# Three Terminal Positive Voltage Regulator
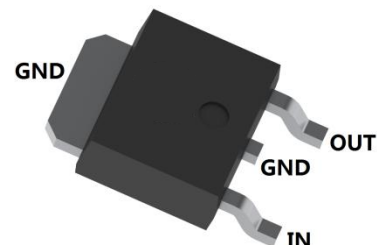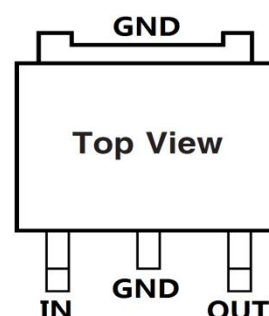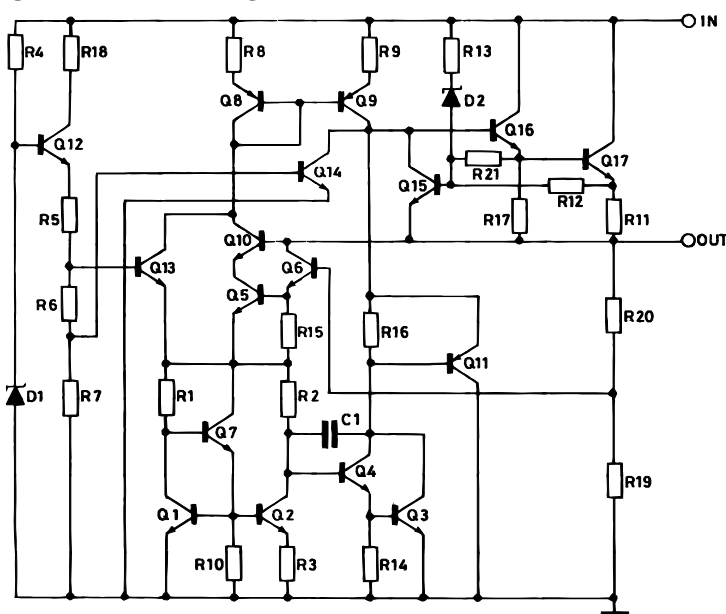
## FEATURES

- Maximum Output Current Io: 0.5 A
- Output Voltage Vo: 5 V,6V,8V,9V,12V,15V,18V,20V,24V
- Continuous Total Dissipation
  PD: 1.25 W (Ta= 25 ℃ )
- Surface Mount device

## SCHEMATIC DIAGRAM



TO-252



GND

Top View

IN    GND    OUT

## MECHANICAL DATA

- Case: TO-252
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.055 grams (approximate)

## MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Input Voltage | $V_i$ | 35 | V |
| Power Dissipation | $P_D$ | 1250 | mW |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 80 | °C/W |
| Operating Temperature | $T_{opr}$ | -25~+125 | °C |
| Storage Temperature Range | $T_{STG}$ | -65 ~+150 | °C |

# Three Terminal Positive Voltage Regulator

**ELECTRICAL CHARACTERISTICS OF 78M05 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=10V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 4.80 | 5.0 | 5.20 | V | $T_J$=+25°C |
|  |  | 4.75 | 5.0 | 5.25 | V | 7V≤$V_i$≤20V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ |  | 15 | 100 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
|  |  |  | 5 | 50 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ |  | 3 | 100 | mV | 7V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
|  |  |  | 1 | 50 | mV | 8V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ |  | 4.2 | 6 | mA | $T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ |  |  | 0.8 | mA | 8V≤$V_i$≤25V,-25°C≤$T_J$≤+125°C |
|  |  |  |  | 0.5 | mA | 5mA≤$I_O$≤350mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ |  | 42 |  | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | 62 | 80 |  | dB | 8V≤$V_i$≤18V,f=120Hz,$I_O$=300mA -25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ |  | 2 | 2.5 | V | $I_O$=350mA,$T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ |  | 300 |  | mA | $V_i$=10V,$T_J$=+25°C |
| Peak Current | $I_{pk}$ |  | 0.5 |  | A | $T_J$=+25°C |

*Pulse Test

**ELECTRICAL CHARACTERISTICS OF 78M06 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=11V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 5.75 | 6.0 | 6.25 | V | $T_J$=+25°C |
|  |  | 5.7 | 6.0 | 6.3 | V | 8V≤$V_i$≤21V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ |  | 18 | 120 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
|  |  |  | 10 | 60 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ |  | 5 | 100 | mV | 8V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
|  |  |  | 1.5 | 50 | mV | 9V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ |  | 4.3 | 6 | mA | $T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ |  |  | 0.8 | mA | 9V≤$V_i$≤25V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
|  |  |  |  | 0.5 | mA | 5mA≤$I_O$≤350mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ |  | 45 |  | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | 59 | 80 |  | dB | 9V≤$V_i$≤19V,f=120Hz,$I_O$=300mA -25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ |  | 2 |  | V | $I_O$=350mA,$T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ |  | 270 |  | mA | $V_i$=11V,$T_J$=+25°C |
| Peak Current | $I_{pk}$ |  | 0.5 |  | A | $T_J$=+25°C |

*Pulse Test

# Three Terminal Positive Voltage Regulator

**ELECTRICAL CHARACTERISTICS OF 78M08 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**($V_i$=14V,$I_o$=350mA,$C_i$=0.33uF,,$C_o$=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 7.7 | 8.0 | 8.3 | V | $T_J$=+25°C |
| | | 7.6 | 8.0 | 8.4 | V | 10.5V≤$V_i$≤23V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | 20 | 160 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | 10 | 80 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | 6 | 100 | mV | 10.5V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
| | | | 2 | 50 | mV | 11V≤$V_i$≤25V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.6 | 6 | mA | $T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 10.5V≤$V_i$≤25V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | 5mA≤$I_O$≤350mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 52 | | μV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | 56 | 80 | | dB | 11.5V≤$V_i$≤21.5V,f=120Hz, $I_O$=300mA,-25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $I_O$=350mA,$T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ | | 250 | | mA | $V_i$=14V,$T_J$=+25°C |
| Peak Current | $I_{pk}$ | | 0.5 | | A | $T_J$=+25°C |

*Pulse Test

**ELECTRICAL CHARACTERISTICS OF 78M09 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**($V_i$=16V,$I_o$=350mA,$C_i$=0.33uF,,$C_o$=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 8.65 | 9.0 | 9.35 | V | $T_J$=+25°C |
| | | 8.55 | 9.0 | 9.45 | V | 11.5V≤$V_i$≤24V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | 20 | 180 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | 10 | 90 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | 6 | 100 | mV | 11.5V≤$V_i$≤26V,$I_O$=200mA,$T_J$=+25°C |
| | | | 2 | 50 | mV | 12V≤$V_i$≤26V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.6 | 6 | mA | $T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 11.5V≤$V_i$≤26V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | 5mA≤$I_O$≤350mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 60 | | μV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | 56 | 80 | | dB | 13V≤$V_i$≤23V,f=120Hz,$I_O$=300mA -25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $I_O$=350mA,$T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ | | 250 | | mA | $V_i$=16V,$T_J$=+25°C |
| Peak Current | $I_{pk}$ | | 0.5 | | A | $T_J$=+25°C |

*Pulse Test

# Three Terminal Positive Voltage Regulator

**ELECTRICAL CHARACTERISTICS OF 78M12 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=19V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 11.5 | 12 | 12.5 | V | $T_J$=+25°C |
| | | 11.4 | 12 | 12.6 | V | 14.5V≤$V_i$≤27V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | 25 | 240 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | 10 | 120 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | 10 | 100 | mV | 14.5V≤$V_i$≤30V,$I_O$=200mA,$T_J$=+25°C |
| | | | 3 | 50 | mV | 16V≤$V_i$≤30V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.6 | 6 | mA | $T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 14.5V≤$V_i$≤30V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | 5mA≤$I_O$≤350mA,-25°C≤$T_J$≤+125°C |
| Output Voltage Drift | $\Delta V/\Delta T$ | | -0.5 | | mV/°C | $I_O$=5mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 75 | | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | 55 | 80 | | dB | 15V≤$V_i$≤25V,f=120Hz,$I_O$=300mA -25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $I_O$=350mA,$T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ | | 300 | | mA | $V_i$=35V,$T_J$=+25°C |
| Peak Current | $I_{pk}$ | | 700 | | mA | $T_J$=+25°C |

*Pulse Test

**ELECTRICAL CHARACTERISTICS OF 78M15 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=23V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 14.4 | 15 | 15.6 | V | $V_i$=23V,$I_O$=350mA,$T_J$=+25°C |
| | | 14.25 | 15 | 15.75 | V | 17.5V≤$V_i$≤30V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | | 300 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | | 150 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | | 100 | mV | 17.5V≤$V_i$≤30V,$I_O$=200mA,$T_J$=+25°C |
| | | | | 50 | mV | 20V≤$V_i$≤26V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.1 | 6 | mA | $V_i$=23V,$I_O$=350mA,$T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 17.5V≤$V_i$≤30V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | $V_i$=23V,5mA≤$I_O$≤350mA, -25°C≤$T_J$≤+125°C |
| Output Voltage Drift | $\Delta V/\Delta T$ | | -1 | | mV/°C | $I_O$=5mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 100 | | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | | 70 | | dB | 18.5V≤$V_i$≤28.5V,f=120Hz, $I_O$=300mA,-25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $T_J$=+25°C |
| Short Circuit Current | $I_{SC}$ | | 300 | | mA | $V_i$=35V,$T_J$=+25°C |
| Peak Current | $I_{PK}$ | | 700 | | mA | $T_J$=+25°C |

*Pulse Test

# Three Terminal Positive Voltage Regulator

**ELECTRICAL CHARACTERISTICS OF 78M18 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=26V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 17.3 | 18 | 18.7 | V | $V_i$=26V,$I_O$=350mA,$T_J$=+25°C |
| | | 17.1 | 18 | 18.9 | V | 20.5V≤$V_i$≤33V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | | 360 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | | 180 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | | 100 | mV | 21V≤$V_i$≤33V,$I_O$=200mA,$T_J$=+25°C |
| | | | | 50 | mV | 24V≤$V_i$≤33V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.2 | 6 | mA | $V_i$=26V,$I_O$=350mA,$T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 21V≤$V_i$≤33V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | $V_i$=26V,5mA≤$I_O$≤350mA, -25°C≤$T_J$≤+125°C |
| Output Voltage Drift | $\Delta V/\Delta T$ | | -1.1 | | mV/°C | $I_O$=5mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 100 | | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | | 70 | | dB | 22V≤$V_i$≤32V,f=120Hz, $I_O$=300mA,-25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $T_J$=+25°C,$I_O$=500mA |
| Short Circuit Current | $I_{SC}$ | | 300 | | mA | $T_J$=+25°C,$V_i$=35V |
| Peak Current | $I_{PK}$ | | 700 | | mA | $T_J$=+25°C |

*Pulse Test

**ELECTRICAL CHARACTERISTICS OF 78M20 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
**(Vi=29V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 19.2 | 20 | 20.8 | V | $V_i$=29V,$I_O$=350mA,$T_J$=+25°C |
| | | 19 | 20 | 21 | V | 23V≤$V_i$≤35V,$I_O$=5mA~350mA, -25°C≤$T_J$≤+125°C |
| Load Regulation | $\Delta V_O$ | | | 400 | mV | $I_O$=5mA~500mA,$T_J$=+25°C |
| | | | | 200 | mV | $I_O$=5mA~200mA,$T_J$=+25°C |
| Line regulation | $\Delta V_O$ | | | 100 | mV | 23V≤$V_i$≤35V,$I_O$=200mA,$T_J$=+25°C |
| | | | | 50 | mV | 24V≤$V_i$≤35V,$I_O$=200mA,$T_J$=+25°C |
| Quiescent Current | $I_q$ | | 4.2 | 6 | mA | $V_i$=29V,$I_O$=350mA,$T_J$=+25°C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 23V≤$V_i$≤35V,$I_O$=200mA, -25°C≤$T_J$≤+125°C |
| | | | | 0.5 | mA | $V_i$=29V,5mA≤$I_O$≤350mA, -25°C≤$T_J$≤+125°C |
| Output Voltage Drift | $\Delta V/\Delta T$ | | -1.2 | | mV/°C | $I_O$=5mA,-25°C≤$T_J$≤+125°C |
| Output Noise Voltage | $V_N$ | | 140 | | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25°C |
| Ripple Rejection | RR | | 70 | | dB | 24V≤$V_i$≤34V,f=120Hz, $I_O$=300mA,-25°C≤$T_J$≤+125°C |
| Dropout Voltage | $V_d$ | | 2 | | V | $T_J$=+25°C,$I_O$=500mA |
| Short Circuit Current | $I_{SC}$ | | 300 | | mA | $T_J$=+25°C,$V_i$=35V |
| Peak Current | $I_{PK}$ | | 700 | | mA | $T_J$=+25°C |

*Pulse Test

# Three Terminal Positive Voltage Regulator

**ELECTRICAL CHARACTERISTICS OF 78M24 AT SPECIFIED VIRTUAL JUNCTION TEMPERATURE**
 **($V_i$=33V,Io=350mA,Ci=0.33uF,,Co=0.1uF, unless otherwise specified )**

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | 23 | 24 | 25 | V | $V_i$=33V,$I_O$=350mA,$T_J$=+25$^\circ$C |
| | | 22.8 | 24 | 25.2 | V | 27V≤$V_i$≤38V,$I_O$=5mA~350mA, -25$^\circ$C≤$T_J$≤+125$^\circ$C |
| Load Regulation | $\Delta V_O$ | | | 480 | mV | $I_O$=5mA~500mA,$T_J$=+25$^\circ$C |
| | | | | 240 | mV | $I_O$=5mA~200mA,$T_J$=+25$^\circ$C |
| Line regulation | $\Delta V_O$ | | | 100 | mV | 27V≤$V_i$≤38V,$I_O$=200mA,$T_J$=+25$^\circ$C |
| | | | | 50 | mV | 28V≤$V_i$≤38V,$I_O$=200mA,$T_J$=+25$^\circ$C |
| Quiescent Current | Iq | | 4.2 | 6 | mA | $V_i$=33V,$I_O$=350mA,$T_J$=+25$^\circ$C |
| Quiescent Current Change | $\Delta I_q$ | | | 0.8 | mA | 27V≤$V_i$≤38V,$I_O$=200mA, -25$^\circ$C≤$T_J$≤+125$^\circ$C |
| | | | | 0.5 | mA | $V_i$=33V,5mA≤$I_O$≤350mA, -25$^\circ$C≤$T_J$≤+125$^\circ$C |
| Output Voltage Drift | $\Delta V/\Delta T$ | | -1.2 | | mV/$^\circ$C | $I_O$=5mA,-25$^\circ$C≤$T_J$≤+125$^\circ$C |
| Output Noise Voltage | $V_N$ | | 170 | | µV/$V_O$ | 10Hz≤f≤100kHz,$T_J$=+25$^\circ$C |
| Ripple Rejection | RR | | 70 | | dB | 28V≤$V_i$≤38V,f=120Hz, $I_O$=300mA,-25$^\circ$C≤$T_J$≤+125$^\circ$C |
| Dropout Voltage | $V_d$ | | 2 | | V | $T_J$=+25$^\circ$C,$I_O$=500mA |
| Short Circuit Current | $I_{SC}$ | | 300 | | mA | $T_J$=+25$^\circ$C,$V_I$=35V |
| Peak Current | $I_{PK}$ | | 700 | | mA | $T_J$=+25$^\circ$C |

*Pulse Test

**TYPICAL APPLICATION**
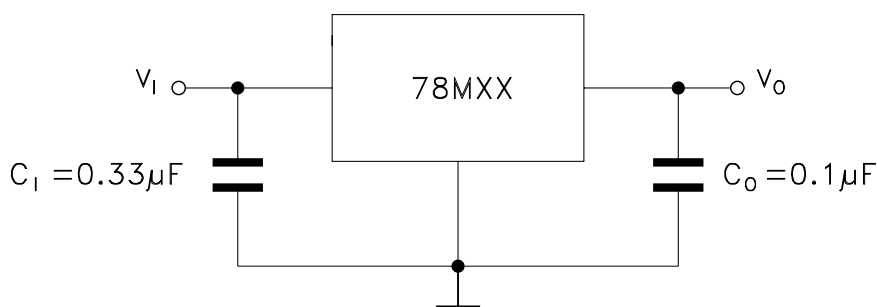


Note: Bypass capacitors are recommended for optimum stability and transient response and should
     be located as close as Possible to the regulators.

# Three Terminal Positive Voltage Regulator
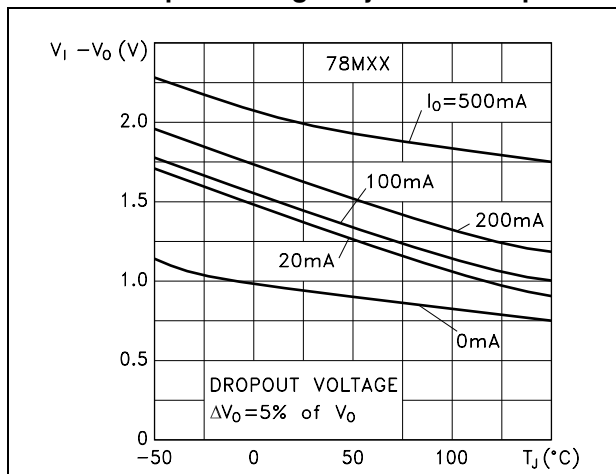
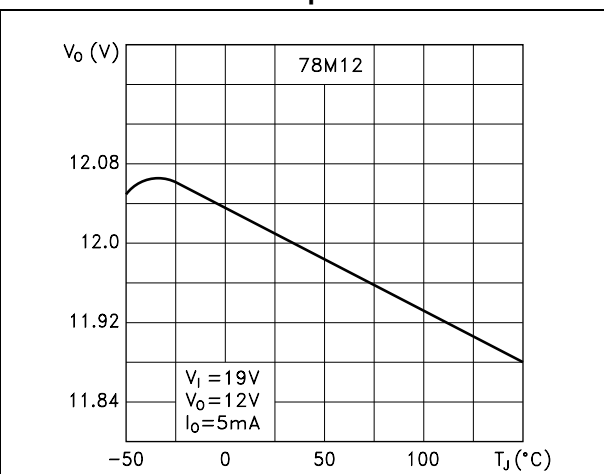**Test Circuits**

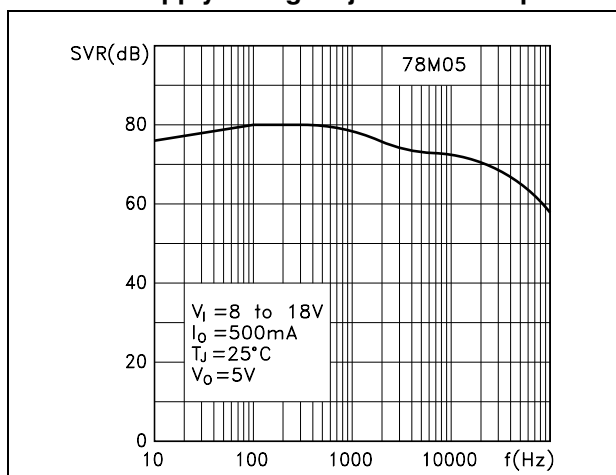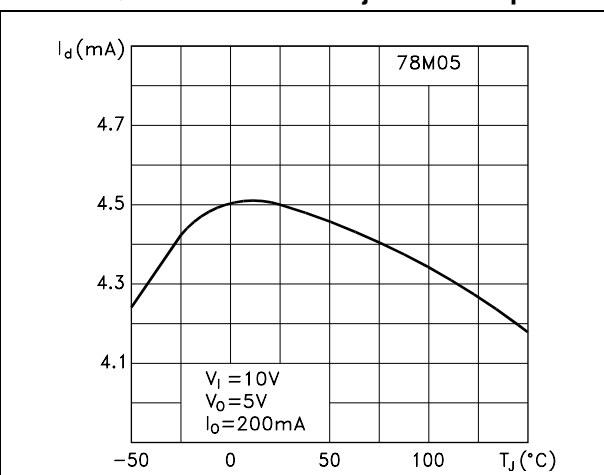**DC Parameter**
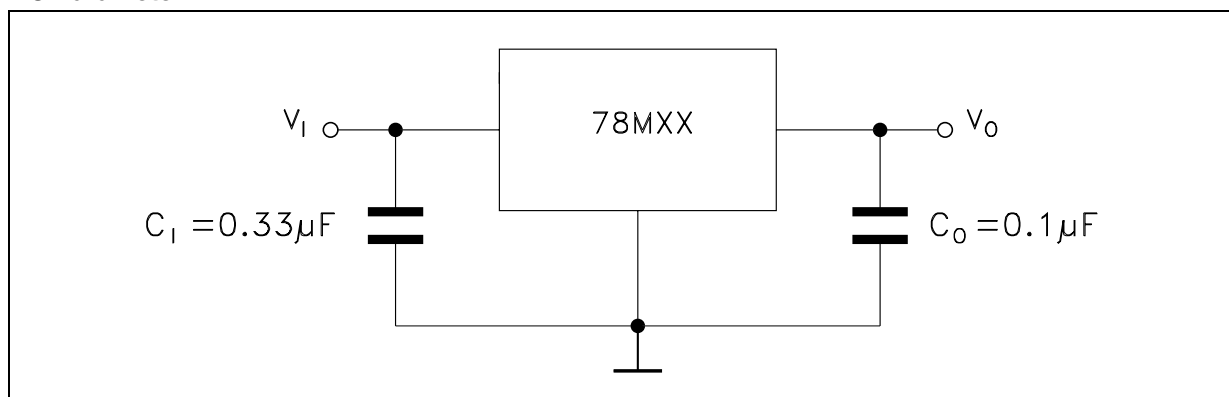


**Load regulation**
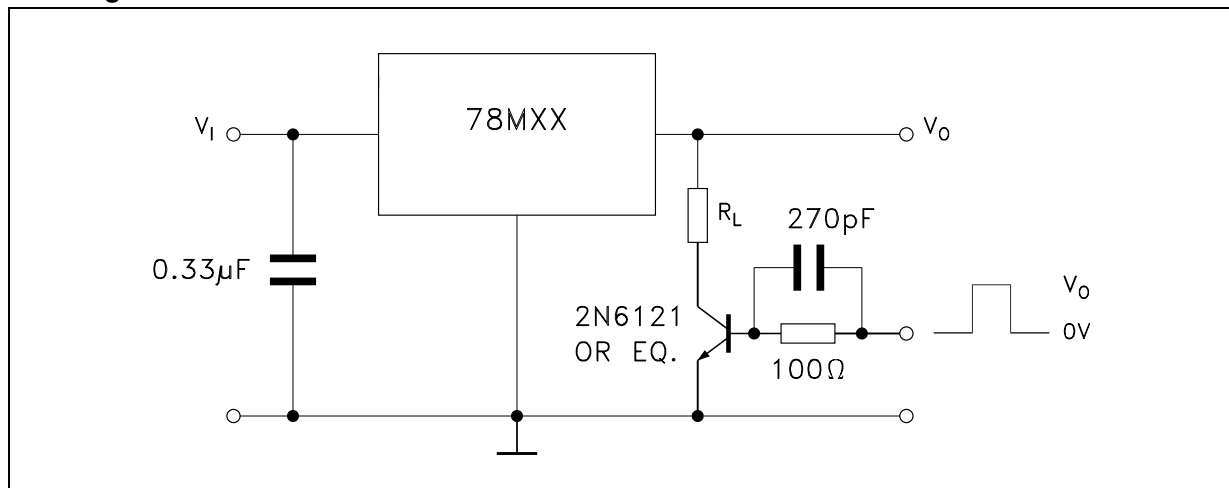


**Ripple rejection**
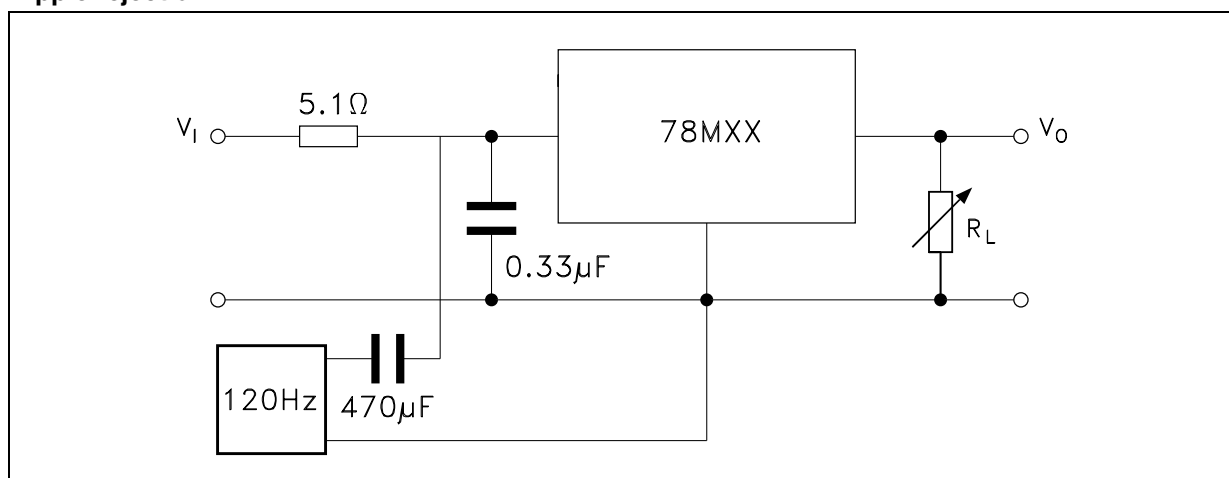
# Three Terminal Positive Voltage Regulator
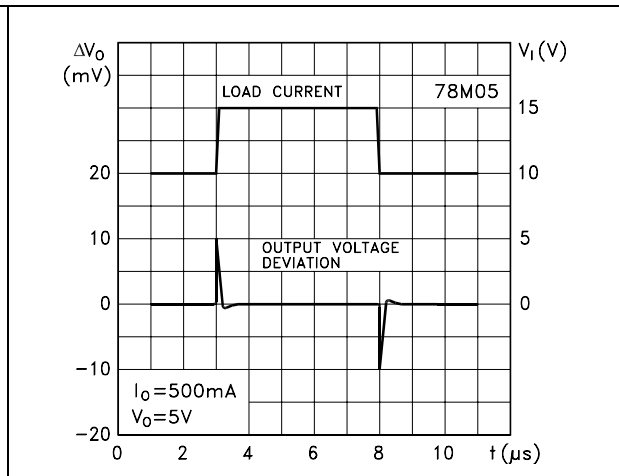
**Typical Characteristics**

### Dropout voltage vs junction temp.



### Dropout characteristics
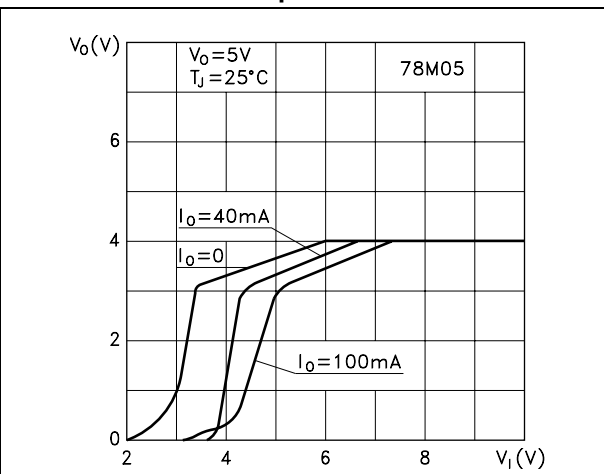


### Peak output current vs input-output differential voltage
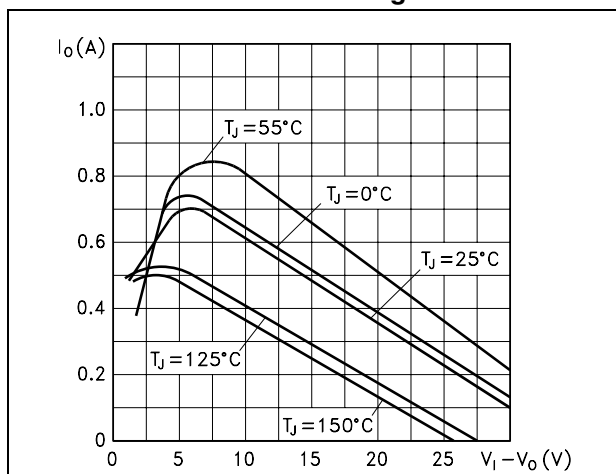


### Output voltage vs junction temperature



### Supply voltage rejection vs freq.



### Quiescent current vs junction temp.

# Three Terminal Positive Voltage Regulator

**Load transient response**
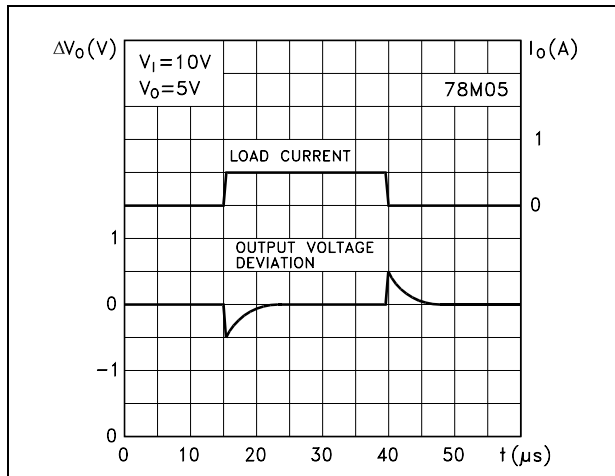


**Line transient response**



**Quiescent current vs input voltage**
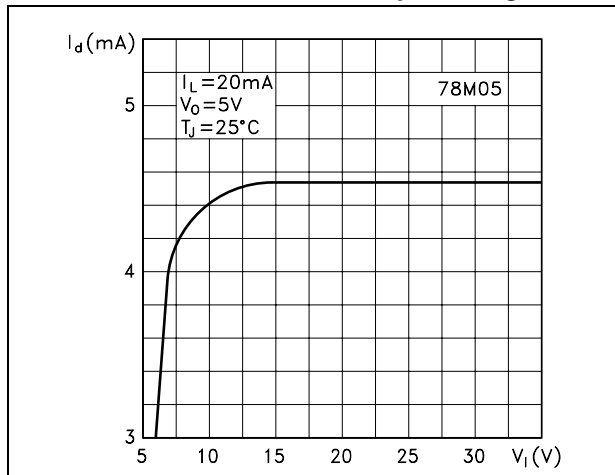
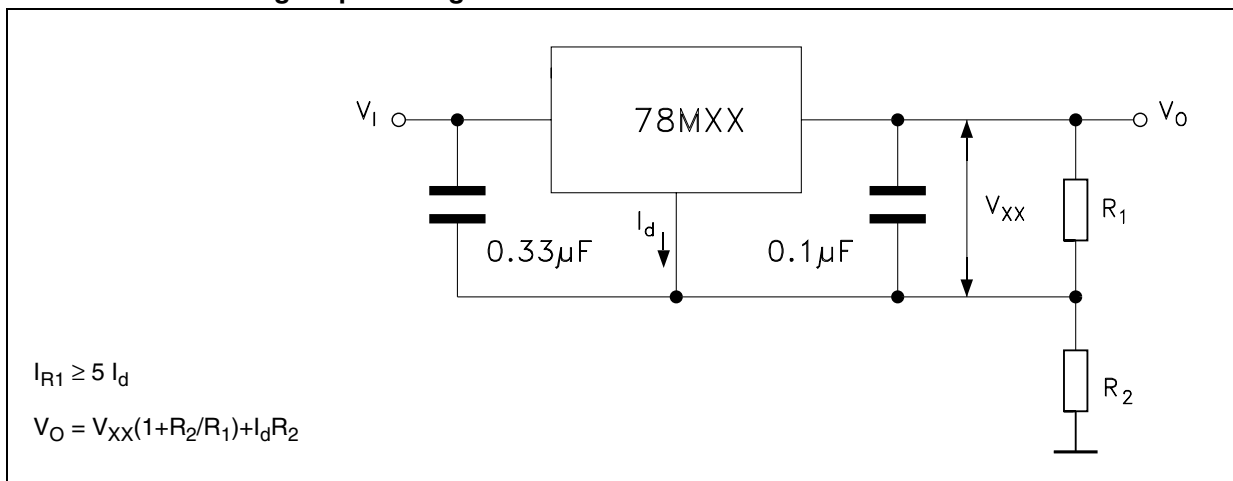# Three Terminal Positive Voltage Regulator

**Fixed output regulator**
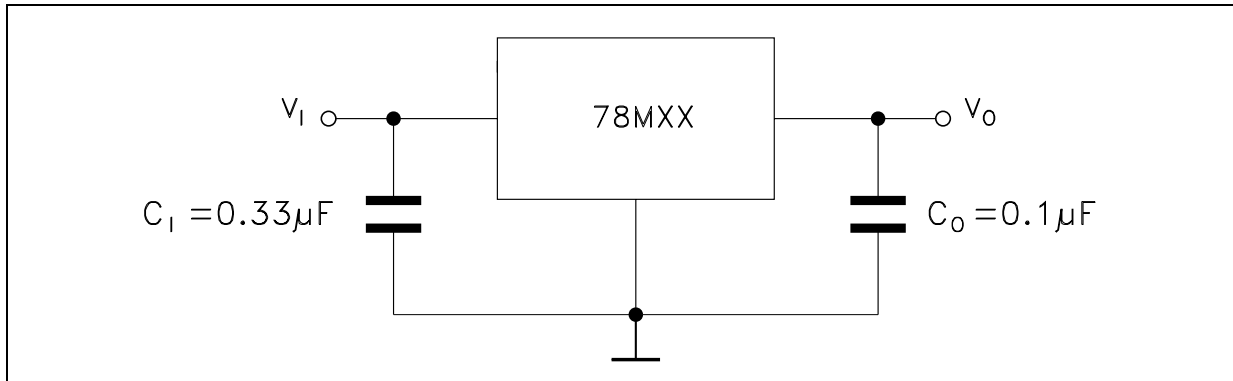


1. To specify an output voltage, substitute voltage value for "XX".
2. Although no output capacitor is need for stability, it does improve transient response.
3. Required if regulator is locate an appreciable distance from power supply filter.
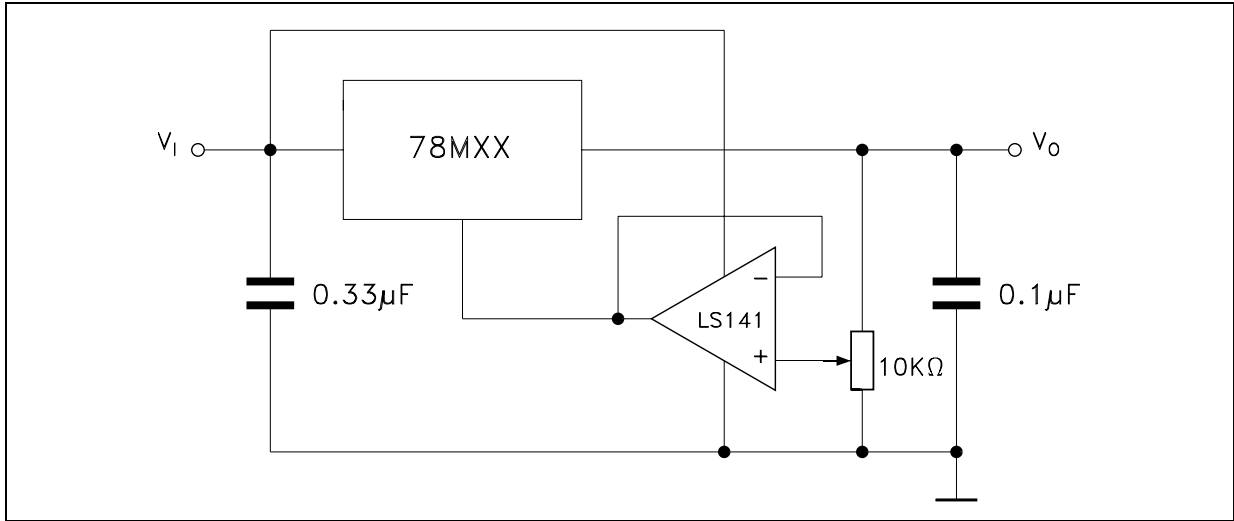
**Constant current regulator**

$$I_O = V_{XX}/R_1 + I_d$$
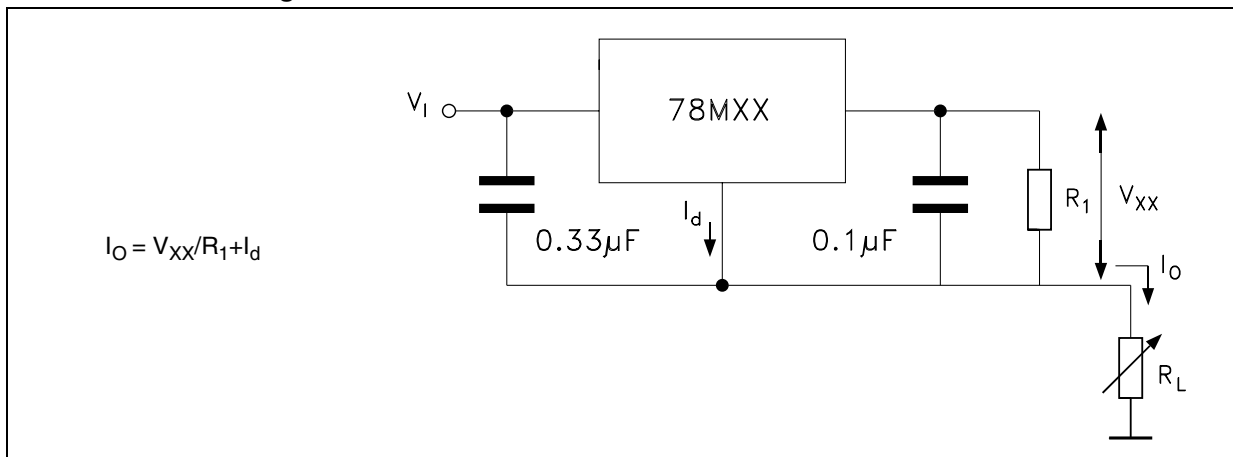


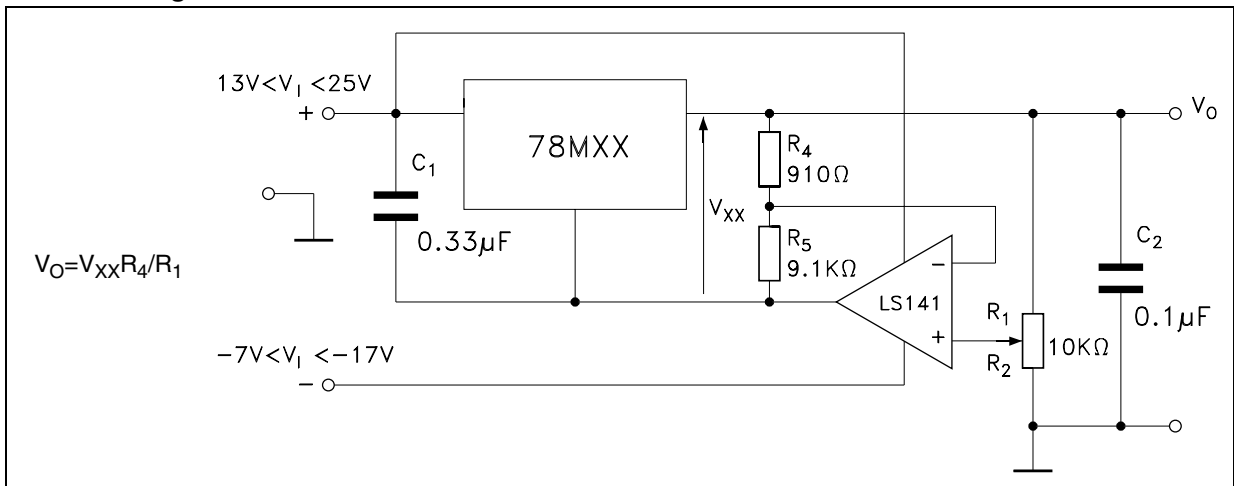**Circuit for increasing output voltage**



$$I_{R1} \geq 5 I_d$$

$$V_O = V_{XX}(1 + R_2/R_1) + I_d R_2$$

# Three Terminal Positive Voltage Regulator

**Adjustable output regulator (7 to 30V)**



**0.5 to 10V Regulator**



$$V_O = V_{XX}R_4/R_1$$

**High current voltage regulator**



$$R_1 = \frac{V_{BEQ1}}{I_{REQ} - (I_{Q1}/\beta_{Q1})}$$

$$I_O = I_{REG} + Q_1 \left(I_{REG} \frac{V_{BEQ1}}{R_1}\right)$$
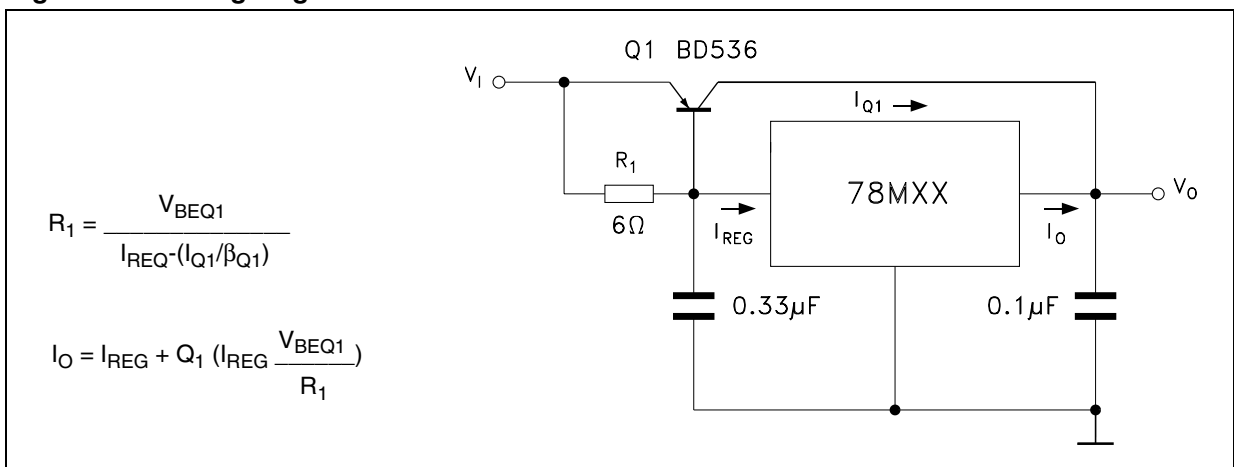
# Three Terminal Positive Voltage Regulator

**High output current with short circuit protection**

$R_{SC}=V_{BEQ2}/I_{SC}$

$R_1$
$3\Omega$

$R_{SC}$    Q1

Q2

78MXX

$0.33\mu F$     $0.1\mu F$

$V_I$    $V_O$

Q1=BD534
Q2=2N6124
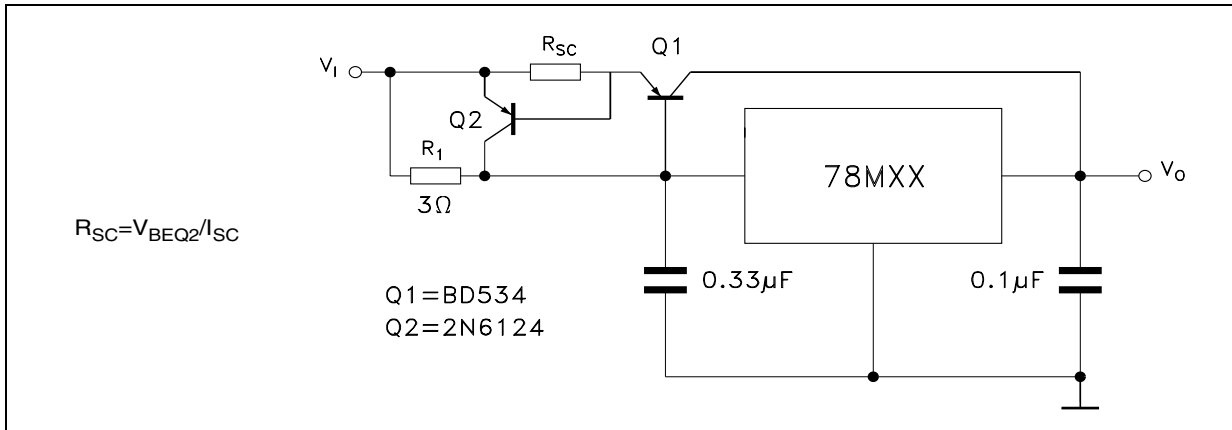
**Tracking voltage regulator**

$V_I$ +      78MXX      $V_O$ +

$0.33\mu F$     $0.1\mu F$    $4.7K\Omega$

COMMON           COMMON

LS141

$4.7K\Omega$

$V_I$ −      2N6124      $V_O$ −
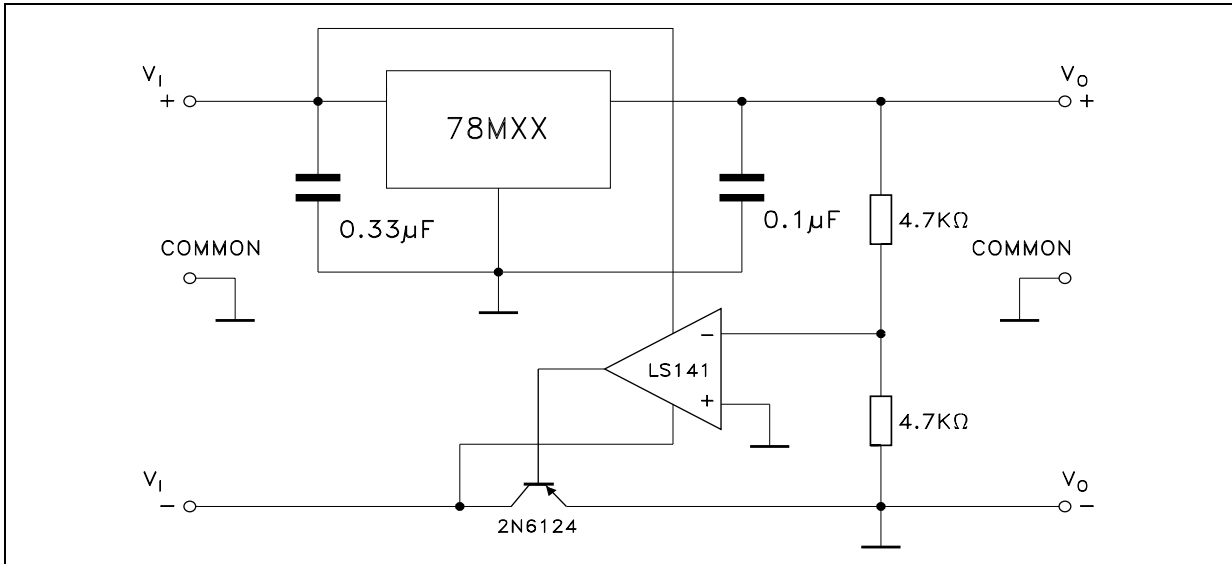
**Adjustable output voltage with temperature compensation**

$V_I$    78MXX    $V_O$

$R_1$   $V_{XX}$

Q2

BC153

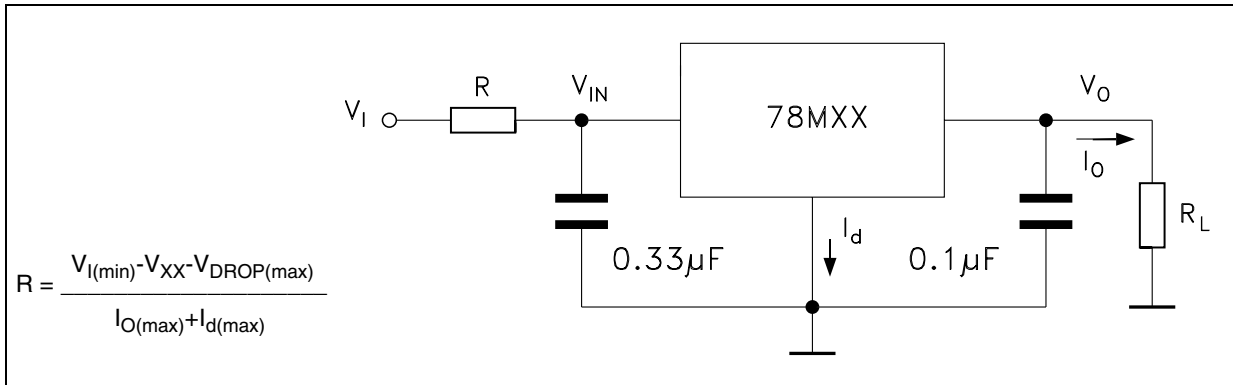$V_O = V_{XX} (1+R_2/R_1) + V_{BE}$

Q1

BC153

C    $R_2$
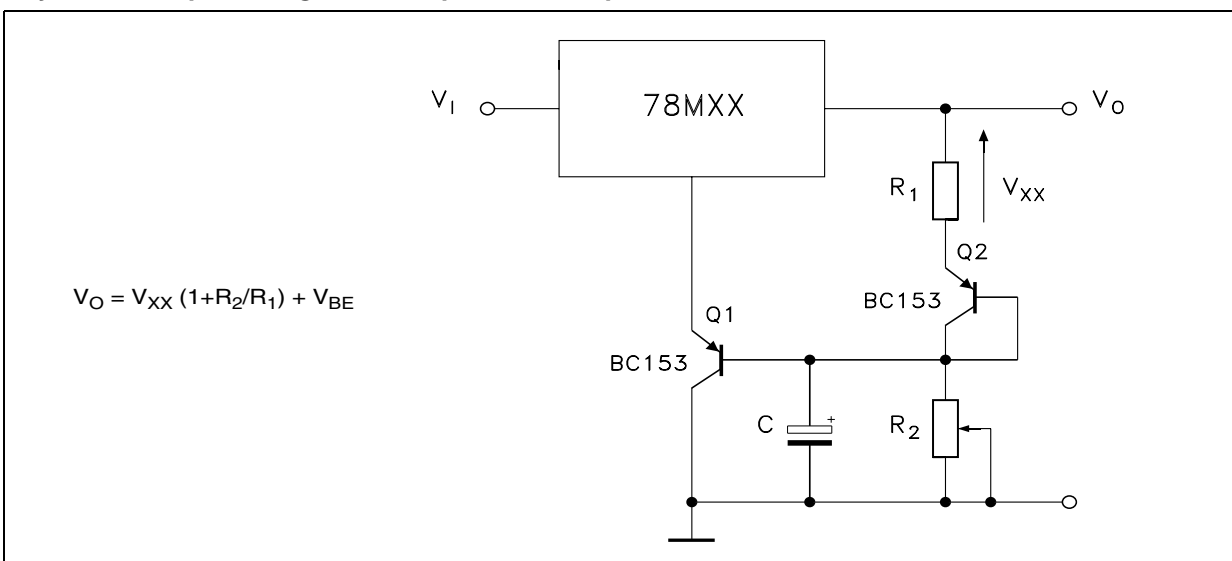
*Note:*     *$Q_2$ is connected as a diode in order to compensate the variation of the $Q_1$ $V_{BE}$ with the temperature. C allows a slow rise time of the $V_O$.*
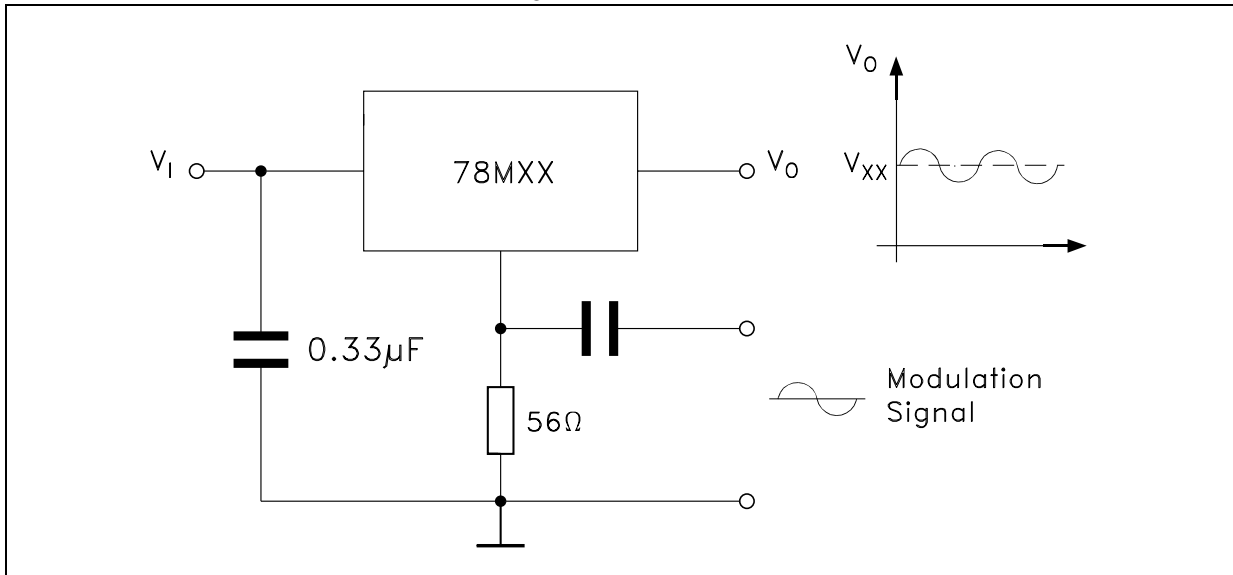
# Three Terminal Positive Voltage Regulator

**High input voltage circuit**



$$V_{IN} = V_I - (V_Z + V_{BE})$$
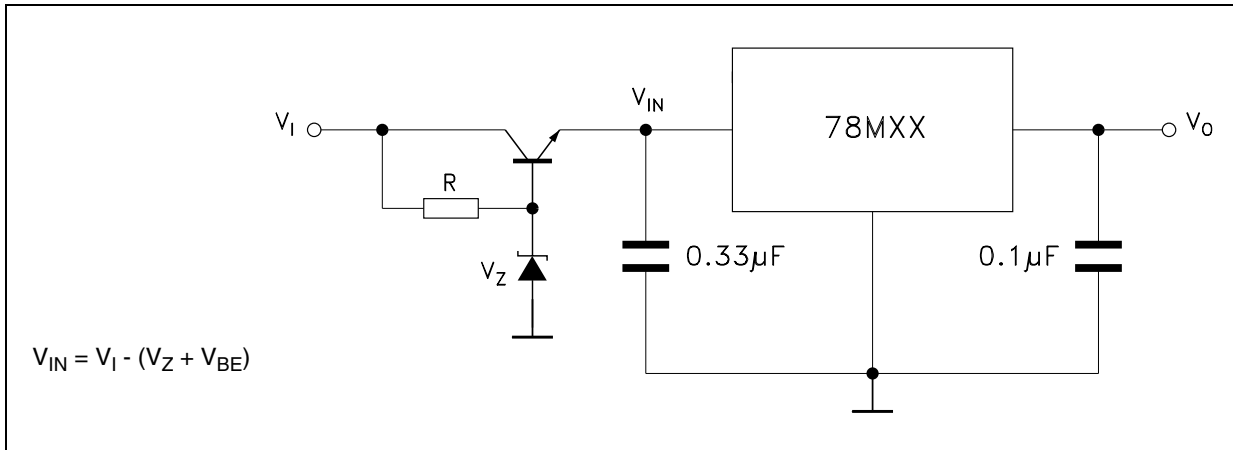
**Reducing power dissipation with dropping resistor**



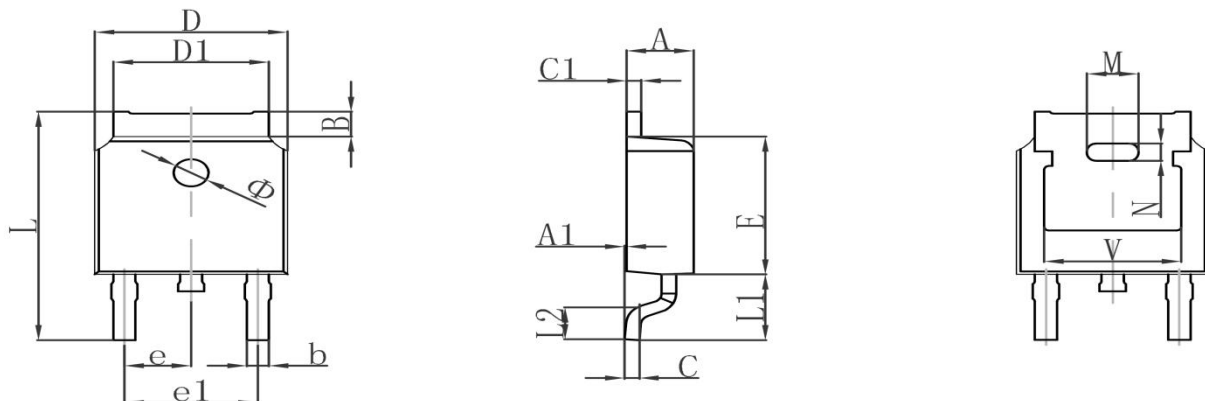$$R = \frac{V_{I(min)} - V_{XX} - V_{DROP(max)}}{I_{O(max)} + I_{d(max)}}$$

**Power AM Modulator (unity voltage gain, $I_O \leq 0.5A$)**



*Note:* *The circuit performs well up to 100 KHz.*

# Three Terminal Positive Voltage Regulator

**TO-252  Package Outline Dimensions**



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------|------|------|------|
|        | Min. | Max. | Min. | Max. |
| A  | 2.200 | 2.380 | 0.087 | 0.094 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| B  | 0.800 | 1.400 | 0.031 | 0.055 |
| b  | 0.710 | 0.810 | 0.028 | 0.032 |
| c  | 0.460 | 0.560 | 0.018 | 0.022 |
| c1 | 0.460 | 0.560 | 0.018 | 0.022 |
| D  | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.130 | 5.460 | 0.202 | 0.215 |
| E  | 6.000 | 6.200 | 0.236 | 0.244 |
| e  | 2.286TYP | | 0.090TYP | |
| e1 | 4.327 | 4.727 | 0.170 | 0.186 |
| M  | 1.778REF | | 0.070REF | |
| N  | 0.762REF | | 0.018REF | |
| L  | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.9REF | | 0.114REF | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| V  | 4.830REF | | 0.190REF | |
| Φ  | 1.100 | 1.300 | 0.043 | 0.051 |

**TO-252 Suggested Pad Layout**
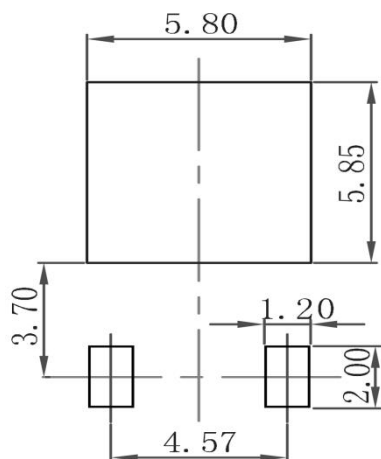


**Note:**

1. Controlling dimension: in millimeters

2. General tolerance: ±0.05mm

3. The pad layout is for reference purposes only

---