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KA78L05AI

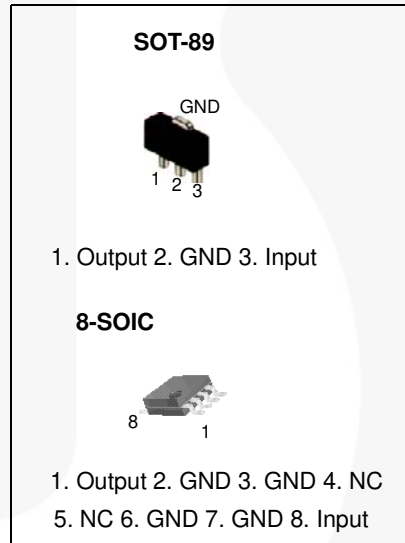
3-Terminal 0.1 A 5 V Positive Voltage Regulator

Features

- Maximum Output Current of 100 mA
- Output Voltage of 5 V
- Thermal Overload Protection
- Short-Circuit Current Limiting
- Output Voltage Offered in $\pm 5\%$ Tolerance

Description

The KA78L05AI of fixed-voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply current up to 100 mA.



Ordering Information

| Product Number | Package | Packing Method | Output Voltage Tolerance | Operating Temperature |
|----------------|---------|----------------|--------------------------|-----------------------|
| KA78L05AIDTF | 8-SOIC | Tape and Reel | $\pm 5\%$ | -40 to +125°C |
| KA78L05AIMTF | SOT-89 | Tape and Reel | | |

Block Diagram

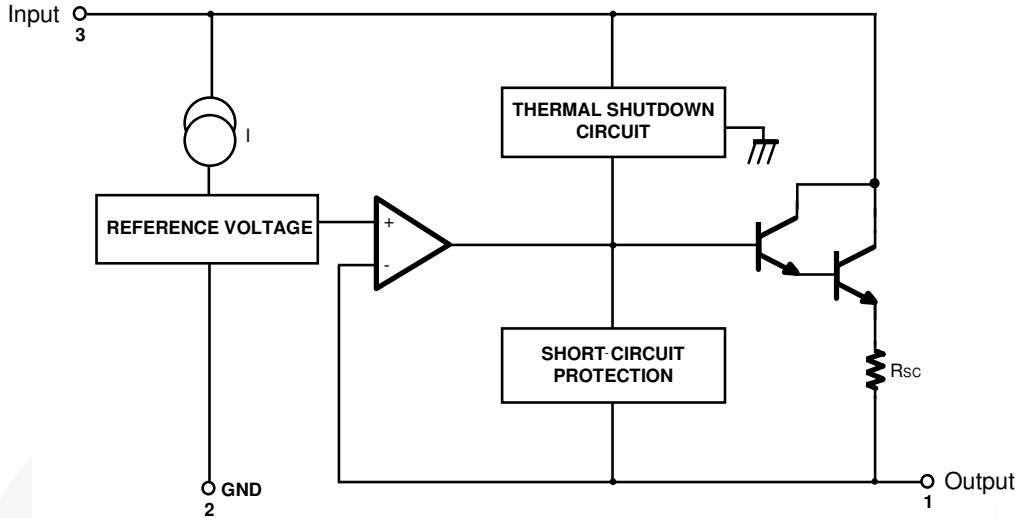


Figure 1. Block Diagram

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

| Symbol | Parameter | Value | Unit |
|-----------------------|--|-------------|------------------------|
| V_I | Input Voltage | 30 | V |
| T_J | Maximum Operating Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{OPR} | Operating Temperature Range | -40 to +125 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -65 to +150 | $^\circ\text{C}$ |
| $R_{\theta\text{JA}}$ | Thermal Resistance Junction-Air | SOT-89 | 225 $^\circ\text{C/W}$ |
| | | 8-SOIC | 160 $^\circ\text{C/W}$ |

Note:

1. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Electrical specifications do not apply when operating the device outside of its stated operating conditions.

Electrical Characteristics

$V_I = 10\text{ V}$, $I_O = 40\text{ mA}$, $-40^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit | |
|-----------------------|---|---|--|-------|------|----------------------------|----|
| V_O | Output Voltage | $T_J = 25^\circ\text{C}$ | 4.8 | 5.0 | 5.2 | V | |
| ΔV_O | Line Regulation ⁽²⁾ | $T_J = 25^\circ\text{C}$ | $7\text{ V} \leq V_I \leq 20\text{ V}$ | | 8 | 150 | mV |
| | | | $8\text{ V} \leq V_I \leq 20\text{ V}$ | | 6 | 100 | mV |
| ΔV_O | Load Regulation ⁽²⁾ | $T_J = 25^\circ\text{C}$ | $1\text{ mA} \leq I_O \leq 100\text{ mA}$ | | 11 | 60 | mV |
| | | | $1\text{ mA} \leq I_O \leq 40\text{ mA}$ | | 5.0 | 30.0 | mV |
| V_O | Output Voltage | $7\text{ V} \leq V_I \leq 20\text{ V}$ | $1\text{ mA} \leq I_O \leq 40\text{ mA}$ | 4.75 | | 5.25 | V |
| | | $7\text{ V} \leq V_I \leq V_{\text{MAX}}^{(3)}$ | $1\text{ mA} \leq I_O \leq 70\text{ mA}$ | 4.75 | | 5.25 | V |
| I_Q | Quiescent Current | $T_J = 25^\circ\text{C}$ | | 2.0 | 5.5 | mA | |
| ΔI_Q | Quiescent Current Change | With Line | $8\text{ V} \leq V_I \leq 20\text{ V}$ | | | 1.5 | mA |
| ΔI_Q | | With Load | $1\text{ mA} \leq I_O \leq 40\text{ mA}^{(4)}$ | | | 0.5 | mA |
| V_N | Output Noise Voltage ⁽⁴⁾ | $T_A = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 40 | | $\mu\text{V}/V_O$ | |
| $\Delta V_O/\Delta T$ | Temperature Coefficient of V_O ⁽⁴⁾ | $I_O = 5\text{ mA}$ | | -0.65 | | $\text{mV}/^\circ\text{C}$ | |
| RR | Ripple Rejection ^{(4), (5)} | $f = 120\text{ Hz}$, $8\text{ V} \leq V_I \leq 18\text{ V}$, $T_J = 25^\circ\text{C}$ | 41 | 80 | | dB | |
| V_D | Dropout Voltage | $T_J = 25^\circ\text{C}$ | | 1.7 | | V | |

Notes:

- 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.
- Power dissipation $P_D \leq 0.75\text{ W}$.
- These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production.
- Recommend minimum load capacitance of $0.01\ \mu\text{F}$ to limit high-frequency noise.

Typical Application⁽⁶⁾

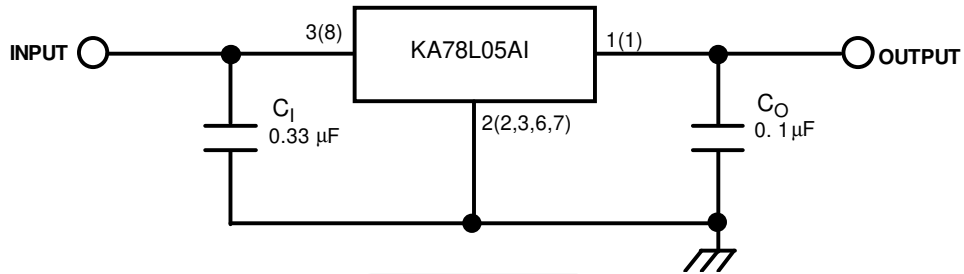


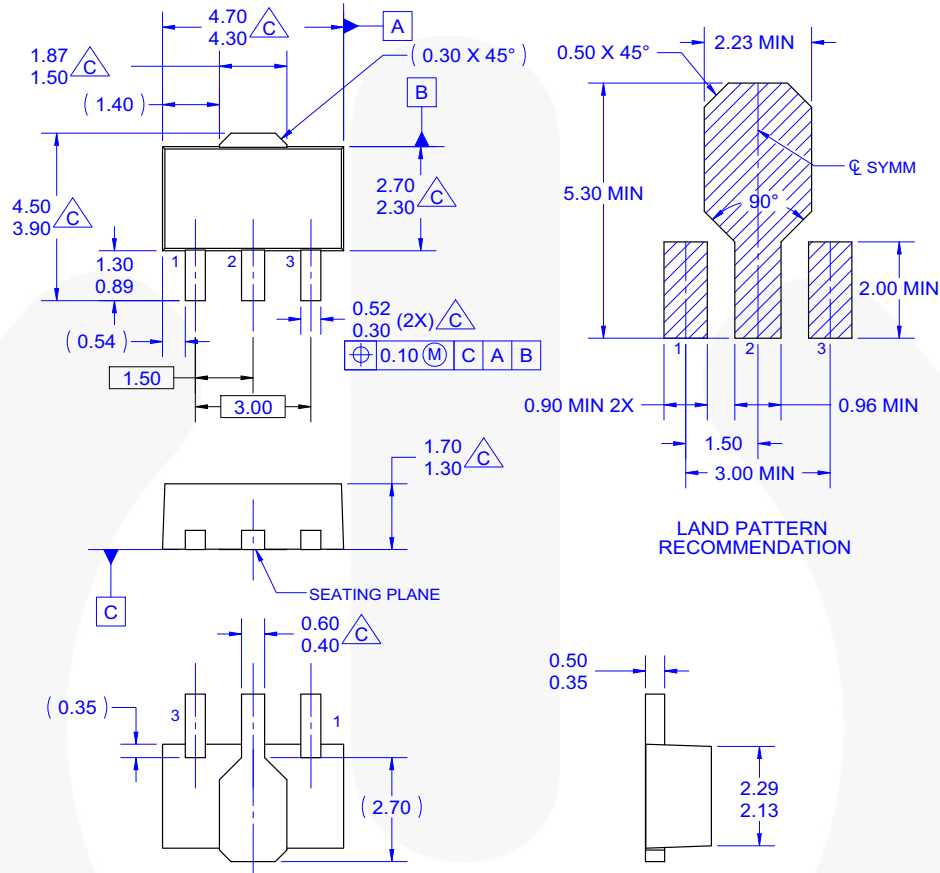
Figure 2. Typical Application

Note:

6. C_1 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.

Physical Dimensions

SOT-89



- NOTES: UNLESS OTHERWISE SPECIFIED.
- A. REFERENCE TO JEDEC TO-243 VARIATION AA.
 - B. ALL DIMENSIONS ARE IN MILLIMETERS.
 - 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: MA03CREV2

Figure 3. 3-Lead, SOT-89, JEDEC TO-243, Option AA

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Physical Dimensions (Continued)

8-SOIC

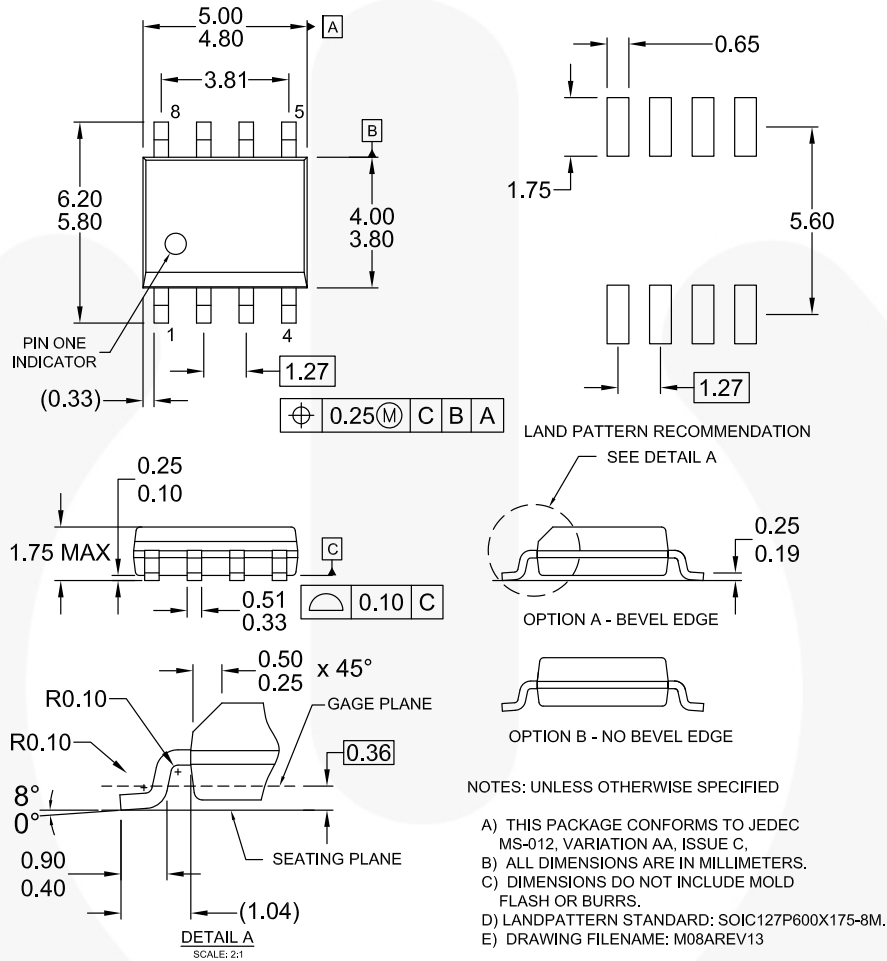


Figure 4. 8LD, SOIC, JEDEC MS-012, 0.150" NARROW BODY

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| BitSiC™ | Global Power Resource SM | Programmable Active Droop™ | TinyBuck™ |
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| CTL™ | GTO™ |  | TinyPWM™ |
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