

ActiveQRTM Quasi-Resonant PWM Controller

FEATURES

- CCM and Quasi-Resonant Operation
- Adjustable up to 45kHz Switching Frequency
- OCP/OLP Protection
- Integrated Patented Frequency Foldback Technique
- Integrated Patented Line Compensation
- Built-in Soft-Start Circuit
- Line Under-Voltage, Thermal, Output Over-voltage, Output Short Protections
- Current Sense Resistor Short Protection
- Transformer Winding Short 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 ACT513 is a high performance peak current mode PWM controller. ACT513 applies *ActiveQRTM* and frequency foldback technique to reduce EMI and improve efficiency. ACT513's maximum design switching frequency is set at 45kHz. 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 *ActiveQRTM* technology, ACT513 increases the average system efficiency compared to conventional solutions and exceeds the latest ES2.0 efficiency standard with good margin.

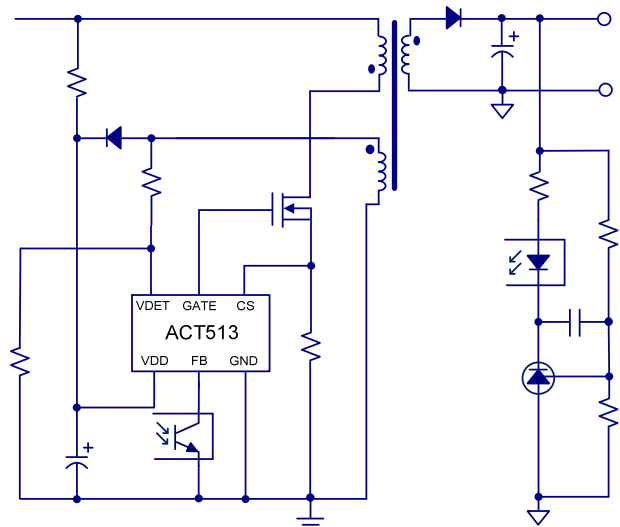
ACT513 integrates comprehensive protection. In case of over temperature, over voltage, winding short, current sense resistor short, open loop and overload conditions, it would enter into auto restart mode including Cycle-by-Cycle current limiting.

ACT513 is to achieve no overshoot and very short rise time even with a big capacitive load with the built-in fast and soft start process.

In full load condition, ACT513 is able to be designed to work in both CCM mode and DCM mode to meet different types of applications. Quasi-Resonant (QR) operation mode can improve efficiency during DCM operation, and reduce EMI and further reduce the components in input filter.

ACT513 is ideal for applications up to 60 Watts.

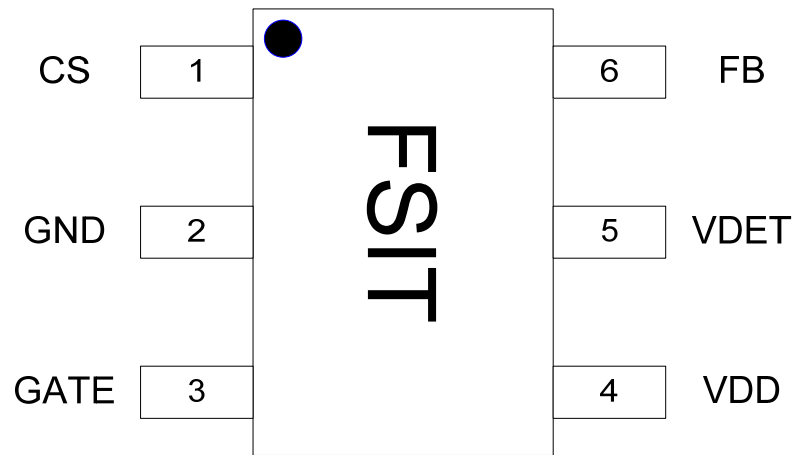
Figure 1:
Simplified Application Circuit



ORDERING INFORMATION

PART NUMBER	TEMPERATURE RANGE	PACKAGE	PINS	PACKING METHOD	TOP MARK
ACT513US-T	-40°C to 85°C	SOT23-6	6	TUBE & REEL	FSIT

PIN CONFIGURATION



**SOT23-6
ACT513US**

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, 12V/2A Output Adaptor

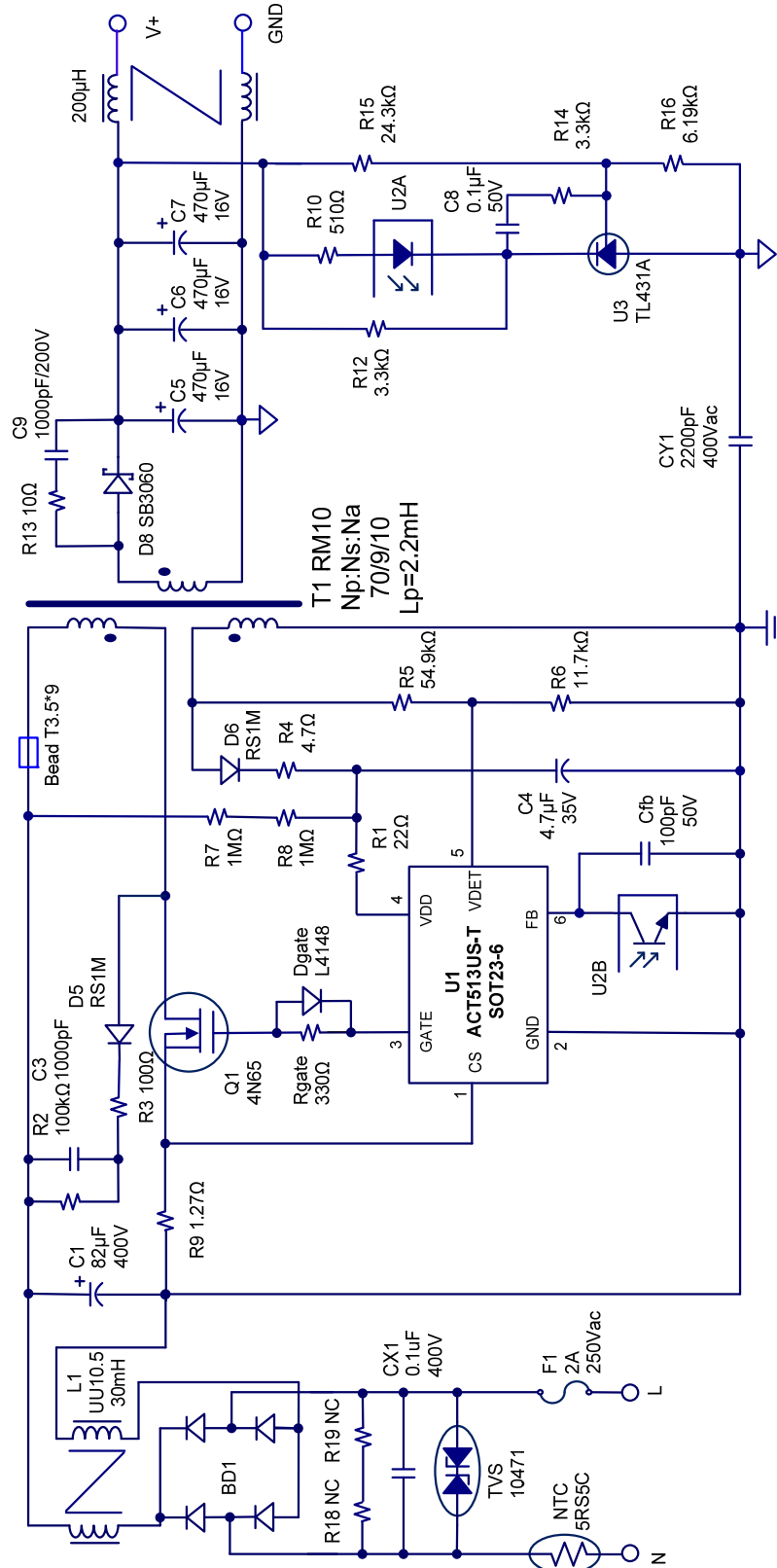


Table 1:
ACT513 12V24W Bill of Materials

ITEM	REFERENCE	DESCRIPTION	QTY	MANUFACTURER
1	U1	IC, ACT513, SOT23-6	1	Active-Semi
2	C1	Capacitor, Electrolytic, 82 μ F/400V, 18 \times 20mm	1	Rubcon
3	C3	Capacitor, Ceramic, 1000pF/1KV, DIP	1	POE
4	C4	Capacitor, Electrolytic, 4.7 μ F/35V, 5*11mm	1	KSC
5	C5,C6,C7	Capacitor, Solid, 470 μ F/16V, 8*16mm	3	Rubcon
6	C8	Capacitor, Ceramic, 0.1 μ F/50V, 0805, SMD	1	POE
7	C9	Capacitor, Ceramic, 1000pF/100V, 0805, SMD	1	POE
8	Cfb	Capacitor, Ceramic, 100pF/50V, 0805, SMD	1	POE
9	BD1	GBL10 2A/600V 4Pin DIP	1	Good-Ark
10	D5	Diode, Ultra Fast, FR107, 1000V/1.0A, DO-41	1	Good-Ark
11	D6	RS1M SMD	1	Good-Ark
12	D8	Diode, Schottky, 60V/30A, SBR3060, DO-220	1	Diodes
13	Dgate	Diode L4148 SMD	1	Good-Ark
14	LF1	CM Inductor, 50mH, UU10.5	1	SoKa
15	LF2	Axial Inductor, 0.75*5T, 5*7, Dip 200uH	1	SoKa
16	Q1	Mosfet Transisor, 04N65, TO-220F	1	Infineon
17	PCB1	PCB, L*W*T =49x68x1.6mm, Cem-1, Rev:A	1	Jintong
18	F1	Fusible, 2A/250V	1	TY-OHM
19	R1	Chip Resistor, 22 Ω , SMD 0805, 5%	1	TY-OHM
20	R2	metal Resistor, 100K Ω , DIP, 1W, 5%	1	TY-OHM
21	R3	Chip Resistor, 100 Ω , 0805, 5%	1	TY-OHM
22	R4	Chip Resistor, 4.7 Ω , 0805, 5%	1	TY-OHM
23	R5	Chip Resistor, 54.9k Ω , 0805, 1%	1	TY-OHM
24	R6	Chip Resistor, 11.8K Ω , 0805, 1%	1	TY-OHM
25	R7,R8	Chip Resistor, 1M Ω , 5%	2	TY-OHM
26	R9	metal Resistor, 1.27 Ω , 1W, 1%	1	TY-OHM
27	R10	Chip Resistor, 510 Ω , 1/4W, 5%	1	TY-OHM
28	R12,R14	Chip Resistor, 3.3K Ω , 0805, 5%	2	TY-OHM
29	R13	Chip Resistor, 10 Ω , 0805, 5%	1	TY-OHM
30	R15	Chip Resistor, 24.3k Ω , 0805, 1%	1	TY-OHM
31	R16	Chip Resistor, 6.19K Ω , 0805, 1%	1	TY-OHM
32	Rgate	Chip Resistor, 330 Ω , 0805, 5%	1	TY-OHM
33	T1	ER28 Lm=4mH	1	
34	CX1	X capacitance, 0.1 μ F/400V, X1	1	
35	NTC	Thermistor, SC053	1	TY-OHM
36	TVS	Varistor, 10471	1	TY-OHM
37	CY1	Y capacitance, 1000pF/400V, Y1	1	SEC
38	U2	Opto-coupler, PC817C CTR=200 dip-4	1	Sharp
39	U3	Voltage Regulator, TL431A, Vref=2.5V TO-92	1	ST