HLF

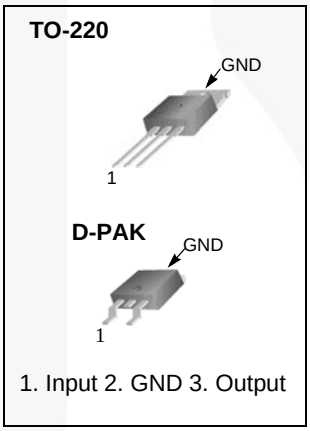
# KA78M05 / LM78M05 / MC78M05
# 3-Terminal 0.5 A Positive Voltage Regulator

## Features

- Output Current up to 0.5 A
- Output Voltages of 5 V
- Thermal Overload Protection
- Short-Circuit Protection
- Output Transistor Safe Operating Area (SOA) Protection

## Description

The KA78M05 / LM78M05 / MC78M05 series of three-terminal positive regulators is available in the TO-220 / D-PAK packages, making it useful in a wide range of applications.



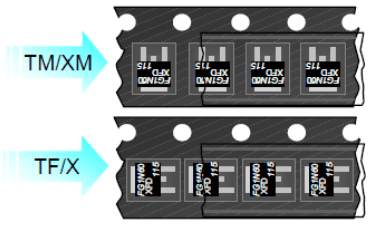

1. Input 2. GND 3. Output

## Ordering Information(1)

| Product Number | Package | Packing Method | Operating Temperature |
|---|---|---|---|
| KA78M05TU | TO-220 (Dual Gauge) | Rail | 0 to +125°C |
| KA78M05RTM | D-PAK | Tape and Reel | |
| MC78M05CDTX | | | |
| LM78M05CT | TO-220 (Single Gauge) | Rail | |

**Note:**

1. Refer to below figure for TM / TF suffix of DPAK packing option.




D-PAK Unit Orientation

## Block Diagram

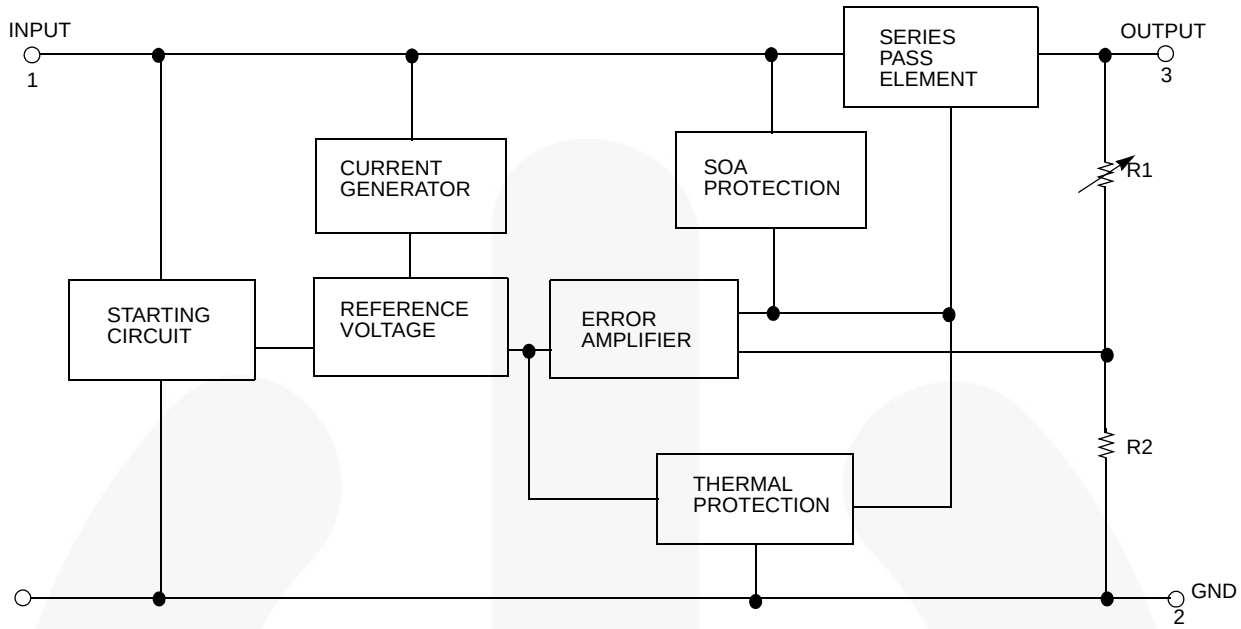



**Figure 1. Block Diagram**

## 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.

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_I$ | Input Voltage (for $V_O$ = 5 V) | | 35 | V |
| $R_{\theta JC}$ | Thermal Resistance, Junction-Case(2) | TO-220 ($T_C$ = +25°C) | 2.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-Air(2, 3) | TO-220 ($T_A$ = +25°C) | 66 | °C/W |
| | | D-PAK ($T_A$ = +25°C) | 92 | |
| $T_{OPR}$ | Operating Junction Temperature Range | | 0 to +125 | °C |
| $T_{J(MAX)}$ | Maximum Junction Temperature Range | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -65 to +150 | °C |

**Notes:**

2. Thermal resistance test board.
   Size: 76.2 mm x 114.3 mm x 1.6 mm (1S0P)
   JEDEC standard: JESD51-3, JESD51-7
3. Assume no ambient airflow.

## Electrical Characteristics

Refer to the test circuits, $0 \leq T_J \leq +125°C$, $I_O$ = 350 mA, $V_I$ = 10 V, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified.

| Symbol | Parameter | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = +25°C | | 4.8 | 5.0 | 5.2 | V |
| | | $I_O$ = 5 mA to 350 mA, $V_I$ = 7 V to 20 V | | 4.75 | 5.00 | 5.25 | |
| $\Delta V_O$ | Line Regulation(4) | $I_O$ = 200 mA, $T_J$ = +25°C | $V_I$ = 7 V to 25 V | | | 100 | mV |
| | | | $V_I$ = 8 V to 25 V | | | 50 | |
| $\Delta V_O$ | Load Regulation(4) | $I_O$ = 5 mA to 0.5 A, $T_J$ = +25°C | | | | 100 | mV |
| | | $I_O$ = 5 mA to 200 mA, $T_J$ = +25 °C | | | | 50 | |
| $I_Q$ | Quiescent Current | $T_J$ = +25°C | | | 4.0 | 6.0 | mA |
| $\Delta I_Q$ | Quiescent Current Change | $I_O$ = 5 mA to 350 mA | | | | 0.5 | mA |
| | | $I_O$ = 200 mA, $V_I$ = 8 V to 25 V | | | | 0.8 | |
| $\Delta V/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA, $T_J$ = 0 to +125°C | | | -0.5 | | mV/°C |
| $V_N$ | Output Noise Voltage | f = 10 Hz to 100 kHz | | | 40 | | µV/Vo |
| RR | Ripple Rejection | f = 120 Hz, $I_O$ = 300 mA, $V_I$ = 8 V to 18 V, $T_J$ = +25 °C | | | 80 | | dB |
| $V_D$ | Dropout Voltage | $T_J$ = +25°C, $I_O$ = 500 mA | | | 2 | | V |
| $I_{SC}$ | Short-Circuit Current | $T_J$ = +25°C, $V_I$ = 35 V | | | 300 | | mA |
| $I_{PK}$ | Peak Current | $T_J$ = +25°C | | | 700 | | mA |

**Note:**

4. 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 is used.

## Typical Applications

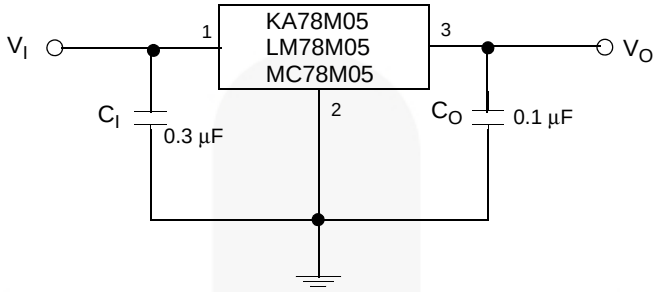



**Figure 2. Fixed-Output Regulator**

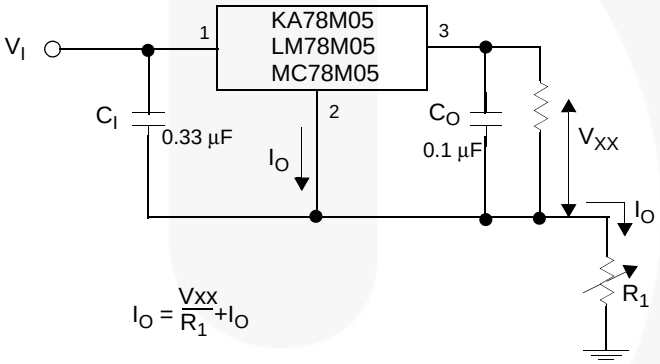



**Figure 3. Constant-Current Regulator**

**Notes:**

5. $C_I$ is required if the regulator is located an appreciable distance from the power supply filter.
6. Although no output capacitor is needed for stability, it does improve transient response.

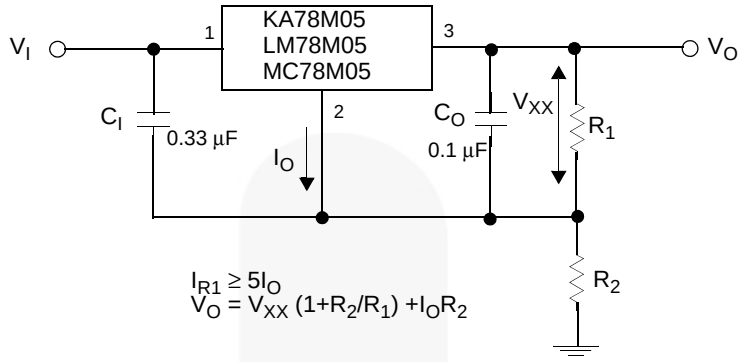



**Figure 4. Circuit for Increasing Output Voltage**

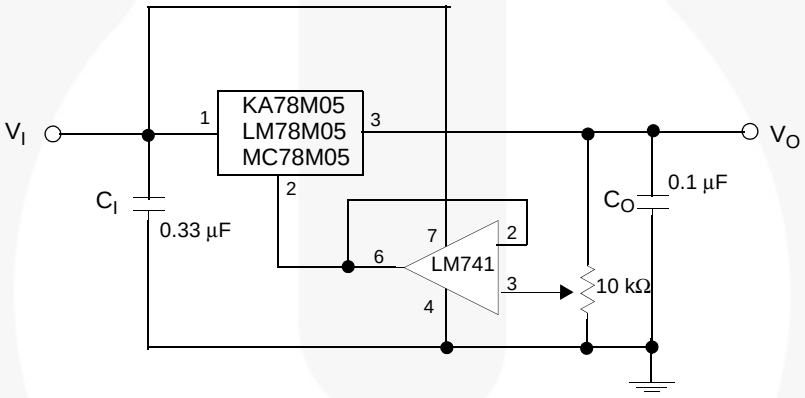



**Figure 5. Adjustable Output Regulator (7 to 30 V)**

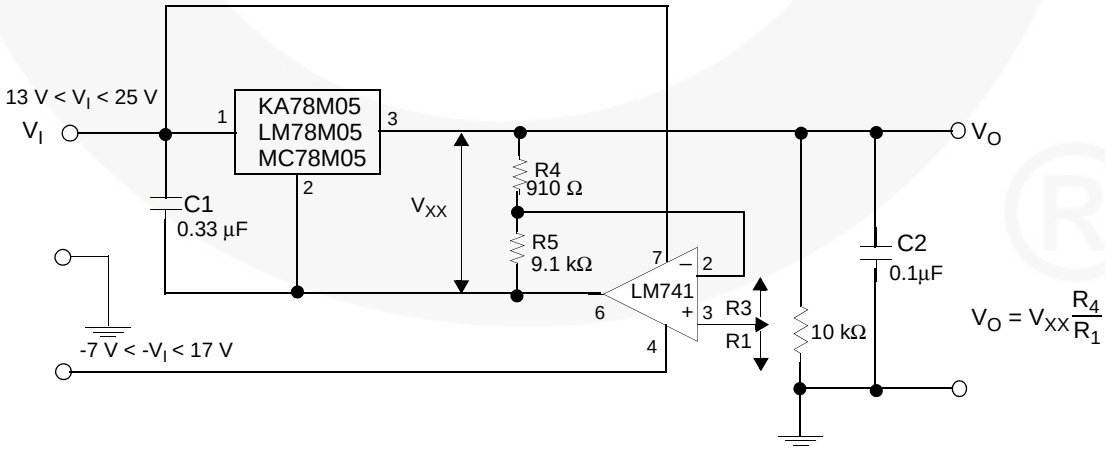



**Figure 6. 0.5 to 10 V Regulator**

## Physical Dimensions

# TO-220 (SINGLE GAUGE)

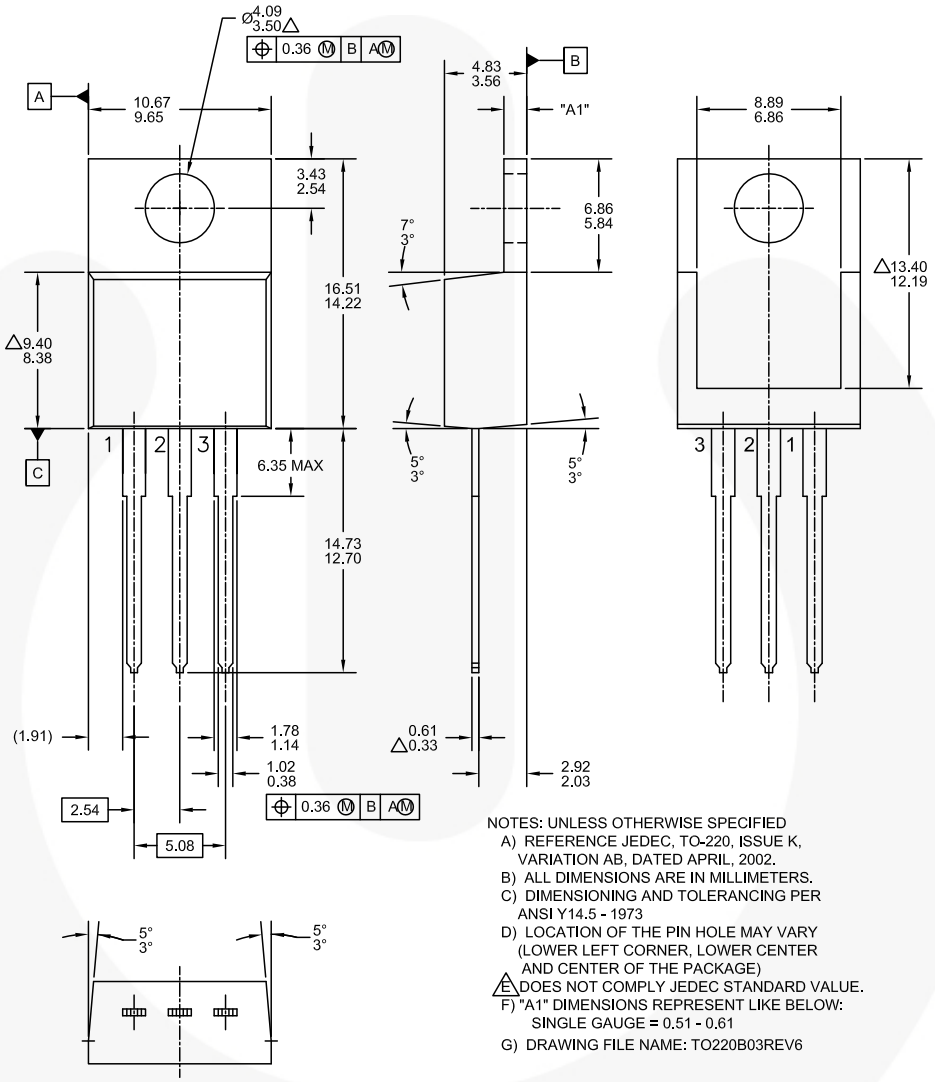



**Figure 7. TO-220, MOLDED, 3-LEAD, JEDEC VARIATION AB (ACTIVE)**

## Physical Dimensions (Continued)

# TO-220 (DUAL GAUGE)

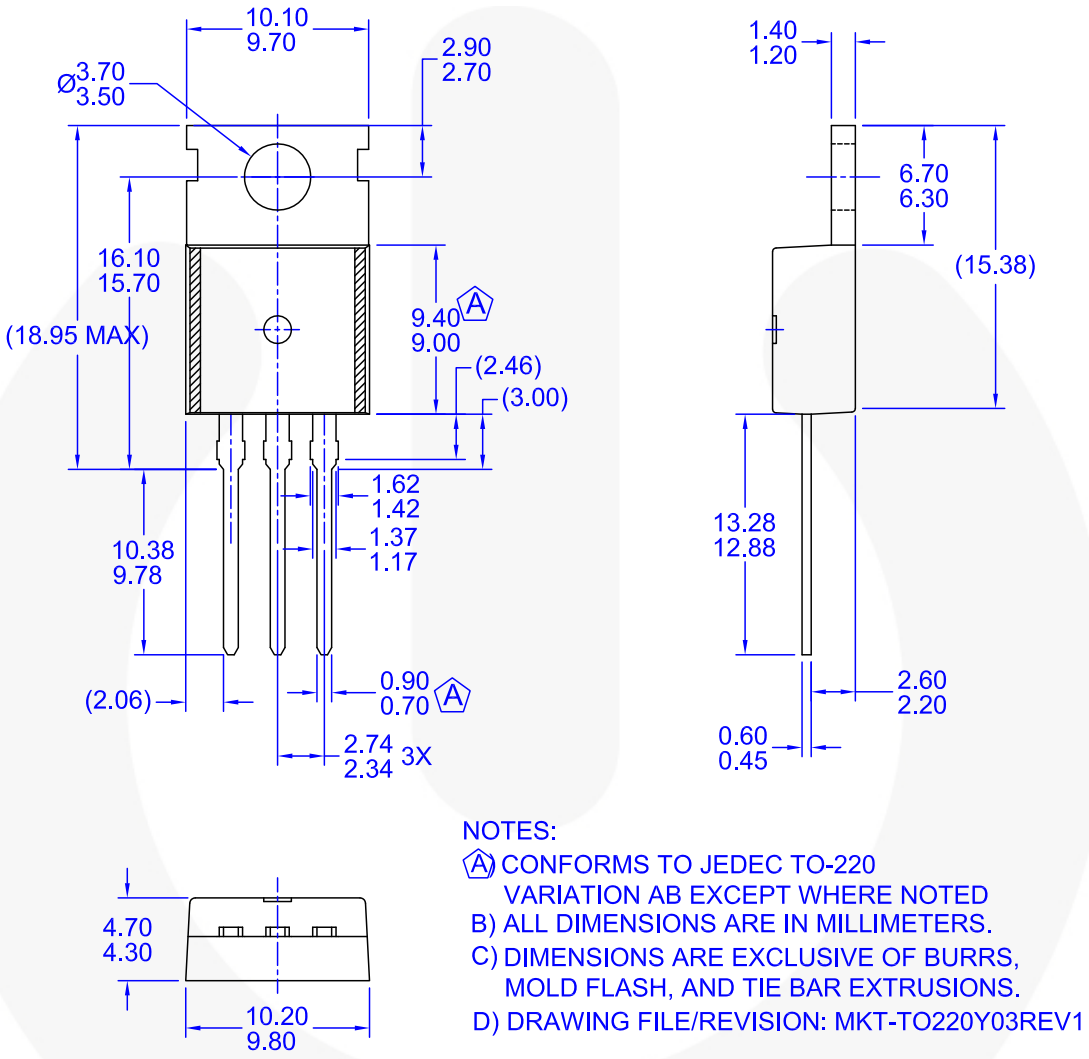
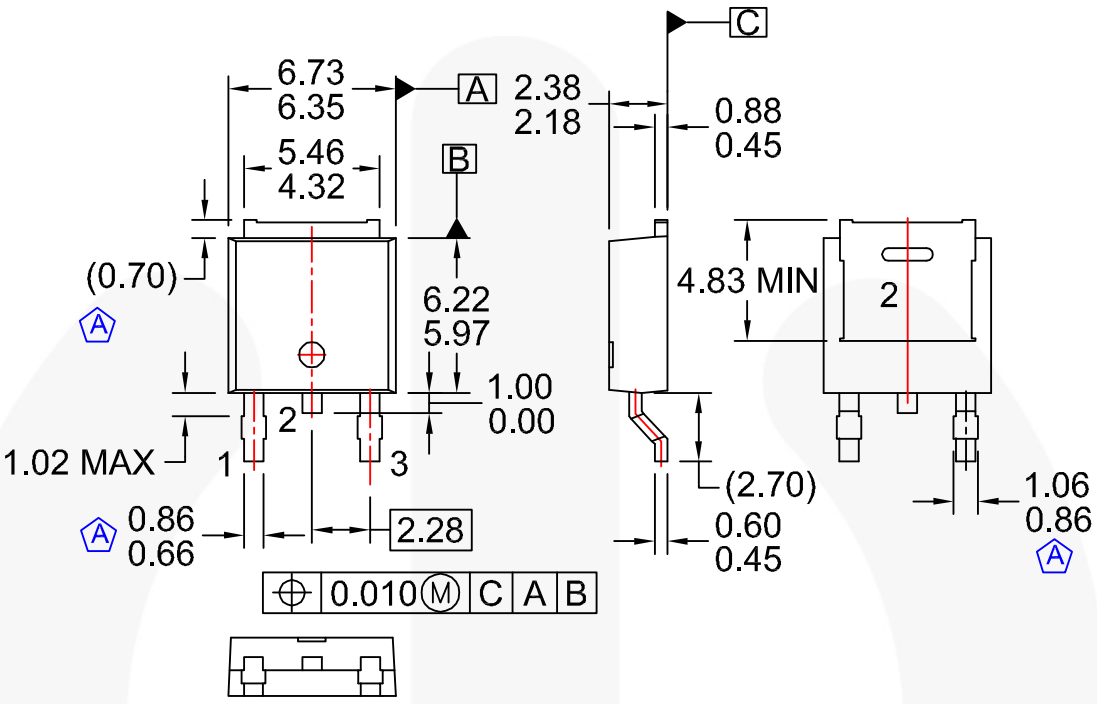



**Figure 8. TO220, MOLDED, 3-LEAD, NON-JEDEC VARIATION AB [DUAL GUAGE]**

## Physical Dimensions (Continued)

D-PAK




NOTES: UNLESS OTHERWISE SPECIFIED

A) CONFORMS TO JEDEC TO-252 VARIATION AB EXCEPT WHERE NOTED

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DRAWING CONFORMS TO ASME Y14.5M-1994

D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

E) FORMERLY NAMED BD1733

F) DRAWING FILE NAME: MKT-TO252D03REV1

**Figure 9. 3-LEAD, TO-252, JEDEC TO-252 VAR. AB, SURFACE MOUNT (DPAK)**