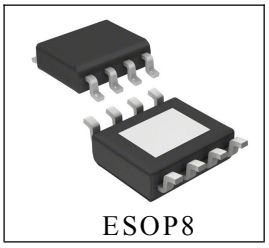
# D2504A

## 2A 150KHz 40V Buck DC/DC Converter With Constant Current Loop

## General Description

The D2504A is a 150KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 2A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

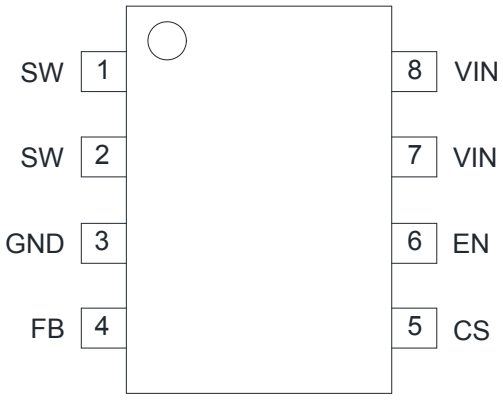

ESOP8

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 100%. An enable function, an over current protection function is built inside. An internal compensation block is built in to minimize external component count.

## Features

- Wide 4.5V to 40V Input Voltage Range
- Output Adjustable from 1.235V to 37V
- Minimum Drop Out 1.5V
- Fixed 150kHz Switching Frequency
- 2A Constant Output Current Capability
- Internal Optimize Power Transistor
- Excellent line and load regulation
- TTL shutdown capability
- ON/OFF pin with hysteresis function
- With output constant current loop
- Cable compensation function
- Built in thermal shutdown function
- Built in current limit function
- Built in output over voltage protection

## Pin Configuration




D2504A(ESOP8)

## Package Information

| Part NO. | Package Description | Package Marking | Package Option |
|---|---|---|---|
| D2504A | ESOP8 | CHMC<br>D2504A<br>SXXXX | 100/Tube<br>4000/Reel |

CHMC:Trademark D2504A:Part NO. SXXXX:Lot NO.

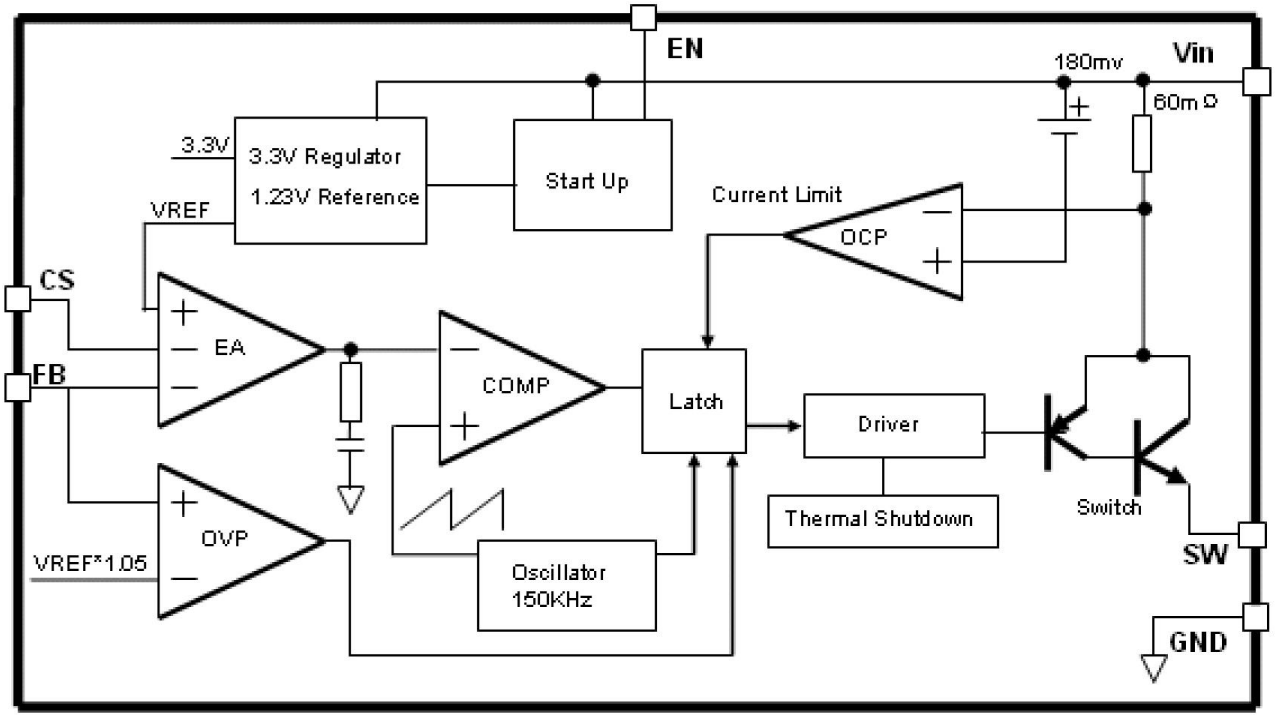
## Applications

- Car Charger
- Battery Charger
- LED Constant Current Driver

## Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1,2 | SW | Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. |
| 3 | GND | Ground Pin.(Note: **Connected the back exposed PAD to Pin3**.) |
| 4 | FB | Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.235V. |
| 5 | CS | Output Current Sense Pin; (Iload=0.155V/Rcs) |
| 6 | EN | Enable Pin. Drive EN pin low to turn on the device, drive it high to turn it off. Floating is default low. |
| 7,8 | VIN | Supply Voltage Input Pin. D2504A operates from a 4.5V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input. |

## Block Diagram



## Absolute Maximum Ratings (Ta=25℃) *

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Input voltage | Vin | -0.3 to 45 | V |
| FB pin voltage | $V_{FB}$ | -0.3 to Vin | V |
| EN pin voltage | $V_{EN}$ | -0.3 to Vin | V |
| SW pin voltage | $V_{SW}$ | -0.3 to Vin | V |
| Power dissipation | $P_D$ | Internally limited | mW |
| Thermal resistance (junction to ambient,no heatsink,free air) | $R_{JA}$ | 50 | ℃/W |
| Operating junction temperature | $T_J$ | -40～ +125 | ℃ |
| Storage temperature | Tstg | -65～ +150 | ℃ |
| Lead temperature (soldering,10 sec) | $T_{LEAD}$ | 260 | ℃ |
| ESD (HBM) | | 2000 | V |

*: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## Electrical Characteristics (unless otherwise specified: Ta= 25°C)

| Characteristic | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Feedback voltage | $V_{FB}$ | Vin=8V to 40V,Vout=5V Iload=0.2A to 2A | 1.21 | 1.235 | 1.26 | V |
| Efficiency | η | Vin=12V,Vout=5V,Iout=2A | | 83 | | % |

## Electrical Characteristics (DC Parameters)

(unless otherwise specified: Vin = 12V, GND=0V, Vin & GND parallel connect a 220uF/50V capacitor; Iout=500mA, Ta= 25°C)

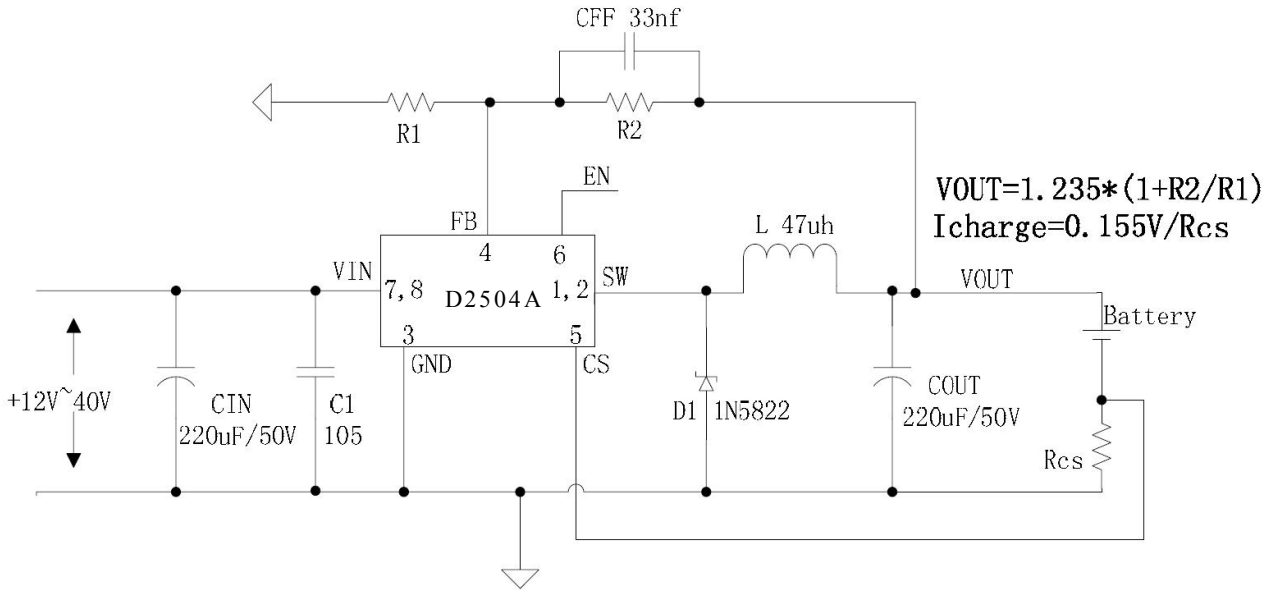
| Characteristic | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input operation voltage | Vin | | 4.5 | | 40 | V |
| Shutdown supply current | $I_{STBY}$ | $V_{EN}$ =5V | | 80 | 200 | μA |
| Quiescent supply current | Iq | $V_{EN}$ =0V, $V_{FB}$ =Vin | | 2 | 5 | mA |
| Oscillator frequency | Fosc | | 127 | 150 | 172 | kHz |
| Switch current limit | IL | $V_{FB}$ =0 | | 3 | | A |
| EN pin threshold | $V_{EN}$ | High(Regulator OFF)<br>Low(Regulator ON) | | 1.4<br>0.8 | | V |
| Output saturation voltage | $V_{CE}$ | $V_{FB}$ =0, $I_{SW}$ =2A | | 1.1 | 1.4 | V |
| Constant current sense voltage | $V_{CS}$ | | 0.140 | 0.170 | 0.240 | V |

## Cable Compensation: (Vout=5V, Io=1A, Rcs=0.1Ω)

| Cable Compensation Value | R1 | R2 |
|---|---|---|
| 100mV | 2K | 6K |
| 200mV | 3K | 9K |
| 300mV | 4K | 12K |
| 400mV | 5K | 15K |
| 500mV | 6K | 18K |

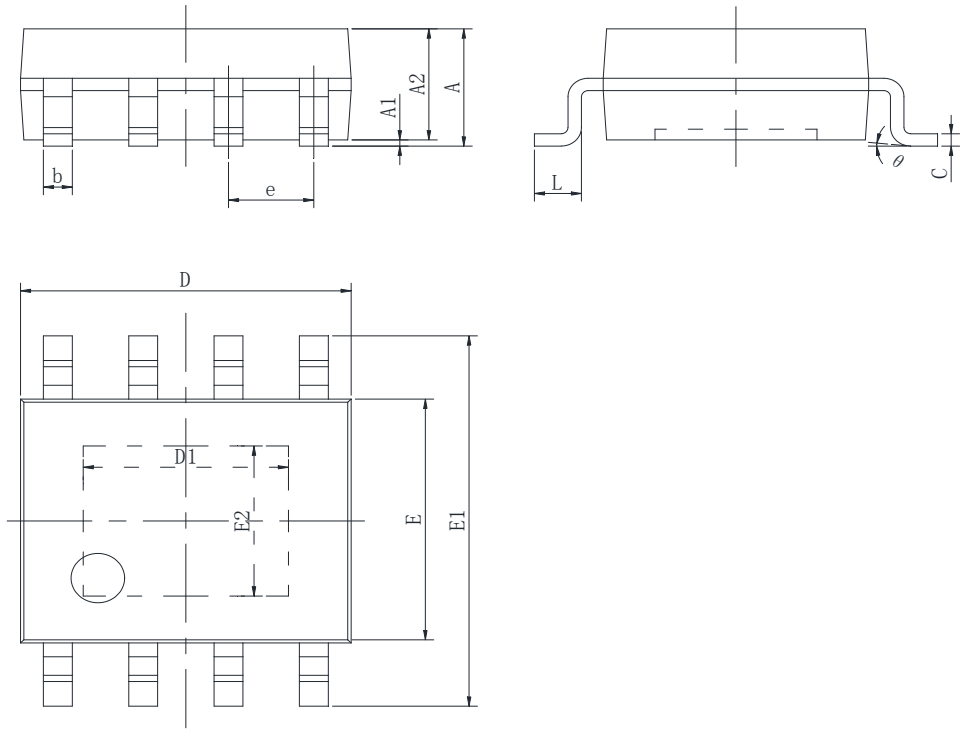
## Application Circuit

### Car Charger



## Outline Dimensions

**ESOP8** Unit: mm




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.700 | 0.053 | 0.067 |
| A1 | 0.050 | 0.200 | 0.002 | 0.008 |
| A2 | 1.300 | 1.500 | 0.051 | 0.059 |
| b | 0.356 | 0.456 | 0.014 | 0.018 |
| c | 0.203(BSC) | | 0.009 | |
| D | 4.800 | 5.000 | 0.188 | 0.197 |
| D1 | 3.302(REF) | | 0.130 | |
| E | 3.800 | 4.000 | 0.149 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| E2 | 2.413(REF) | | 0.095 | |
| e | 1.270(BSC) | | 0.050 | |
| L | 0.400 | 0.600 | 0.015 | 0.023 |
| θ | 0° | 6° | 0° | 6° |

## Statements

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