

Features

- n Wide 8V to 32V Input Voltage Range
- n Output Adjustable from 0.8V to 26V
- n Minimum Drop Out 0.3V
- n Fixed 160KHz Switching Frequency
- n Maximum 2A Output Current Capability
- n Internal Optimize Power MOSFET
- n Excellent line and load regulation
- n High efficiency up to 92%
- n TTL shutdown capability
- n EN pin with hysteresis function
- n With output constant current loop
- n Built in Constant Voltage (CV) Loop
- n Built in Constant Current (CC) Loop
- n Built in thermal shutdown function
- n Built in output short protection
- n SOP8 package

General Description

The XL2005 is a 160 KHz 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.

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.

Applications

- n Car Charger
- n Battery Charger



Figure1. Package Type of XL2005

Pin Configurations

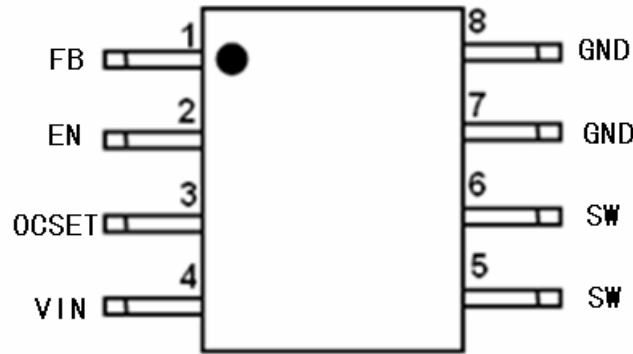


Figure2. Pin Configuration of XL2005 (Top View)

Table 1 Pin Description

| Pin Number | Pin Name | Description |
|------------|----------|---|
| 1 | FB | Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 0.8V. |
| 2 | EN | Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. |
| 3 | OCSET | Output Constant Current Set Pin. |
| 4 | VIN | Supply Voltage Input Pin. XL2005 operates from a 8V to 32V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input. |
| 5,6 | SW | Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. |
| 7,8 | GND | Ground Pin. |

Function Block

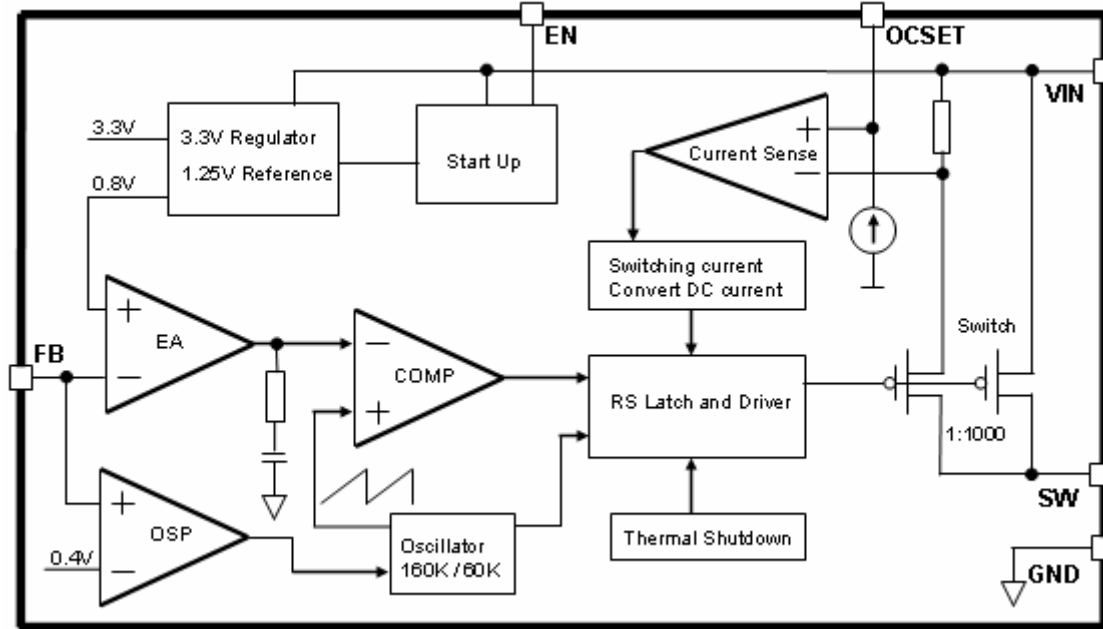


Figure3. Function Block Diagram of XL2005

Ordering Information

| Package | Temperature Range | Part Number | Marking ID | Packing Type |
|---------|-------------------|-------------|------------|--------------|
| | | Lead Free | Lead Free | |
| | | XL2005E1 | XL2005E1 | Tube |
| | | XL2005TRE1 | XL2005E1 | Tape & Reel |

XLSEMI Pb-free products, as designated with “E1” suffix in the par number, are RoHS compliant.

Absolute Maximum Ratings (Note1)

| Parameter | Symbol | Value | Unit |
|--|-------------------|-------------------------|------|
| Input Voltage | V _{in} | -0.3 to 34 | V |
| FB Pin Voltage | V _{FB} | -0.3 to V _{in} | V |
| EN Pin Voltage | V _{EN} | -0.3 to V _{in} | V |
| SW Pin Voltage | V _{SW} | -0.3 to V _{in} | V |
| Power Dissipation | P _D | Internally limited | mW |
| Thermal Resistance (Junction to Ambient, No Heatsink, Free Air) | R _{JA} | 100 | °C/W |
| Operating Junction Temperature | T _J | -40 to 125 | °C |
| Storage Temperature | T _{STG} | -65 to 150 | °C |
| Lead Temperature (Soldering, 10 sec) | T _{LEAD} | 260 | °C |
| ESD (HBM) | | > 2000 | V |

| | |
|--|--------|
| 2A 160KHz 32V Buck DC/DC Converter With CV/CC Loop | XL2005 |
|--|--------|

Note1: 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.

XL2005 Electrical Characteristics

T_a = 25°C ;unless otherwise specified.

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|------------------|--|------|------|------|------|
| <i>System parameters test circuit figure4</i> | | | | | | |
| VFB | Feedback Voltage | V _{in} = 8V to 30V, V _{out} =5V I _{load} =0.2A | 780 | 800 | 820 | mV |
| Efficiency | η | V _{in} =12V , V _{out} =5V I _{out} =1.5A | - | 90 | - | % |

Electrical Characteristics (DC Parameters)

V_{in} = 12V, GND=0V, V_{in} & GND parallel connect a 100uf/35V capacitor; I_{out}=500mA, T_a = 25°C ; the others floating unless otherwise specified, system parameters reference figure4.

| Parameters | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|--------------------------|-------------------|---|------|------------|------|------|
| Input operation voltage | V _{in} | | 8 | | 32 | V |
| Shutdown Supply Current | I _{STBY} | V _{EN} =0V | | 60 | 200 | uA |
| Quiescent Supply Current | I _q | V _{EN} =2V, V _{FB} =Vin | | 2.5 | 5 | mA |
| Oscillator Frequency | F _{osc} | | 128 | 160 | 192 | KHz |
| EN Pin Threshold | V _{EN} | High (Regulator ON) Low (Regulator OFF) | | 1.7 1.1 | | V |
| Output Power PMOS | R _{dson} | V _{FB} =0V, V _{in} =12V, I _{sw} =2A | | 60 | 80 | mohm |
| Output Voltage Set | VFB | V _{out} =(1+R2/R1)*VFB | 0.78 | 0.8 | 0.82 | V |

2A 160KHz 32V Buck DC/DC Converter With CV/CC Loop XL2005

Typical Application Circuit (Car Charger)

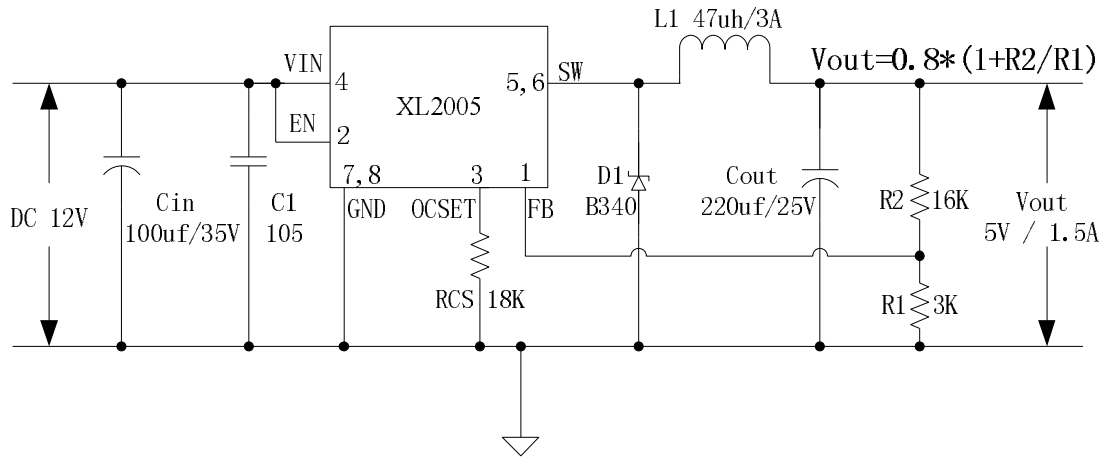


Figure4. XL2005 Typical Application Circuit (Car Charger)

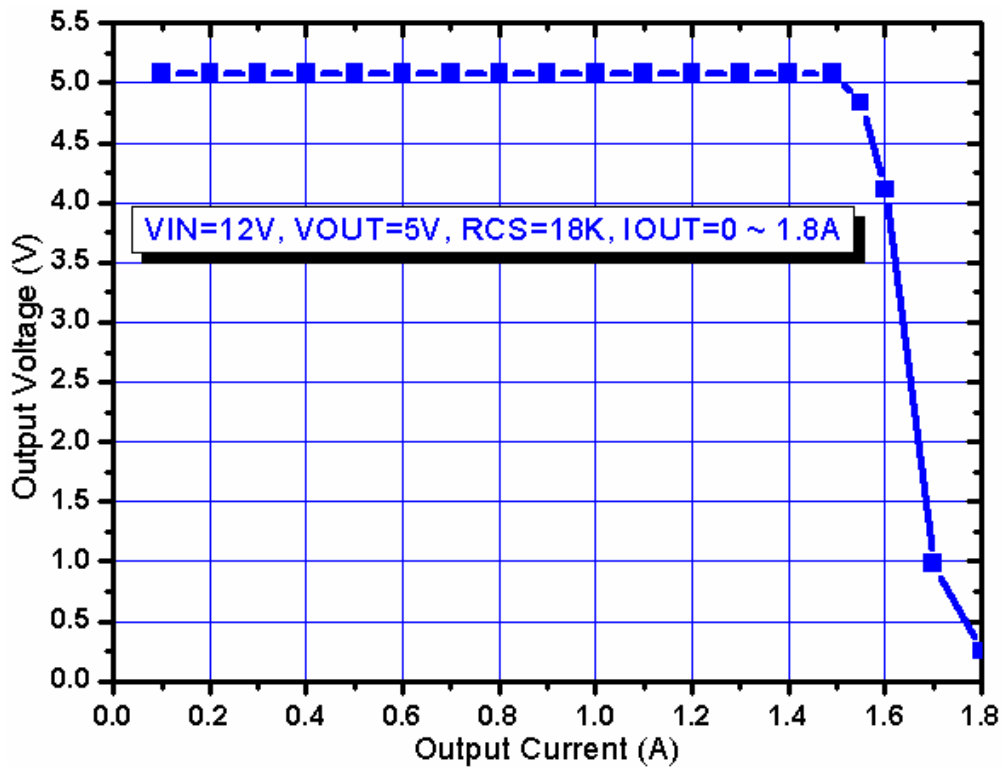


Figure5. Output Voltage VS Output Current Curve

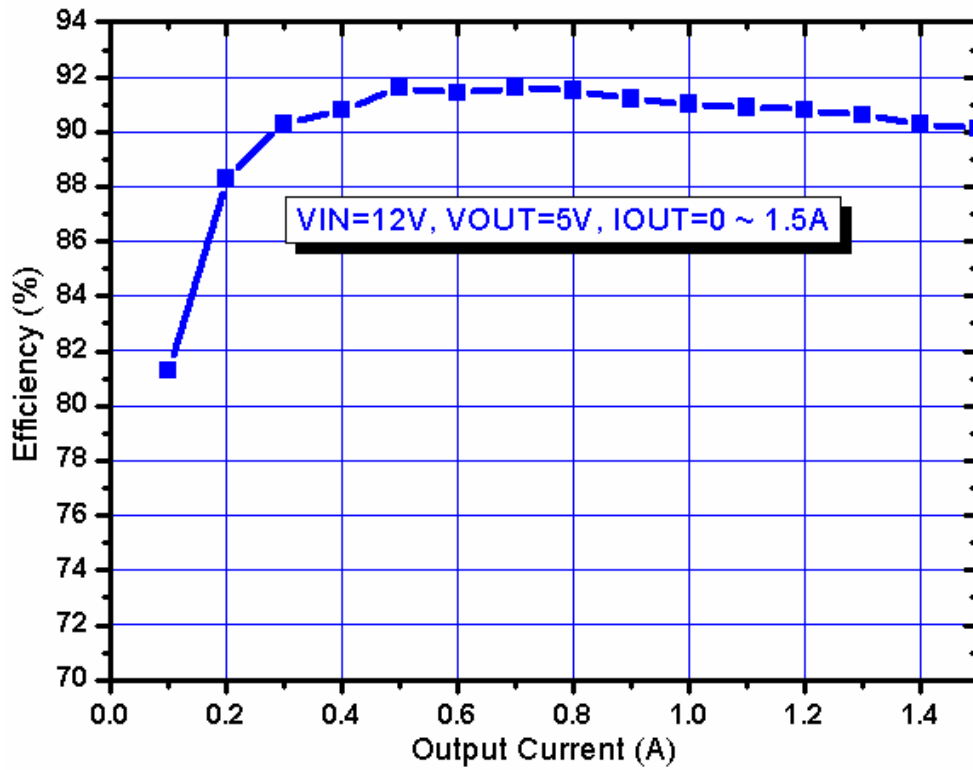


Figure6. Output Current VS Efficiency Curve

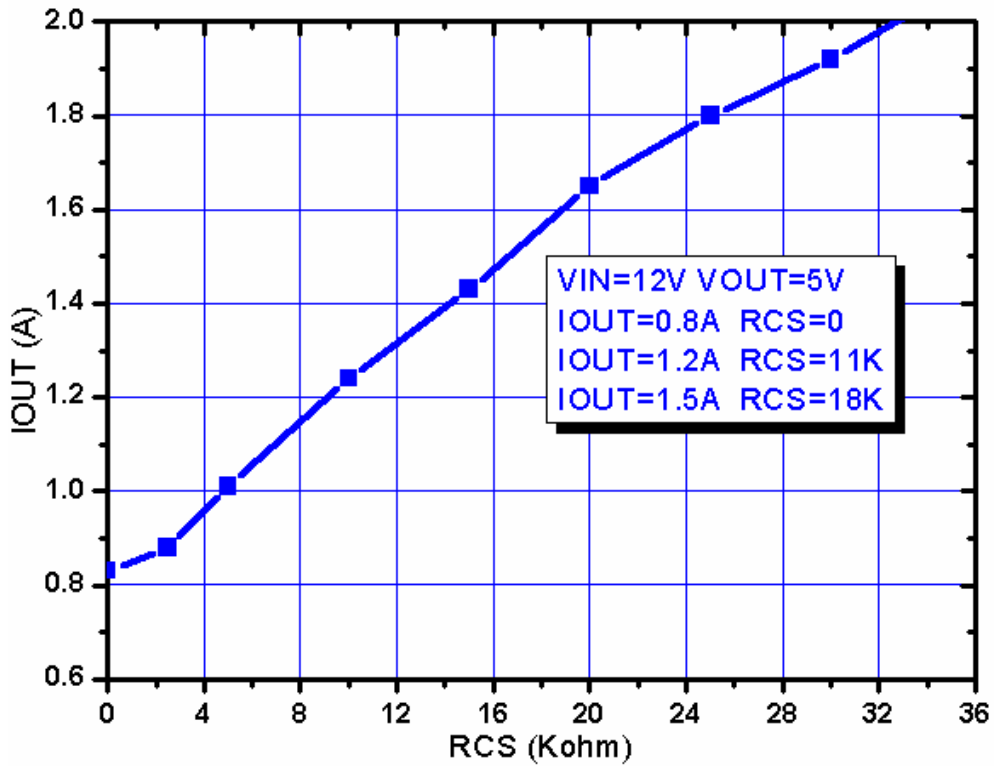


Figure7. RCS VS Output Current Select Curve

Schottky Diode Selection Table

| Current | Surface Mount | Through Hole | VR (The same as system maximum input voltage) | | |
|---------|---------------|--------------|---|--------|--------|
| | | | 20V | 30V | 40V |
| 1A | | √ | 1N5817 | 1N5818 | 1N5819 |
| | √ | | SS12 | SS13 | SS14 |
| 3A | | √ | 1N5820 | 1N5821 | 1N5822 |
| | | √ | MBR320 | MBR330 | MBR340 |
| | √ | | SK32 | SK33 | SK34 |
| | √ | | | 30WQ03 | 30WQ04 |
| | | √ | | 31DQ03 | 31DQ04 |
| | | √ | SR302 | SR303 | SR304 |

Package Information

SOP8 Package Mechanical Dimensions

SOIC-8

Unit: mm(inch)

