Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor’s system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.
LM336Z25
Programmable Shunt Regulator

Features
• Low-Temperature Coefficient
• Guaranteed Temperature Stability: 4 mV (Typical)
• 0.2 Ω Dynamic Impedance
• 1.0% Initial Tolerance Available
• Easily Trimmed for Minimum Temperature Drift

Description
The LM336Z25 integrated circuit is a precision 2.5 V shunt regulator. The monolithic I_C voltage reference operates as a low temperature coefficient 2.5 V Zener with 0.2 Ω dynamic impedance. A third terminal on the LM336Z25 allows the reference voltage and temperature coefficient to be trimmed. LM336Z25 is useful as a precision 2.5 V low-voltage reference for digital voltmeters, power supplies, or OP-AMP circuitry. The 2.5 V makes it convenient to obtain a stable reference from low-voltage supplies. Further, since the LM336Z25 operates as a shunt regulator, it can be used as either a positive or negative voltage reference.

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>LM336Z25</td>
<td>0 ~ +70°C</td>
<td>LM336Z25</td>
<td>TO-92</td>
<td>Bulk</td>
</tr>
<tr>
<td>LM336Z25X</td>
<td>0 ~ +70°C</td>
<td>LM336Z25</td>
<td>TO-92</td>
<td>Tape and Reel</td>
</tr>
</tbody>
</table>
Block Diagram

Figure 1. Block Diagram

Schematic Diagram

Figure 2. Schematic Diagram
Absolute Maximum Ratings\(^{(1)}\)

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 \(T_\text{A} = 25^\circ\text{C}\) unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I_R)</td>
<td>Reverse Current</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>(I_F)</td>
<td>Forward current</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>(T_{\text{OPR}})</td>
<td>Operating Temperature Range</td>
<td>0 ~ +70</td>
<td>°C</td>
</tr>
<tr>
<td>(T_{\text{STG}})</td>
<td>Storage Temperature Range</td>
<td>-60 ~ +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note:

1. The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating.

Electrical Characteristics

Values are at \(0^\circ\text{C} \leq T_{\text{A}} \leq +70^\circ\text{C}\) 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>(V_R)</td>
<td>Reverse Breakdown Voltage</td>
<td>(T_{\text{A}} = 25^\circ\text{C}, I_R = 1 \text{ mA})</td>
<td>2.44</td>
<td>2.49</td>
<td>2.54</td>
<td>V</td>
</tr>
<tr>
<td>(\Delta V_R / \Delta I_R)</td>
<td>Reverse Breakdown Change with Current</td>
<td>(T_{\text{A}} = 25^\circ\text{C}, 600\mu\text{A} \leq I_R \leq 10 \text{ mA})</td>
<td>2.6</td>
<td>10.0</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>(Z_D)</td>
<td>Reverse Dynamic Impedance</td>
<td>(T_{\text{A}} = 25^\circ\text{C}, I_R = 1 \text{ mA})</td>
<td>0.2</td>
<td>1.0</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>(ST_{T})</td>
<td>Temperature Stability</td>
<td>(I_R = 1\text{ mA})</td>
<td>1.8</td>
<td>6.0</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>(\Delta V_R / \Delta I_R)</td>
<td>Reverse Breakdown Change with Current</td>
<td>(600\mu\text{A} \leq I_R \leq 10 \text{ mA})</td>
<td>3.0</td>
<td>12.0</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>(Z_D)</td>
<td>Reverse Dynamic Impedance</td>
<td>(I_R = 1 \text{ mA})</td>
<td>0.4</td>
<td>1.4</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>(ST)</td>
<td>Long Term Stability In Reference Voltage</td>
<td>(I_R = 1 \text{ mA})</td>
<td>20.0</td>
<td>ppm/ Khr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Typical Performance Characteristics

Figure 3. Reverse Voltage Change

Figure 4. Reverse Characteristics

Figure 5. Temperature (°C)

Figure 6. Forward Characteristics
Physical Dimensions

TO-92 Bulk Type

Figure 17. 3-Lead, TO-92, Molded, Standard Straight Lead

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http://www.fairchildsemi.com/packaging/
Physical Dimensions (Continued)

TO-92 Tape and Reel Type

NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING WITH REFERENCE TO JEDC TO-92 RECOMMENDATIONS.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994.
D) TO-92 (32, 94, 96, 97, 98) PIN CONFIGURATION.

Figure 18. 3-Lead, TO-92, Molded, 0.200 in Line Spacing Lead Form

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<th>Product Status</th>
<th>Definition</th>
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<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>
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