

ActiveQR[™] Quasi-Resonant PWM Controller

FEATURES

- Quasi-Resonant Operation
- Adjustable up to 150kHz Switching Frequency
- Accurate OCP/OLP Protection
- Integrated Patented Frequency Foldback Technique
- Integrated Patented Line and Primary Inductance Compensation
- Built-in Soft-Start Circuit
- Line Under-Voltage, Thermal, Output Over-voltage, Output Short Protections
- Current Sense Resistor Short Protection
- Transformer Short Winding Protection
- 100mW Standby Power
- Complies with Global Energy Efficiency and CEC Average Efficiency Standards
- Tiny SOT23-6 Packages

APPLICATIONS

- AC/DC Adaptors/Chargers for Cell Phones, Cordless Phone, PDAs, E-books
- Adaptors for Portable Media Player, DSCs, Set-top boxes, DVD players, records
- Linear Adapter Replacements

GENERAL DESCRIPTION

The ACT510 is a high performance peak current mode PWM controller. ACT510 applies *ActiveQR[™]* and frequency foldback technique to reduce EMI and improve efficiency. ACT510's maximum switching frequency is set at 150kHz. Very low standby power, good dynamic response and accurate voltage regulation is achieved with an opto-coupler and the secondary side control circuit.

The burst mode operation enables low standby power of 100mW with small output voltage ripple. By applying frequency foldback and *ActiveQR[™]* technology, ACT510 increases the average system efficiency compared to conventional solutions and

exceeds the latest ES2.0 efficiency standard with good margin.

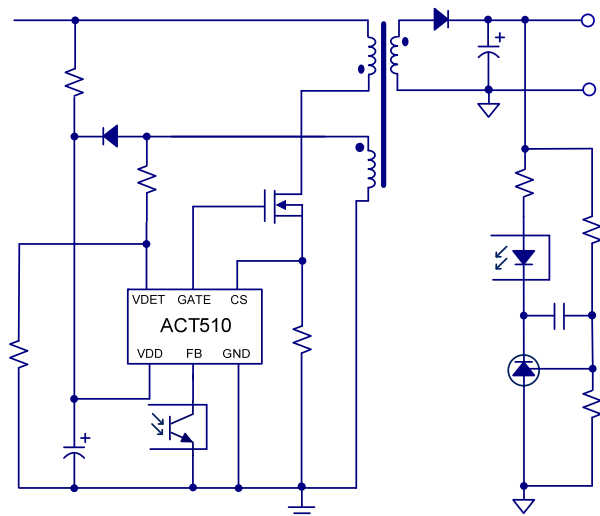
ACT510 integrates comprehensive protection. In case of over temperature, over voltage, short winding, short current sense resistor, open loop and overload conditions, it would enter into auto restart mode including Cycle-by-Cycle current limiting.

ACT510 is to achieve no overshoot and very short rise time even with big capacitive load (4000 μ F) with the built-in fast and soft start process.

The Quasi-Resonant (QR) operation mode can effectively improve efficiency, reduce the EMI noise and further reduce the components in input filter.

ACT510 is idea for application up to 60 Watt.

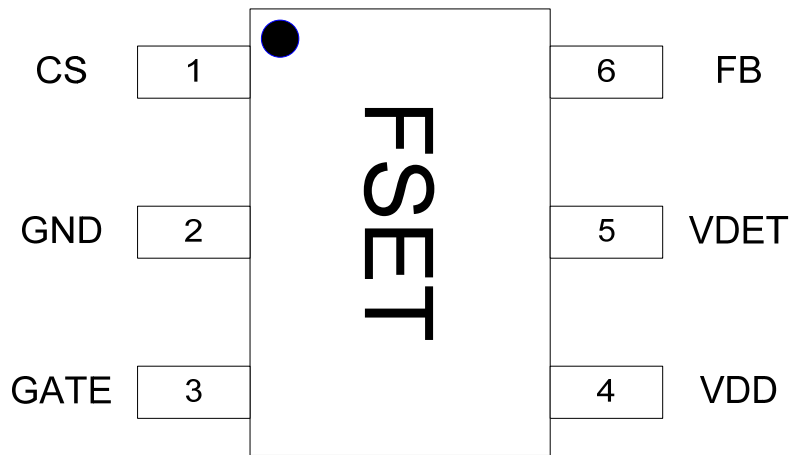
Figure 1:
Simplified Application Circuit



ORDERING INFORMATION

| PART NUMBER | TEMPERATURE RANGE | PACKAGE | PINS | PACKING METHOD | TOP MARK |
|-------------|-------------------|---------|------|----------------|----------|
| ACT510US-T | -40°C to 85°C | SOT23-6 | 6 | TUBE & REEL | FSET |

PIN CONFIGURATION



SOT23-6
ACT510US

PIN DESCRIPTIONS

| PIN | NAME | DESCRIPTION |
|-----|------|---|
| 1 | CS | Current Sense Pin. Connect an external resistor (R_{CS}) between this pin and ground to set peak current limit for the primary switch. |
| 2 | GND | Ground. |
| 3 | GATE | Gate Drive. Gate driver for the external MOSFET transistor. |
| 4 | VDD | Power Supply. This pin provides bias power for the IC during startup and steady state operation. |
| 5 | VDET | Valley Detector Pin. Connect this pin to a resistor divider network from the auxiliary winding to detect zero-crossing points for valley turn on operation. |
| 6 | FB | Feedback Pin. Connect this pin to optocouplers's collector for output regulation. |

Figure 4:
Universal VAC Input, 5V/2A Output Charger

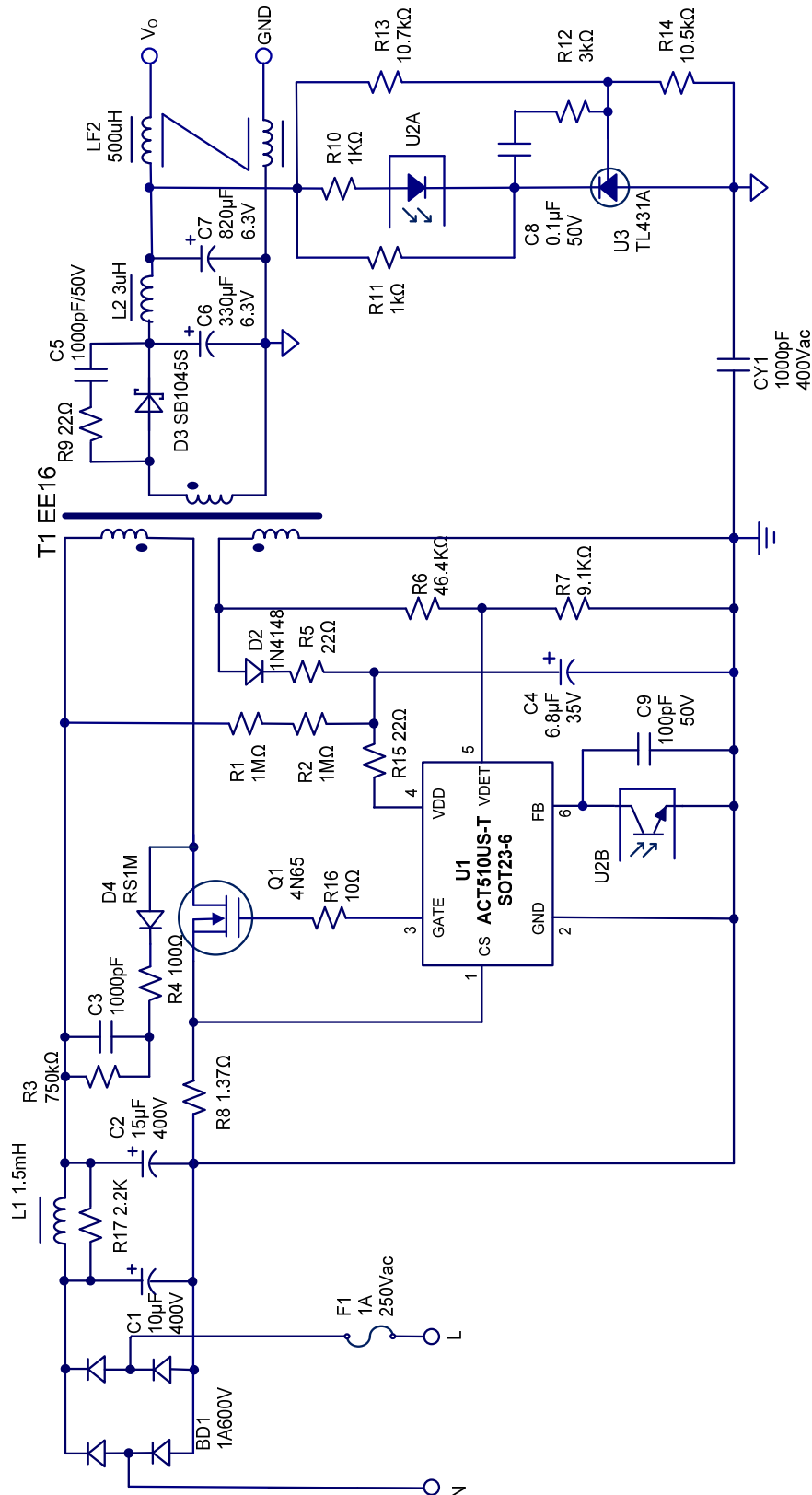


Table 1:
ACT510 5V10W Bill of Materials

| ITEM | REFERENCE | DESCRIPTION | QTY | MANUFACTURER |
|------|-------------|--|-----|--------------|
| 1 | U1 | IC, ACT510, SOT23-6 | 1 | Active-Semi |
| 2 | C1 | Capacitor, Electrolytic, 15µF/400V, 12x16mm | 1 | RUBYCON |
| 3 | C2 | Capacitor, Electrolytic, 10µF/400V, 10x15mm | 1 | RUBYCON |
| 4 | C3 | Capacitor, Ceramic, 1000pF/500V, 0805,SMD | 1 | POE |
| 5 | C4 | Capacitor, Electrolytic, 6.8µF/35V, 5x11mm | 1 | POE |
| 6 | C5 | Capacitor, Ceramic, 1000PF/100V, 0805,SMD | 1 | POE |
| 7 | C6 | Capacitor, Electrolytic, 330µF/6.3V, 6.3x8mm | 1 | KSC |
| 8 | C7 | Capacitor, Electrolytic, 820µF/6.3V, 6.5x15mm | 1 | KSC |
| 9 | C8 | Capacitor, Ceramic, 0.1µF/25V, 0805, SMD | 1 | POE |
| 10 | C9 | Capacitor, Ceramic, 1000pF/25V, 0805, SMD | 1 | POE |
| 11 | CY1 | Safety Y1, Capacitor, 1000pF/400V, Dip | 1 | UXT |
| 12 | BD1 | Bridge Rectifier, D1010S, 1000V/1.0A, SDIP | 1 | PANJIT |
| 13 | D2 | Fast Recovery Rectifier, RS1G, 200V/1.0A, RMA | 1 | PANJIT |
| 14 | D3 | Diode, Schottky, 45V/10A, S10U45S, SMD | 1 | Diodes |
| 15 | D4 | Fast Recovery Rectifier, RS1M, 1000V/1.0A, RMA | 1 | PANJIT |
| 16 | D5 | Diode,Ultra Fast, LL4148, SMD Open | 1 | Good-Ark |
| 17 | L1 | Axial Inductor, 1.5mH, 5*7, Dip | 1 | SoKa |
| 18 | L2 | Axial Inductor, 0.55*5T, 5*7, Dip | 1 | SoKa |
| 19 | LF2 | CM Filter,R6K, 500µH, 0.55*2 6T | 1 | SoKa |
| 20 | Q1 | Mosfet Transistor, 4N60, TO-262 | 1 | Infineon |
| 21 | PCB1 | PCB, L*W*T=53x29x1.6mm, Cem-1, Rev:A | 1 | Jintong |
| 22 | F1 | Fuse, 1A/250V | 1 | TY-OHM |
| 23 | R1,R2 | Chip Resistor, 1.0MΩ 1206, 5% | 2 | TY-OHM |
| 24 | R3 | Carbon Resistor, 750KΩ, 0805, 5% | 1 | TY-OHM |
| 25 | R4 | Chip Resistor, 100Ω, 0805, 5% | 1 | TY-OHM |
| 26 | R5, R9, R15 | Chip Resistor, 22Ω, 0805, 5% | 3 | TY-OHM |
| 27 | R6 | Chip Resistor, 46.4KΩ, 0805,1% | 1 | TY-OHM |
| 28 | R7 | Chip Resistor, 9.1KΩ, 0805, 1% | 1 | TY-OHM |
| 29 | R8 | Chip Resistor, 1.37Ω, 1206 , 5% | 1 | TY-OHM |
| 30 | R10, R11 | Chip Resistor, 1KΩ, 0805, 5% | 2 | TY-OHM |
| 31 | R12 | Chip Resistor, 3KΩ, 0805, 5% | 1 | TY-OHM |
| 32 | R13 | Chip Resistor, 10.7KΩ, 0805, 1% | 1 | TY-OHM |
| 33 | R14 | Chip Resistor, 10.5KΩ, 0805, 1% | 1 | TY-OHM |
| 34 | R16 | Chip Resistor, 10Ω, 0805, 5% | 1 | TY-OHM |
| 35 | R17 | Chip Resistor, 2.2KΩ, 0805, 5% | 1 | TY-OHM |
| 36 | T1 | Transformer, Lp=0.54mH, EE16 | 1 | |
| 37 | U2 | OPOT PC817C | 1 | Sharp |
| 38 | IC3 | TL431 TO-92 | 1 | ST |