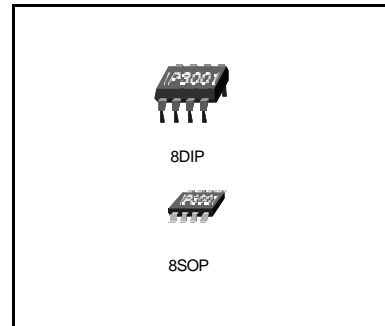




DESCRIPTIONS

The IP3001 is a third-generation family of power factor correction controllers using a discontinuous mode of operation. It is optimized for the high density switching mode power supply and ballast.

The addition of an internal start-up circuit eliminates bulky external components while allowing independent boost converter operation. Addition of internal current sense blanking also eliminates the need for the external R/C filter network. Internal clamping of the error amplifier and multiplier output improve turn on overshoot characteristics and current limiting. Special circuitry has also been added to prevent abnormal function in load runaway conditions. And finally, output drive clamps limiting power MOSFET gate drive independent of supply voltage greatly enhance the products practical application.



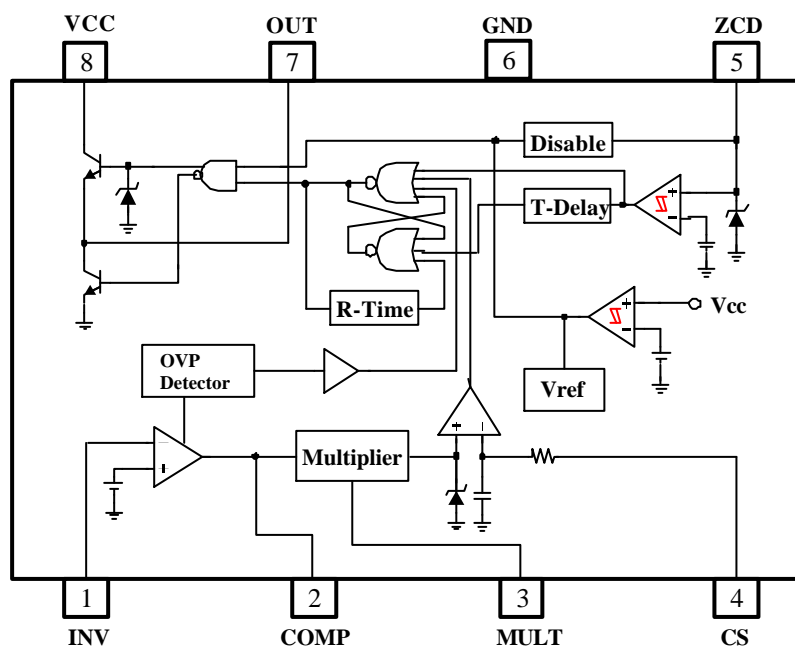
FEATURES

- Very Precise Adjustable Output OVP(Dynamic & Static OVP Function)
- Extremely Low Start-up Current(Typically 40uA)
- Very Low Operating Supply Current(Typically 4mA)
- Internal Start-up Timer
- Current Sense Filter On Chip
- Disable Function
- 1.4% Precision Internal Reference Voltage
- Extremely Minimized External Part Counts
- 8DIP / 8SOP package

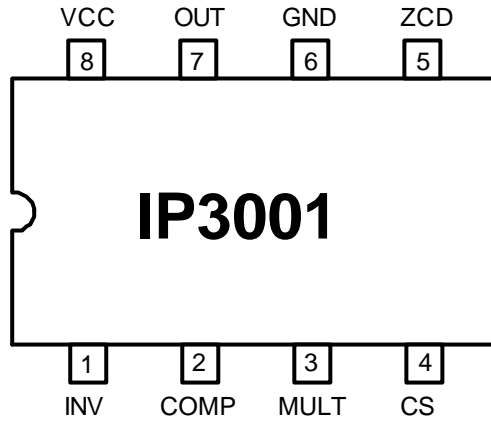
ORDER INFORMATION

| Device | Package | Operating Temp |
|---------|---------|----------------|
| IP3001 | 8DIP | -25°C ~ +125°C |
| IP3001D | 8SOP | |

BLOCK DIAGRAM



PIN CONNECTIONS



PIN DESCRIPTIONS

| NO | SYMBOL | I/O | DESCRIPTION |
|----|--------|-----|---|
| 1 | INV | I | INVERTING INPUT OF ERROR AMPLIFIER |
| 2 | COMP | O | OUTPUT OF ERROR AMPLIFIER |
| 3 | MULT | I | INPUT OF THE MULTIPLIER STAGE |
| 4 | CS | I | INPUT TO THE COMPARATOR OF THE CONTROL LOOP |
| 5 | ZCD | I | CURRENT DRIVEN LOGIC INPUT |
| 6 | GND | - | INPUT SUPPLY VOLTAGE RETURN |
| 7 | OUT | O | OUTPUT PIN |
| 8 | VCC | - | INPUT SUPPLY VOLTAGE |

ABSOLUTE MAXIMUM RATINGS

| CHARACTERISTICS | SYMBOL | VALUE | UNIT |
|--------------------------------|---------------|------------|-------|
| Maximum supply voltage | VCCmax | 18 | V |
| Output Totem-pole Peak Current | Ipeak | 500 | +/-mA |
| Analog Inputs & Outputs | INV,COMP,MULT | -0.3 ~ 7 | V |
| Current Sense Input | CS | -0.3 ~ 7 | V |
| ZCD Input | Izcd | 10 | +/-mA |
| Power dissipation | Pd | 800 | mW |
| Operating Junction Temperature | Tj | -25 ~ +125 | °C |
| Storage temperature | Tstg | -65 ~ 150 | °C |

ELECTRICAL CHARACTERISTICS

(Ta = -25°C to 125°C, Vcc=14V unless otherwise specified.)

| SUPPLY VOLTAGE SECTION | | | | | | |
|----------------------------------|---------------|-----------------------------|------------|------------|------------|-------------|
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Start-up Threshold Voltage | Vth(st) | Vcc Increasing | 11 | 12 | 13 | V |
| Hysteresis | Hys | | 2 | 2.5 | 3 | V |
| SUPPLY CURRENT SECTION | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Start-up Current | Ist | Before Turn-on (Vcc=11V) | 20 | 40 | 90 | uA |
| Quiescent Current | Iq | | - | 3 | 6 | mA |
| Operating Supply Current | Icc | CL=1nF @50KHz | - | 4 | 8 | mA |
| Operating Current at OVP | Icc_ovp | | - | 1.5 | 3 | mA |
| ERROR AMPLIFIER SECTION | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Voltage Feedback Input Threshold | Vinv | Ta=25°C | 2.465 | 2.5 | 2.535 | V |
| Line Regulation | dVinv | 12V<Vcc<16V | - | 0.1 | 5 | mV |
| Input Bias Current | Iinv | | -0.5 | | 0.5 | uA |
| Voltage Gain | Gv | Open Loop | 60 | 80 | | dB |
| Gain Bandwidth | GB | | | 1 | | MHz |
| Output Source Current | Isource | Vcomp=4V, Vinv=2.4V | -2 | -4 | | mA |
| Output Sink Current | Isink | Vcomp=4V, Vinv=2.6V | 2.5 | 4.5 | | mA |
| Upper Clamp Voltage | Vupper | I source=0.1mA | | 6 | | V |
| Lower Clamp Voltage | Vlower | I sink=0.1mA | | 2.25 | | V |

**ELECTRICAL CHARACTERISTICS**

(Ta = -25°C to 125°C, Vcc=14V unless otherwise specified.)

| MULTIPLIER SECTION | | | | | | |
|------------------------------------|---------------|------------------------|------------|------------|------------|-------------|
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Linear Operating Voltage | Vmult | | 0 | - | 3.6 | V |
| Output Max. Slope | dVcs/dVmult | Vmult=0.6~1V, Vcomp=5V | 1.5 | 1.65 | 1.8 | |
| Multiplier Gain | K | Vmult=1V, Vcomp=3.5V | 0.45 | 0.6 | 0.75 | 1/V |
| CURRENT SENSE COMPARATOR | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Current Sense Reference Clamp | Vcs | Vmult=2.5V, Vcomp=6V | 1.6 | 1.75 | 1.9 | V |
| Input Bias Current | Ics | 0V<Vcs<1.6V | -0.5 | -0.1 | 0.5 | uA |
| Delay to Output | td | | | 200 | 450 | ns |
| ENABLE SECTION | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Input Threshold Voltage | Ven | Vmult=0V, Vinv=2.2V | 1.7 | 2 | 2.3 | V |
| Hysteresis | Venhys | | 0.2 | 0.5 | 0.8 | V |
| Upper Clamp Voltage | Vclamp(h) | Ien=3mA | 6.3 | 6.8 | 7.3 | V |
| Lower Clamp Voltage | Vclamp(l) | Ien=-100uA | 0.4 | 0.7 | 1 | V |
| Input Bias Current | Ienbias | 1V<Ven<4V | -1 | -0.1 | 1 | uA |
| Input High/Low Clamp Diode Current | Ienclamp | | - | - | +/-3 | mA |
| Disable Threshold | Vdis | | 0.15 | 0.2 | 0.25 | V |
| RESTART TIMER SECTION | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Restart Time delay | trst | | | 150 | | us |

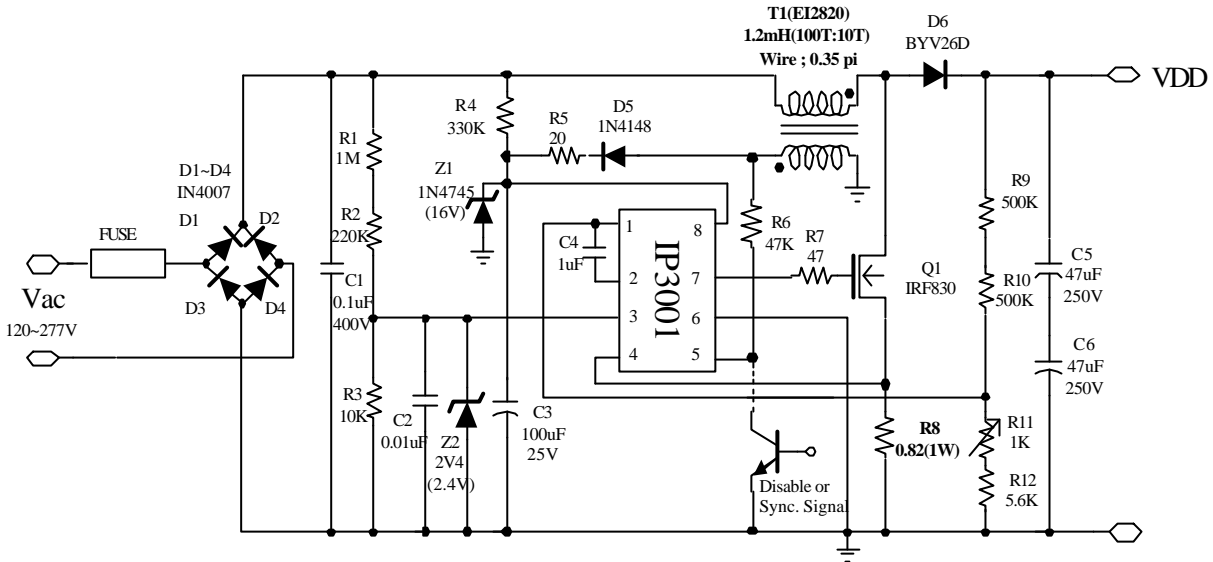
ELECTRICAL CHARACTERISTICS

(Ta = -25°C to 125°C, Vcc=14V unless otherwise specified.)

| OUTPUT SECTION | | | | | | |
|------------------------------------|---------------|-------------------|------------|------------|------------|-------------|
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Output Voltage High | Voh | Io = -10mA | 10.5 | 11.5 | | V |
| Output Voltage Low | Vol | Io = 10mA | 0.2 | 0.8 | 1.2 | V |
| Output Voltage Rise Time | tr | Cl = 1nF | - | 100 | 200 | ns |
| Output Voltage Fall Time | tf | Cl = 1nF | - | 50 | 100 | ns |
| OUTPUT OVER VOLTAGE SECTION | | | | | | |
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
| Dynamic OVP Triggering Current | Iovp | | 35 | 40 | 45 | uA |
| Static OVP Threshold Voltage | Vovp | Vinv = 2.7V | 2.1 | 2.25 | 2.4 | V |



TYPICAL APPLICATION



| Part | Value | Vendor | Part | Value | Vendor |
|-------------|---|---|--------|------------------------|--------|
| Fuse | 250V,2A | | R7 | 47,1/4W | |
| D1,D2,D3,D4 | 1N4007 | COB Technology | R8 | 0.82,1W | |
| D5 | 1N4148 | | R9,R10 | 500K,1/4W | |
| D6 | BYV26D | Philips | R11 | 1K,Variable | |
| Z1(Zener) | 1N4745(16V) | | R12 | 5.6K,1/4W | |
| Z2(Zener) | 2V4(2.4V) | | C1 | 0.1uF,400V,Miller | |
| R1 | 1M,1/4W | | C2 | 0.01uF,25V,Ceramic | |
| R2 | 220K,1/4W | | C3 | 100uF,50V,Electorlytic | |
| R3 | 10K,1/4W | | C4 | 1uF,25V,Electorlytic | |
| R4 | 330K,1/4W | | C5 | 47uF,250V,Electorlytic | |
| R5 | 20,1/4W | | C6 | 47uF,250V,Electorlytic | |
| R6 | 47K,1/4W | | | | |
| T1 | 1.2mH, Core; EI2820, Primary(1 to 3) 100Turns, Secondary(4 to 5) 10Turns, Wire;0.35pi | | | | |
| IC | IP3001 | Interpion Semiconductor (www.interpionsemi.com) | | | |
| Q | IRF830 | IR | | | |