

4A, 18V High Efficiency Synchronous Step-Down Converter

DESCRIPTION

The ETA1486 is a wide input range, high-efficiency, DC-to-DC step-down switching regulator, capable of delivering up to 4A of output current. Current mode PWM control allows the use of small external components, such as ceramic input and output caps, as well as small inductors, while still providing low output ripples. On top of the integrated internal synchronous rectifier that eliminates external Schottky diode, ETA1486 also employs a proprietary control scheme that switches the device into a power save mode during light load, thereby extending the range of high efficiency operation. Therefore, ETA1486 is a much superior solution in comparison to other competitions in terms of efficiency and cost. Overall, ETA1486 is a highly efficient and robust solution for DC-DC step-down applications that requires wide input ranges.

ETA1486 is available ESO8 Packages.

FEATURES

- ◆ **Wide Input Operating Range from 4.5V to 18V**
- ◆ **High Efficiency: Up to 95% at Light Load**
- ◆ **Capable of Delivering 4A**
- ◆ **No External Schottky Diode Needed**
- ◆ **Inductor Short Circuit Protection**
- ◆ Current Mode control
- ◆ 0.923V Reference for Low Output voltages
- ◆ Logic Control Shutdown
- ◆ Thermal shutdown and UVLO
- ◆ Available in ESO8 Package

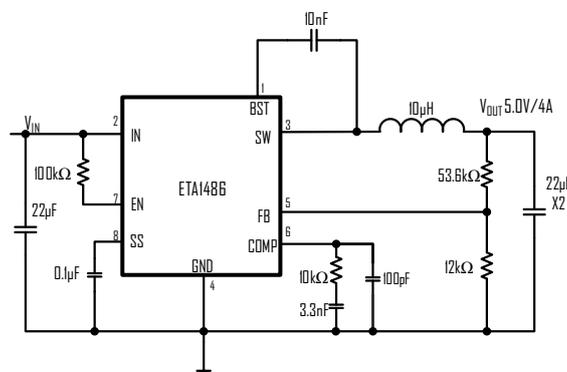
APPLICATIONS

- ◆ LCD TVs
- ◆ Notebook computers
- ◆ FPGA power supplies
- ◆ LED drivers

ORDERING INFORMATION

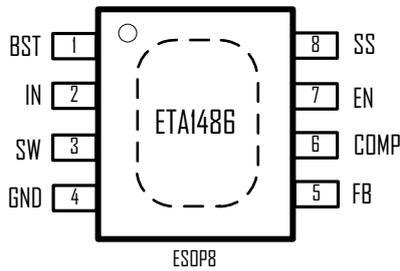
| PART | PACKAGE PIN | TOP MARK |
|------------|-------------|-----------------------------|
| ETA1486E8A | ESOP8 | ETA1486 YWWPL -Date Code |

TYPICAL APPLICATION



4A Wide Input Step Down Synchronous Converter

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

| | |
|-----------------------------------|--------------------|
| IN Voltage..... | -0.3V to 20V |
| SW, EN Voltage..... | -0.3V to VIN+0.3V |
| BST Voltage..... | -0.3V to SW+6V |
| FB Voltage..... | -0.3V to 6V |
| SW to ground current | Internally limited |
| Operating Temperature Range | -40°C to 85°C |
| Storage Temperature Range | -55°C to 150°C |

ELECTRICAL CHARACTERISTICS

(VIN = 5V, unless otherwise specified. Typical values are at TA = 25°C.)

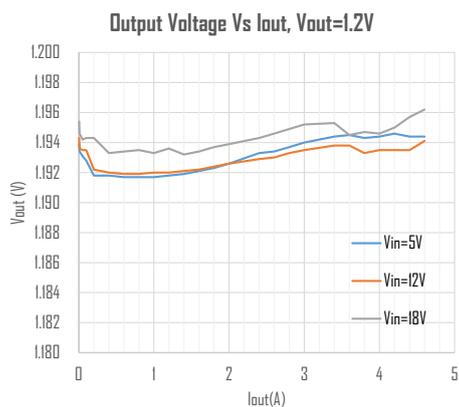
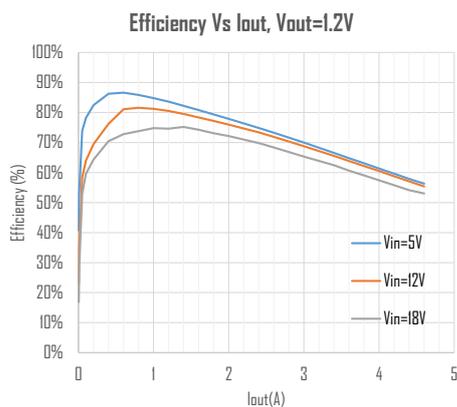
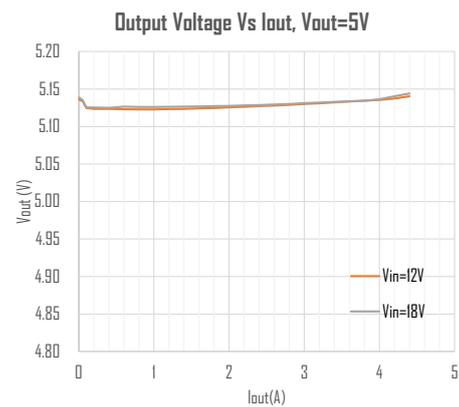
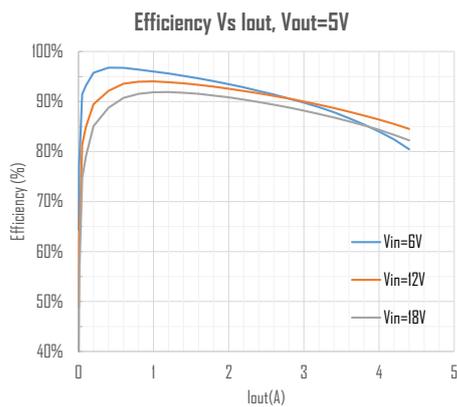
| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------------------|---|-------|-------|-------|-------|
| Input Voltage Range | | 4.2 | | 18 | V |
| Input UVLO | Rising, Hysteresis=140mV | | 3.55 | | V |
| Input Supply Current | V _{FB} = 1.0V | | 1.6 | | mA |
| Input Shutdown Current | | | 6 | | μA |
| FB Feedback Voltage | | 0.904 | 0.923 | 0.942 | V |
| FB Input Current | | | 0.01 | | μA |
| Error Amp Transconductance | | | 800 | | μS |
| Switching Frequency | | | 340 | | KHz |
| High side Switch On Resistance | I _{SW} = 200mA | | 90 | | mΩ |
| Low side Switch On Resistance | I _{SW} = 200mA | | 85 | | mΩ |
| High side Switch Current Limit | | | 6 | | A |
| SW Leakage Current | V _{IN} = 12V, V _{SW} = 0 or 12V, EN = GND | | | 10 | μA |
| EN Input Current | | | | 1 | μA |
| EN Input Low Voltage | | | | 0.5 | V |
| EN Input High Voltage | | 1.5 | | | V |
| Thermal Shutdown | Hysteresis=40°C | | 150 | | °C |

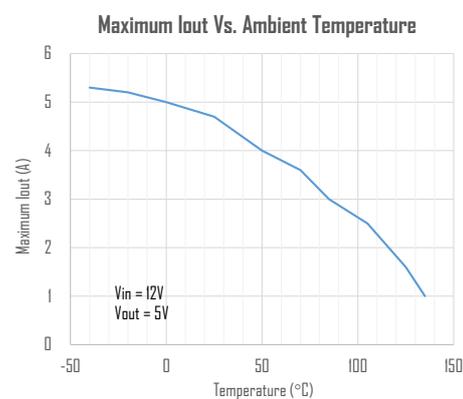
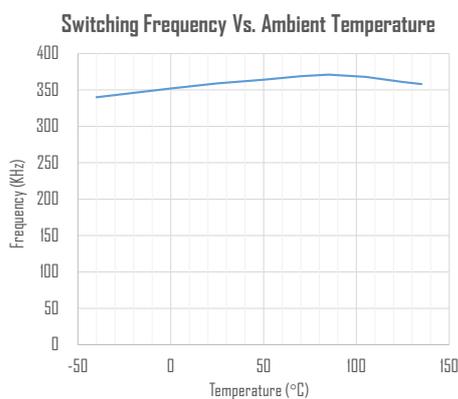
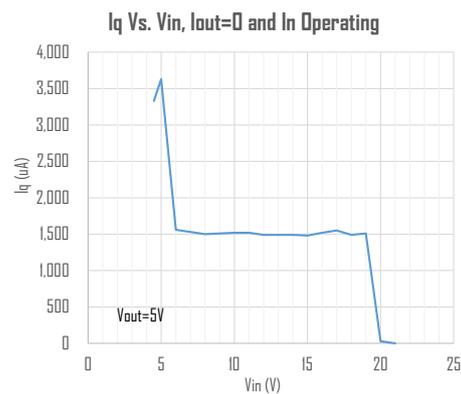
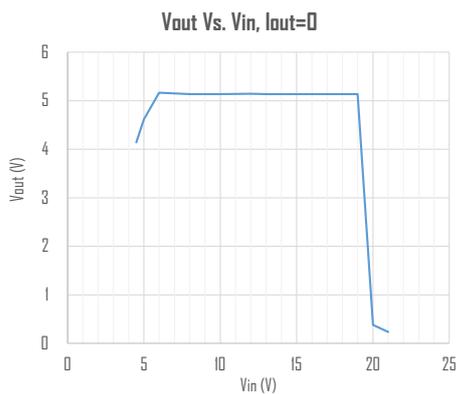
PIN DESCRIPTION

| PIN # | NAME | DESCRIPTION |
|-------|------|---|
| 1 | BST | Bootstrap pin. Connect a 10nF capacitor from this pin to SW |
| 2 | IN | Supply Voltage. Bypass with a 22 μ F ceramic capacitor to GND |
| 3 | SW | Inductor Connection. Connect an inductor Between SW and the regulator output. |
| 4 | GND | Ground |
| 5 | FB | Feedback Input. Connect an external resistor divider from the output to FB and GND to set V_{OUT} |
| 6 | COMP | Regulator Compensation. Connect series RC network to GND. |
| 7 | EN | Enable pin for the IC. Drive this pin to high to enable the part, low to disable. |
| 8 | SS | Soft start pin. Connect a 0.1 μ F capacitor from this pin to GND |

TYPICAL CHARACTERISTICS

(Typical values are at $T_A = 25^\circ\text{C}$ unless otherwise specified.)





FUNCTION DESCRIPTIONS

Loop Operation

The ETA1486 is a wide input range, high-efficiency, DC-to-DC step-down switching regulator, capable of delivering up to 4A of output current, integrated with a 90/85mΩ synchronous MOSFET pair, eliminating the need for external diode. It uses a PWM current-mode control scheme. An error amplifier integrates error between the FB signal and the internal reference voltage. The output of the integrator is then compared to the sum of a current-sense signal and the slope compensation ramp. This operation generates a PWM signal that modulates the duty cycle of the power MOSFETs to achieve regulation for output voltage.

Current Limit

There is a cycle-by-cycle current limit on the high-side MOSFET of 6A(typ). When the current flowing out of SW exceeds this limit, the high-side MOSFET turns off and the synchronous rectifier turns on. Unlike the traditional method of current limiting by limiting the voltage at the compensation pin, which usually has large variation due to duty cycle variance, this type of peak current limiting scheme provides a relatively more accurate limit for output current, thereby lowering the requirements for system design.

Light Load Operation

Traditionally, a fixed constant frequency PWM DC-DC regulator always switches even when the output load is small. When energy is shuffling back and forth through the power MOSFETs, power is lost due to the finite RDSONs of the MOSFETs and

parasitic capacitances. At light load, this loss is prominent and efficiency is therefore very low. ETA1486 employs a proprietary control scheme that improves efficiency in this situation by enabling the device into a power save mode during light load, thereby extending the range of high efficiency operation.

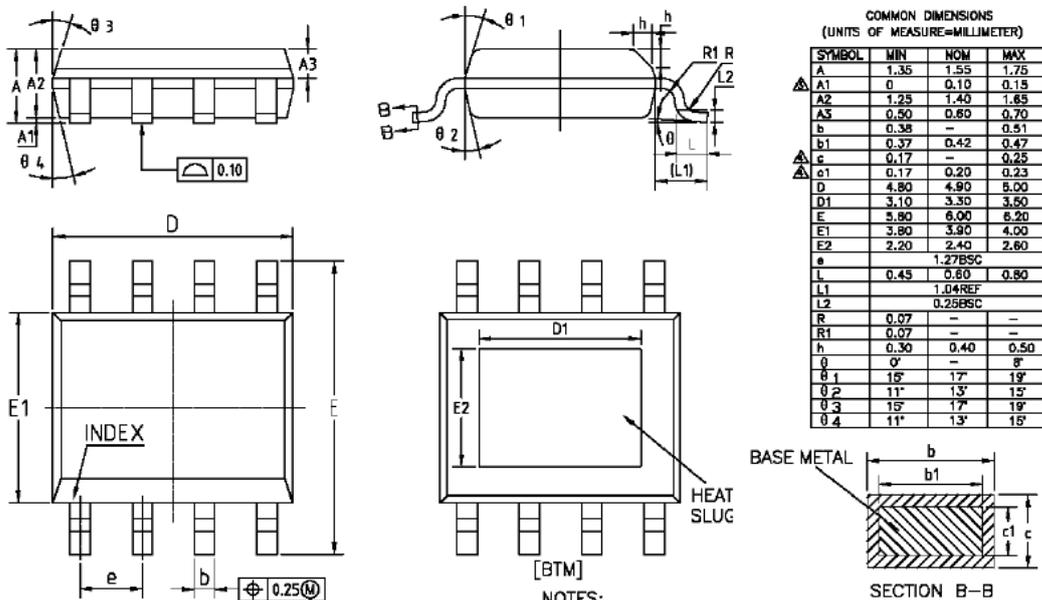
APPLICATION INFORMATION

Components Selection

| V _{OUT} (V) | C _{OUT} (μF) | L (μH) |
|----------------------|-----------------------|--------|
| 8 | 22x2 | 22 |
| 5 | 22x2 | 15 |
| 3.3 | 22x2 | 10 |
| 2.5 | 22x2 | 6.8 |
| 1.8 | 22x2 | 4.7 |
| 1.2 | 22x2 | 3.3 |

PACKAGE OUTLINE

Package: ESOP8



NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MS-012 AA
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.