



September 2014

# LM317AHV 3-Terminal Positive Adjustable Regulator

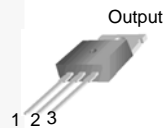
## Features

- Output Current in Excess of 1.5 A
- Output Adjustable Between 1.2 V and 57 V
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- Output Transistor Safe Area Compensation
- TO-220 Package

## Description

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5 A of load current with an output voltage adjustable over a 1.2 V to 57 V. It employs internal current limiting, thermal shut down and safe area compensation.

### TO-220 (Single Gauge)



1. Adj 2. Output 3. Input

## Ordering Information

| Product Number | Marking  | Package                  | Packing Method | Operating Temperature |
|----------------|----------|--------------------------|----------------|-----------------------|
| LM317AHVT      | LM317AHV | TO-220 3L (Single Gauge) | Rail           | 0 to +125°C           |

## Block Diagram

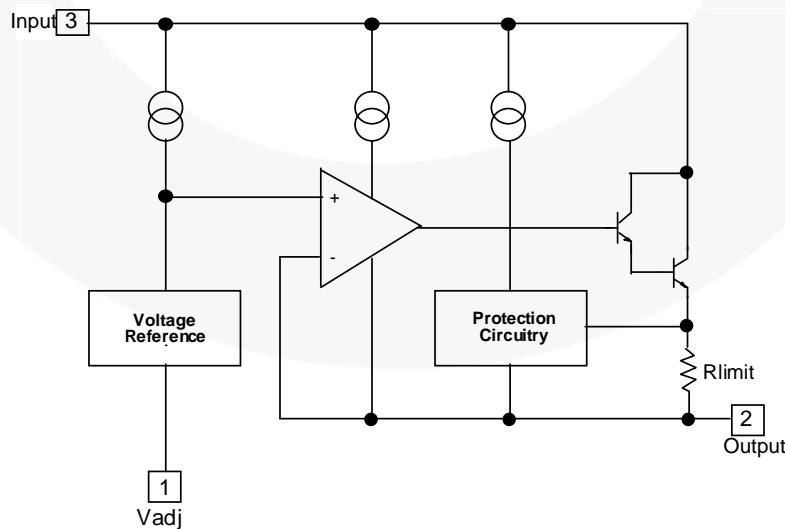


Figure 1. Block Diagram

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol                | Parameter                                 | Value       | Unit                |
|-----------------------|---|-------------|---------------------|
| $V_I - V_O$           | Input-Output Voltage Differential         | 60          | V                   |
| $T_{\text{LEAD}}$     | Lead Temperature                          | 230         | $^\circ\text{C}$    |
| $T_J$                 | Operating Junction Temperature Range      | 0 to +125   | $^\circ\text{C}$    |
| $T_{\text{STG}}$      | Storage Temperature Range                 | -65 to +125 | $^\circ\text{C}$    |
| $\Delta V_O/\Delta T$ | Temperature Coefficient of Output Voltage | $\pm 0.02$  | $\%/^\circ\text{C}$ |

## Thermal Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol                | Parameter                            | Value              | Unit                      |
|-----------------------|--------------------------------------|--------------------|---------------------------|
| $P_D$                 | Power Dissipation                    | Internally Limited | W                         |
| $R_{\theta\text{JC}}$ | Thermal Resistance, Junction to Case | 5                  | $^\circ\text{C}/\text{W}$ |

## Electrical Characteristics

$V_I - V_O = 5\text{ V}$ ,  $I_O = 0.5\text{ A}$ ,  $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$ ,  $I_{\text{MAX}} = 1.5\text{ A}$ ,  $P_{\text{DMAX}} = 20\text{ W}$ , unless otherwise specified.

| Symbol              | Parameter                                    | Conditions  | Min. | Typ.  | Max.  | Unit            |
|---------------------|--|---|------|-------|-------|-----------------|
| Rline               | Line Regulation <sup>(1)</sup>               | $T_A = +25^\circ\text{C}$ ,<br>$3\text{ V} \leq V_I - V_O \leq 60\text{ V}$   |      | 0.01  | 0.04  | %V              |
|                     |  | $3\text{ V} \leq V_I - V_O \leq 60\text{ V}$  |      | 0.02  | 0.07  |                 |
| Rload               | Load Regulation <sup>(1)</sup>               | $T_A = +25^\circ\text{C}$ , $10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ ,<br>$V_O < 5\text{ V}$                           |      | 18    | 25    | mV              |
|                     |  | $T_A = +25^\circ\text{C}$ , $10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ ,<br>$V_O \geq 5\text{ V}$                        |      | 0.4   | 0.5   | %V <sub>O</sub> |
|                     |  | $10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ , $V_O < 5\text{ V}$  |      | 40    | 70    | mV              |
|                     |  | $10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ , $V_O \geq 5\text{ V}$   |      | 0.8   | 1.5   | %V <sub>O</sub> |
| I <sub>ADJ</sub>    | Adjustable Pin Current                       | -   |      | 46    | 100   | μA              |
| ΔI <sub>ADJ</sub>   | Adjustable Pin Current Change                | $3\text{ V} \leq V_I - V_O \leq 60\text{ V}$ ,<br>$10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ , $P_D \leq P_{\text{MAX}}$ |      | 2     | 5     | μA              |
| V <sub>REF</sub>    | Reference Voltage                            | $3\text{ V} \leq V_I - V_O \leq 60\text{ V}$ ,<br>$10\text{ mA} \leq I_O \leq I_{\text{MAX}}$ , $P_D \leq P_{\text{MAX}}$ | 1.20 | 1.25  | 1.30  | V               |
| ST <sub>T</sub>     | Temperature Stability                        | $T_J = 0^\circ\text{C}$ to $+125^\circ\text{C}$   |      | 0.7   |       | %V <sub>O</sub> |
| I <sub>L(MIN)</sub> | Minimum Load Current to Maintain Regulation  | $V_I - V_O = 60\text{ V}$   |      | 3.5   | 12.0  | mA              |
| I <sub>O(MAX)</sub> | Maximum Output Current                       | $V_I - V_O \leq 15\text{ V}$ , $P_D \leq P_{\text{MAX}}$  | 1.0  | 2.2   |       | A               |
|                     |  | $V_I - V_O \leq 60\text{ V}$ , $P_D \leq P_{\text{MAX}}$ ,<br>$T_A = 25^\circ\text{C}$                                    |      | 0.3   |       |                 |
| e <sub>N</sub>      | RMS Noise, % of V <sub>OUT</sub>             | $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 10\text{ kHz}$  |      | 0.003 | 0.010 | %V <sub>O</sub> |
| RR                  | Ripple Rejection                             | $V_O = 10\text{ V}$ , $f = 120\text{ Hz}$ ,<br>without C <sub>ADJ</sub>   |      | 60    |       | dB              |
|                     |  | $V_O = 10\text{ V}$ , $f = 120\text{ Hz}$ ,<br>C <sub>ADJ</sub> = 10 μF <sup>(2)</sup>                                    | 66   | 75    |       |                 |
| ST                  | Long-Term Stability, $T_J = T_{\text{HIGH}}$ | $T_A = +25^\circ\text{C}$ for end point<br>measurements, 1000HR   |      | 0.3   | 1.0   | %               |

### Notes:

- Load and line regulation are specified at constant junction temperature. Change in V<sub>D</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used. (P<sub>MAX</sub> = 20 W)
- C<sub>ADJ</sub>, when used, is connected between the adjustment pin and ground.

## Typical Performance Characteristics

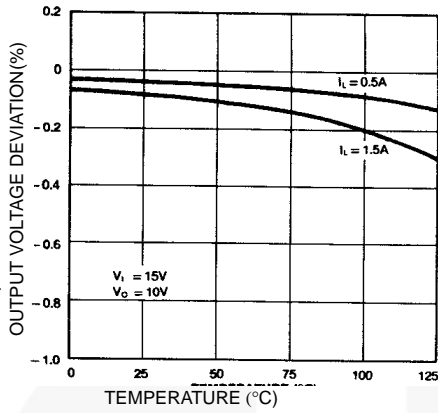


Figure 2. Load Regulation

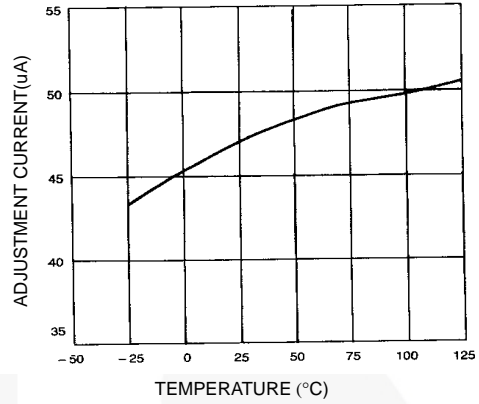


Figure 3. Adjustment Current

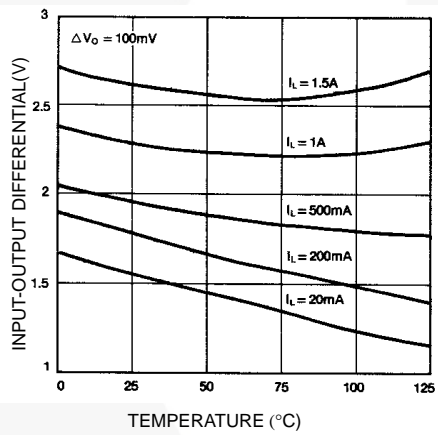


Figure 4. Dropout Voltage

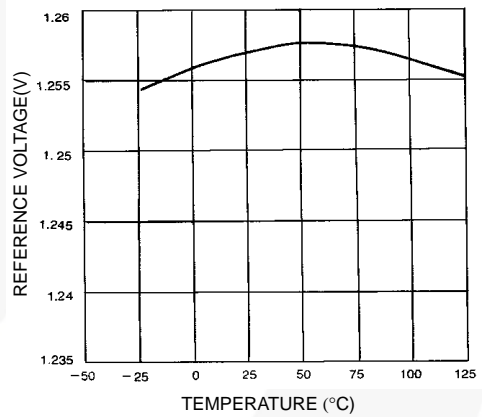
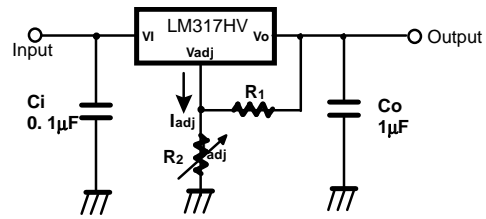


Figure 5. Reference Voltage

### Typical Application<sup>(3)</sup>



$$V_O = 1.25V \left(1 + \frac{R_2}{R_1}\right) + I_{adj} R_2$$

**Figure 6. Programmable Regulator**

**Note:**

- $C_i$  is required when regulator is located an appreciable distance from power supply filter.  $C_o$  is not needed for stability, however, it does improve transient response. Since  $I_{ADJ}$  is controlled to less than  $100 \mu A$ , the error associated with this term is negligible in most applications.

Physical Dimensions

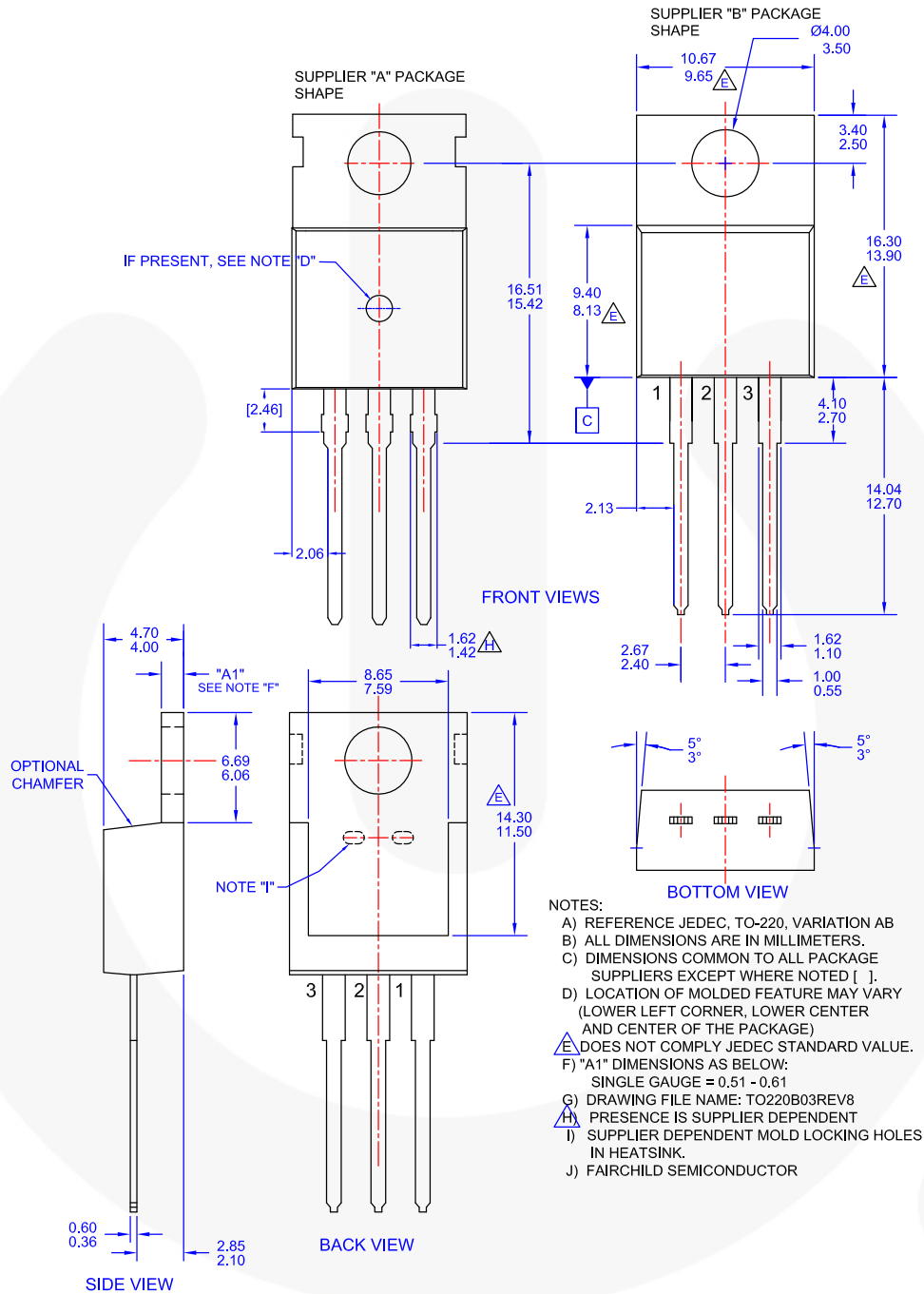


Figure 7. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB



**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- |                          |  |                                       |                  |
|--------------------------|--|---------------------------------------|------------------|
| AccuPower™               | F-PFS™   |                                       |                  |
| Awinda®                  | FRFET®   | PowerTrench®                          | TinyBoost®       |
| AX-CAP®*                 | Global Power Resource <sup>SM</sup>            | PowerXS™                              | TinyBuck®        |
| BitSiC™                  | GreenBridge™                                   | Programmable Active Droop™            | TinyCalc™        |
| Build it Now™            | Green FPS™                                     | QFET®                                 | TinyLogic®       |
| CorePLUS™                | Green FPS™ e-Series™                           | QS™                                   | TINYOPTO™        |
| CorePOWER™               | Gmax™  | Quiet Series™                         | TinyPower™       |
| CROSSVOLT™               | GTO™   | RapidConfigure™                       | TinyPWM™         |
| CTL™                     | IntelliMAX™                                    |                                       | TinyWire™        |
| Current Transfer Logic™  | ISOPLANAR™                                     | Saving our world, 1mW/W/kW at a time™ | TranSiC™         |
| DEUXPEED®                | Making Small Speakers Sound Louder and Better™ | SignalWise™                           | TriFault Detect™ |
| Dual Cool™               | MegaBuck™                                      | SmartMax™                             | TRUECURRENT®*    |
| EcoSPARK®                | MICROCOUPLER™                                  | SMART START™                          | µSerDes™         |
| EfficientMax™            | MicroFET™                                      | Solutions for Your Success™           |                  |
| ESBC™                    | MicroPak™                                      | SPM®                                  | UHC®             |
|                          | MicroPak2™                                     | STEALTH™                              | Ultra FRFET™     |
| Fairchild®               | MillerDrive™                                   | SuperFET®                             | UniFET™          |
| Fairchild Semiconductor® | MotionMax™                                     | SuperSOT™-3                           | VCX™             |
| FACT Quiet Series™       | MotionGrid®                                    | SuperSOT™-6                           | VisualMax™       |
| FACT®                    | MTI®   | SuperSOT™-8                           | VoltagePlus™     |
| FAST®                    | MTx®   | SupreMOS®                             | XS™              |
| FastvCore™               | MVN®   | SyncFET™                              | Xsens™           |
| FETBench™                | mWSaver®                                       | Sync-Lock™                            | 仙童™              |
| FPS™                     | OptoHiT™                                       |                                       |                  |

\* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT [HTTP://WWW.FAIRCHILDSEMI.COM](http://www.fairchildsemi.com). FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

| Datasheet Identification | Product Status        | Definition  |
|--------------------------|-----------------------|---|
| Advance Information      | Formative / In Design | Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.   |
| Preliminary              | First Production      | Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| No Identification Needed | Full Production       | Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.   |
| Obsolete                 | Not In Production     | Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.  |

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[LM317HVT](#)