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: ±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: ±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 ±2.5%
- Oscillator frequency: 100kHz (±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.

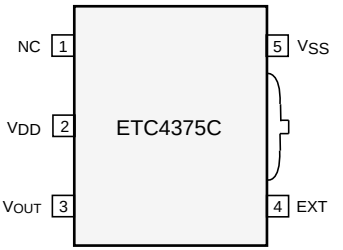
Ordering Information

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

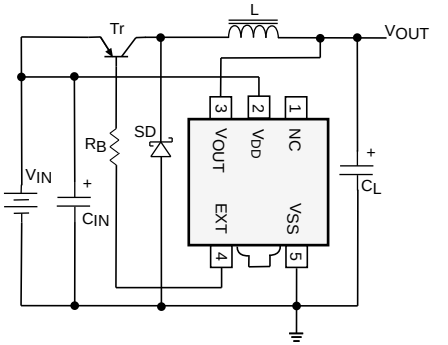


SOT-89-5

Typical Applications

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

Typical Application Circuit



L: 100µH (SUMIDA, CD-54)
SD: MA735 (Schottky diode; MATSUSHITA)
C_L: 10V 47µF (Tantalum capacitor, NICHICON, F93)
C_{IN}: 16V 10µF (Tantalum capacitor, NICHICON, F93)
Tr: 2SA1213
R_B: 1.0kΩ

Absolute Maximum Ratings Ta=25°C

Terminal Voltage
- V_{OUT} 12V
- EXT . . . . . -0.3V to (V_{OUT}+0.3V)

Terminal Current
- EXT . . . . . +/-50mA

Operating Temperature Range
- Topr . . . . . -30°C to 80°C

Storage Temperature Range
- Tstg . . . . . -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, Ta=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}, VEXT=V_{OUT}-0.4V		37.5	62.5	Ω
EXT “Low” On Resistance	REXTL	Same as I_{DD1}, VEXT=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.

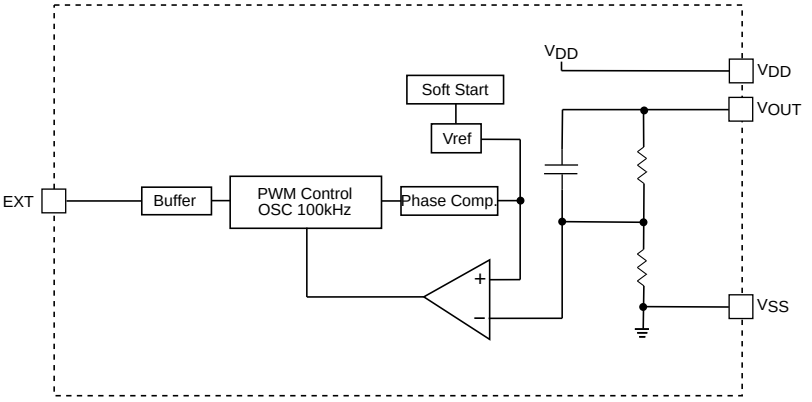
Pin Functions

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

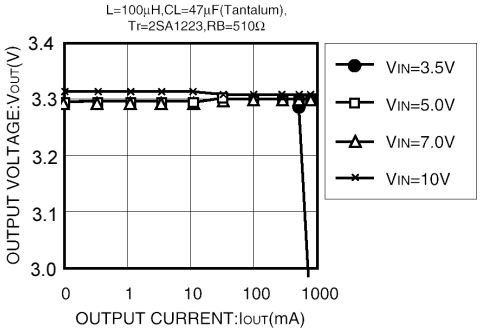
ETC4375



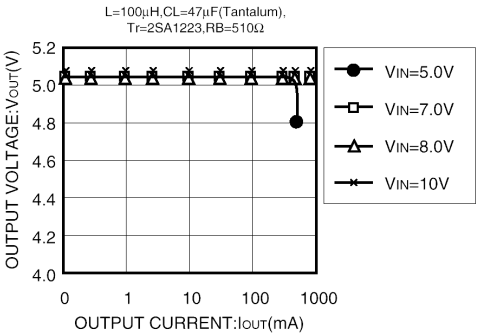
Characteristics

(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT

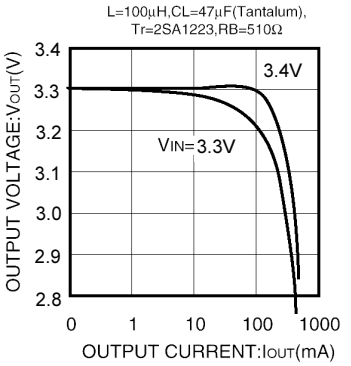
ETC4375C-33



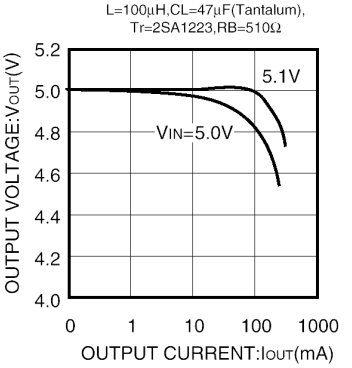
ETC4375C-50



ETC4375C-33

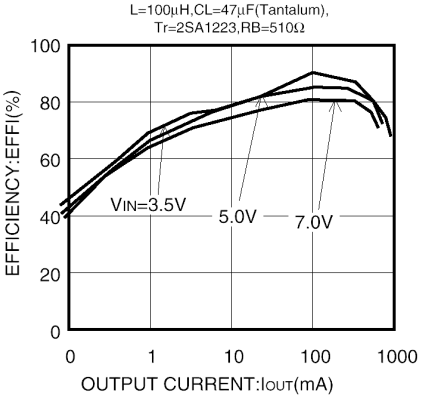


ETC4375C-50

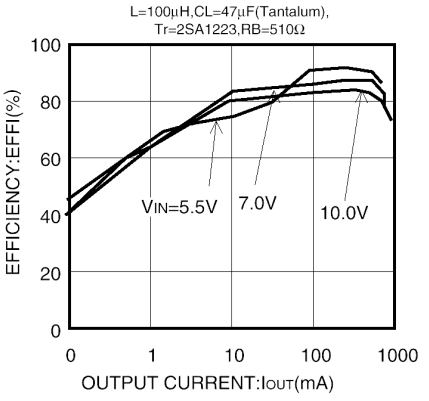


(2) EFFICIENCY vs. OUTPUT CURRENT

ETC4375C-33



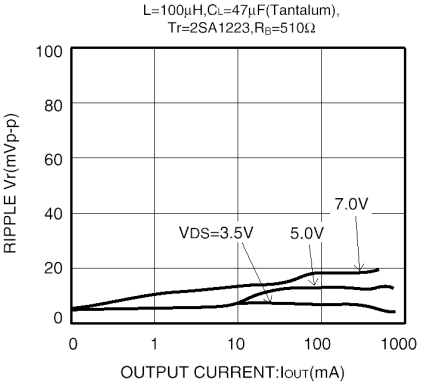
ETC4375C-50



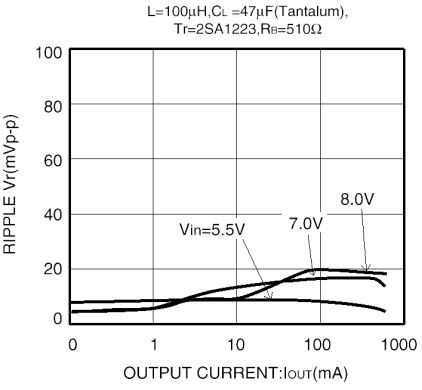
Characteristics

(3) RIPPLE VOLTAGE vs. OUTPUT CURRENT

ETC4375C-33

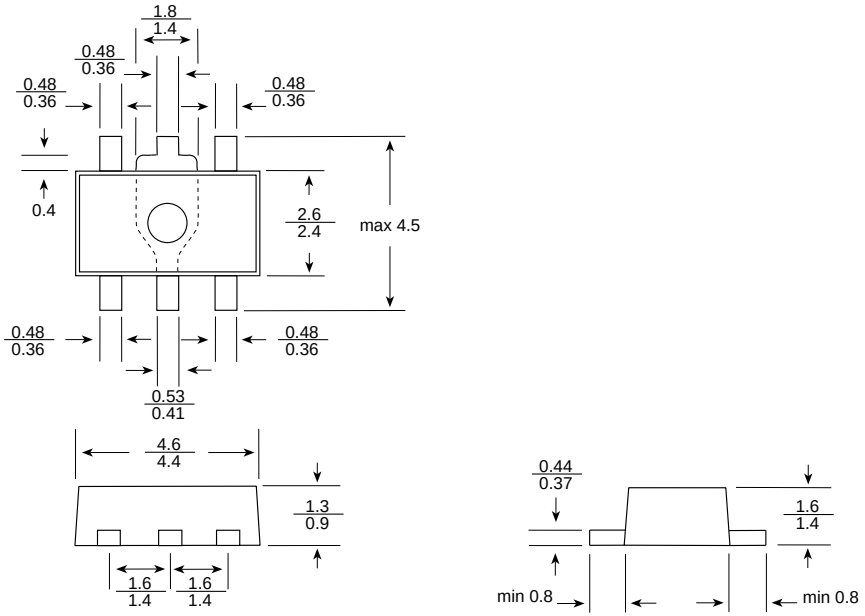


ETC4375C-50



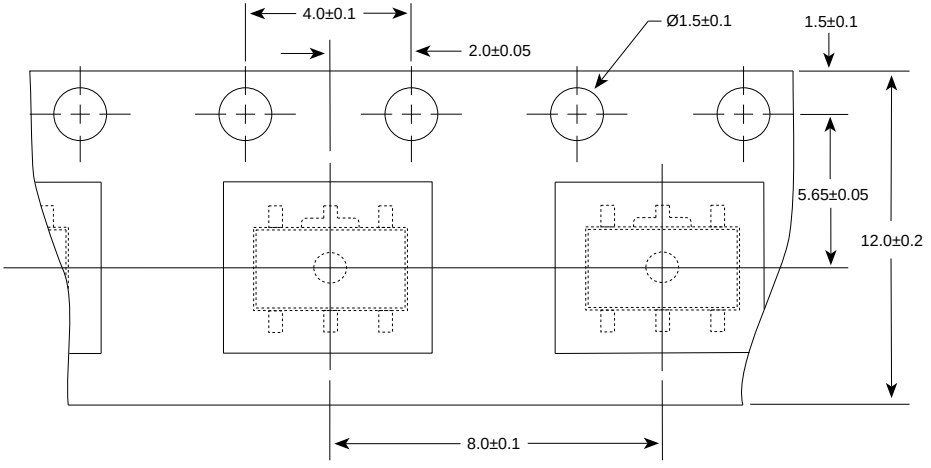
Packaging Information

P Package, 5-Pin SOT-89-5 Small Outline Transistor Package



Dimensions are in mm.

SOT-89-5 Tape and Reel Information



Dimensions are in millimeters.

Electronic Technology

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