



## 3-Terminal 0.5A Positive Voltage Regulator ME78M05

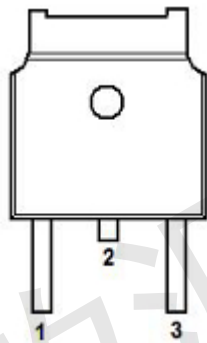
### General Description

ME78M05 is a three-terminal positive regulator. Internal current limiting, thermal shutdown circuitry and safe-area compensation for the internal pass transistor combine to make these devices remarkably rugged under most operating conditions. Maximum output current, with adequate heat- sinking is 500 mA.

### Features

- Output Current up to 0.5A
- Output Voltages of 5V
- Thermal Overload Protection
- Short Circuit Protection
- Package: TO252

### Pin Configuration



1. Input
2. GND
3. Output

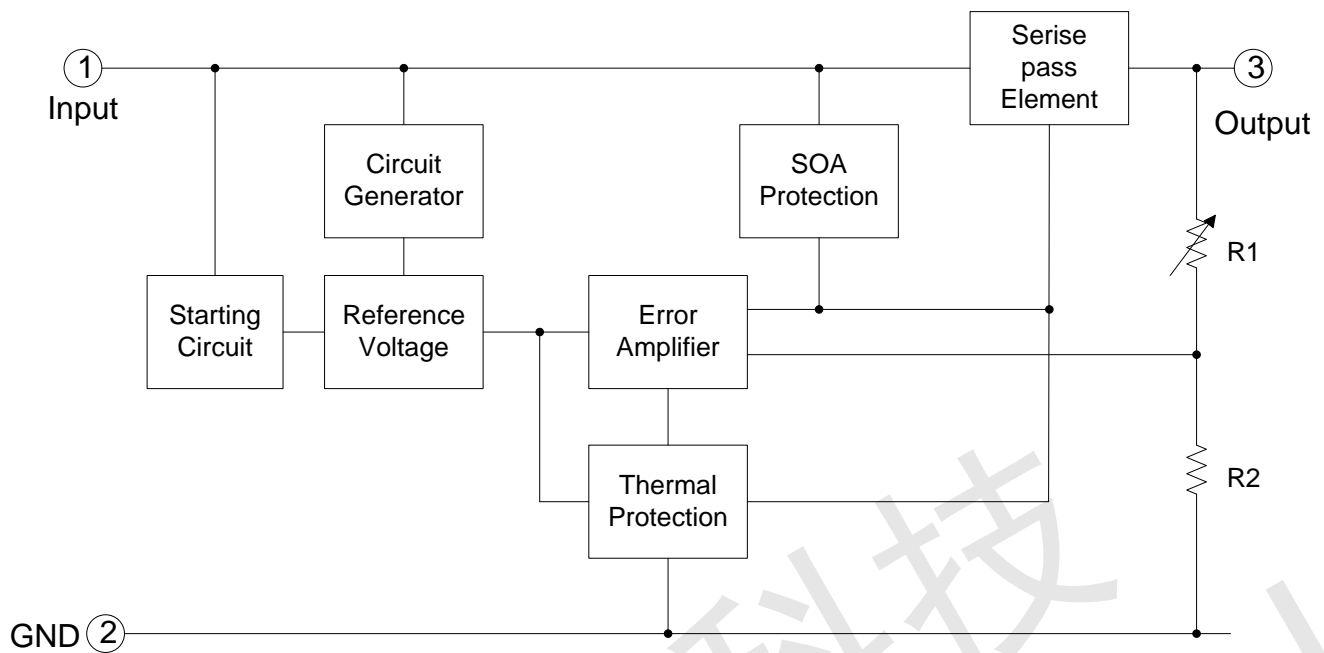
### Maximum Ratings(Ta=25°C)

| Parameter                                    | Rating                 | Unit |
|--|------------------------|------|
| Input supply voltage : VIN                   | 35                     | V    |
| MAX. Output current:Iout                     | 500                    | mA   |
| Maximum junction temperature: T <sub>j</sub> | -25~125                | °C   |
| Storage temperature :T <sub>str</sub>        | -55~150                | °C   |
| Soldering temperature and time               | +260 (Recommended 10S) | °C   |

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.



Block Diagram



Electrical Characteristics

( $I_o = 350\text{mA}$ ,  $V_{IN} = 10\text{V}$ ,  $0 \leq T_j \leq 125^\circ\text{C}$ , unless otherwise noted)

| Parameter                | Symbol       | Conditions   | Min. | Typ. | Max. | Unit              |
|--------------------------|--------------|--|------|------|------|-------------------|
| Output Voltage           | $V_o$        | $I_o = 40\text{mA}$ , $V_{IN} = 10\text{V}$  | 4.8  | 5.0  | 5.2  | V                 |
|                          |              | $I_o = 5\text{mA} \sim 350\text{mA}$<br>$V_{IN} = 7\text{V} \sim 20\text{V}$                                 | 4.75 | 5.0  | 5.25 |                   |
| Line Regulations         | LNR          | $V_{IN} = 7\text{V} \sim 20\text{V}$ , $I_o = 40\text{mA}$   | -60  | -    | 60   | mV                |
| Load Regulation          | LDR          | $V_{IN} = 10\text{V}$ , $I_o = 5\text{mA} \sim 500\text{mA}$   | -100 | -    | 100  | mV                |
| Dropout Voltage          | $V_{DIF}$    | $T_j = 25^\circ\text{C}$ , $I_o = 500\text{mA}$  | -    | 2    | -    | V                 |
| Output noise Voltage     | $V_N$        | $f = 10\text{Hz}$ to $100\text{KHz}$   | -    | 40   | -    | $\mu\text{V}/V_o$ |
| Ripple Rejection         | PSRR         | $T_j = 25^\circ\text{C}$ , $f = 120\text{Hz}$ , $I_o = 300\text{mA}$<br>$V_{IN} = 8\text{V} \sim 20\text{V}$ | -    | 80   | -    | dB                |
| Peak Output Current      | $I_{pk}$     | $T_j = 25^\circ\text{C}$   | -    | 1000 | -    | mA                |
| Quiescent Current        | $I_Q$        | $T_j = 25^\circ\text{C}$   | -    | 3.2  | 8    | mA                |
| Quiescent Current Change | $\Delta I_Q$ | $I_o = 5\text{mA} \sim 350\text{mA}$   | -    | -    | 0.5  | mA                |
|                          |              | $I_o = 200\text{mA}$ , $V_{IN} = 8\text{V} \sim 20\text{V}$  | -    | -    | 0.8  |                   |

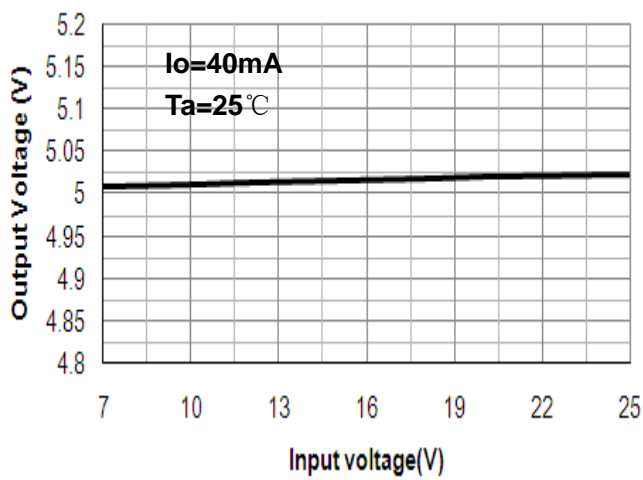
LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

LDR: Load Regulation. The change in output voltage for a change in load current at constant chip temperature.

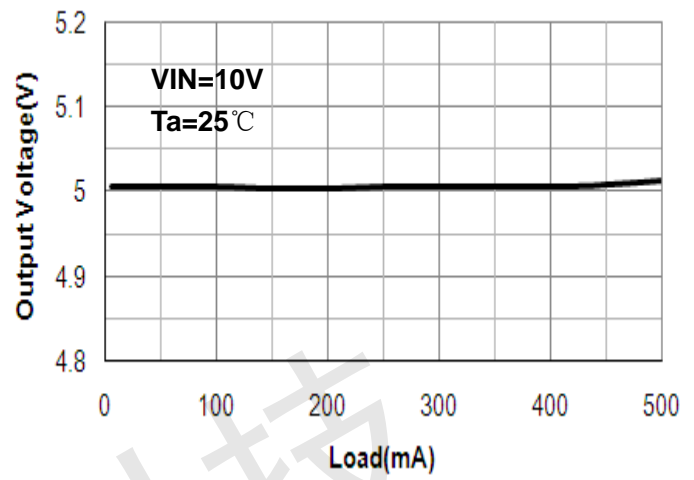


Type Characteristics

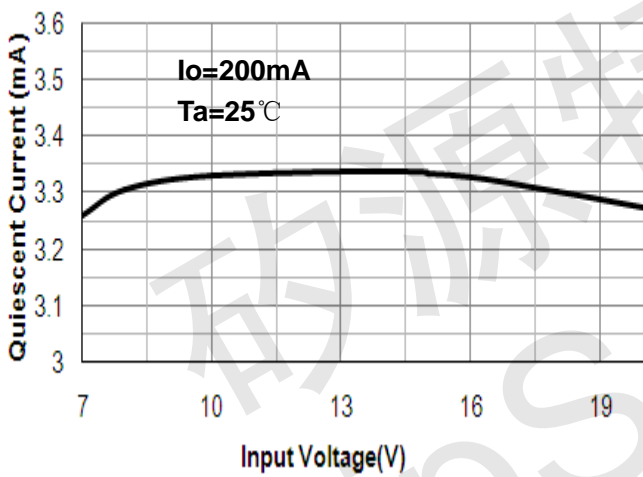
Output Voltage vs. Input voltage



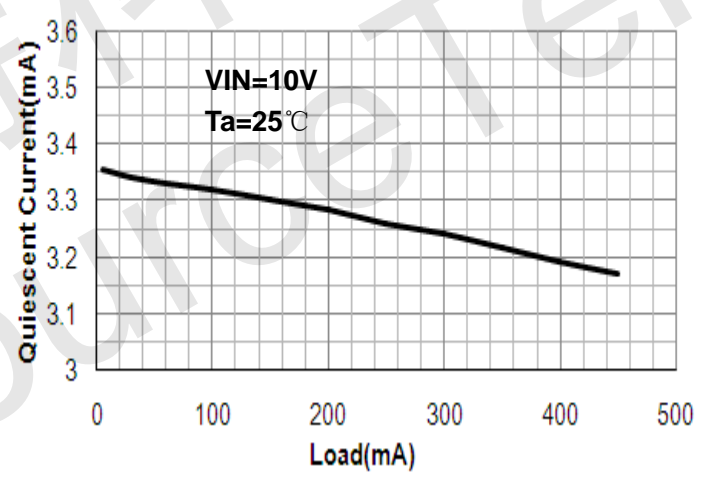
Output Voltage vs. Load



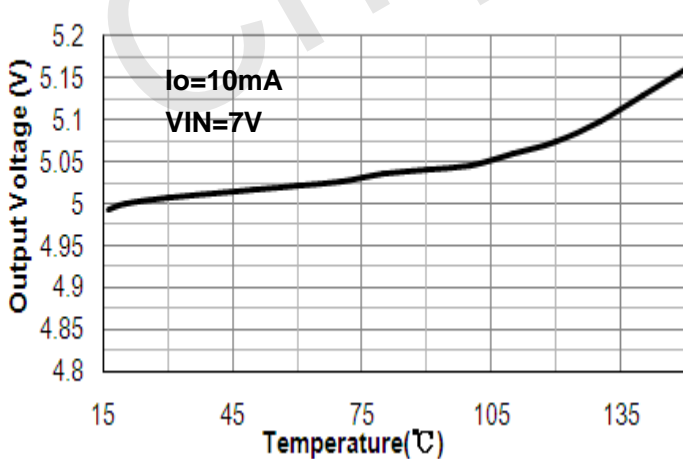
Quiescent Current vs. Input Voltage



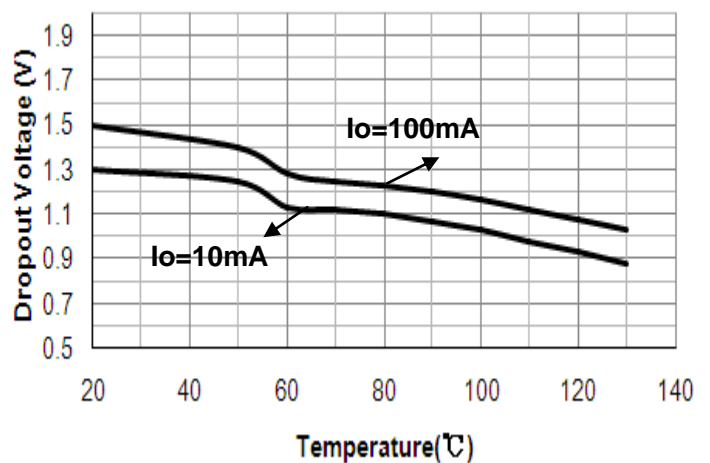
Quiescent Current vs. Load



Output Voltage vs. Temperature



Dropout Voltage vs. Temperature





## Operation Description

ME78M05 is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33 $\mu$ F or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

## Typical Application Circuit

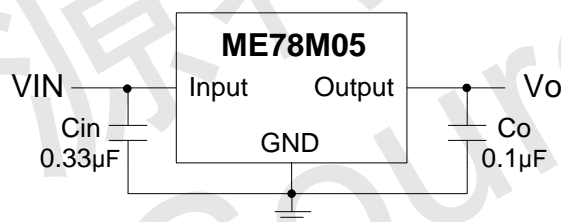


Fig.1 Fixed Output Regulator

Note:a.Cin is required if the regulator is located an appreciable distance from the power supply filter.

b.Although no output capacitor is needed for stability, it does improve transient response.

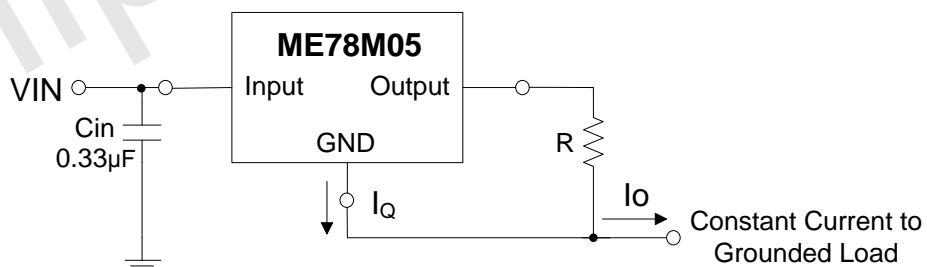
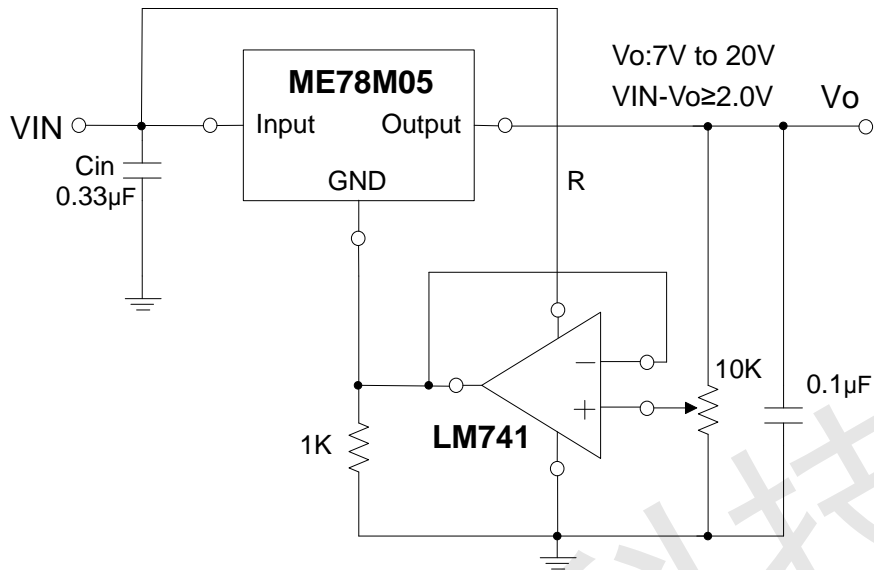


Fig.2 Constant Current Regulator

The ME78M05 regulator can also be used as a current source when connected as Fig.2. In order to minimize dissipation the ME78M05 is chosen in this application. Resistor R determines the current as follows:

$$I_o = \frac{5V}{R} + I_q$$

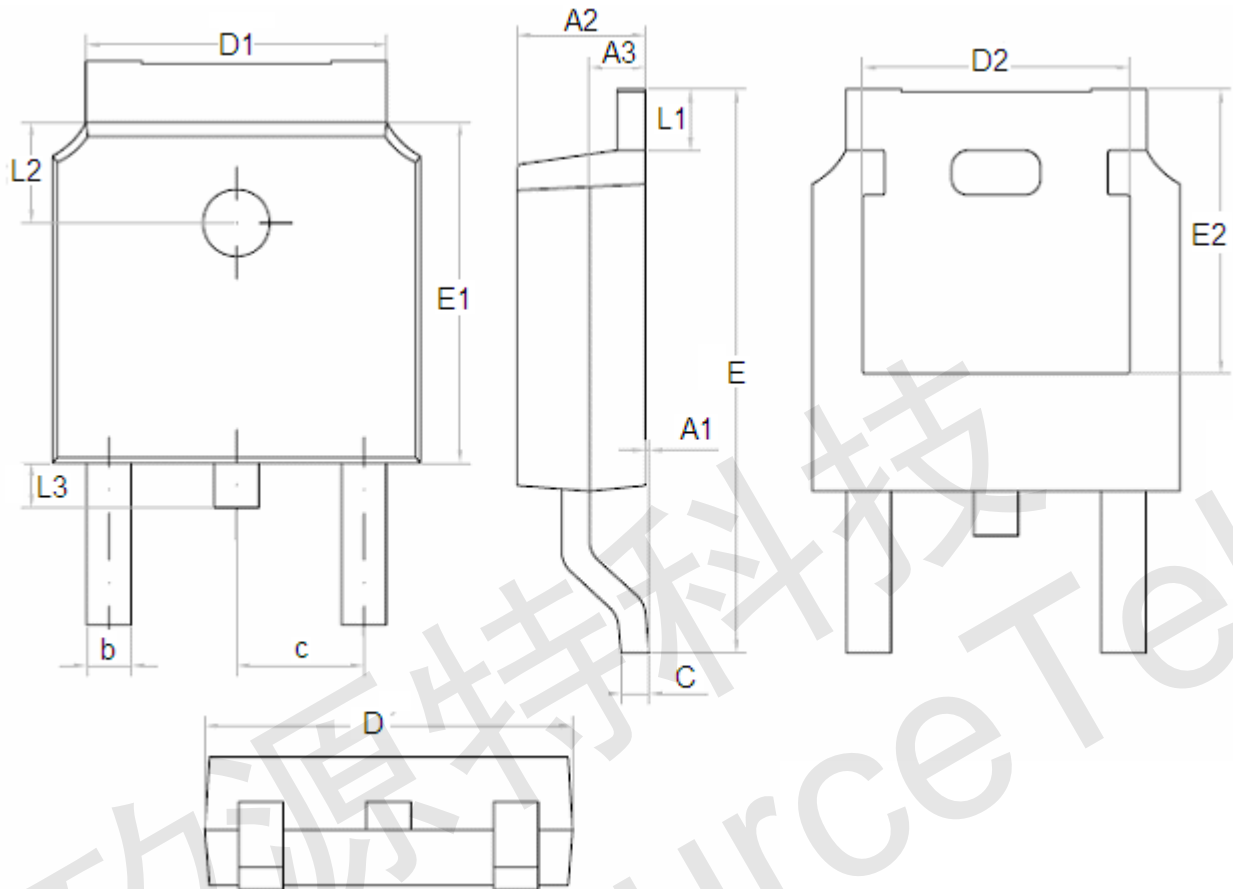


The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtainable with this arrangement is 2.0 V greater than the regulator voltage.



Package Information

Package Type:TO-252



| DIM | Millimeters |       | Inches |        |
|-----|-------------|-------|--------|--------|
|     | Min         | Max   | Min    | Max    |
| A1  | 0           | 0.1   | 0      | 0.004  |
| A2  | 2.20        | 2.40  | 0.0866 | 0.0945 |
| A3  | 0.90        | 1.10  | 0.0354 | 0.0433 |
| b   | 0.75        | 0.85  | 0.0295 | 0.0335 |
| c   | 2.20        | 2.40  | 0.0866 | 0.0945 |
| C   | 0.50        | 0.60  | 0.0197 | 0.0236 |
| D   | 6.50        | 6.70  | 0.2559 | 0.2638 |
| D1  | 5.30        | 5.50  | 0.2087 | 0.2165 |
| D2  | 4.70        | 4.90  | 0.1850 | 0.1929 |
| E   | 9.90        | 10.30 | 0.3898 | 0.4055 |
| E1  | 6.00        | 6.20  | 0.2362 | 0.2441 |
| E2  | 5.20        | 5.40  | 0.2047 | 0.2126 |
| L1  | 0.90        | 1.25  | 0.0354 | 0.0492 |
| L2  | 1.70        | 1.90  | 0.0669 | 0.0748 |
| L3  | 0.60        | 1.00  | 0.0236 | 0.0394 |



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