



ETC4375

PWM Controlled, Step-Down DC/DC Converters

Description

The ETC4375 series are PWM controlled step down DC/DC converters. The ETC4375 series is produced using CMOS process and laser trimming technologies to attain low-power and high-accuracy.

Built-in phase compensation and soft start-up circuits ensure excellent transient response and improved electrical characteristics.

Standard output voltages of 3.3V and 5.0V (accuracy: $\pm 2.5\%$) are available and custom output voltages from 2.0V to 7.0V in 0.1V increments can be considered.

The internal oscillator is trimmed to a fixed frequency of 100kHz (accuracy: $\pm 15\%$). The duty ratio varies up to 100% according to the load.

A step-down converter can be easily configured with only a transistor, a coil, a diode, and a capacitor.

Features

- Operating (start-up) voltage range: 2.2V to 10V
- Standard output voltages: 3.3V or 5.0V
- Customizable output voltage range: 2.0V to 7.0V in 0.1V increments
- Output voltage accuracy $\pm 2.5\%$
- Oscillator frequency: 100kHz ($\pm 15\%$)
- Maximum output current: 500mA min. at $V_{IN}=5.0V$, $V_{OUT}=3.3V$
- High efficiency: 88% typ. at $V_{IN}=3.6V$, $V_{OUT}=3.3V$, $I_{OUT}=100mA$, Note(1)
- Built-in phase compensation and soft start-up circuits
- Package: SOT-89-5

Note(1): Performance depends on external components and PCB layout.

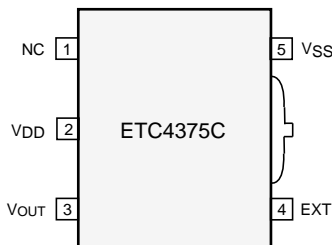
Ordering Information

Part	Package	Temp. Range
ETC4375C-XXP	SOT-89-5	-30°C to +80°C

XX: Output voltage (33 = 3.3V, 50 = 5.0V)

Pin Configuration

Top View

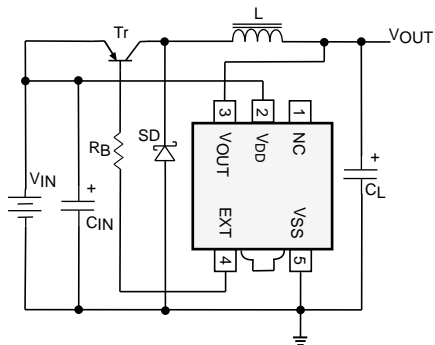


SOT-89-5

Typical Applications

- Cellular phones, pagers
- Palmtops
- Cameras, video recorders
- Portable equipment

Typical Application Circuit



L: 100 μ H (SUMIDA, CD-54)

SD: MA735 (Schottky diode; MATSUSHITA)

CL: 10V 47 μ F (Tantalum capacitor, NICHICON, F93)

CIN: 16V 10 μ F (Tantalum capacitor, NICHICON, F93)

Tr: 2SA1213

RB: 1.0k Ω

ETC4375

Absolute Maximum Ratings $T_a=25^{\circ}\text{C}$

Terminal Voltage
V_{OUT} 12V
EXT -0.3V to (V_{OUT}+0.3V)
Terminal Current
EXT +/-50mA

Operating Temperature Range
T_{opr} -30°C to 80°C
Storage Temperature Range
T_{stg} -40°C to 125°C
Power Dissipation
Pd 500mW

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability. Operating ranges define those limits between which the functionality of the device is guaranteed.

Electrical Characteristics

ETC4375C-50P V_{OUT}=5.0V, F_{OSC}=100kHz, T_a=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V _{OUT}	External components connected	4.875	5.000	5.125	V
Maximum Input Voltage	V _{IN}		10			V
Supply Voltage Range	V _{DD}		2.2		10	V
Supply Current 1	I _{DD1}	No external components, Apply output voltage x 0.95 to V _{OUT}		24.9	41.6	μA
Supply Current 2	I _{DD2}	Same as I _{DD1} , Apply output voltage x 1.1 to V _{OUT}		19.9	33.2	μA
EXT "High" On Resistance	REXTH	Same as I _{DD2} , V _{EXT} =V _{OUT} -0.4V		37.5	62.5	Ω
EXT "Low" On Resistance	REXTL	Same as I _{DD1} , V _{EXT} =0.4V		30	50	Ω
Oscillator Frequency	F _{OSC}	Same as V _{OUT} , Measuring of EXT waveform	85	100	115	kHz
Maximum Duty Ratio	MAXDTY	Same as I _{DD1} , Measuring of EXT waveform	100			%
Efficiency	EFFI			90		%
Soft-Start Time	T _{SS}		4.0	10.0	20.0	msec

Measuring conditions: Unless otherwise specified, V_{IN}=V_{DD}=V_{OUT} x 1.2, I_{OUT}=100mA. See Typical Application Circuit.

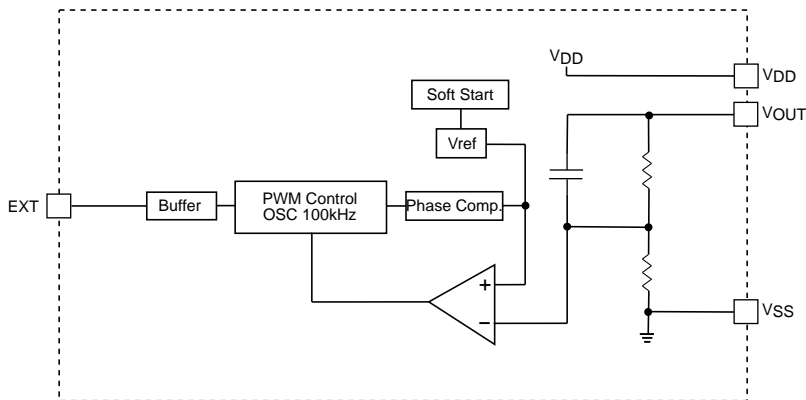
Pin Functions

ETC4375

Pin Name	Pin No.	Function
NC	1	No connection
V _{DD}	2	IC internal power supply
V _{OUT}	3	Output voltage monitor
EXT	4	External switch transistor drive
V _{SS}	5	Ground

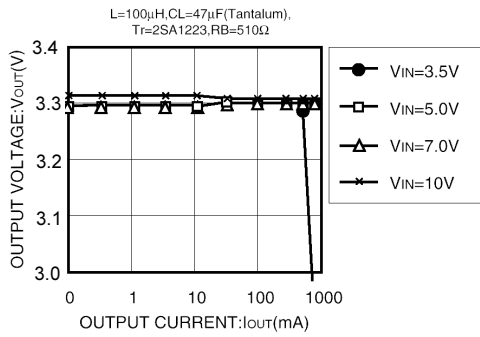
Block Diagram

ETC4375

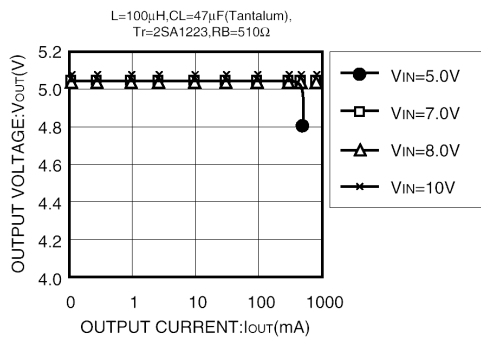


Characteristics

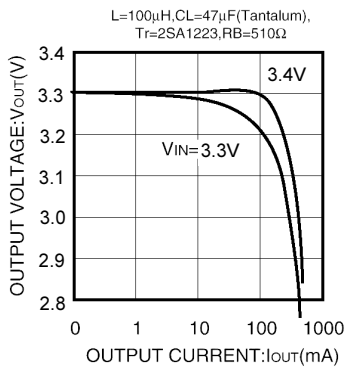
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT
ETC4375C-33



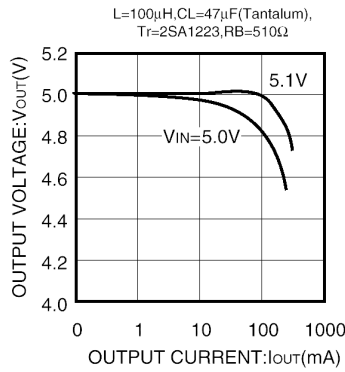
ETC4375C-50



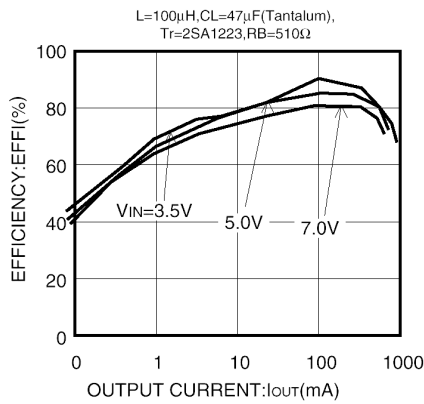
ETC4375C-33



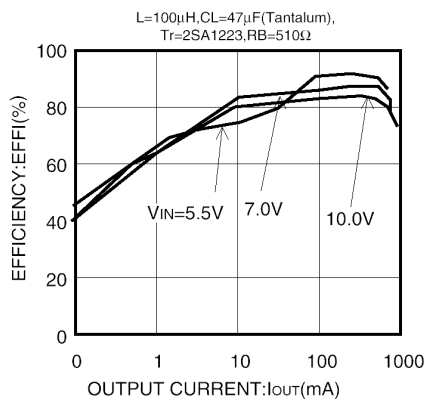
ETC4375C-50



(2) EFFICIENCY vs. OUTPUT CURRENT
ETC4375C-33

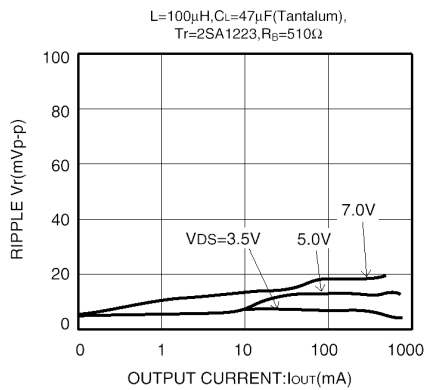


ETC4375C-50

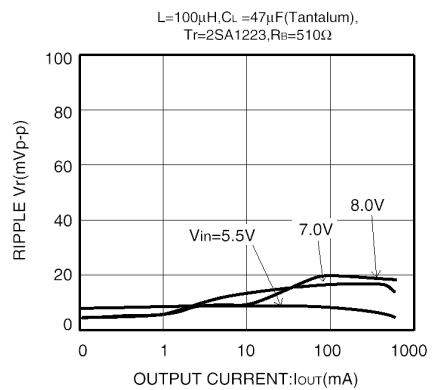


Characteristics

(3) RIPPLE VOLTAGE vs. OUTPUT CURRENT ETC4375C-33



ETC4375C-50



Technical drawing of a 3D printed part, showing three views: top, front, and side views. Dimensions are in mm.

Top View:

- Overall width: 4.6 / 4.4
- Overall height: 4.5 / 4.0
- Central circular hole diameter: 1.8 / 1.4
- Four vertical slots, each with a width of 0.48 / 0.36
- Distance between the center of the hole and the center of the nearest slot: 0.53 / 0.41
- Distance between the centers of adjacent slots: 1.6 / 1.4

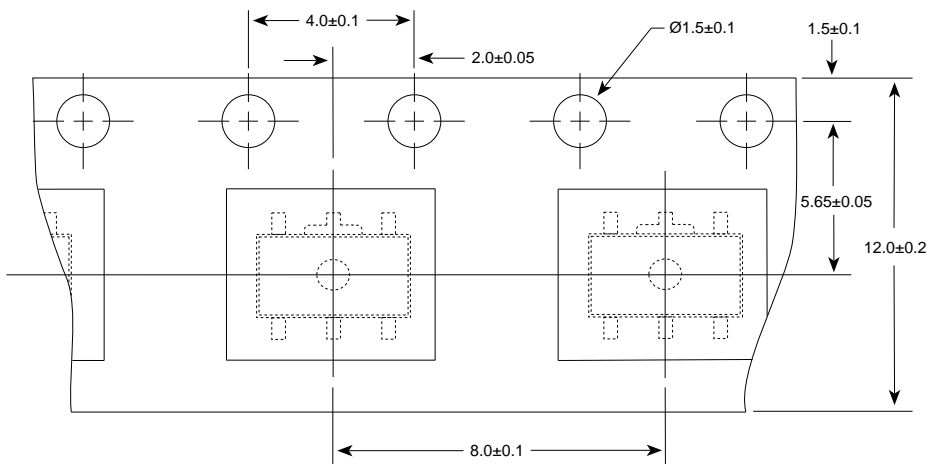
Front View:

- Overall width: 4.6 / 4.4
- Overall height: 1.3 / 0.9
- Four vertical slots, each with a width of 0.48 / 0.36
- Distance between the center of the hole and the center of the nearest slot: 0.53 / 0.41
- Distance between the centers of adjacent slots: 1.6 / 1.4

Side View:

- Overall width: 1.6 / 1.4
- Overall height: 0.44 / 0.37
- Four vertical slots, each with a width of 0.48 / 0.36
- Distance between the center of the hole and the center of the nearest slot: 0.53 / 0.41
- Distance between the centers of adjacent slots: 1.6 / 1.4

SOT-89-5 Tape and Reel Information



Electronic Technology

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