



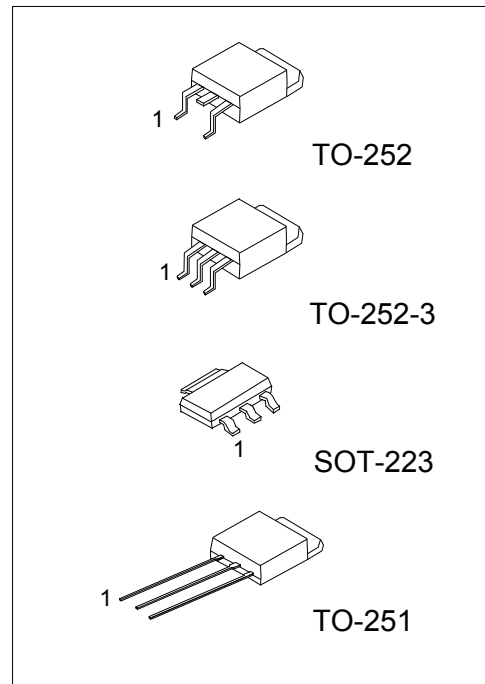
3-TERMINALS 1A POSITIVE VOLTAGE REGULATOR

DESCRIPTION

The AMS **78MXX** family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1 A.

FEATURE

- * Output Current Up To 1 A
- * Fixed Output Voltage Of 5V, 6V, 8V, 9V, 12V, 15V and 18V Available
- * Thermal Overload Shutdown Protection
- * Short Circuit Current Limiting
- * Output Transistor SOA Protection



ORDERING INFORMATION

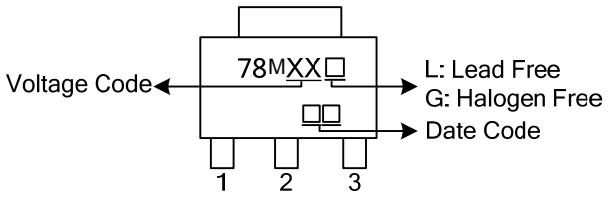
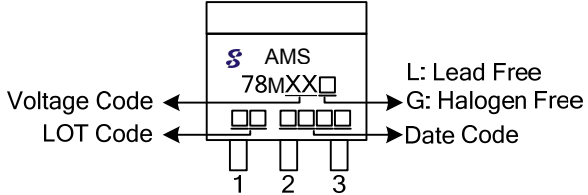
| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 78MxxL-AA3-R | 78MxxG-AA3-R | SOT-223 | I | G | O | Tape Reel |
| 78MxxL-TM3-T | 78MxxG-TM3-T | TO-251 | I | G | O | Tube |
| 78MxxL-TN3-R | 78MxxG-TN3-R | TO-252 | I | G | O | Tape Reel |
| 78MxxL-TNA-R | 78MxxG-TNA-R | TO-252-3 | I | G | O | Tape Reel |

Note: 1. xx: Output Voltage, refer to Marking Information
 2. Pin Code: I: Input G: GND O: Output

| | |
|---|--|
| <p>78MxxL-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Free (4)Output Voltage Code</p> | <p>(1) R: Tape Reel, T: Tube (2) AA3: SOT-223, TM3: TO-251, TN3: TO-252, TNA: TO-252-3 (3) G: Halogen Free, L: Lead Free (4) xx: refer to Marking Information</p> |
|---|--|

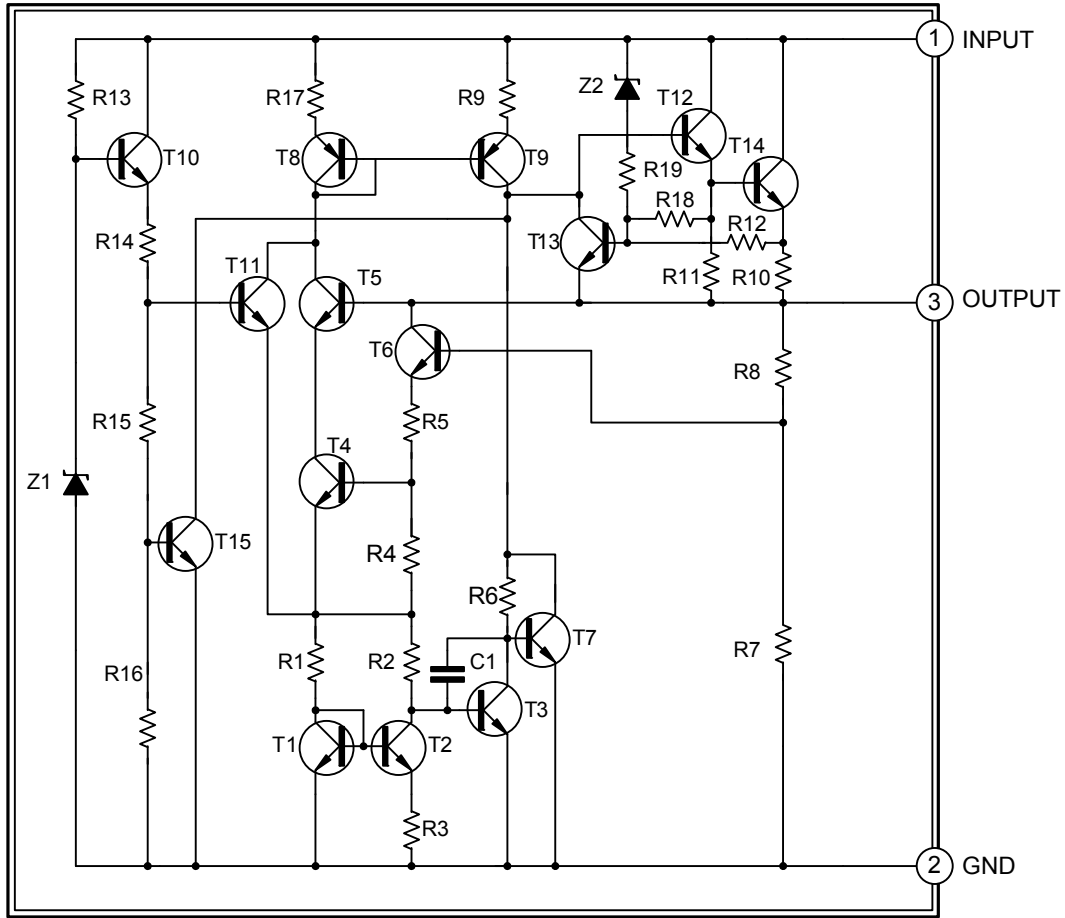


■ MARKING INFORMATION

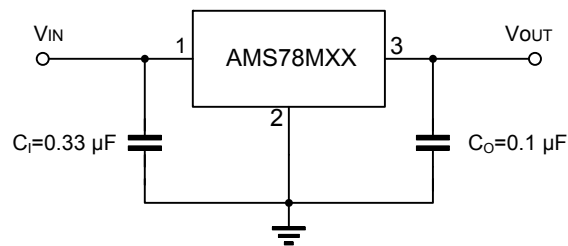
| PACKAGE | VOLTAGE CODE | MARKING |
|------------------------------|---|---|
| SOT-223 | 05: 5V 06: 6V 08: 8V 09: 9V 12: 12V 15: 15V 18: 18V |  <p>Diagram of SOT-223 marking: The top surface of the package is marked with '78MXX' followed by a small square. An arrow labeled 'Voltage Code' points to the '78MXX' text. To the right, an arrow points to the small square, with text 'L: Lead Free', 'G: Halogen Free', and 'Date Code' listed vertically.</p> |
| TO-251 TO-252 TO-252-3 | |  <p>Diagram of TO-251/252/252-3 marking: The top surface is marked with the AMS logo, 'AMS', '78MXX', and a small square. An arrow labeled 'Voltage Code' points to '78MXX'. An arrow labeled 'LOT Code' points to the small square. To the right, an arrow points to the small square, with text 'L: Lead Free', 'G: Halogen Free', and 'Date Code' listed vertically.</p> |



■ BLOCK DIAGRAM



■ TYPICAL APPLICATION CIRCUIT



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



■ ABSOLUTE MAXIMUM RATINGS ($T_J=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|--|-----------------|------------|------------------|
| Input Voltage | V_{IN} | 35 | V |
| Output Current | I_{OUT} | 1 | A |
| Power Dissipation ($T_C=25^\circ\text{C}$) | SOT-223 | 8.5 | W |
| | TO-251 / TO-252 | 10 | |
| Operating Junction Temperature | T_J | -20 ~ +150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -65 ~ +150 | $^\circ\text{C}$ |

Notes: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|------------------|-----------------|---------|--------------------|
| Junction to Case | SOT-223 | 15 | $^\circ\text{C/W}$ |
| | TO-251 / TO-252 | 12.5 | |

■ ELECTRICAL CHARACTERISTICS

($T_J=25^\circ\text{C}$, $C_I=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$, $P_D\leq 7\text{W}$, unless otherwise specified)

For 78M05 ($V_{IN}=10\text{V}$, $I_{OUT}=1\text{A}$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|------|------|------|----------------------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | 4.8 | 5 | 5.2 | V |
| | | $V_{IN}=7.5\sim 20\text{V}$, $I_{OUT}=5\text{mA}\sim 1\text{A}$ | 4.75 | | 5.25 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | | | 100 | mV |
| | | $I_{OUT}=5\text{mA}\sim 200\text{mA}$ | | | 50 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=7\text{V}\sim 25\text{V}$ | | | 100 | mV |
| | | $V_{IN}=7.5\sim 20\text{V}$, $I_{OUT}=1\text{A}$ | | | 50 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1\text{A}$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{UT}=7.5\sim 20\text{V}$ | | | 1 | mA |
| | | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | | | 1 | mA |
| Output Noise Voltage | eN | $10\text{Hz}\leq f\leq 100\text{kHz}$ | | 40 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5\text{mA}$ | | -0.6 | | $\text{mV}/^\circ\text{C}$ |
| Ripple Rejection | RR | $V_{IN}=8\sim 18\text{V}$, $f=120\text{Hz}$ | 62 | 80 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35\text{V}$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |

For 78M06 ($V_{IN}=11\text{V}$, $I_{OUT}=1\text{A}$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|------|------|------|----------------------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | 5.76 | 6 | 6.24 | V |
| | | $V_{IN}=8.5\sim 21\text{V}$, $I_{OUT}=5\text{mA}\sim 1\text{A}$ | 5.7 | | 6.3 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | | | 60 | mV |
| | | $I_{OUT}=5\text{mA}\sim 200\text{mA}$ | | | 30 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=8\sim 25\text{V}$ | | | 60 | mV |
| | | $V_{IN}=8.5\sim 21\text{V}$, $I_{OUT}=1\text{A}$ | | | 60 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1\text{A}$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=8.5\sim 21\text{V}$ | | | 1 | mA |
| | | $I_{OUT}=5\text{mA}\sim 1\text{A}$ | | | 1 | mA |
| Output Noise Voltage | eN | $10\text{Hz}\leq f\leq 100\text{kHz}$ | | 45 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5\text{mA}$ | | -0.7 | | $\text{mV}/^\circ\text{C}$ |
| Ripple Rejection | RR | $V_{IN}=9\sim 19\text{V}$, $f=120\text{Hz}$ | 59 | 75 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35\text{V}$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |



■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78M08 ($V_{IN}=14V$, $I_{OUT}=1A$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|------|------|------|---------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5mA\sim 1A$ | 7.68 | 8 | 8.32 | V |
| | | $V_{IN}=10.5\sim 23V$, $I_{OUT}=5mA\sim 1A$ | 7.6 | | 8.4 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5mA\sim 1A$ | | | 80 | mV |
| | | $I_{OUT}=5mA\sim 200mA$ | | | 40 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=10.5\sim 25V$ | | | 80 | mV |
| | | $V_{IN}=10.5\sim 23V$, $I_{OUT}=1A$ | | | 80 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1A$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=10.5\sim 23V$ | | | 1 | mA |
| | | $I_{OUT}=5mA\sim 1A$ | | | 0.5 | mA |
| Output Noise Voltage | eN | $10Hz \leq f \leq 100kHz$ | | 58 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5mA$ | | -0.9 | | $mV/^\circ C$ |
| Ripple Rejection | RR | $V_{IN}=11.5\sim 21.5V$, $f=120Hz$ | 56 | 72 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35V$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |

For 78M09 ($V_{IN}=15V$, $I_{OUT}=1A$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|------|------|------|---------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5mA\sim 1A$ | 8.64 | 9 | 9.36 | V |
| | | $V_{IN}=11.5\sim 24V$, $I_{OUT}=5mA\sim 1A$ | 8.55 | | 9.45 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5mA\sim 1A$ | | | 90 | mV |
| | | $I_{OUT}=5mA\sim 200mA$ | | | 45 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=11.5\sim 25V$ | | | 90 | mV |
| | | $V_{IN}=11.5\sim 24V$, $I_{OUT}=1A$ | | | 90 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1A$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=11.5\sim 24V$ | | | 1 | mA |
| | | $I_{OUT}=5mA\sim 1A$ | | | 0.5 | mA |
| Output Noise Voltage | eN | $10Hz \leq f \leq 100kHz$ | | 58 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5mA$ | | -1.1 | | $mV/^\circ C$ |
| Ripple Rejection | RR | $V_{IN}=12.5\sim 22.5V$, $f=120Hz$ | 56 | 72 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35V$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |

For 78M12 ($V_{IN}=19V$, $I_{OUT}=1A$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5mA\sim 1A$ | 11.52 | 12 | 12.48 | V |
| | | $V_{IN}=14.5\sim 27V$, $I_{OUT}=5mA\sim 1A$ | 11.4 | | 12.6 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5mA\sim 1A$ | | | 120 | mV |
| | | $I_{OUT}=5mA\sim 200mA$ | | | 60 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=14.5\sim 30V$ | | | 120 | mV |
| | | $V_{IN}=14.6\sim 27V$, $I_{OUT}=1A$ | | | 120 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1A$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=14.5\sim 30V$ | | | 1 | mA |
| | | $I_{OUT}=5mA\sim 1A$ | | | 0.5 | mA |
| Output Noise Voltage | eN | $10Hz \leq f \leq 100kHz$ | | 75 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5mA$ | | -1.5 | | $mV/^\circ C$ |
| Ripple Rejection | RR | $V_{IN}=15\sim 25V$, $f=120Hz$ | 55 | 72 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35V$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |



■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78M15 ($V_{IN}=23V$, $I_{OUT}=1A$, $C_I=0.33\mu F$, $C_O=0.1\mu F$.)

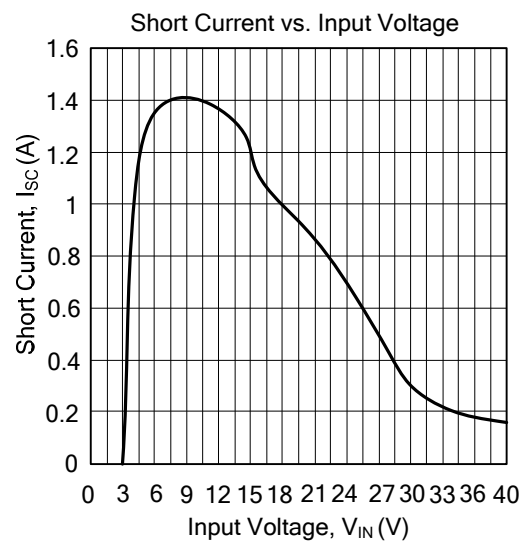
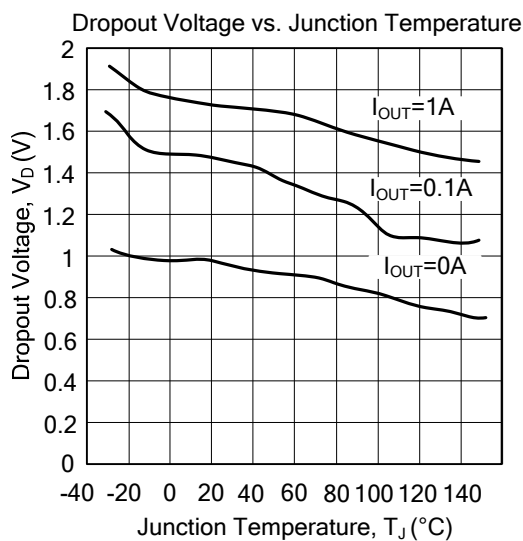
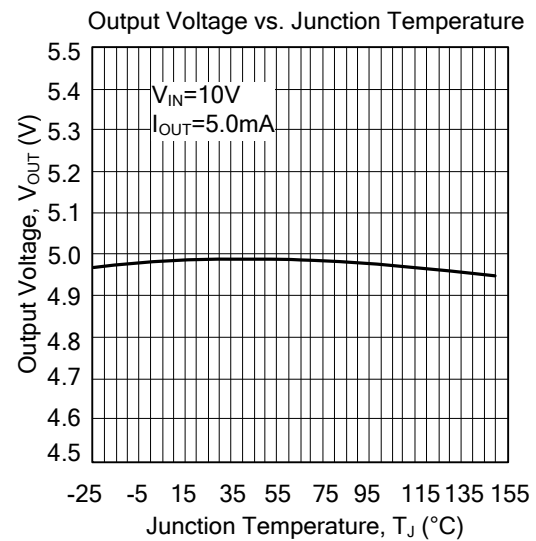
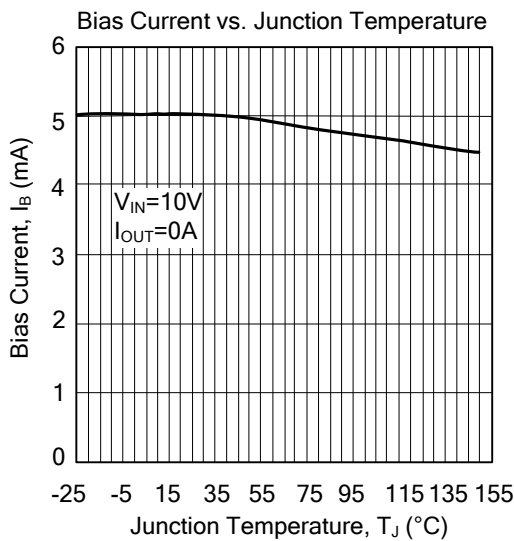
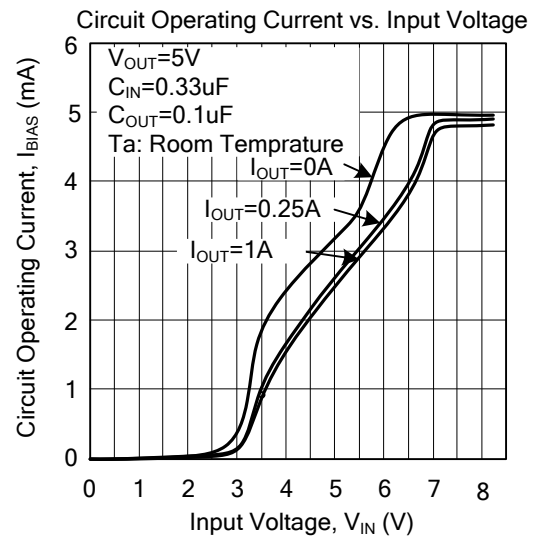
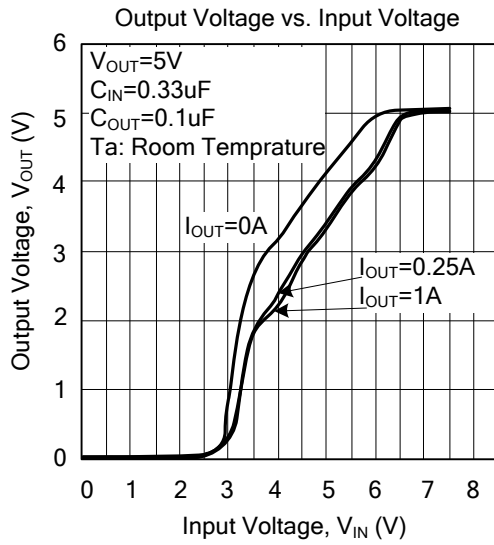
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5mA\sim 1A$ | 14.4 | 15 | 15.6 | V |
| | | $V_{IN}=17.5\sim 30V$, $I_{OUT}=5mA\sim 1A$ | 14.25 | | 15.75 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5mA\sim 1A$ | | | 150 | mV |
| | | $I_{OUT}=5mA\sim 200mA$ | | | 75 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=18.5\sim 30V$ | | | 150 | mV |
| | | $V_{IN}=17.5\sim 30V$, $I_{OUT}=1A$ | | | 150 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1A$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=17.5\sim 30V$ | | | 1 | mA |
| | | $I_{OUT}=5mA\sim 1A$ | | | 0.5 | mA |
| Output Noise Voltage | eN | $10Hz \leq f \leq 100kHz$ | | 90 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5mA$ | | -1.8 | | $mV/^\circ C$ |
| Ripple Rejection | RR | $V_{IN}=18.5\sim 28.5V$, $f=120Hz$ | 54 | 70 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35V$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |

For 78M18 ($V_{IN}=27V$, $I_{OUT}=1A$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------------|--|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $I_{OUT}=5mA\sim 1A$ | 17.28 | 18 | 18.72 | V |
| | | $V_{IN}=21\sim 33V$, $I_{OUT}=5mA\sim 1A$ | 17.1 | | 18.9 | V |
| Load Regulation | ΔV_{OUT} | $I_{OUT}=5mA\sim 1A$ | | | 180 | mV |
| | | $I_{OUT}=5mA\sim 200mA$ | | | 90 | mV |
| Line Regulation | ΔV_{OUT} | $V_{IN}=21\sim 33V$ | | | 180 | mV |
| | | $V_{IN}=21\sim 33V$, $I_{OUT}=1A$ | | | 180 | mV |
| Quiescent Current | I_Q | $I_{OUT}=1A$ | | | 8 | mA |
| Quiescent Current Change | ΔI_Q | $V_{IN}=21.5\sim 33V$ | | | 1 | mA |
| | | $I_{OUT}=5mA\sim 1A$ | | | 0.5 | mA |
| Output Noise Voltage | eN | $10Hz \leq f \leq 100kHz$ | | 110 | | μV |
| Temperature coefficient of V_{OUT} | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=5mA$ | | -2.2 | | $mV/^\circ C$ |
| Ripple Rejection | RR | $V_{IN}=22\sim 32V$, $f=120Hz$ | 53 | 69 | | dB |
| Peak Output Current | I_{PEAK} | | | 1.8 | | A |
| Short-Circuit Current | I_{SC} | $V_{IN}=35V$ | | 250 | | mA |
| Dropout Voltage | V_D | | | 2 | | V |



■ TYPICAL CHARACTERISTICS





■ TYPICAL CHARACTERISTICS (Cont.)

