

**2A CMOS LDO REGULATOR****AP2132B**

## General Description

The AP2132B series are positive voltage regulator ICs fabricated by CMOS process. The ICs consist of a voltage reference, an error amplifier, a power transistor, a resistor network for setting output voltage, a current limit circuit for current protection, and a chip enable circuit.

The AP2132B series have features of large current, low dropout voltage, high output voltage accuracy, low input voltage. The AP2132B provides a power good (PG) signal to indicate if the voltage level of  $V_{OUT}$  reaches 92% of its rating value. And it operates with  $V_{IN}$  as low as 1.4V and  $V_{CTRL}$  voltage 5V with output voltage programmable as low as 0.8V.

The AP2132B are available in 1.2V, 1.5V, 1.8V, 2.5V fixed output voltage versions and adjustable output voltage version. The fixed versions integrate the adjust resistors. It is also available in an adjustable version, which can set the output voltage with external resistor. If the pin of adjustable output voltage is to ground, it will switch to fixed output voltage.

AP2132B series are available in PSOP-8 package.

## Features

- Adjustable Output: 0.8V to 3.0V
- Low Dropout Voltage: 300mV@  $I_{OUT}=2A$ ,  $V_{OUT}=1.2V$
- Over Current and Over Temperature Protection
- Enable Pin
- PSOP-8 Package with Thermal Pad
- Maximum Output Current: 2A
- High Output Voltage Accuracy: 2%
- $V_{OUT}$  Power Good Signal
- Excellent Line/Load Regulation

## Applications

- Notebook



Figure 1. Package Type of AP2132B

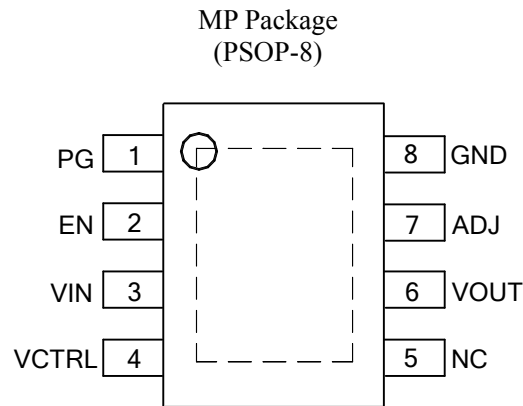
**2A CMOS LDO REGULATOR**
**AP2132B**
**Pin Configuration**


Figure 2. Pin Configuration of AP2132B (Top View)

**Pin Description**

| Pin Number | Pin Name | Function   |
|------------|----------|--|
| 1          | PG       | Assert high once $V_{OUT}$ reaches 92% of its rating voltage   |
| 2          | EN       | Enable input   |
| 3          | VIN      | Input voltage  |
| 4          | VCTRL    | Input voltage for controlling circuit  |
| 5          | NC       | Not connected  |
| 6          | VOUT     | Regulated output voltage   |
| 7          | ADJ      | Adjust output: when connected to ground, the output voltage is set by internal resistors; when external feedback resistors are connected, the output voltage will be $V_{OUT}=0.8(R1+R2)/R2$ |
| 8          | GND      | Ground   |

**2A CMOS LDO REGULATOR**

**AP2132B**

**Functional Block Diagram**

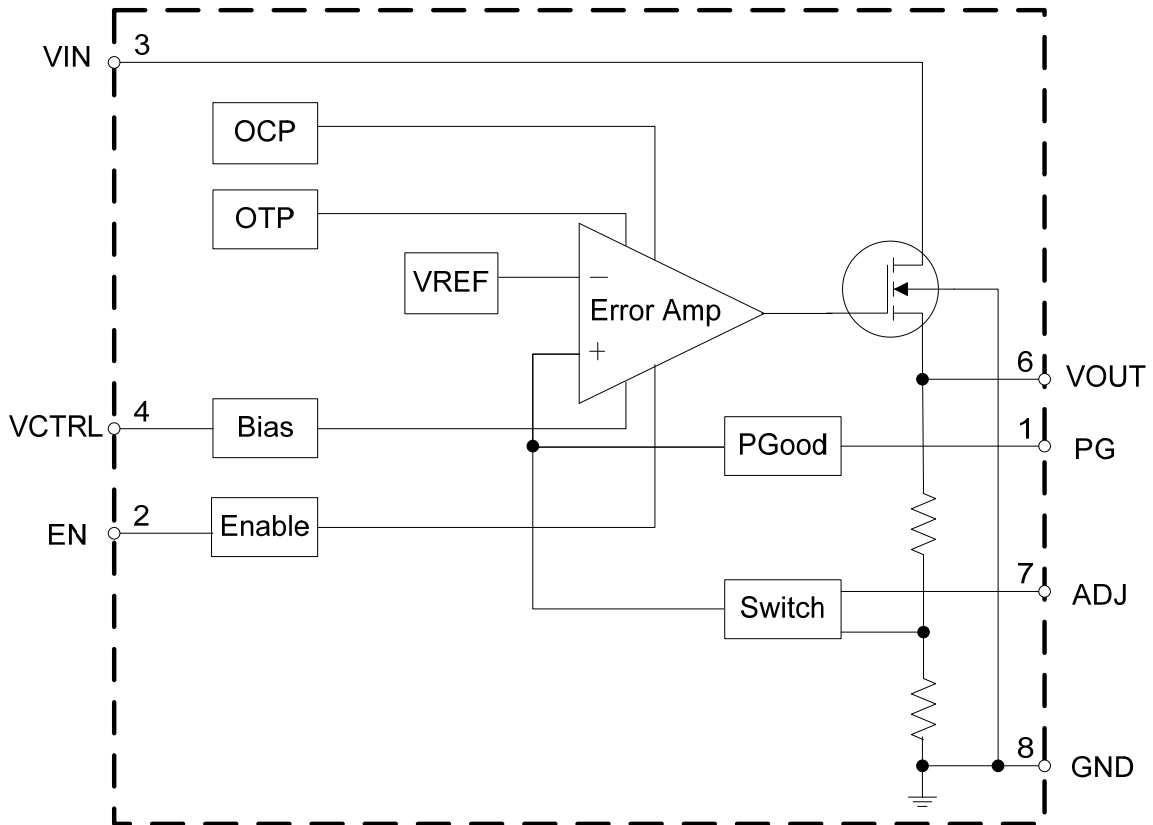
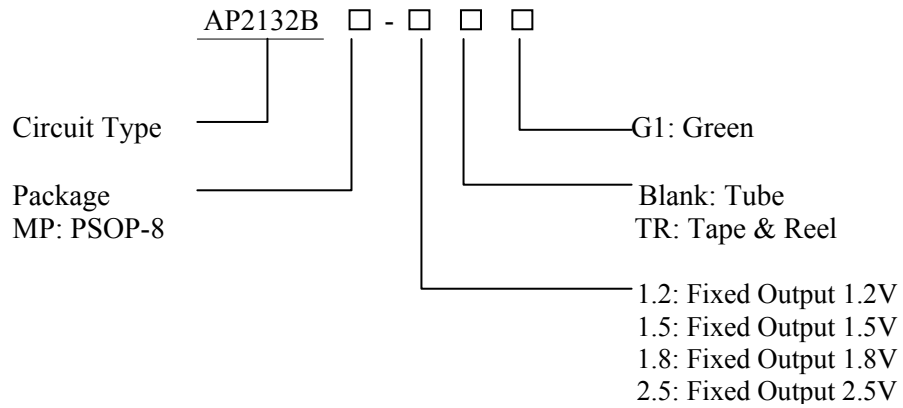


Figure 3. Functional Block Diagram of AP2132B

**2A CMOS LDO REGULATOR**

**AP2132B**

**Ordering Information**



| Package | Temperature Range | Version Description                              | Part Number       | Marking ID  | Packing Type |
|---------|-------------------|--|-------------------|-------------|--------------|
| PSOP-8  | -40 to 85 °C      | Each fixed output version integrates ADJ version | AP2132BMP-1.2G1   | 2132B-1.2G1 | Tube         |
|         |                   |  | AP2132BMP-1.2TRG1 | 2132B-1.2G1 | Tape & Reel  |
|         |                   |  | AP2132BMP-1.5G1   | 2132B-1.5G1 | Tube         |
|         |                   |  | AP2132BMP-1.5TRG1 | 2132B-1.5G1 | Tape & Reel  |
|         |                   |  | AP2132BMP-1.8G1   | 2132B-1.8G1 | Tube         |
|         |                   |  | AP2132BMP-1.8TRG1 | 2132B-1.8G1 | Tape & Reel  |
|         |                   |  | AP2132BMP-2.5G1   | 2132B-2.5G1 | Tube         |
|         |                   |  | AP2132BMP-2.5TRG1 | 2132B-2.5G1 | Tape & Reel  |

BCD Semiconductor's Pb-free products, as designated with "G1" suffix in the part number, are RoHS compliant and Green.

**2A CMOS LDO REGULATOR****AP2132B****Absolute Maximum Ratings (Note 1)**

| Parameter                             | Symbol        | Value       | Unit |
|---------------------------------------|---------------|-------------|------|
| Input Voltage                         | $V_{IN}$      | 6.0         | V    |
| Input Voltage for Controlling Circuit | $V_{CTRL}$    |             |      |
| Enable Input Voltage                  | $V_{EN}$      | -0.3 to 6.0 | V    |
| Output Current                        | $I_{OUT}$     | 2.5         | A    |
| Thermal Resistance (Note 2)           | $\theta_{JA}$ | 53          | °C/W |
| Operating Junction Temperature        | $T_J$         | 150         | °C   |
| Storage Temperature Range             | $T_{STG}$     | -65 to 150  | °C   |
| Lead Temperature (Soldering, 10sec)   | $T_{LEAD}$    | 260         | °C   |
| ESD (Machine Model)                   |               | 200         | V    |
| ESD (Human Body Model)                |               | 2000        | V    |

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Note 2:  $\theta_{JA}$  is measured with the component mounted on 2-Layer FR-4 PCB board with 1.0cm\*1.0cm thermal sink pad in free air.

**Recommended Operating Conditions**

| Parameter                             | Symbol     | Min | Max | Unit |
|---------------------------------------|------------|-----|-----|------|
| Input Voltage                         | $V_{IN}$   | 1.4 | 5.5 | V    |
| Input Voltage for Controlling Circuit | $V_{CTRL}$ | 4.5 | 5.5 | V    |
| Operating Ambient Temperature Range   | $T_A$      | -40 | 85  | °C   |



**2A CMOS LDO REGULATOR**

**AP2132B**

**Electrical Characteristics**

$V_{IN}=V_{OUT}+0.5V$ ,  $V_{CTRL}=V_{EN}=5V$ ,  $T_A=25^{\circ}C$ ,  $C_{IN}=C_{OUT}=10\mu F$ ,  $C_{CTRL}=1\mu F$ ,  $I_{OUT}=10mA$ , unless otherwise specified.

| Parameter                              | Symbol   | Conditions  | Min                   | Typ       | Max                    | Unit             |
|--|--|---|-----------------------|-----------|------------------------|------------------|
| Output Voltage                         | $V_{OUT}$  | $V_{IN}=V_{OUT}+0.5V$ ,<br>$I_{OUT}=10mA$                 | $V_{OUT} \times 98\%$ |           | $V_{OUT} \times 102\%$ | V                |
| Input Voltage                          | $V_{IN}$   |   | 1.4                   |           | 5.5                    | V                |
| Current Limit                          | $I_{LIMIT}$                                      | $V_{IN}-V_{OUT}=1V$                                       | 3                     |           |                        | A                |
| Load Regulation                        | $V_{RLOAD}$                                      | $V_{IN}=V_{OUT}+0.5V$ , $10mA \leq I_{OUT} \leq 2A$       |                       | 10        |                        | mV               |
| Line Regulation                        | $V_{RLINE}$                                      | $V_{OUT}+0.5V \leq V_{IN} \leq 5V$ ,<br>$I_{OUT}=10mA$    |                       | 2         |                        | mV               |
| Dropout Voltage                        | $V_{DROP}$                                       | $I_{OUT}=500mA$   |                       | 80        | 120                    | mV               |
|  |  | $I_{OUT}=1A$  |                       | 150       | 200                    | mV               |
|  |  | $I_{OUT}=2A$  |                       | 300       | 450                    | mV               |
| Supply Current                         | $I_{SUPPLY}$                                     | $V_{IN}=V_{OUT}+0.5V$ , $I_{OUT}=0mA$                     |                       | 300       |                        | $\mu A$          |
| $V_{CTRL}$ Current                     | $I_{CTRLH}$                                      | $V_{IN}=V_{OUT}+0.5V$ , $V_{CTRL}=V_{EN}=5V$              |                       | 250       | 500                    | $\mu A$          |
|  | $I_{CTRL L}$                                     | $V_{IN}=V_{OUT}+0.5V$ , $V_{CTRL}=5V$ , $V_{EN}=0V$       |                       | 0.1       | 1.0                    | $\mu A$          |
| Power Supply Rejection Ratio           | PSRR   | Ripple 0.5Vp-p,<br>$V_{IN}=V_{OUT}+1V$                    | f=100Hz               |           | 60                     | dB               |
|  |  |   | f=1kHz                |           | 60                     | dB               |
| Output Voltage Temperature Coefficient | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T}$ | $I_{OUT}=10mA$ , $-40^{\circ}C \leq T_A \leq 85^{\circ}C$ |                       | $\pm 100$ |                        | ppm/ $^{\circ}C$ |
| Short Circuit Current                  | $I_{SHORT}$                                      |   |                       | 0.3       | 0.5                    | A                |
| Reference Voltage                      | $V_{REF}$  | Adjust Short to $V_{OUT}$                                 | 0.784                 | 0.8       | 0.816                  | V                |
| Enable “High” Voltage                  |  | Enable Input Voltage “High”                               | 1.2                   |           |                        | V                |
| Enable “Low” Voltage                   |  | Enable Input Voltage “Low”                                |                       |           | 0.4                    | V                |
| Thermal Shutdown                       | OTSD   |   |                       | 165       |                        | $^{\circ}C$      |
| Thermal Shutdown Hysteresis            |  |   |                       | 20        |                        | $^{\circ}C$      |
| $V_{OUT}$ Power Good Voltage           | $V_{THPG}$                                       |   |                       | 92        |                        | %                |
| $V_{PG}$ Hysteresis                    |  |   |                       | 7         |                        | %                |
| Adjust Pin Threshold                   |  |   |                       | 200       |                        | mV               |
| Thermal Resistance (Junction to Case)  | $\theta_{JC}$                                    | PSOP-8  |                       | 29        |                        | $^{\circ}C/W$    |

**2A CMOS LDO REGULATOR**

**AP2132B**

**Typical Performance Characteristics**

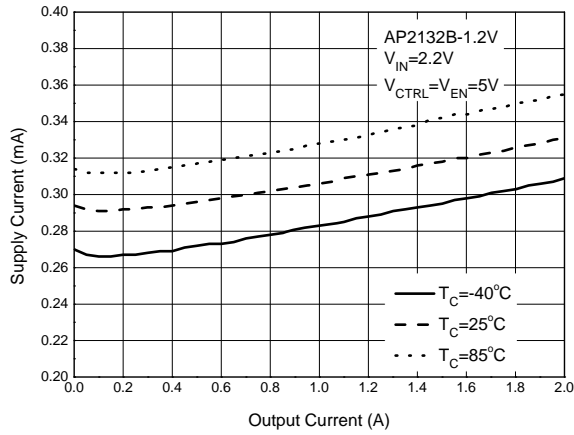


Figure 4. Supply Current vs. Output Current

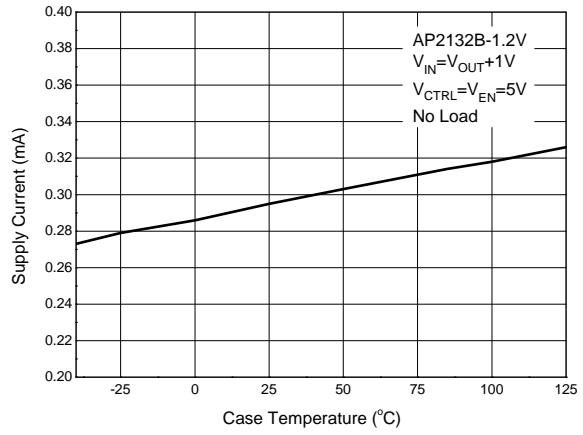


Figure 5. Supply Current vs. Case Temperature

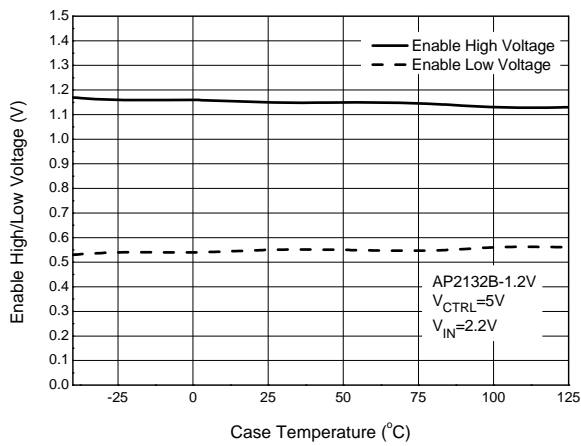


Figure 6. Enable High/Low Voltage vs. Case Temperature

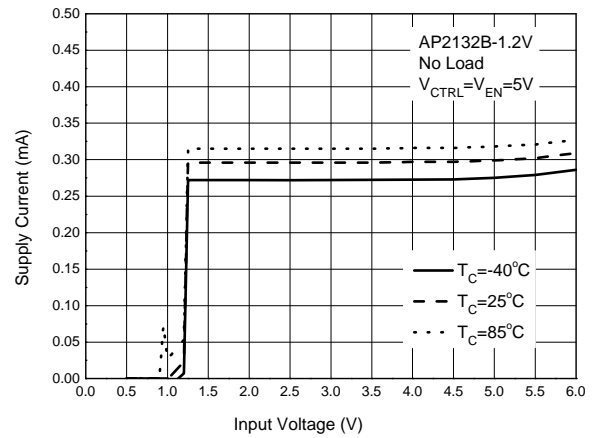


Figure 7. Supply Current vs. Input Voltage

**Typical Performance Characteristics (Continued)**

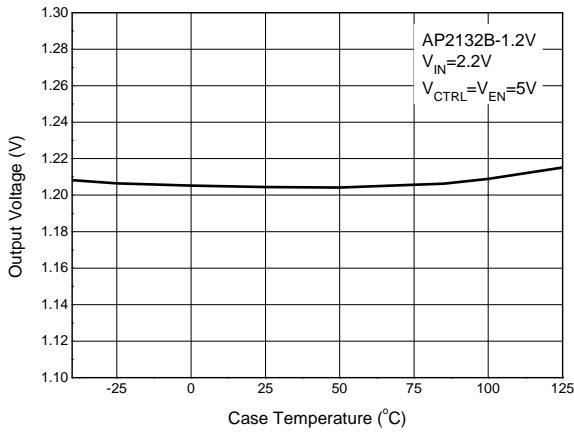


Figure 8. Output Voltage vs. Case Temperature

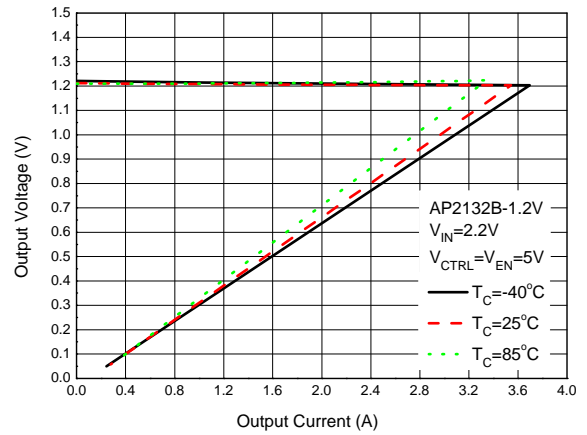


Figure 9. Output Voltage vs. Output Current

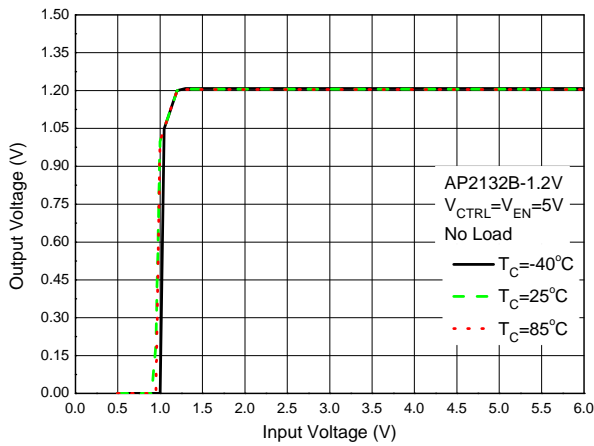


Figure 10. Output Voltage vs. Input Voltage

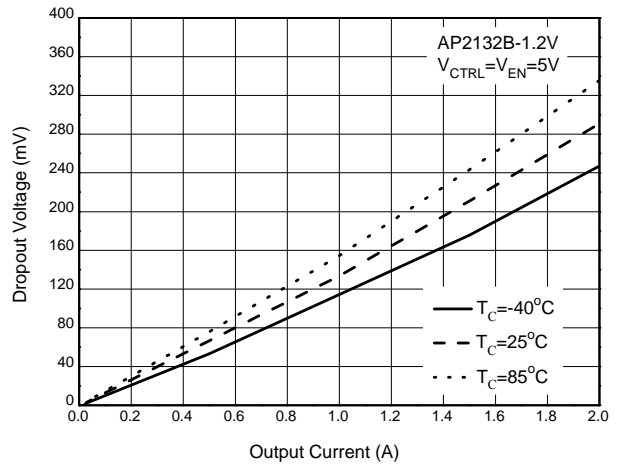


Figure 11. Dropout Voltage vs. Output Current



**2A CMOS LDO REGULATOR**

**AP2132B**

**Typical Performance Characteristics (Continued)**

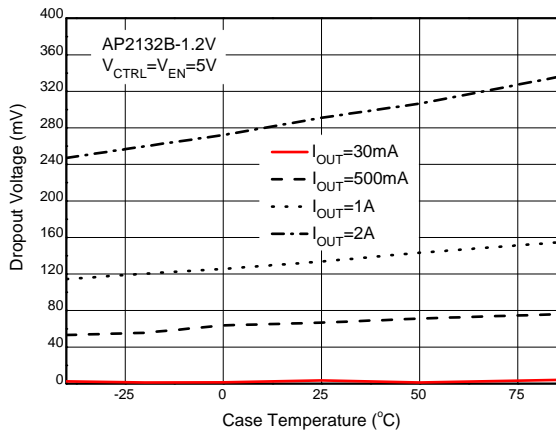


Figure 12. Dropout Voltage vs. Case Temperature

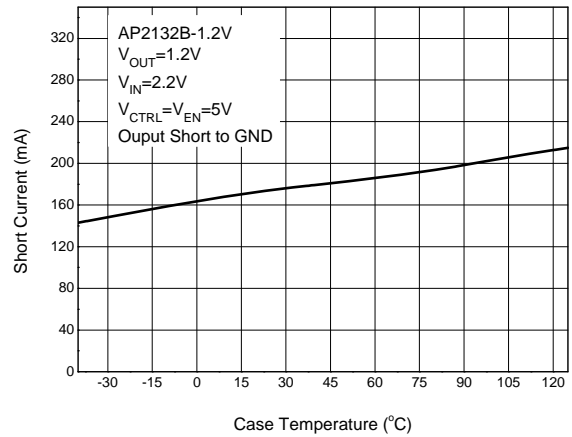


Figure 13. Short Current vs. Case Temperature

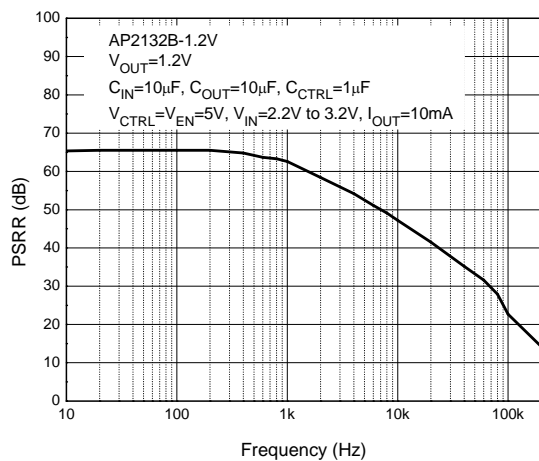


Figure 14. PSRR vs. Frequency

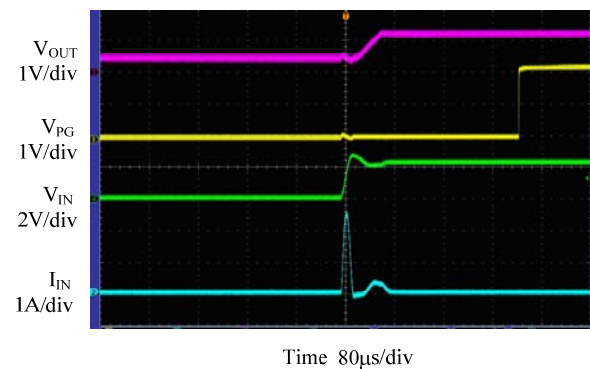


Figure 15.  $V_{IN}$  Start up Waveform  
( $V_{CTRL}=V_{EN}=5V$ ,  $V_{IN}=0$  to 2.2V, No Load)

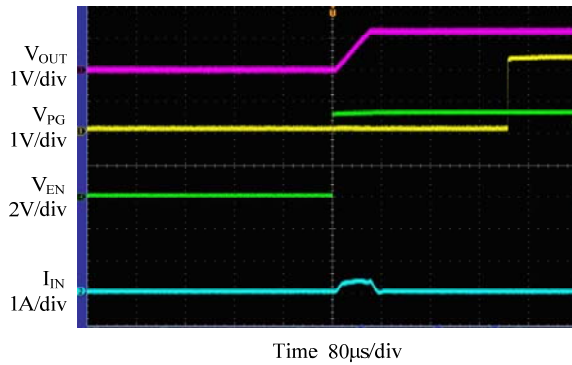
**Typical Performance Characteristics (Continued)**


Figure 16.  $V_{EN}$  Start up Waveform  
( $V_{CTRL}=5V$ ,  $V_{EN}=0$  to  $5V$ ,  $V_{IN}=2.2V$ , No Load)

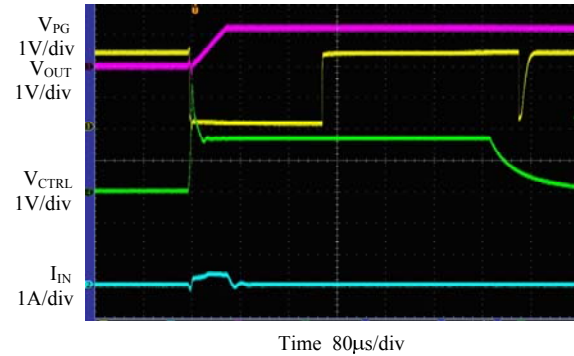


Figure 17.  $V_{CTRL}$  Start up and Shut down Waveform  
( $V_{CTRL}=0$  to  $5V$ ,  $V_{EN}=5V$ ,  $V_{IN}=2.2V$ , No Load)

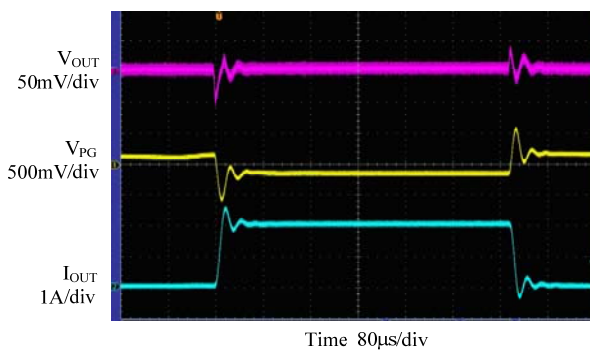


Figure 18. Load Transient  
( $V_{CTRL}=V_{EN}=5V$ ,  $V_{IN}=2.2V$ ,  $I_{OUT}=0$  to  $2A$ )

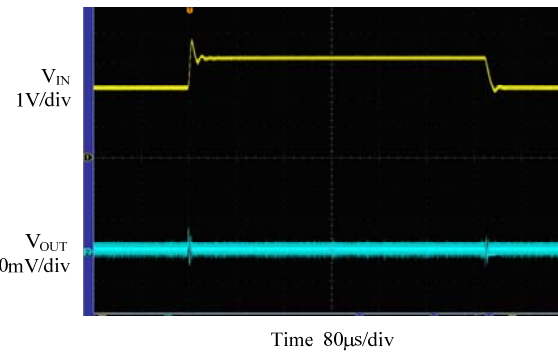


Figure 19. Line Transient  
( $V_{CTRL}=V_{EN}=5V$ ,  $C_{IN}=C_{CTRL}=1\mu F$ ,  $C_{OUT}=10\mu F$ ,  
 $V_{IN}=2.2V$  to  $3.2V$ ,  $I_{OUT}=10mA$ )

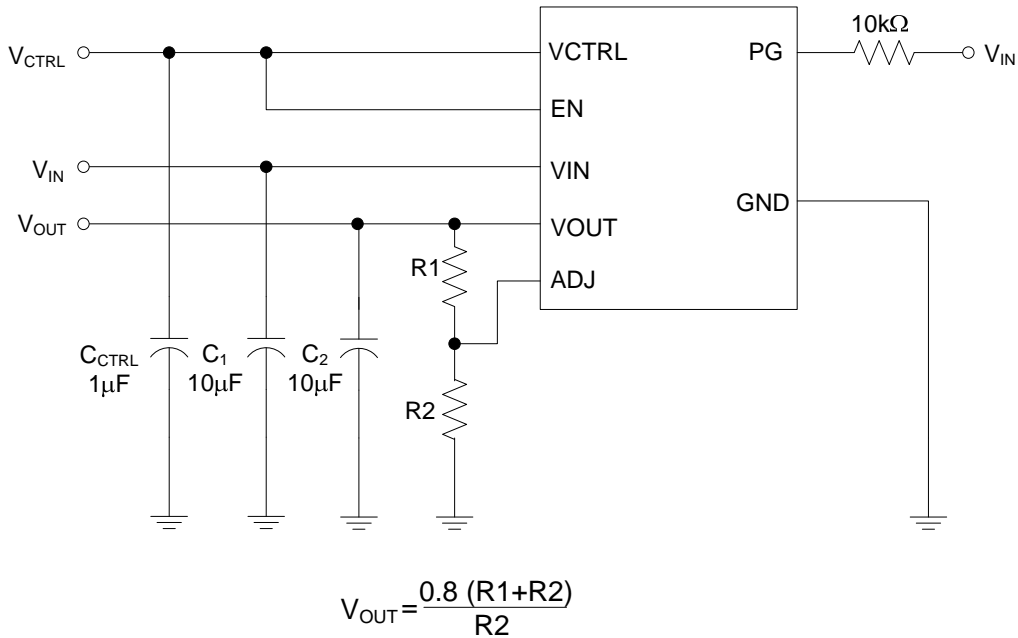
**2A CMOS LDO REGULATOR**
**AP2132B**
**Typical Application**


Figure 20. Typical Application of AP2132B for Adjustable Version

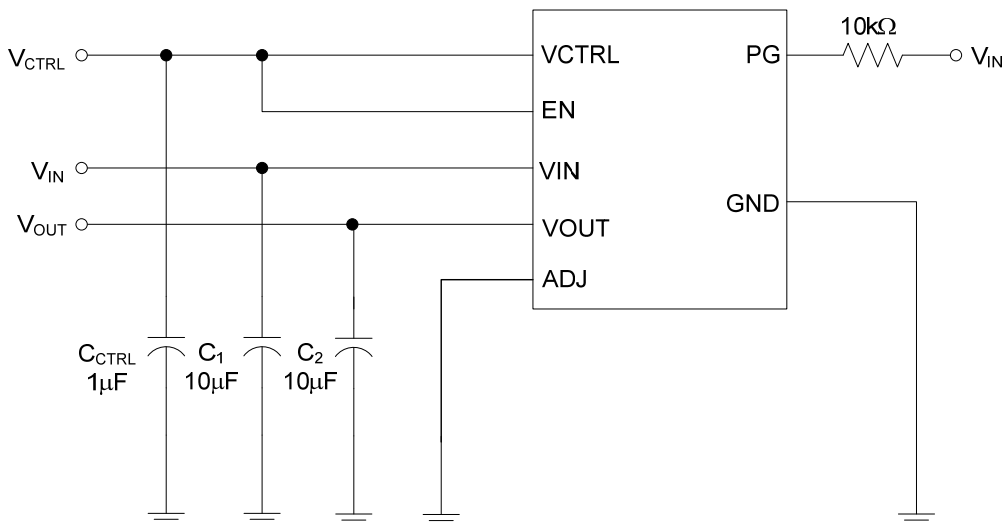


Figure 21. Typical Application of AP2132B for Fixed Version

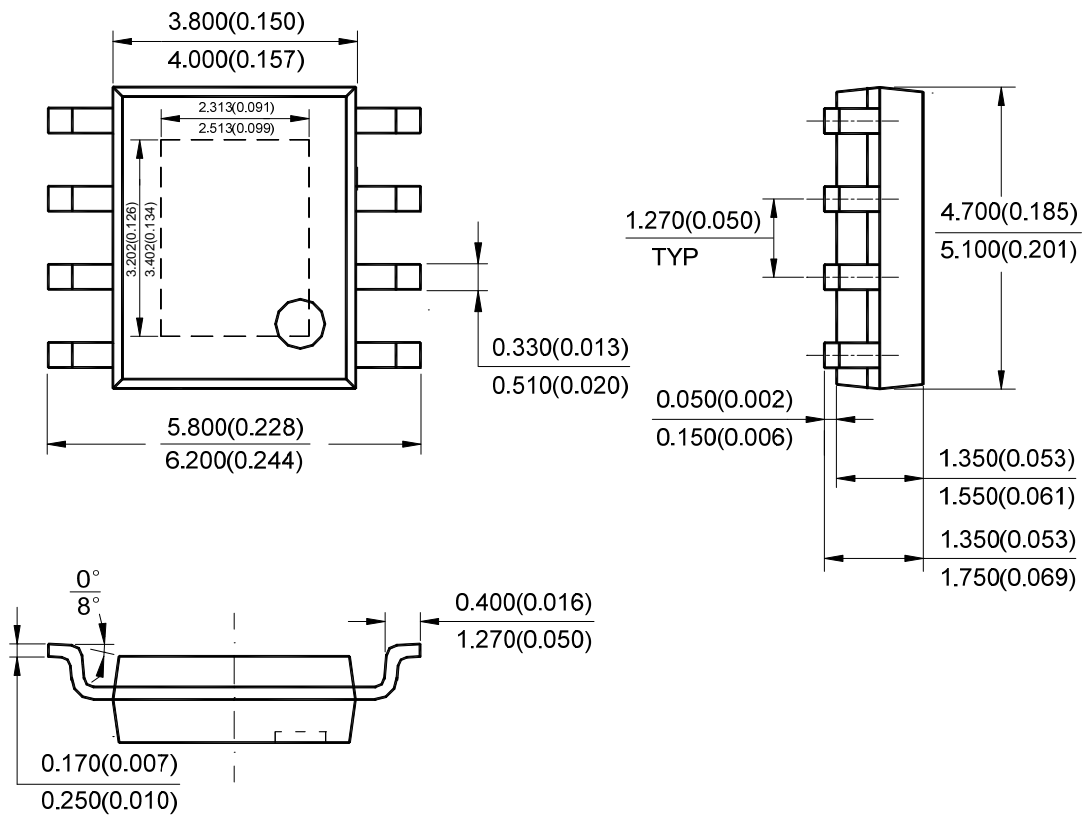
**2A CMOS LDO REGULATOR**

**AP2132B**

**Mechanical Dimensions**

**PSOP-8**

**Unit: mm(inch)**



Note: Eject hole, oriented hole and mold mark is optional.



## **BCD Semiconductor Manufacturing Limited**

<http://www.bcdsemi.com>

### **IMPORTANT NOTICE**

BCD Semiconductor Manufacturing Limited reserves the right to make changes without further notice to any products or specifications herein. BCD Semiconductor Manufacturing Limited does not assume any responsibility for use of any its products for any particular purpose, nor does BCD Semiconductor Manufacturing Limited assume any liability arising out of the application or use of any its products or circuits. BCD Semiconductor Manufacturing Limited does not convey any license under its patent rights or other rights nor the rights of others.

---

#### **MAIN SITE**

##### **- Headquarters**

##### **BCD Semiconductor Manufacturing Limited**

No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, China  
Tel: +86-21-24162266, Fax: +86-21-24162277

##### **- Wafer Fab**

##### **Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.**

800 Yi Shan Road, Shanghai 200233, China  
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

#### **REGIONAL SALES OFFICE**

##### **Shenzhen Office**

##### **Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office**

Unit A Room 1203, Skyworth Bldg., Gaoxin Ave. 1.S., Nanshan District, Shenzhen, China  
Tel: +86-755-8826 7951  
Fax: +86-755-8826 7865

##### **Taiwan Office**

##### **BCD Semiconductor (Taiwan) Company Limited**

4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan  
Tel: +886-2-2656 2808  
Fax: +886-2-2656 2806

##### **USA Office**

##### **BCD Semiconductor Corp.**

30920 Huntwood Ave. Hayward, CA 94544, USA  
Tel : +1-510-324-2988  
Fax: +1-510-324-2788