# 0.4A 150KHz 80V Buck DC to DC Converter XL7005A

## Features

- Wide 5V to 80V Operation Voltage
- Output Adjustable from 1.25V to 20V
- Maximum Duty Cycle 100%
- Minimum Drop Out 1V
- Fixed 150KHz Switching Frequency
- Maximum 0.4A Output Current
- Recommend output power less than 5W
- Internal Optimize HV Power Transistor
- High efficiency up to 85%
- Excellent line and load regulation
- TTL shutdown capability
- Built in thermal shutdown function
- Built in output short Protection Function
- Built in current limit function
- SOP8-EP (Exposed PAD) package

## Applications

- Ebike Controller Power Supply
- Telecom / Networking Equipment

## General Description

The XL7005A is a 150KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 0.4A 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. When output short protection function happens, the operation frequency will be reduced from 150KHz to 45KHz. An internal compensation block is built in to minimize external component count.

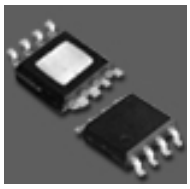


Figure1. Package Type of XL7005A

## Pin Configurations

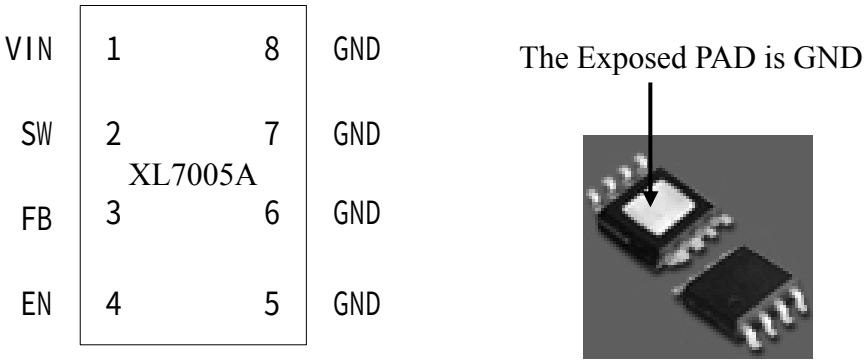



Figure2. Pin Configuration of XL7005 A(Top View)

Table 1 Pin Description

| Pin Number | Pin Name | Description |
|---|---|---|
| 1 | VIN | Supply Voltage Input Pin. XL7005A operates from a 5V to 80V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input. |
| 2 | SW | Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. |
| 3 | FB | Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.25V. |
| 4 | EN | Enable Pin. Drive EN pin low to turn on the device, drive it high to turn it off. Floating is default low. |
| 5~8 | GND | Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL7005A. The exposed PAD is GND. |

## Function Block

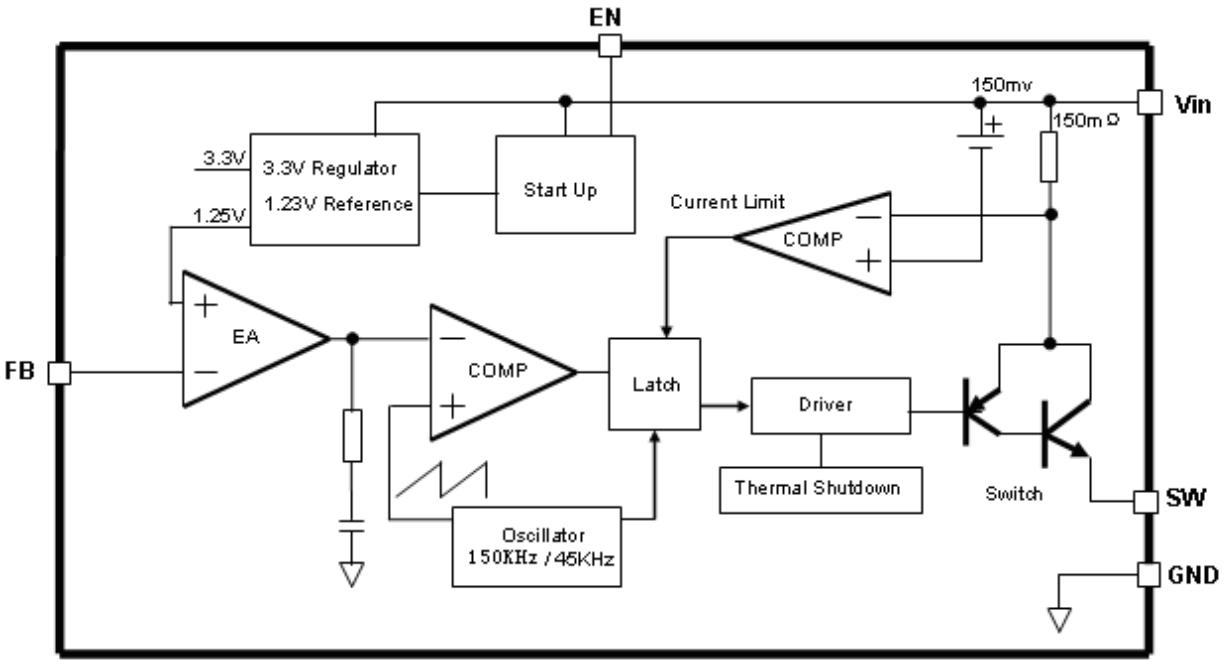



Figure3. Function Block Diagram of XL7005A

## Typical Application Circuit

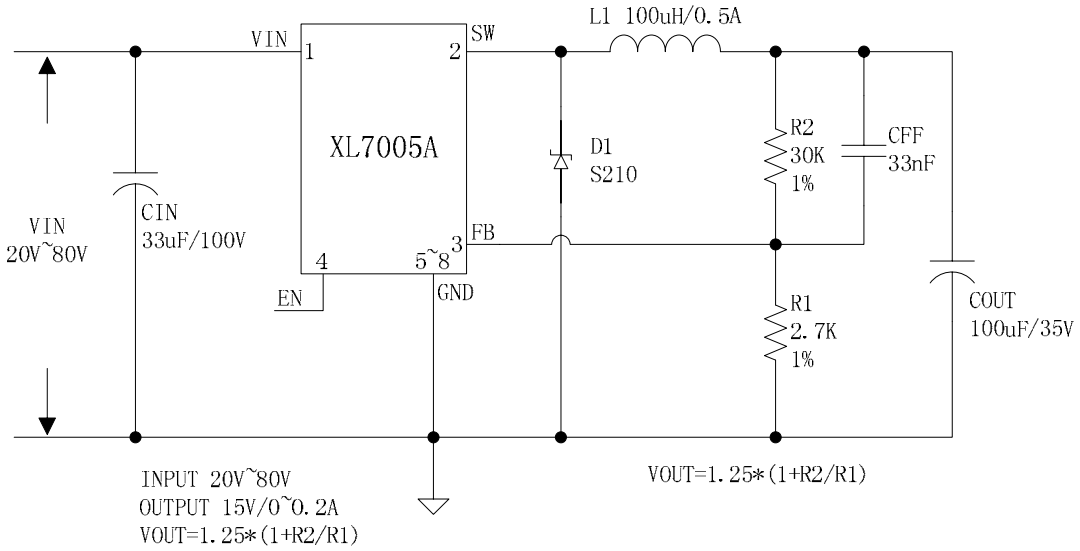



Figure4. XL7005A Typical Application Circuit

## Ordering Information

| Order Information | Marking ID | Package Type | Packing Type Supplied As |
|---|---|---|---|
| XL7005A | XL7005A | SOP8-EP | 2500 Units on Tape & Reel |

## Absolute Maximum Ratings（Note1）

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Input Voltage | Vin | -0.3 to 85 | V |
| Feedback Pin Voltage | $V_{FB}$ | -0.3 to Vin | V |
| EN Pin Voltage | $V_{EN}$ | -0.3 to Vin | V |
| Output Switch Pin Voltage | $V_{SW}$ | -0.3 to Vin | V |
| Power Dissipation | $P_D$ | Internally limited | mW |
| Thermal Resistance (SOP8-EP)<br>(Junction to Ambient, No Heatsink, Free Air) | $R_{JA}$ | 60 | ºC/W |
| Maximum Junction Temperature | $T_J$ | -40 to 150 | ºC |
| Operating Junction Temperature | $T_J$ | -40 to 125 | ºC |
| Storage Temperature | $T_{STG}$ | -65 to 150 | ºC |
| Lead Temperature (Soldering, 10 sec) | $T_{LEAD}$ | 260 | ºC |
| ESD (HBM) | | >3000 | V |

**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.

## XL7005A Electrical Characteristics

$T_a$ = 25℃;unless otherwise specified.

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| ***System parameters test circuit figure4*** | | | | | | |
| VFB | FB Voltage | Vin =20V to 80V<br>Iload=0.1A to 0.2A | 1.225 | 1.25 | 1.275 | V |
| ŋ | Efficiency | Vin=36V ,Vout=15V<br>Iout=0.2A | - | 85 | - | % |
| ŋ | Efficiency | Vin=48V ,Vout=15V<br>Iout=0.2A | - | 81 | - | % |
| ŋ | Efficiency | Vin=60V ,Vout=15V<br>Iout=0.2A | - | 75 | - | % |

## Electrical Characteristics (DC Parameters)

Vin = 48V, GND=0V, Vin & GND parallel connect a 33uf/100V capacitor; Iout=0.2A, $T_a$ = 25℃; the others floating unless otherwise specified.

| Parameters | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input operation voltage | Vin | | 5 | | 80 | V |
| Shutdown Supply Current | $I_{STBY}$ | $V_{EN}$=2V | | 85 | 200 | uA |
| Quiescent Supply Current | $I_q$ | $V_{EN}$=0V,<br>$V_{FB}$=Vin | | 2.5 | 5 | mA |
| Oscillator Frequency | Fosc | | 120 | 150 | 180 | KHz |
| Switch Current Limit | $I_L$ | $V_{FB}$=0 | | 0.5 | | A |
| EN Pin Threshold | $V_{EN}$ | High (Regulator OFF) | | 1.6 | | V |
| | | Low (Regulator ON) | | 0.8 | | |
| EN Pin Input Leakage Current | $I_H$ | $V_{EN}$=2.5V (OFF) | | 6 | 20 | uA |
| | $I_L$ | $V_{EN}$=0.5V (ON) | | 1 | 10 | uA |
| Output Saturation Voltage | $V_{CE}$ | $V_{FB}$=0V<br>$I_{out}$=0.4A | | 0.87 | | V |
| Max. Duty Cycle | $D_{MAX}$ | $V_{FB}$=0V | | 100 | | % |

## Typical System Application (Recommend output current safe work range)

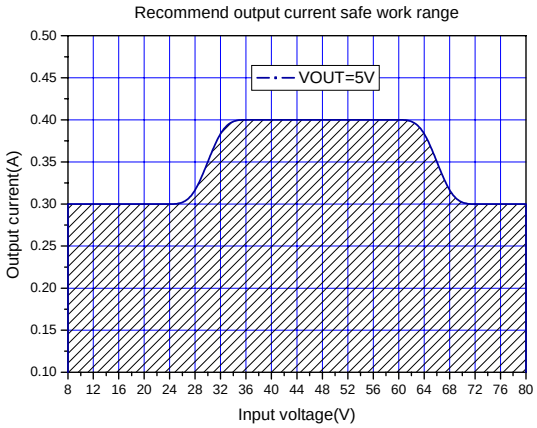



Figure5.Max output current(VOUT=5V)

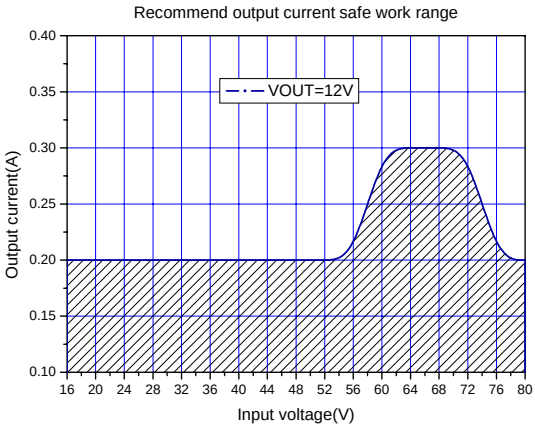



Figure6.Max output current(VOUT=12V)

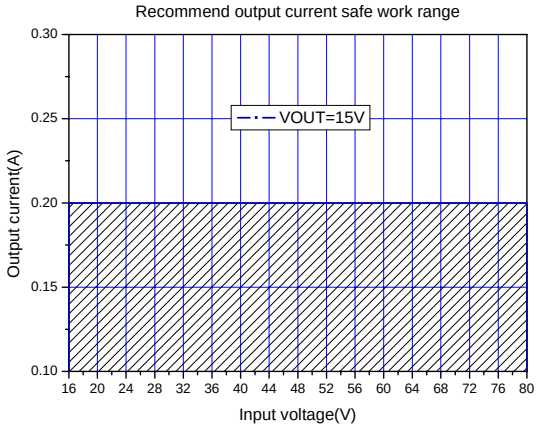



Figure7.Max output current(VOUT=15V)

## Typical System Application(VOUT=15V/0.2A)

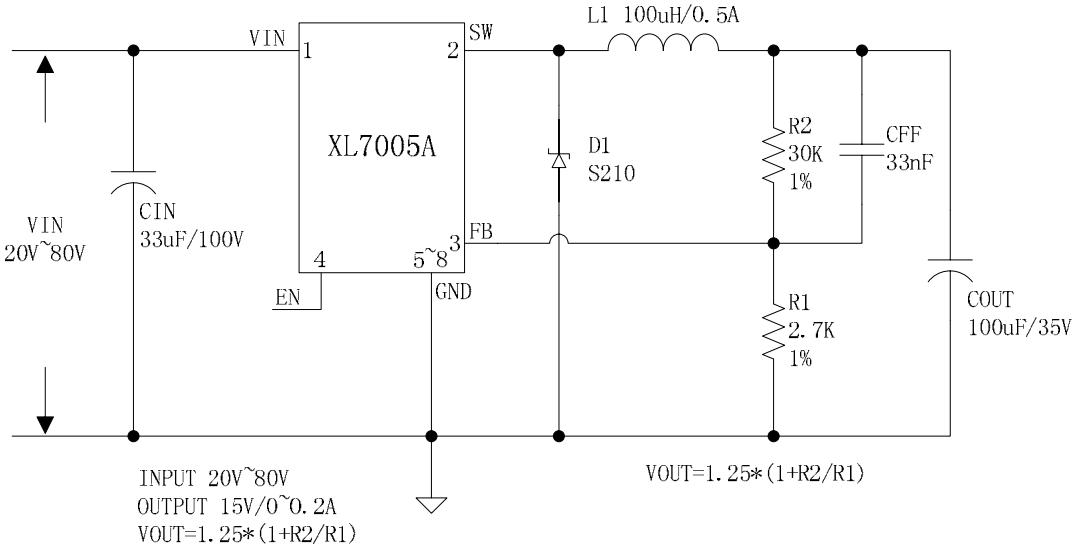



Figure8. XL7005A System Application (VIN=24V~80V, VOUT=15V/0.2A)

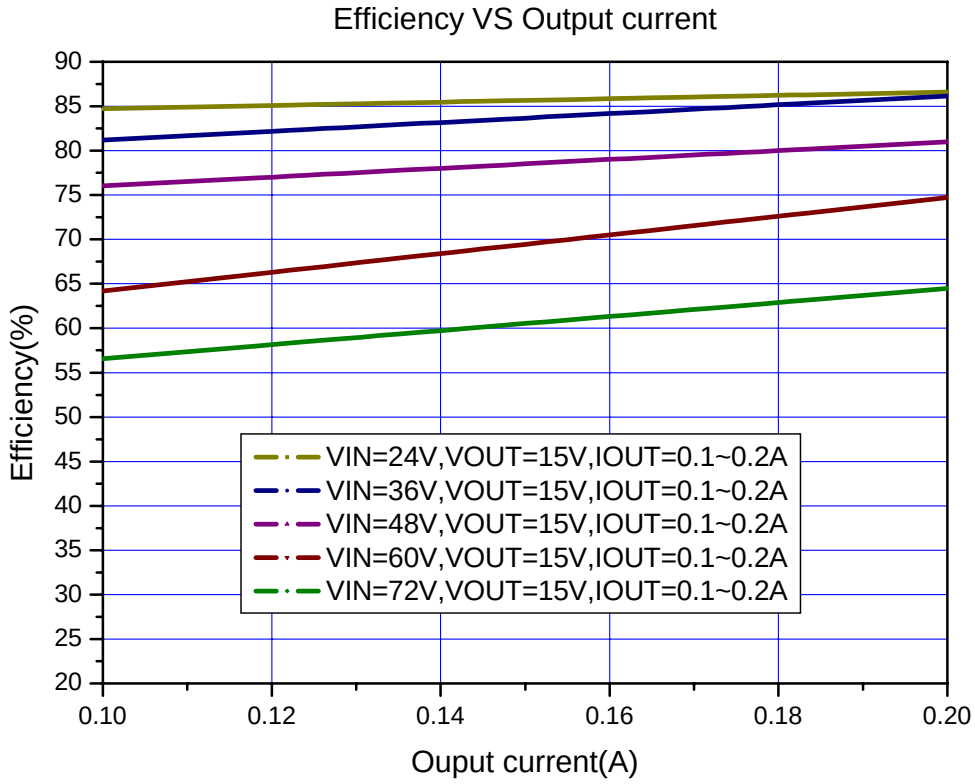



Figure9. XL7005A System Application (Efficiency VS Output Current)

## Typical System Application(VOUT=5V/0.4A)

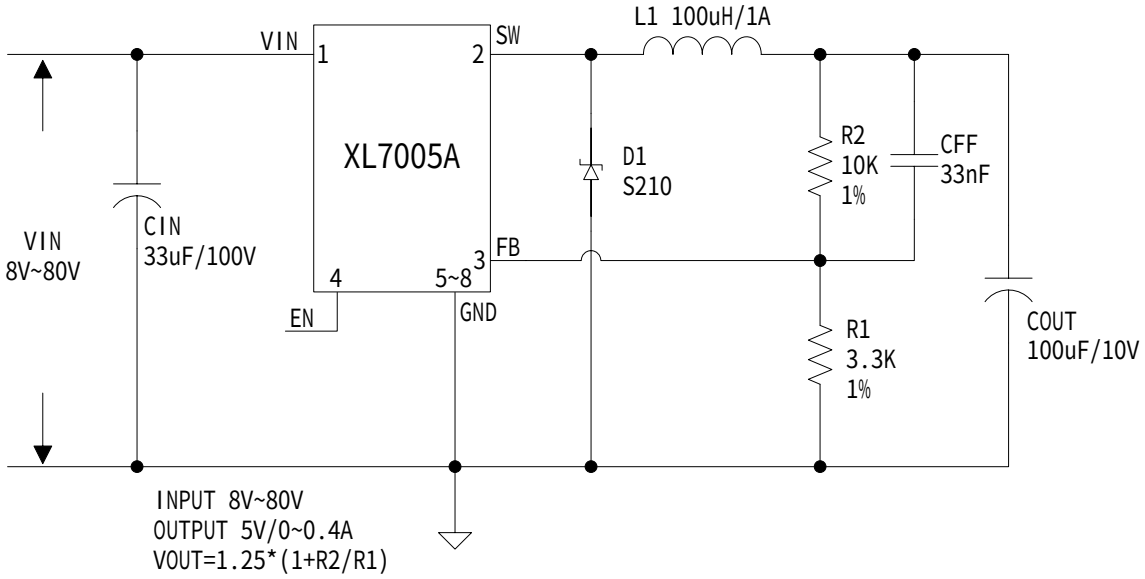



Figure10. XL7005A System Application (VIN=8V~80V, VOUT=5V/0.4A)

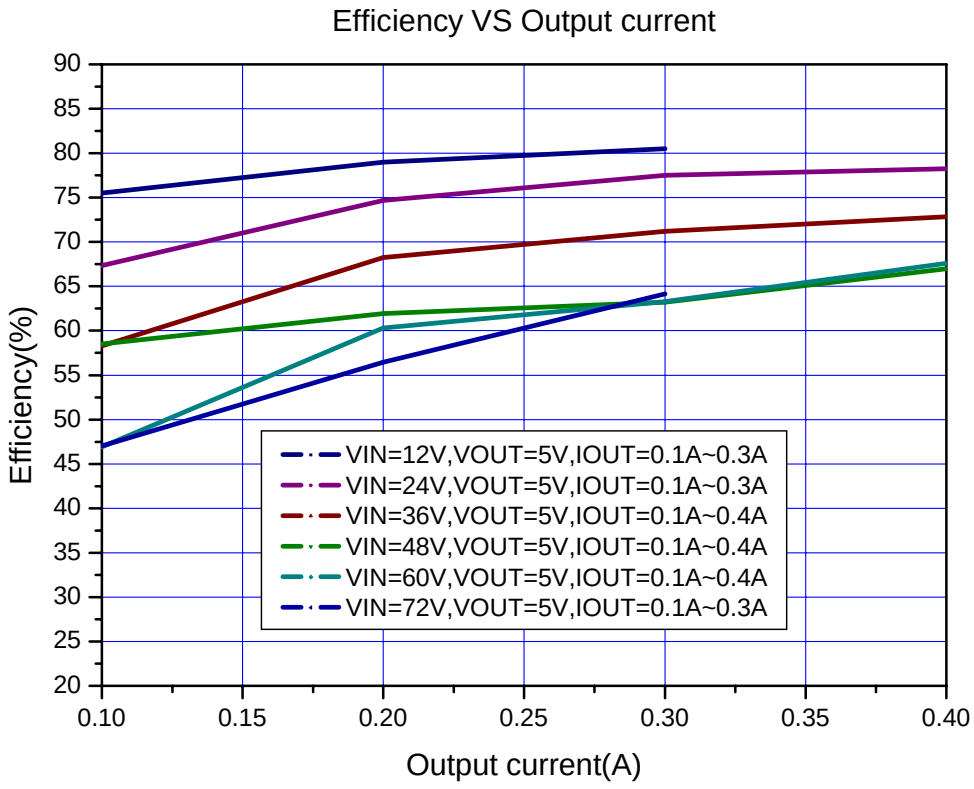
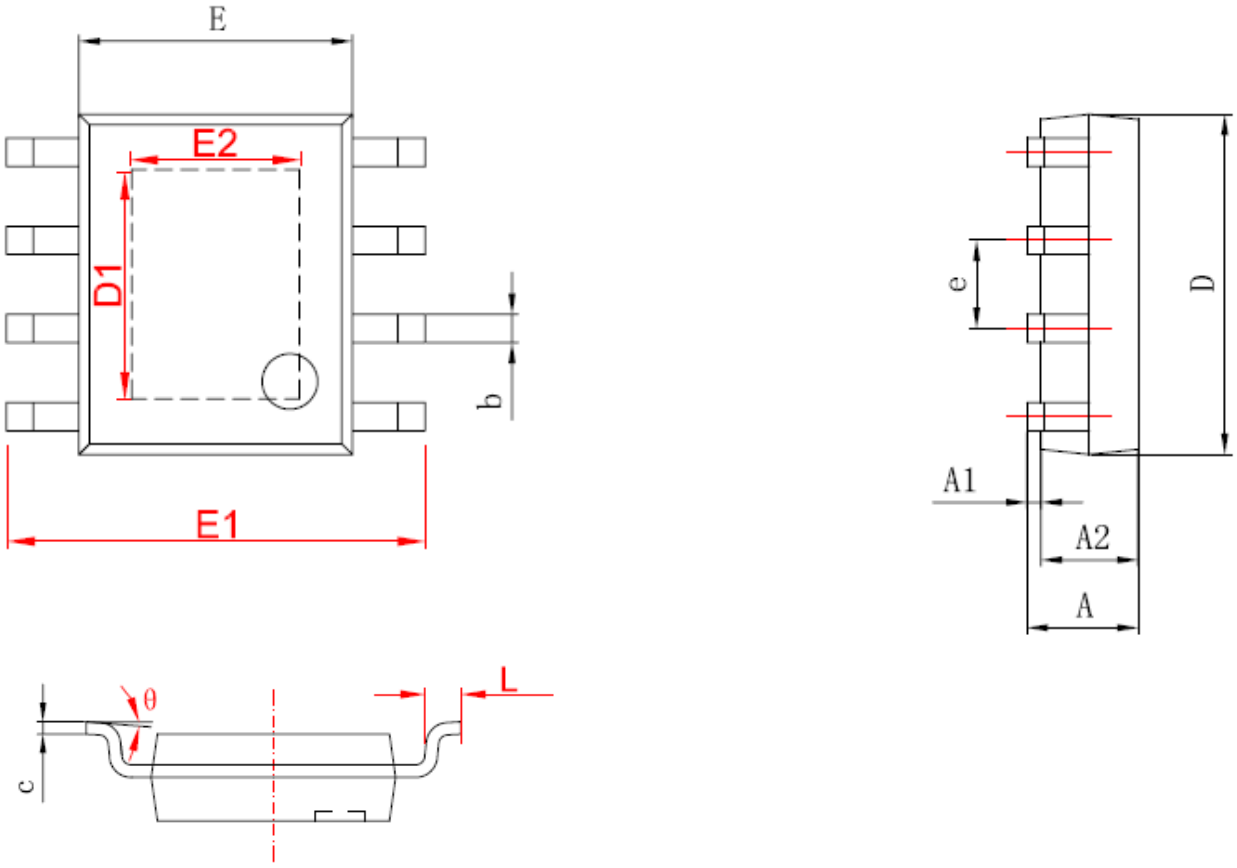



Figure11. XL7005A System Application (Efficiency VS Output Current)

## Package Information

## Package Information (SOP8-EP)




| 字符 | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.050 | 0.150 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| D1 | 3.202 | 3.402 | 0.126 | 0.134 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| E2 | 2.313 | 2.513 | 0.091 | 0.099 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

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