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[^0]
## MC78LXXA / LM78LXXA <br> 3-Terminal 0.1 A Positive Voltage Regulator

## Features

- Maximum Output Current of 100 mA
- Output Voltage of $5 \mathrm{~V}, 6 \mathrm{~V}, 8 \mathrm{~V}, 12 \mathrm{~V}$, and 15 V
- Thermal Overload Protection
- Short-Circuit Current Limiting
- Output Voltage Offered in $\pm 5 \%$ Tolerance


## Description

The MC78LXXA / LM78LXXA series of fixed-voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply current up to 100 mA .


## 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 $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ unless otherwise noted.

| Symbol | Parameter |  | Value | Unit |
| :---: | :---: | :---: | :---: | :---: |
| $V_{1}$ | Input Voltage | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}$ to 8 V | 30 | V |
|  |  | $\mathrm{V}_{\mathrm{O}}=12 \mathrm{~V}$ to 15 V | 35 | V |
| Topr | Operating Temperature Range |  | -40 to $+125^{\circ} \mathrm{C}$ | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\text {J(MAX) }}$ | Maximum Junction Temperature |  | 150 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\text {STG }}$ | Storage Temperature Range |  | -65 to +150 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{R}_{\text {өJC }}$ | Thermal Resistance, Junction-Case | TO-92 | 50 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| $\mathrm{R}_{\theta \mathrm{JJA}}$ | Thermal Resistance, Junction-Air | TO-92 | 150 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
|  |  | SOT-89 | 225 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
|  |  | 8-SOIC | 160 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |

## Electrical Characteristics (MC78L05A / LM78L05A)

$\mathrm{V}_{\mathrm{I}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=40 \mathrm{~mA},-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{J}} \leq 125^{\circ} \mathrm{C}, \mathrm{C}_{\mathrm{I}}=0.33 \mu \mathrm{~F}, \mathrm{C}_{\mathrm{O}}=0.1 \mu \mathrm{~F}$, unless otherwise specified.

| Symbol | Parameter |  | Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 4.8 | 5.0 | 5.2 | V |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Line Regulation ${ }^{(1)}$ |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $7 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ |  | 8 | 150 | mV |
|  |  |  | $8 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ |  | 6 | 100 | mV |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Load Regulation ${ }^{(1)}$ |  |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 100 \mathrm{~mA}$ |  | 11 | 60 | mV |
|  |  |  | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  | 5.0 | 30.0 | mV |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $7 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  | 5.25 | V |
|  |  |  | $7 \mathrm{~V} \leq \mathrm{V}_{1} \leq \mathrm{V}_{\text {MAX }}{ }^{(2)}$ | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ | 4.75 |  | 5.25 | V |
| $\mathrm{I}_{\mathrm{Q}}$ | Quiescent Current |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 2.0 | 5.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ | Quiescent Current Change | With Line | $8 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ |  |  |  | 1.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ |  | With Load | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  |  | 0.1 | mA |
| $\mathrm{V}_{\mathrm{N}}$ | Output Noise Voltage |  | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, 10 \mathrm{~Hz} \leq \mathrm{f} \leq 100 \mathrm{kHz}$ |  |  | 40 |  | $\mu \mathrm{V} / \mathrm{Vo}$ |
| $\Delta \mathrm{V}_{\mathrm{O}} / \Delta \mathrm{T}$ | Temperature Coefficient of $\mathrm{V}_{\mathrm{O}}$ |  | $\mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |  |  | -0.65 |  | $\mathrm{mV} /{ }^{\circ} \mathrm{C}$ |
| RR | Ripple Rejection |  | $\mathrm{f}=120 \mathrm{~Hz}, 8 \mathrm{~V} \leq \mathrm{V}_{\mathrm{I}} \leq 18 \mathrm{~V}, \mathrm{~T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 41 | 80 |  | dB |
| $\mathrm{V}_{\mathrm{D}}$ | Dropout Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 1.7 |  | V |

## Notes:

1. The maximum steady-state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represents pulse test conditions with junction temperature as indicated at the initiation of tests.
2. Power dissipation $\mathrm{P}_{\mathrm{D}} \leq 0.75 \mathrm{~W}$.

## Electrical Characteristics (MC78L06A)

$\mathrm{V}_{\mathrm{I}}=12 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=40 \mathrm{~mA},-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{J}} \leq 125^{\circ} \mathrm{C}, \mathrm{C}_{\mathrm{I}}=0.33 \mu \mathrm{~F}, \mathrm{C}_{\mathrm{O}}=0.1 \mu \mathrm{~F}$, unless otherwise specified.

| Symbol | Parameter |  |  | Conditions | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 5.75 | 6.0 | 6.25 | V |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Line Regulation ${ }^{(3)}$ |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $8.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ |  | 64 | 175 | mV |
|  |  |  | $9 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}$ |  | 54 | 125 | mV |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Load Regulation ${ }^{(3)}$ |  |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 100 \mathrm{~mA}$ |  | 12.8 | 80.0 | mV |
|  |  |  | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ |  |  | 5.8 | 40.0 | mV |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $8.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}, 1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  | 5.7 |  | 6.3 | V |
|  |  |  | $8.5 \mathrm{~V} \leq \mathrm{V}_{\mathrm{I}} \leq \mathrm{V}_{\mathrm{MAX}}{ }^{(4)}, 1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ |  | 5.7 |  | 6.3 | V |
| $\mathrm{I}_{\mathrm{Q}}$ | Quiescent Current |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  |  | 5.5 | mA |
|  |  |  | $\mathrm{T}_{\mathrm{J}}=125^{\circ} \mathrm{C}$ |  |  | 3.9 | 6.0 | mA |
| $\Delta l_{\text {Q }}$ | Quiescent Current Change | With Line | $9 \mathrm{~V} \leq \mathrm{V}_{1} \leq$ |  |  |  | 1.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ |  | With Load | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}}$ | 40 mA |  |  | 0.1 | mA |
| $\mathrm{V}_{\mathrm{N}}$ | Output Noise Voltage |  | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ | $10 \mathrm{~Hz} \leq \mathrm{f} \leq 100 \mathrm{kHz}$ |  | 40 |  | $\mu \mathrm{V} / \mathrm{Vo}$ |
| $\Delta \mathrm{V}_{\mathrm{O}} / \Delta \mathrm{T}$ | Temperature Coefficient of $\mathrm{V}_{\mathrm{O}}$ |  | $\mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |  |  | 0.75 |  | $\mathrm{mV} /{ }^{\circ} \mathrm{C}$ |
| RR | Ripple Rejection |  | $\mathrm{f}=120 \mathrm{~Hz}$ | $10 \mathrm{~V} \leq \mathrm{V}_{1} \leq 20 \mathrm{~V}, \mathrm{~T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | 40 | 46 |  | dB |
| $\mathrm{V}_{\mathrm{D}}$ | Dropout Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 1.7 |  | V |

Notes:
3. The maximum steady-state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represents pulse test conditions with junction temperature as indicated at the initiation of tests.
4. Power dissipation $\mathrm{P}_{\mathrm{D}} \leq 0.75 \mathrm{~W}$.

## Electrical Characteristics (MC78L08A)

$\mathrm{V}_{\mathrm{I}}=14 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=40 \mathrm{~mA},-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{J}} \leq 125^{\circ} \mathrm{C}, \mathrm{C}_{\mathrm{I}}=0.33 \mu \mathrm{~F}, \mathrm{C}_{\mathrm{O}}=0.1 \mu \mathrm{~F}$, unless otherwise specified.

| Symbol | Parameter |  | Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 7.7 | 8.0 | 8.3 | V |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Line Regulation ${ }^{(5)}$ |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $10.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 23 \mathrm{~V}$ |  | 10 | 175 | mV |
|  |  |  | $11 \mathrm{~V} \leq \mathrm{V}_{1} \leq 23 \mathrm{~V}$ |  | 8 | 125 | mV |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Load Regulation ${ }^{(5)}$ |  |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 100 \mathrm{~mA}$ |  | 15 | 80 | mV |
|  |  |  | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  | 8 | 40 | mV |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $10.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 23 \mathrm{~V}$ | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ | 7.6 |  | 8.4 | V |
|  |  |  | $10.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq \mathrm{V}_{\text {MAX }}{ }^{(6)}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ | 7.6 |  | 8.4 | V |
| $\mathrm{I}_{\mathrm{Q}}$ | Quiescent Current |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 2.0 | 5.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ | Quiescent Current Change | With Line | $11 \mathrm{~V} \leq \mathrm{V}_{1} \leq 23 \mathrm{~V}$ |  |  |  | 1.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ |  | With Load | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  |  | 0.1 | mA |
| $\mathrm{V}_{\mathrm{N}}$ | Output Noise Voltage |  | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, 10 \mathrm{~Hz} \leq \mathrm{f} \leq 100 \mathrm{kHz}$ |  |  | 60 |  | $\mu \mathrm{V} / \mathrm{Vo}$ |
| $\Delta \mathrm{V}_{\mathrm{O}} / \Delta \mathrm{T}$ | Temperature Coefficient of $\mathrm{V}_{\mathrm{O}}$ |  | $\mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |  |  | -0.8 |  | $\mathrm{mV} /{ }^{\circ} \mathrm{C}$ |
| RR | Ripple Rejection |  | $\mathrm{f}=120 \mathrm{~Hz}, 11 \mathrm{~V} \leq \mathrm{V}_{\mathrm{I}} \leq 21 \mathrm{~V}, \mathrm{~T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 39 | 70 |  | dB |
| $\mathrm{V}_{\mathrm{D}}$ | Dropout Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 1.7 |  | V |

Notes:
5. The maximum steady-state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represents pulse test conditions with junction temperature as indicated at the initiation of tests.
6. Power dissipation $\mathrm{P}_{\mathrm{D}} \leq 0.75 \mathrm{~W}$.

## Electrical Characteristics (MC78L12A / LM78L12A)

$\mathrm{V}_{\mathrm{I}}=19 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=40 \mathrm{~mA},-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{J}} \leq 125^{\circ} \mathrm{C}, \mathrm{C}_{\mathrm{I}}=0.33 \mu \mathrm{~F}, \mathrm{C}_{\mathrm{O}}=0.1 \mu \mathrm{~F}$, unless otherwise specified.

| Symbol | Parameter |  | Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 11.5 | 12.0 | 12.5 | V |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Line Regulation ${ }^{(7)}$ |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $14.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 27 \mathrm{~V}$ |  | 20 | 250 | mV |
|  |  |  | $16 \mathrm{~V} \leq \mathrm{V}_{1} \leq 27 \mathrm{~V}$ |  | 15 | 200 | mV |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Load Regulation ${ }^{(7)}$ |  |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 100 \mathrm{~mA}$ |  | 20 | 100 | mV |
|  |  |  | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  | 10 | 50 | mV |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $14.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 27 \mathrm{~V}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ | 11.4 |  | 12.6 | V |
|  |  |  | $14.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq \mathrm{V}_{\mathrm{MAX}}{ }^{(8)}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ | 11.4 |  | 12.6 | V |
| $\mathrm{I}_{\mathrm{Q}}$ | Quiescent Current |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 2.1 | 6.0 | mA |
| $\Delta_{\mathrm{Q}}$ | Quiescent Current Change | With Line | $16 \mathrm{~V} \leq \mathrm{V}_{1} \leq 27 \mathrm{~V}$ |  |  |  | 1.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ |  | With Load | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  |  | 0.1 | mA |
| $\mathrm{V}_{\mathrm{N}}$ | Output Noise Voltage |  | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, 10 \mathrm{~Hz} \leq \mathrm{f} \leq 100 \mathrm{kHz}$ |  |  | 80 |  | $\mu \mathrm{V} / \mathrm{Vo}$ |
| $\Delta \mathrm{V}_{\mathrm{O}} / \Delta \mathrm{T}$ | Temperature Coefficient of $\mathrm{V}_{\mathrm{O}}$ |  | $\mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |  |  | -1.0 |  | $\mathrm{mV} /{ }^{\circ} \mathrm{C}$ |
| RR | Ripple Rejection |  | $\mathrm{f}=120 \mathrm{~Hz}, 15 \mathrm{~V} \leq \mathrm{V}_{\mathrm{I}} \leq 25 \mathrm{~V}, \mathrm{~T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 37 | 65 |  | dB |
| $\mathrm{V}_{\mathrm{D}}$ | Dropout Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 1.7 |  | V |

## Notes:

7. The maximum steady-state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represents pulse test conditions with junction temperature as indicated at the initiation of tests.
8. Power dissipation $\mathrm{P}_{\mathrm{D}} \leq 0.75 \mathrm{~W}$.

## Electrical Characteristics (MC78L15A)

$\mathrm{V}_{\mathrm{I}}=23 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=40 \mathrm{~mA},-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{J}} \leq 125^{\circ} \mathrm{C}, \mathrm{C}_{\mathrm{I}}=0.33 \mu \mathrm{~F}, \mathrm{C}_{\mathrm{O}}=0.1 \mu \mathrm{~F}$, unless otherwise specified.

| Symbol | Parameter |  | Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 14.4 | 15.0 | 15.6 | V |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Line Regulation ${ }^{(9)}$ |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $17.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 30 \mathrm{~V}$ |  | 25 | 300 | mV |
|  |  |  | $20 \mathrm{~V} \leq \mathrm{V}_{1} \leq 30 \mathrm{~V}$ |  | 20 | 250 | mV |
| $\Delta \mathrm{V}_{\mathrm{O}}$ | Load Regulation ${ }^{(9)}$ |  |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 100 \mathrm{~mA}$ |  | 25 | 150 | mV |
|  |  |  | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  | 12 | 75 | mV |
| $\mathrm{V}_{\mathrm{O}}$ | Output Voltage |  | $17.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq 30 \mathrm{~V}$ | $1 \mathrm{~mA} \leq \mathrm{l}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ | 14.25 |  | 15.75 | V |
|  |  |  | $17.5 \mathrm{~V} \leq \mathrm{V}_{1} \leq \mathrm{V}_{\mathrm{MAX}}{ }^{(10)}$ | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 70 \mathrm{~mA}$ | 14.25 |  | 15.75 | V |
| $\mathrm{I}_{\mathrm{Q}}$ | Quiescent Current |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 2.1 | 6.0 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ | Quiescent Current Change | With Line | $20 \mathrm{~V} \leq \mathrm{V}_{1} \leq 30 \mathrm{~V}$ |  |  |  | 1.5 | mA |
| $\Delta \mathrm{l}_{\mathrm{Q}}$ |  | With Load | $1 \mathrm{~mA} \leq \mathrm{I}_{\mathrm{O}} \leq 40 \mathrm{~mA}$ |  |  |  | 0.1 | mA |
| $\mathrm{V}_{\mathrm{N}}$ | Output Noise Voltage |  | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}, 10 \mathrm{~Hz} \leq \mathrm{f} \leq 100 \mathrm{kHz}$ |  |  | 90 |  | $\mu \mathrm{V} / \mathrm{Vo}$ |
| $\Delta \mathrm{V}_{\mathrm{O}} / \Delta \mathrm{T}$ | Temperature Coefficient of $\mathrm{V}_{\mathrm{O}}$ |  | $\mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |  |  | -1.3 |  | $\mathrm{mV} /{ }^{\circ} \mathrm{C}$ |
| RR | Ripple Rejection |  | $\mathrm{f}=120 \mathrm{~Hz}, 18.5 \mathrm{~V} \leq \mathrm{V}_{\mathrm{I}} \leq 28.5 \mathrm{~V}, \mathrm{~T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  | 34 | 60 |  | dB |
| $\mathrm{V}_{\mathrm{D}}$ | Dropout Voltage |  | $\mathrm{T}_{\mathrm{J}}=25^{\circ} \mathrm{C}$ |  |  | 1.7 |  | V |

Notes:
9. The maximum steady-state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represents pulse test conditions with junction temperature as indicated at the initiation of tests.
10. Power dissipation $\mathrm{P}_{\mathrm{D}} \leq 0.75 \mathrm{~W}$.

## Typical Application



Figure 2. Typical Application

## Notes:

13. To specify an output voltage, substitute voltage value for " XX ".
14. $C_{l}$ is required if the regulator is located an appreciable distance from the power supply filter. Though $C_{0}$ is not needed for stability, it improves transient response. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulator.



NOTES: UNLESS OTHERWISE SPECIFIED
A. DRAWING CONFORMS TO JEDEC MS-013,

VARIATION AC.
ALL DIMENSIONS ARE IN MILLIMETERS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5M-2009.
D. DRAWING FILENAME: MKT-ZAO3FREV3.
E. FAIRCHILD SEMICONDUCTOR.



NOTES: UNLESS OTHERWISE SPECIFIED.
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[^1]
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[^1]:    C. DOES NOT COMPLY JEDEC STANDARD VALUE.
    D. DIMENSIONS ARE EXCLUSIVE OF BURRS,

    MOLD FLASH AND TIE BAR PROTRUSION.
    E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
    F. DRAWING FILE NAME: MA03CREV3

