



**THE DATASHEET OF
AP130-33WG-7**



Features

- Input Voltage Range: 2.7V to 5.5V
- Dropout Voltage 400mV at 300mA Output Current
- Guaranteed 300mA Output Current
- Internal RON = 1.5Ω PMOS Draws No Base Current
- Low Quiescent Current 50μA
- Output Voltage: 1.5V/1.8V/2.0V/2.5V/2.8V/3.0V/3.3V/3.5; Accuracy 2%
- Fast Transient Response
- Good Load Regulation
- Current Limit and Thermal Shutdown Protection
- Short Circuit Current Fold-Back
- Lead Free Packages: SC59, SC59R, SOT89-3L, and SOT89R-3L
- SC59, SC59R, SOT23, SOT89-3L, and SOT89R-3L: Available in "Green" Molding Compound (No Br, Sb) (Note 9)
- Lead Free Finish/ RoHS Compliant (Note 1)

Description

The AP130 is a 300mA, fixed output voltage, low dropout linear regulator. The device includes pass element, error amplifier, band-gap, current-limit and thermal shutdown circuitry. The characteristics of low dropout voltage and less quiescent current make it good for some critical current application, for example, some battery powered devices. The typical quiescent current is approximately 50μA from zero to maximum load. Due to internal flexible design, results in extensively fixed output voltage versions and make it convenient to use for applications. Built-in current-limit and thermal-shutdown functions prevent any fault condition from IC damage.

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

Applications

- Battery Powered Device
- CD-ROM, DVD, and LAN Card
- PC Peripheral
- Wireless Communication

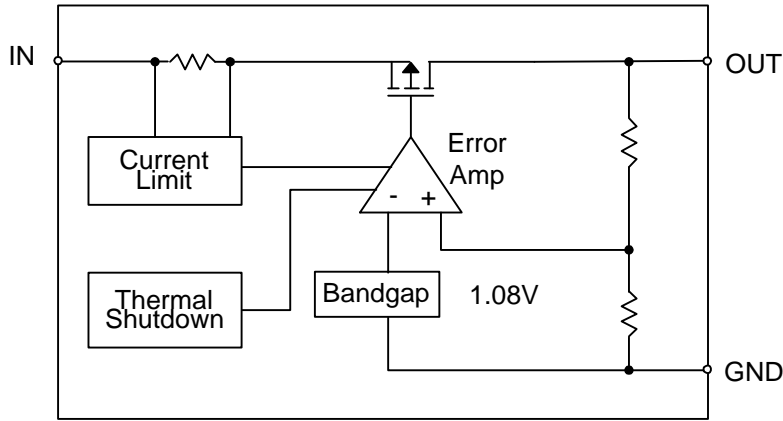
Typical Application Circuit



Pin Assignments

| Package | | No. | Pin Name | Description |
|--|------|-----|----------|---|
| Type | Code | | | |
| <p>(Top View)</p>  <p>(SC59)</p> | W | 1 | IN | IN: Power Input OUT: Output Voltage GND: Ground |
| | | 2 | OUT | |
| | | 3 | GND | |
| <p>(Top View)</p>  <p>(SC59R)</p> | R | 1 | GND | |
| | | 2 | OUT | |
| | | 3 | IN | |
| <p>(Top View)</p>  <p>(SOT23)</p> | SA | 1 | IN | |
| | | 2 | OUT | |
| | | 3 | GND | |
| <p>(Top View)</p>  <p>(SOT89-3L)</p> | Y | 1 | OUT | |
| | | 2 | GND | |
| | | 3 | IN | |
| <p>(Top View)</p>  <p>(SOT89R-3L)</p> | YR | 1 | GND | |
| | | 2 | IN | |
| | | 3 | OUT | |

Functional Block Diagram



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|-----------------|--------------------------------|-------------|------|
| V _{CC} | Input Voltage | +6 | V |
| T _{OP} | Operating Junction Temperature | -40 to +125 | °C |
| T _{ST} | Storage Temperature Range | -65 to +150 | °C |

Recommended Operating Conditions

| Symbol | Parameter | Min | Max | Unit |
|------------------|-------------------------------|-----|-----|------|
| V _{IN} | Input Voltage | 2.7 | 5.5 | V |
| I _{OUT} | Output Current | 0 | 300 | mA |
| T _A | Operating Ambient Temperature | -40 | 85 | °C |

Electrical Characteristics

$T_A = 25^\circ\text{C}$, $C_{IN} = 1\mu\text{F}$, $C_{OUT} = 10\mu\text{F}$, unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ. | Max | Unit |
|-------------------|---|---|-----|------|-----|---------------------------|
| V_{DROD} | Dropout Voltage (Note 2) | $I_L = 300\text{mA}$ | - | 400 | 500 | mV |
| I_{LIMIT} | Current Limit (Note 3) | $V_{IN} = 5\text{V}$, $V_{OUT} = 0\text{V}$ | 350 | 450 | - | mA |
| I_{short} | Short Circuit Current | $V_{OUT} < 1.05\text{V}$ | - | 150 | 300 | mA |
| ΔV_{LINE} | Line Regulation | $I_{OUT} = 1\text{mA}$, $V_{IN} = (V_{OUT} + 1\text{V})$ to 5.5V | - | 0.1 | 0.3 | %/V |
| PSRR | Ripple Rejection | $F = 100\text{Hz}$, $C_{IN} = 1\mu\text{F}$, $C_O = 10\mu\text{F}$, $I_L = 100\text{mA}$ | - | 58 | - | dB |
| ΔV_{LOAD} | Load Regulation (Note 4) | $I_L = 1\sim 300\text{mA}$, $V_{IN} = 5\text{V}$ | - | 30 | 40 | mV |
| ΔV_{OUT} | Output Voltage Accuracy | $I_L = 1\text{mA}$, $V_{IN} = 5\text{V}$ | -2 | - | +2 | % |
| | Output Voltage Temperature Coefficient (Note 5) | | - | 50 | 150 | PPM/ $^\circ\text{C}$ |
| I_Q | Quiescent Current | $I_L = 0\text{mA}$, $V_{IN} = 5\text{V}$ | - | 50 | 100 | μA |
| θ_{JA} | Thermal Resistance Junction-to-Ambient | SC59/SC59R (Note 6) | - | 250 | - | $^\circ\text{C}/\text{W}$ |
| | | SOT23 (Note 7) | - | 200 | - | |
| | | SOT89-3L/SOT89R-3L (Note 8) | - | 100 | - | |
| θ_{JC} | Thermal Resistance Junction-to-Case | SC59/SC59R (Note 6) | - | 79 | - | $^\circ\text{C}/\text{W}$ |
| | | SOT23 (Note 7) | - | 43 | - | |
| | | SOT89-3L/SOT89R-3L (Note 8) | - | 23 | - | |

- Notes:
- Dropout voltage is defined as the input to output differential voltage. Dropout is measured at constant junction temperature by using pulsed on time, and the criterion is V_{OUT} inside target value $\pm 2\%$. This test is skipped at the condition of $V_{IN} < 3\text{V}$.
 - Current limit is measured at constant junction temperature by using pulsed testing with a low ON time.
 - Regulation is measured at constant junction temperature by using pulsed testing with a low ON time.
 - Guaranteed by design.
 - Test condition for SC59/SC59R: Devices mounted on FR-4 PC board, 1 MRP, 2oz copper, single sided, calibrate at $T_J = 125^\circ\text{C}$, $T_A = 25^\circ\text{C}$, with minimum recommended pad layout.
 - Test condition for SOT23: Devices mounted on FR-4 PC board, 1 MRP, calibrate at $T_J = 85^\circ\text{C}$, $T_A = 29^\circ\text{C}$.
 - Test condition for SOT89-3L/SOT89R-3L: No Heat Sink, no air flow.

Typical Performance Characteristics



Functional Descriptions

A minimum of 10 μF capacitor must be connected from OUT to ground to insure stability. Typically a large storage capacitor is connected from V_{IN} to ground to ensure that the input voltage does not sag below the minimum dropout voltage during the load transient response.

Ordering Information



| Device | Package Code | Packaging (Note 10) | 7"/13" Tape and Reel | |
|----------------|--------------|---------------------|----------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| AP130-XXWL-7 | W | SC59 | 3000/Tape & Reel | -7 |
| AP130-XXWG-7 | W | SC59 | 3000/Tape & Reel | -7 |
| AP130-XXRL-7 | R | SC59R | 3000/Tape & Reel | -7 |
| AP130-XXRG-7 | R | SC59R | 3000/Tape & Reel | -7 |
| AP130-XXSAG-7 | SA | SOT23 | 3000/Tape & Reel | -7 |
| AP130-XXYL-13 | Y | SOT89-3L | 2500/Tape & Reel | -13 |
| AP130-XXYG-13 | Y | SOT89-3L | 2500/Tape & Reel | -13 |
| AP130-XXYRL-13 | YR | SOT89R-3L | 2500/Tape & Reel | -13 |
| AP130-XXYRG-13 | YR | SOT89R-3L | 2500/Tape & Reel | -13 |

Notes: 9. SOT23 is available in "Green" product only.
 10. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

Marking Information

(1) SC59, SC59R and SOT23

(Top View)



XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green
a~z : Lead Free

| Device | Package (Note 11) | Identification Code |
|------------|-------------------|---------------------|
| AP130-15W | SC59W | CA |
| AP130-18W | SC59W | CD |
| AP130-20W | SC59W | CF |
| AP130-25W | SC59W | CK |
| AP130-28W | SC59W | CN |
| AP130-30W | SC59W | CP |
| AP130-33W | SC59W | CS |
| AP130-35W | SC59W | CU |
| AP130-15R | SC59R | GO |
| AP130-18R | SC59R | GR |
| AP130-20R | SC59R | GT |
| AP130-25R | SC59R | GY |
| AP130-28R | SC59R | H1 |
| AP130-30R | SC59R | H3 |
| AP130-33R | SC59R | H9 |
| AP130-35R | SC59R | HB |
| AP130-15SA | SOT23 | U2 |
| AP130-18SA | SOT23 | U3 |
| AP130-20SA | SOT23 | U4 |
| AP130-25SA | SOT23 | U5 |
| AP130-28SA | SOT23 | U6 |
| AP130-30SA | SOT23 | U7 |
| AP130-33SA | SOT23 | U8 |
| AP130-35SA | SOT23 | U9 |

Marking Information (cont.)

(2) SOT89-3L and SOT89R-3L

(Top View)



XX : Identification code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : Internal code
A~Z : Green
a~z : Lead Free

| Device | Package (Note 11) | Identification Code |
|------------|-------------------|---------------------|
| AP130-15Y | SOT89-3L | CA |
| AP130-18Y | SOT89-3L | CD |
| AP130-20Y | SOT89-3L | CF |
| AP130-25Y | SOT89-3L | CK |
| AP130-28Y | SOT89-3L | CN |
| AP130-30Y | SOT89-3L | CP |
| AP130-33Y | SOT89-3L | CS |
| AP130-35Y | SOT89-3L | CU |
| AP130-15YR | SOT89R-3L | GO |
| AP130-18YR | SOT89R-3L | GR |
| AP130-20YR | SOT89R-3L | GT |
| AP130-25YR | SOT89R-3L | GY |
| AP130-28YR | SOT89R-3L | H1 |
| AP130-30YR | SOT89R-3L | H3 |
| AP130-33YR | SOT89R-3L | H9 |
| AP130-35YR | SOT89R-3L | HB |

Notes: 11. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SC59 and SC59R



(2) Package Type: SOT23



Package Outline Dimensions (cont.)

(3) Package Type: SOT89-3L and SOT89R-3L



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