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KA78RL00

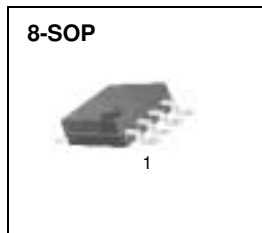
Adjustable Micro Power Voltage Regulator

Features

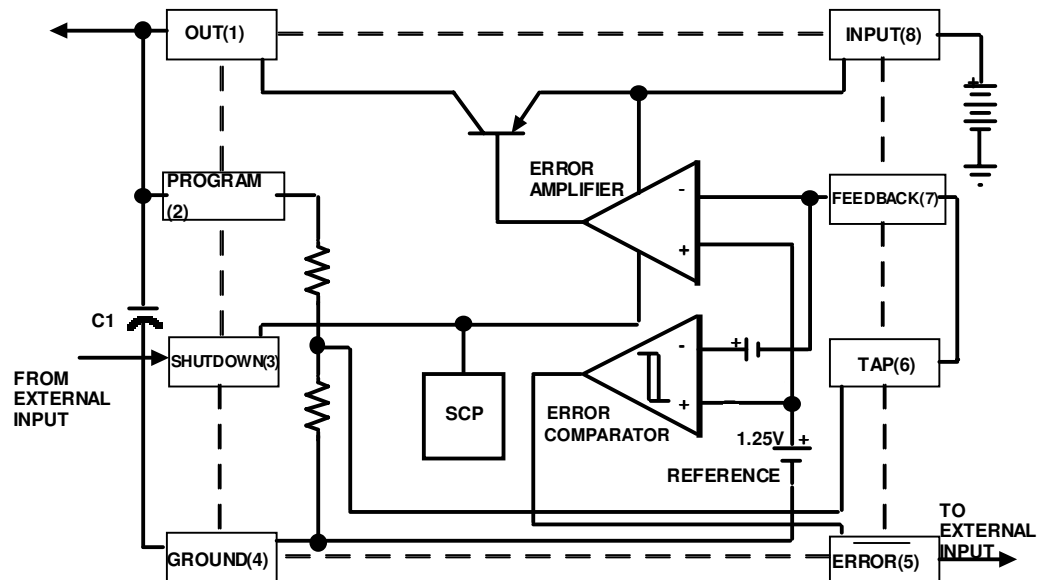
- Low Quiescent Current
- Low Dropout Voltage
- Low Temperature Coefficient
- Tight Line and Load Regulation
- Guaranteed 100mA Output Current
- Internal Short Current & Thermal Limit
- Error Signals of Output Dropout (8 pin Versions Only)
- External Shut-down (8 pin Versions Only)

Description

The KA78RL00 is an adjustable micro power voltage regulator suitable for use in battery-powered systems. This regulator has various functions such as alarm which warns of a low output voltage, often due to falling batteries on the input, the external shutdown which enables the regulator to be switched on and off, current and temperature limiting.



Internal Block Diagram



Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|--------------------------------------|------------------|--------------------|-------------|
| Input Supply Voltage | V _{IN} | -0.3 ~ +30 | V |
| Power Dissipation | P _D | Internally Limited | W |
| Thermal Resistance Junction-Air | R _{θJA} | 127.5 | °C/W |
| Storage Temperature Range | T _{STG} | -65 ~ +150 | °C |
| Operating Junction Temperature Range | T _{OPR} | -40 ~ +125 | °C |

Electrical Characteristics

(Refer to the test circuit, $T_a = 25\text{ }^\circ\text{C}$, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------------|---------------------|----------------------------------------------------------|-------|------|-------|-----------------------|
| ALL VOLTAGE OPTIONS | | | | | | |
| Output Voltage Temperature Coefficient | $\Delta V/\Delta T$ | (Note1) | - | 50 | - | ppm/ $^\circ\text{C}$ |
| Line Regulation (Note2) | ΔV | $(V_o + 1)V \leq V_{IN} \leq 28V$ $I_L = 50\text{mA}$ | - | - | 0.4 | % |
| Load Regulation (Note2) | ΔV | $100\mu\text{A} \leq I_L \leq 100\text{mA}$ | - | - | 0.3 | % |
| Dropout Voltage | V_D | $I_L = 100\mu\text{A}$ | - | - | 150 | mV |
| | | $I_L = 100\text{mA}$ | - | - | 600 | mV |
| Ground Current | I_G | $I_L = 100\mu\text{A}$ | - | - | 140 | μA |
| | | $I_L = 100\text{mA}$ | - | - | 7 | mA |
| Current Limit | I_{CL} | $V_O = 0V$ | 110 | 165 | 220 | mA |
| 8-PIN VERSIONS ONLY | | | | | | |
| Reference Voltage | V_{REF} | (Note3) | 1.235 | 1.26 | 1.285 | V |
| | V_{REF} | | 1.225 | 1.26 | 1.295 | V |
| ERROR COMPARATOR | | | | | | |
| Output Low Voltage | V_{OL} | $V_{IN} = (V_o - 0.5)V, I_{OL} = 400\mu\text{A}$ | - | 150 | 400 | mV |
| High Threshold Voltage | V_{TH} | (Note4) | 25 | 60 | - | mV |
| Low Threshold Voltage | V_{TL} | (Note4) | - | 75 | 140 | mV |
| Hysteresis | V_{HYS} | (Note4) | - | 15 | - | mV |
| SHUTDOWN INPUT | | | | | | |
| Shutdown Threshold Range | V_{SD} | (Note5) | 0.6 | 1.3 | 2.0 | V |
| Shutdown Input Current | I_{SD} | $V_{SD} = 2.4V$ | - | 30 | 100 | μA |
| | | $V_{SD} = 28V$ | - | 450 | 750 | μA |

Note :

- Output or reference voltage temperature coefficient is defined as the worst case voltage change divided by the total temperature range.
- Regulation is measured at constant junction temperature , using pulse testing with a low duty cycle.
- $V_{ref} \leq V_{out} \leq (V_{in} - 1V)$, $2.5V \leq V_{in} \leq 28V$, $100\mu\text{A} \leq I_L \leq 100\text{mA}$, $T_A \leq T_{AMAX}$.
- Threshold and hysteresis are expressed in terms of voltage differential at the Feedback terminal below the normal reference . To express these thresholds in terms of output voltage change , multiply by the error amplifier gain = $V_O / V_{REF} = (R1 + R2) / R2$.
- $V_{shutdown} \leq 0.6\text{ V}$, $V_{OUT} = \text{ON}$, $V_{shutdown} \geq 2.0\text{ V}$, $V_{OUT} = \text{OFF}$.

Typical Performance Characteristics

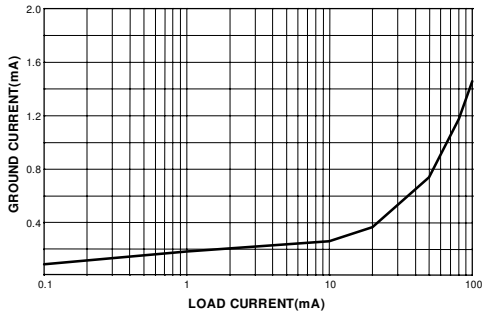


Figure 1. Quiescent Current

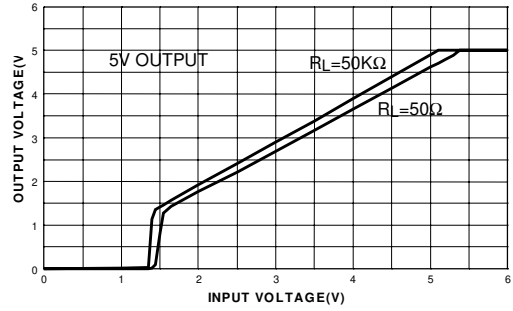


Figure 2. Dropout Characteristics

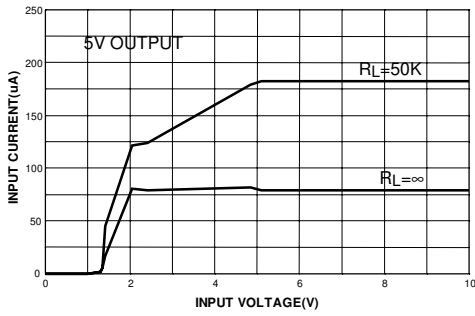


Figure 3. Input Current

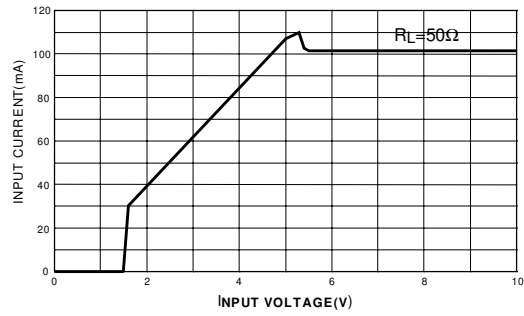


Figure 4. Input Current

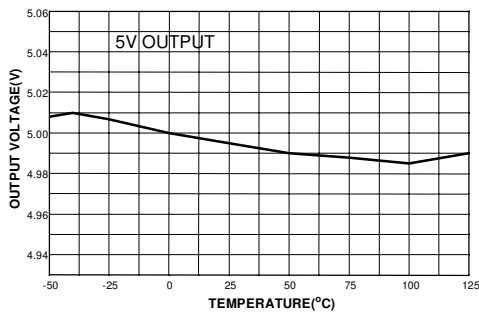


Figure 5. Output Voltage vs. Temperature

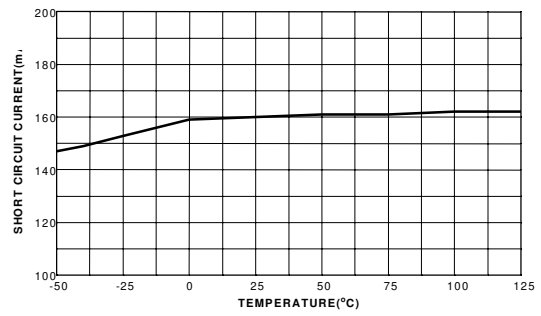


Figure 6. Short Circuit Current

Typical Performance Characteristics (Continued)

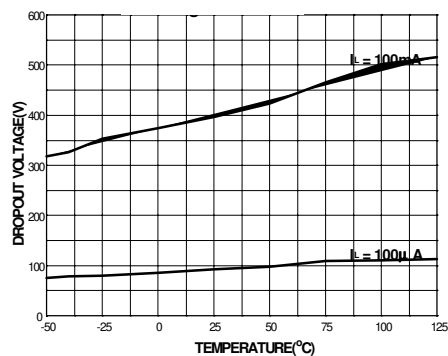


Figure 7. Dropout Voltage

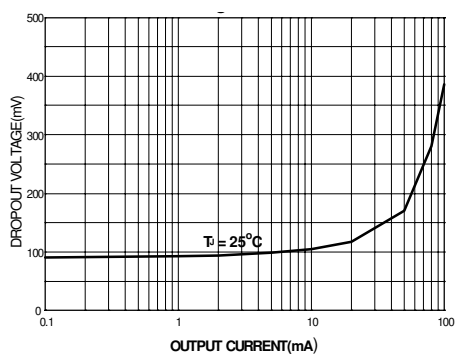
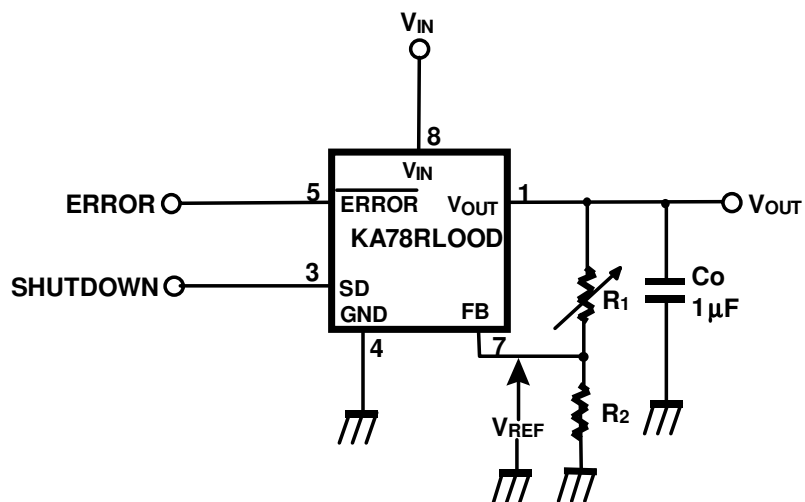


Figure 8. Dropout Voltage

Typical Application



$$V_O = V_{REF} (1 + R_1 / R_2) + I_{FB} R_1$$

CO is required between the output and ground for stability at output voltages of 5V or more. since IFB is controlled to less than 40nA, the error associated with this term is negligible in most applications. At lower output voltage, more capacitance is required. without this capacitance the part will oscillate.

Ordering Information

| Product Number | Package | Operationg Temperature |
|-----------------------|----------------|-------------------------------|
| KA78RL00D | 8-SOP | -40 ~ +125°C |

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