**Features**

- Output Current in Excess of 100 mA
- Output Adjustable Between 1.2 V and 37 V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Floating Operation for High-Voltage Applications

**Description**

The LM317L is a 3-terminal, adjustable, positive-voltage regulator capable of supplying in excess of 100 mA over an output voltage range of 1.2 V to 37 V. This voltage regulator requires only two external resistors to set the output voltage.

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Operating Temperature Range</th>
<th>Top Mark</th>
<th>Package</th>
<th>Packing Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM317LM</td>
<td>0°C to +125°C</td>
<td>LM317LM</td>
<td>8-SOIC</td>
<td>Rail</td>
</tr>
<tr>
<td>LM317LMX</td>
<td>0°C to +125°C</td>
<td>LM317LM</td>
<td>8-SOIC</td>
<td>Tape and Reel</td>
</tr>
<tr>
<td>LM317LZ</td>
<td>0°C to +125°C</td>
<td>LM317LZ</td>
<td>TO-92</td>
<td>Bulk</td>
</tr>
<tr>
<td>LM317LZX</td>
<td>0°C to +125°C</td>
<td>LM317LZ</td>
<td>TO-92</td>
<td>Tape and Reel</td>
</tr>
</tbody>
</table>
**Block Diagram**

![Block Diagram](image)

**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 $T_A = 25^\circ$C unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{I} - V_{O}$</td>
<td>Input-Output Voltage Differential</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>$P_D$</td>
<td>Power Dissipation</td>
<td>Internally limited</td>
<td>W</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Operating Junction Temperature Range</td>
<td>0 ~ +125</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage Temperature Range</td>
<td>-65 ~ +125</td>
<td>°C</td>
</tr>
</tbody>
</table>
### Electrical Characteristics

$V_I - V_O = 5$ V, $I_O = 40$ mA, $0 \degree C \leq T_J \leq +125 \degree C$, $P_{DMAX} = 625$ mW, unless otherwise specified.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{LINE}$</td>
<td>Line Regulation$^{(1)}$</td>
<td>$T_A = +25 \degree C$, $3 \leq V_I - V_O \leq 40$ V</td>
<td>0.01</td>
<td>0.04</td>
<td>0.02</td>
<td>% / V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$3 \leq V_I - V_O \leq 40$ V</td>
<td></td>
<td></td>
<td></td>
<td>% / V</td>
</tr>
<tr>
<td>$R_{LOAD}$</td>
<td>Load Regulation$^{(1)}$</td>
<td>$T_A = +25 \degree C$, $10 \leq I_O \leq 100$ mA, $V_O \leq 5$ V</td>
<td>5</td>
<td>25</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_A = +25 \degree C$, $10 \leq I_O \leq 100$ mA, $V_O \geq 5$ V</td>
<td></td>
<td></td>
<td></td>
<td>% / V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$10 \leq I_O \leq 100$ mA, $V_O \leq 5$ V</td>
<td>20</td>
<td>70</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$10 \leq I_O \leq 100$ mA, $V_O \geq 5$ V</td>
<td>0.3</td>
<td>1.5</td>
<td></td>
<td>% / V</td>
</tr>
<tr>
<td>$I_{ADJ}$</td>
<td>Adjustment Pin Current</td>
<td></td>
<td>50</td>
<td></td>
<td>100</td>
<td>μA</td>
</tr>
<tr>
<td>$\Delta I_{ADJ}$</td>
<td>Adjustment Pin Current Change</td>
<td>$3 \leq V_I - V_O \leq 40$ V, $10 \leq I_O \leq 100$ mA, $P_D &lt; P_{DMAX}$</td>
<td>0.2</td>
<td></td>
<td>5</td>
<td>μA</td>
</tr>
<tr>
<td>$V_{REF}$</td>
<td>Reference Voltage</td>
<td>$3 \leq V_I - V_O \leq 40$ V, $10 \leq I_O \leq 100$ mA, $P_D \leq P_{DMAX}$</td>
<td>1.20</td>
<td>1.25</td>
<td>1.30</td>
<td>V</td>
</tr>
<tr>
<td>$ST_T$</td>
<td>Temperature Stability</td>
<td></td>
<td>0.7</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>$I_{L(MIN)}$</td>
<td>Minimum Load Current to Maintain Regulation</td>
<td>$V_I - V_O = 40$ V</td>
<td>3.5</td>
<td>10</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{O(MAX)}$</td>
<td>Maximum Output Current</td>
<td>$V_I - V_O \leq 15$ V, $P_D &lt; P_{DMAX}$</td>
<td>100</td>
<td></td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_A = +25 \degree C$, $V_I - V_O \leq 40$ V, $P_D &lt; P_{DMAX}$</td>
<td>25</td>
<td></td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>$e_N$</td>
<td>RMS Noise, % of $V_{OUT}$</td>
<td>$T_A = +25 \degree C$, $10$ Hz &lt; $f$ &lt; $10$ kHz</td>
<td>0.003</td>
<td></td>
<td></td>
<td>% / $V_O$</td>
</tr>
<tr>
<td>$RR$</td>
<td>Ripple Rejection</td>
<td>$V_O = 10V$, $f = 120$ Hz, without $C_{ADJ}$</td>
<td>65</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_O = 10V$, $f = 120$ Hz, $C_{ADJ} = 10 \mu F$</td>
<td>66</td>
<td></td>
<td>80</td>
<td>dB</td>
</tr>
<tr>
<td>$ST$</td>
<td>Long-Term Stability</td>
<td>$T_J = +125 \degree C$, 1000 Hours</td>
<td>0.3</td>
<td></td>
<td></td>
<td>%</td>
</tr>
</tbody>
</table>

**Notes:**

1. Load and Line regulation are specified at constant junction temperature. Change in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
Typical Application

Figure 2. 5V Electronic Shutdown Regulator
D1 protects the device during an input short circuit.

Figure 3. Slow Turn-On Regulator

Figure 4. Current Regulator

\[ I_{OMAX} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} @ \frac{1.25V}{R1} \]

\[ I_{OMAX} = \left( \frac{V_{REF}}{R1 + R2} \right) + I_{ADJ} @ \frac{1.25V}{R1 + R2} \]

5mA < \( I_O \) < 500mA
Physical Dimensions

TO-92 Bulk Type

Figure 5. 3-Lead, TO-92, Molded, Standard Straight Lead

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild’s worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor’s online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/
Physical Dimensions

TO-92 Tape and Reel Type

Figure 6. 3-Lead, TO-92, Molded, 0.200 in Line Spacing Lead Form

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild’s worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor’s online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/

For current tape and reel specifications, visit Fairchild Semiconductor’s online packaging area:
Physical Dimensions (Continued)

8-SOIC

Figure 7. 8-Lead, SOIC, JEDEC MS 0-12, 0.150 inch Narrow Body

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild’s worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor’s online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/

For current tape and reel specifications, visit Fairchild Semiconductor’s online packaging area:
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.

FETBench
FastvCore

TRADEMARKS

proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their

under Sales Support.

BitSiC
AX-CAP
AccuPower

FACT Quiet Series
FACT
FACT™
FAST™
FastvCore™
FETBench™
FPS™

F-PCS™
FRFET™
Global Power Resource™
GreenBridge™
Green FPS™
Gold Power Source™
Gmax™
GTO™
IntelliMAX™
ISOLPLANAR™
Making Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
mWSaver™
OptiHiT™
OPTOLOGIC®
OPTOPLANNER™

PowerTrench™
PowerXS™
Programmable Active Droop™
QFET™
QS™
Quiet Series™
RapidConfigure™

Saving our world, 1mWatt/kW at a time™

SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™

SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8

SupreMOS®
SyncFET™
Sync-Lock™

The Power Franchise™
TinyBoost™
TinyBuck™
TinyCalc™

TinyLogic®
TinyOPTO™

TinyPower™
TinyPWM™
TinyWire™

TransiSTOR™

TrueFault Detect™
TRUECURRENT™

μSerDes™

Ultra FRFET™

UniFET™

VCX™

VisualMax™

VoltagePlus™

XS™

* 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 HERETO IN IMPROVE RELIABILITY, FUNCTION, OR DESIGN. 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 APvicMENT 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, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their

PRODUCT STATUS DEFINITIONS
Definition of Terms

<table>
<thead>
<tr>
<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Information</td>
<td>Formative / In Design</td>
<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
</tr>
<tr>
<td>Preliminary</td>
<td>First Production</td>
<td>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.</td>
</tr>
<tr>
<td>No Identification Needed</td>
<td>Full Production</td>
<td>Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.</td>
</tr>
<tr>
<td>Obsolete</td>
<td>Not In Production</td>
<td>Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.</td>
</tr>
</tbody>
</table>

Rev. I63

© Fairchild Semiconductor Corporation www.fairchildsemi.com