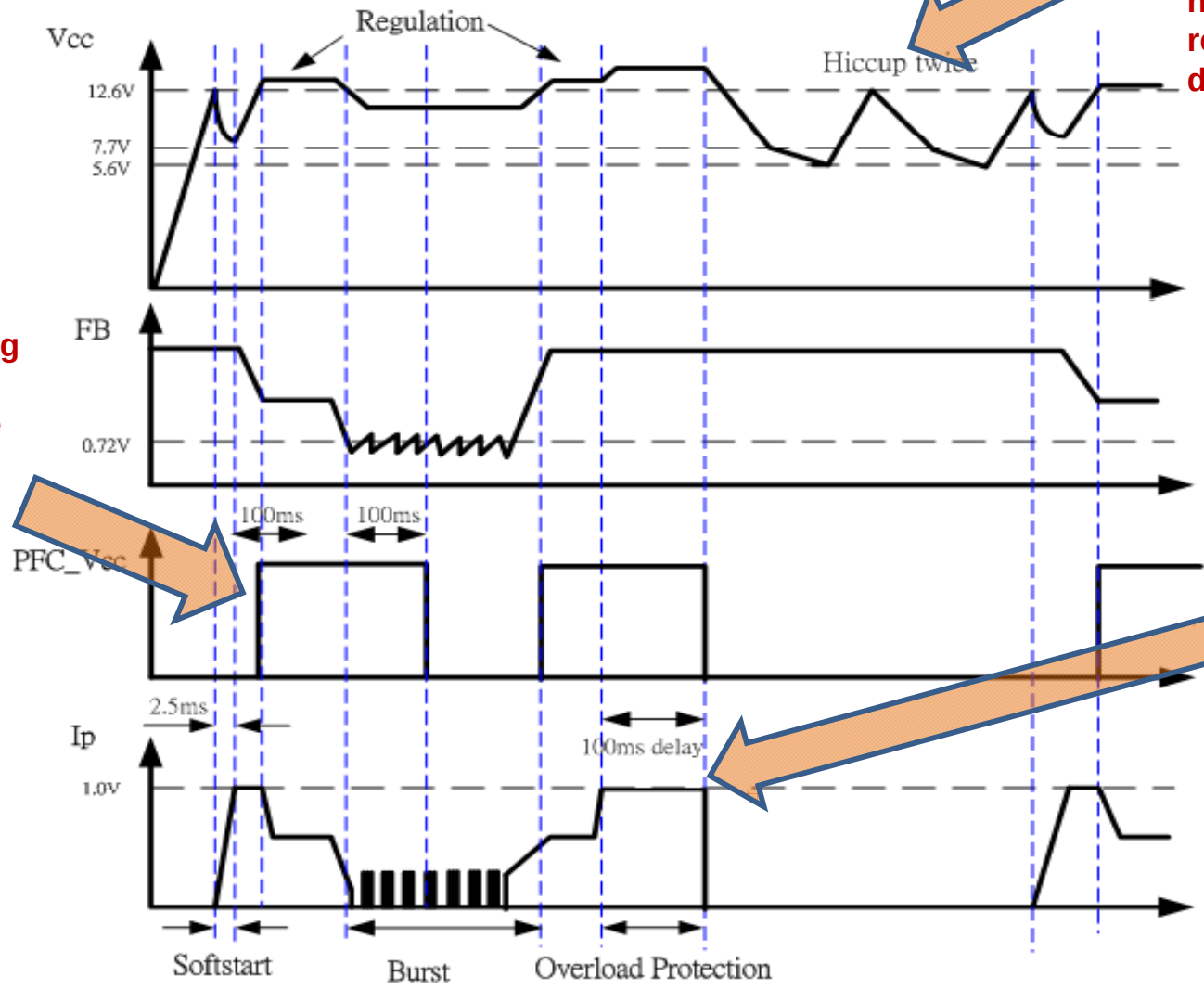
b) Controller enters burst when FB<0.72V, PFC_Vcc turns off after 100ms delay

c) Controller exits burst when FB>1.20V, PFC_Vcc turns ON immediately

Over Current Protection

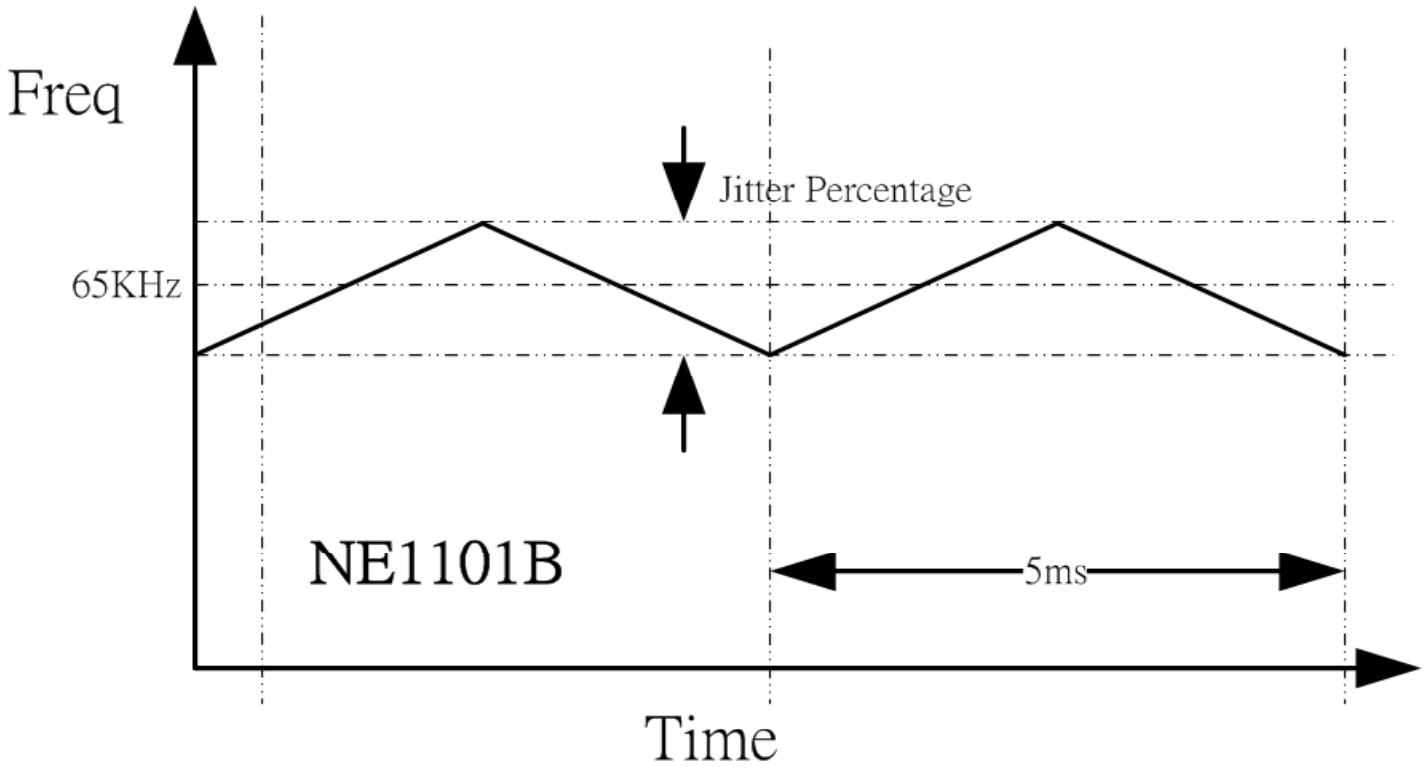
Vcc double restart counter extends the hiccup period . Helps to reduce hiccup power dissipation

PFC bias is disabled during startup till output voltage enters regulation



Overload is confirmed after 100ms delay. Controller shutdown the PWM output

Frequency Jittering



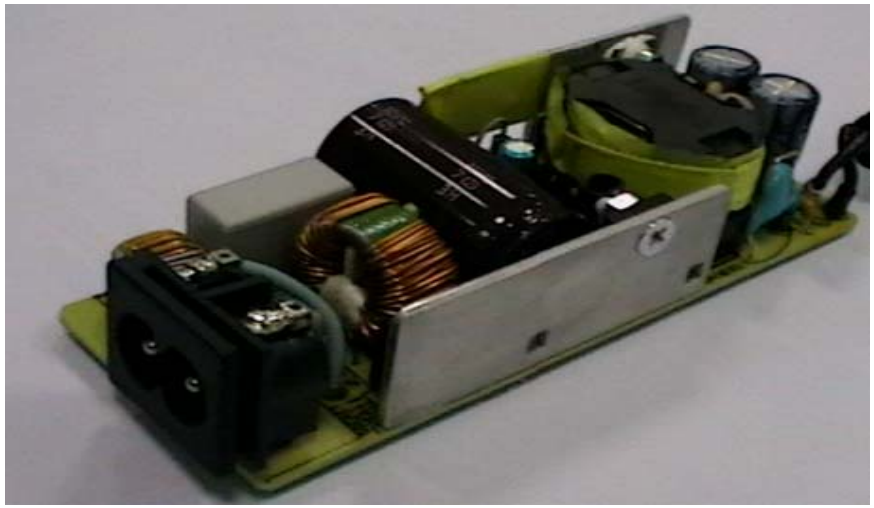
a) Spreads EMI spectrum and lower their noise amplitudes

b) Cost saving on EMI components and pcb space

c) Jittering is disabled during Burst

Reference Designs

NE1101 65W Adaptor Reference Design



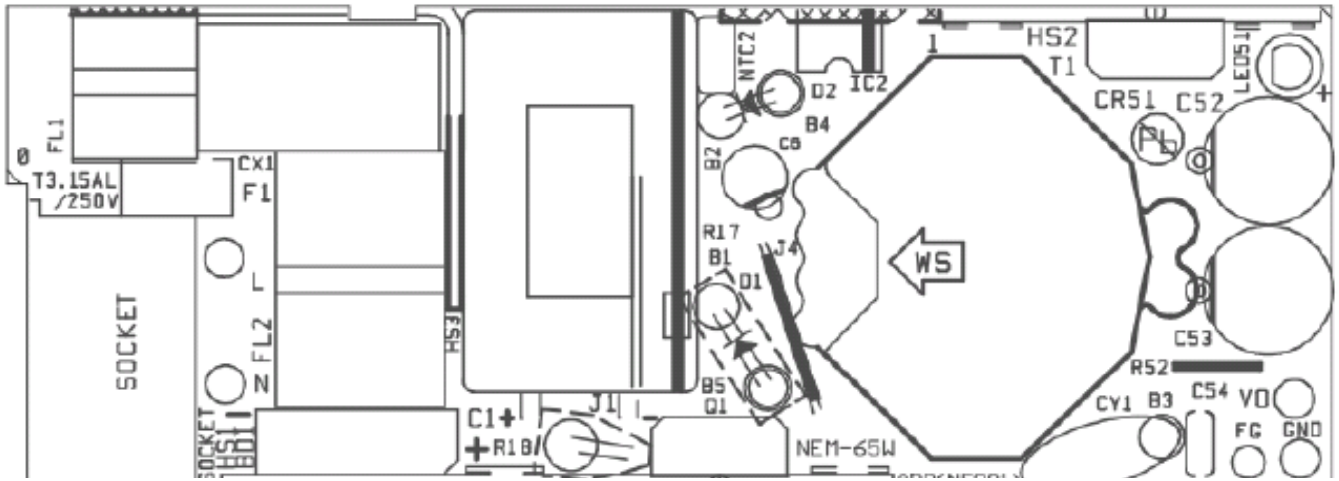
Key Features

- AC input 90VAC-276VAC
- 65W output power
- Standby power < 0.3W
- No audible noise
- Efficiency >85%
- OCP, OVP, OTP protections
- Meets Energy star EPS V2
- Meets EN55022 Class B

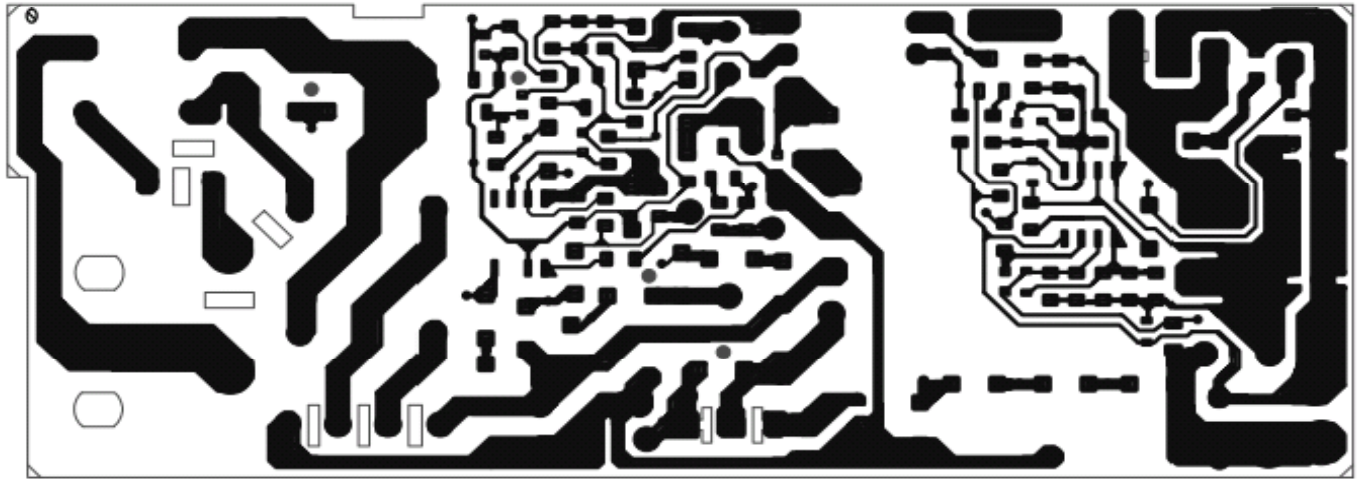
NEM

NE1101 65W Adaptor Reference design

TOP Component



Bottom Layer

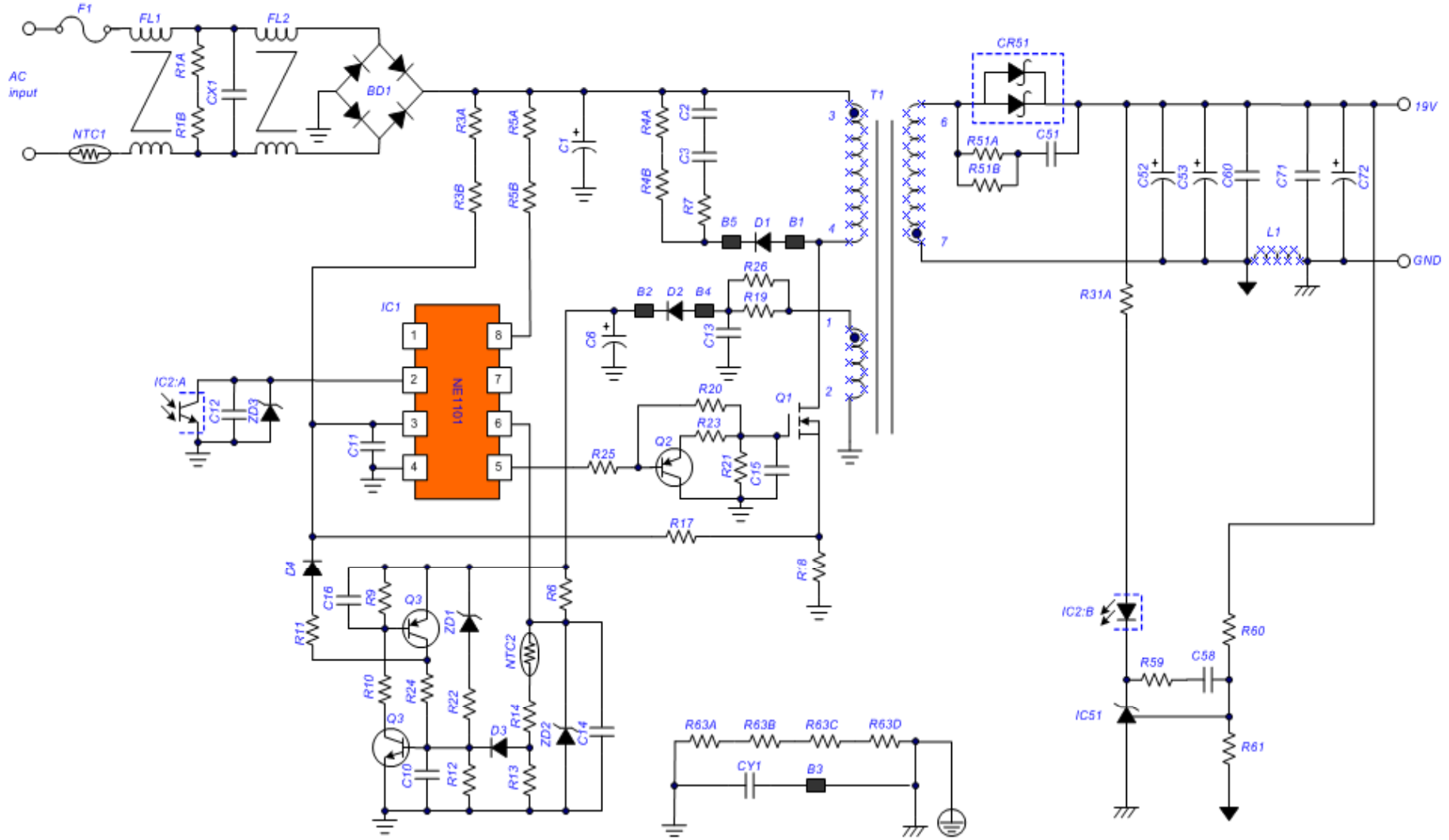


PCB size
10cm x 4 cm

Summary on NE1101 Reference Designs

Part Number	Output Power	Output Volt	AC Input	SB Power	Avr Efficiency
NE1101EVM-65W	65W	19V	110V	140mW	87.92%
			230V	220mW	87.50%
NE1101EVM-40W	40W	12V	110V	70mW	87.20%
			230V	100mW	87.15%
NE1101EVM-20W	20W	5V	110V	18mW	81.40%
			230V	24mW	79.07%

Typical Application (12V/40W)



Sales and Technical Supports

- Design-in documents:
  - Reference design schematics
  - PCB layout Gerber files
  - BOM
  - Mathcad external component calculation tool
- Sales contact: max_hsieh@nem.com.tw
- FAE contacts: shonyu_yang@nem.com.tw
  greg_su@nem.com.tw