



## 78TXXA

## LINEAR INTEGRATED CIRCUIT

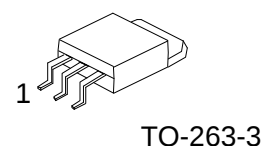
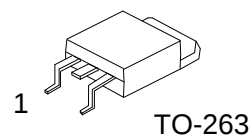
### 3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

#### DESCRIPTION

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

#### FEATURES

- \* Peak Output Current Up To 1 A
- \* Fixed Output Voltage Of 5V, 6V, 7V, 8V, 9V, 10V, 12V, 15V, 18V and 24V 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 |           |
| 78TXXAL-TQ2-R   | 78TXXAG-TQ2-R | TO-263   | I              | G | O | Tape Reel |
| 78TXXAL-TQ2-T   | 78TXXAG-TQ2-T | TO-263   | I              | G | O | Tube      |
| 78TXXAL-TQ3-R   | 78TXXAG-TQ3-R | TO-263-3 | I              | G | O | Tape Reel |
| 78TXXAL-TQ3-T   | 78TXXAG-TQ3-T | TO-263-3 | I              | G | O | Tube      |

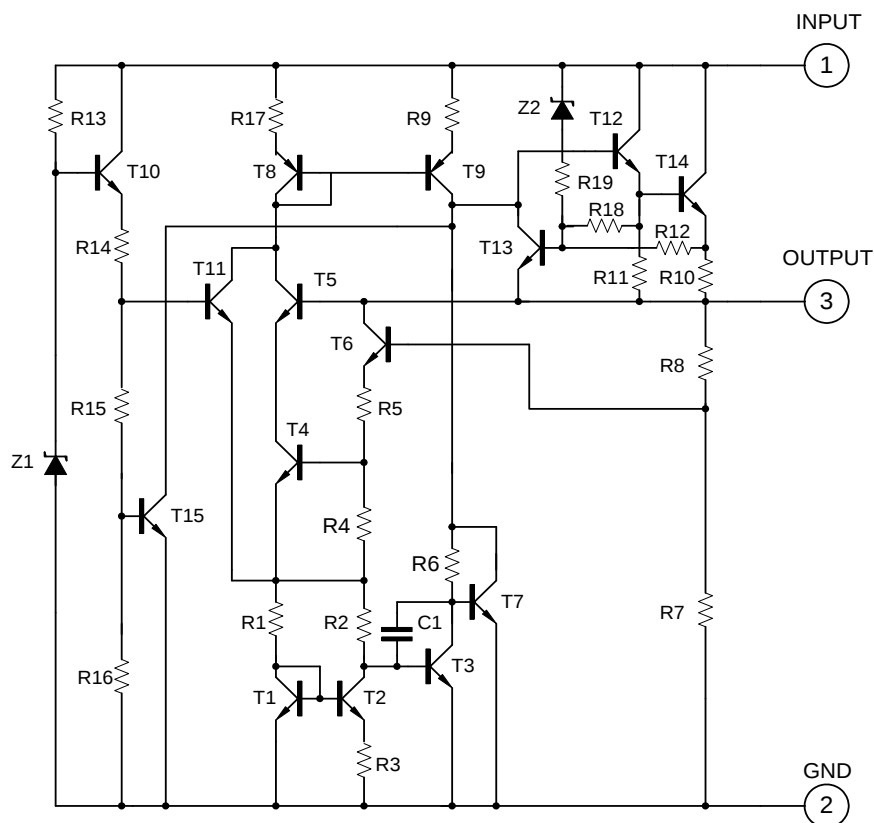
Note: Pin Code: I: Input G: GND O: Output

|               |                                                                                  |                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 78TXXAG-TQ2-R | (1)Packing Type<br>(2)Package Type<br>(3)Green Package<br>(4)Output Voltage Code | (1) R: Tape Reel, T: Tube<br>(2) TO-263: TQ2, TO-263-3: TQ3<br>(3) G: Halogen Free and Lead Free, L: Lead Free<br>(4) XX: refer to Marking Information |
|---------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|

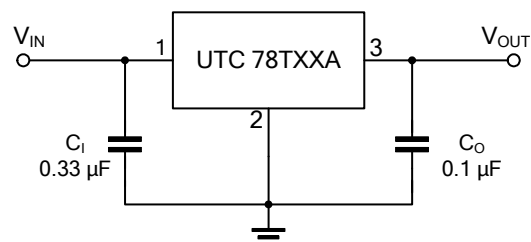
### MARKING INFORMATION

| PACKAGE            | VOLTAGE CODE | MARKING |
|--------------------|--------------|---------|
| TO-263<br>TO-263-3 | 05 :5.0V     |         |
|                    | 06 :6.0V     |         |
|                    | 07 :7.0V     |         |
|                    | 08 :8.0V     |         |
|                    | 09 :9.0V     |         |
|                    | 10 :10V      |         |
|                    | 12 :12V      |         |
|                    | 15 :15V      |         |
|                    | 18 :18V      |         |
|                    | 24:24V       |         |

### TEST CIRCUIT



### APPLICATION CIRCUIT



Note 1: To specify an output voltage, substitute voltage value for "XX".

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

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

| PARAMETER                      | SYMBOL    | RATING             | UNIT |
|--------------------------------|-----------|--------------------|------|
| Input Voltage                  | $V_{IN}$  | 35                 | V    |
| Output Current                 | $I_{OUT}$ | 1                  | A    |
| Power Dissipation              | $P_D$     | Internally Limited | W    |
| Junction Temperature           | $T_J$     | +125               | °C   |
| Operating Junction Temperature | $T_{OPR}$ | -40~ +125          | °C   |
| Storage Temperature            | $T_{STG}$ | -40~ +150          | °C   |

Note: 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.

### ■ ELECTRICAL CHARACTERISTICS

( $T_J = 0^{\circ}\text{C} \sim 125^{\circ}\text{C}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified) (Note 1)

For 78T05A ( $V_{IN} = 10\text{V}$ ,  $I_{OUT} = 0.5\text{A}$ )

| PARAMETER                        | SYMBOL                  | TEST CONDITIONS                                                                                          | MIN  | TYP  | MAX  | UNIT          |
|----------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Output Voltage                   | $V_{OUT}$               | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                     | 4.80 | 5.0  | 5.20 | V             |
|                                  |                         | $V_{IN} = 7.5\text{V} \sim 20\text{V}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$ , $P_D \leq 15\text{W}$ | 4.75 |      | 5.25 | V             |
| Load Regulation                  | $\Delta V_{OUT}$        | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                     |      |      | 50   | mV            |
|                                  |                         | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 0.25\text{A} \sim 0.75\text{A}$                                  |      |      | 25   | mV            |
| Line regulation                  | $\Delta V_{OUT}$        | $V_{IN} = 7\text{V} \sim 25\text{V}$ , $T_J = 25^{\circ}\text{C}$                                        |      |      | 50   | mV            |
|                                  |                         | $V_{IN} = 7.5\text{V} \sim 20\text{V}$ , $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 1.0\text{A}$            |      |      | 50   | mV            |
| Quiescent Current                | $I_Q$                   | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} \leq 1.0\text{A}$                                                  |      |      | 8.0  | mA            |
| Quiescent Current Change         | $\Delta I_Q$            | $V_{IN} = 7.5\text{V} \sim 20\text{V}$                                                                   |      |      | 1.0  | mA            |
|                                  |                         | $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                                                  |      |      | 0.5  | mA            |
| Output Noise Voltage             | eN                      | $10\text{Hz} \leq f \leq 100\text{kHz}$                                                                  |      | 40   |      | $\mu\text{V}$ |
| Temperature coefficient of $V_O$ | $\Delta V_O / \Delta T$ | $I_{OUT} = 5\text{mA}$                                                                                   |      | -0.6 |      | mV/°C         |
| Ripple Rejection                 | RR                      | $V_{IN} = 8\text{V} \sim 18\text{V}$ , $f = 120\text{Hz}$ , $T_J = 25^{\circ}\text{C}$                   | 62   | 80   |      | dB            |
| Peak Output Current              | $I_{PEAK}$              | $T_J = 25^{\circ}\text{C}$                                                                               |      | 1.8  |      | A             |
| Short-Circuit Current            | $I_{SC}$                | $V_{IN} = 35\text{V}$ , $T_J = 25^{\circ}\text{C}$                                                       |      | 250  |      | mA            |
| Dropout Voltage                  | $V_D$                   | $T_J = 25^{\circ}\text{C}$                                                                               |      | 2.0  |      | V             |

For 78T06A ( $V_{IN} = 11\text{V}$ ,  $I_{OUT} = 0.5\text{A}$ )

| PARAMETER                        | SYMBOL                  | TEST CONDITIONS                                                                                          | MIN  | TYP  | MAX  | UNIT          |
|----------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Output Voltage                   | $V_{OUT}$               | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                     | 5.76 | 6.0  | 6.24 | V             |
|                                  |                         | $V_{IN} = 8.5\text{V} \sim 21\text{V}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$ , $P_D \leq 15\text{W}$ | 5.70 |      | 6.30 | V             |
| Load Regulation                  | $\Delta V_{OUT}$        | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                     |      |      | 60   | mV            |
|                                  |                         | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 0.25\text{A} \sim 0.75\text{A}$                                  |      |      | 30   | mV            |
| Line regulation                  | $\Delta V_{OUT}$        | $V_{IN} = 8\text{V} \sim 25\text{V}$ , $T_J = 25^{\circ}\text{C}$                                        |      |      | 60   | mV            |
|                                  |                         | $V_{IN} = 8.5\text{V} \sim 21\text{V}$ , $T_J = 25^{\circ}\text{C}$ , $I_{OUT} = 1.0\text{A}$            |      |      | 60   | mV            |
| Quiescent Current                | $I_Q$                   | $T_J = 25^{\circ}\text{C}$ , $I_{OUT} \leq 1.0\text{A}$                                                  |      |      | 8.0  | mA            |
| Quiescent Current Change         | $\Delta I_Q$            | $V_{IN} = 8.5\text{V} \sim 21\text{V}$                                                                   |      |      | 1.0  | mA            |
|                                  |                         | $I_{OUT} = 5\text{mA} \sim 1.0\text{A}$                                                                  |      |      | 0.5  | mA            |
| Output Noise Voltage             | eN                      | $10\text{Hz} \leq f \leq 100\text{kHz}$                                                                  |      | 45   |      | $\mu\text{V}$ |
| Temperature coefficient of $V_O$ | $\Delta V_O / \Delta T$ | $I_{OUT} = 5\text{mA}$                                                                                   |      | -0.7 |      | mV/°C         |
| Ripple Rejection                 | RR                      | $V_{IN} = 9\text{V} \sim 19\text{V}$ , $f = 120\text{Hz}$ , $T_J = 25^{\circ}\text{C}$                   | 59   | 75   |      | dB            |
| Peak Output Current              | $I_{PEAK}$              | $T_J = 25^{\circ}\text{C}$                                                                               |      | 1.8  |      | A             |
| Short-Circuit Current            | $I_{SC}$                | $V_{IN} = 35\text{V}$ , $T_J = 25^{\circ}\text{C}$                                                       |      | 250  |      | mA            |
| Dropout Voltage                  | $V_D$                   | $T_J = 25^{\circ}\text{C}$                                                                               |      | 2.0  |      | V             |

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T07A ( $V_{IN}=13V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                         | MIN  | TYP  | MAX  | UNIT            |
|----------------------------------|-----------------------|---------------------------------------------------------|------|------|------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                  | 6.72 | 7.0  | 7.28 | V               |
|                                  |                       | $V_{IN}=9.5V-22V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 6.65 |      | 7.35 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                  |      |      | 70   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$               |      |      | 35   | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=9V-25V$ , $T_J=25^{\circ}C$                     |      |      | 70   | mV              |
|                                  |                       | $V_{IN}=9.5V-22V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |      |      | 70   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                 |      |      | 8.0  | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=9.5V-22V$                                       |      |      | 1.0  | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                      |      |      | 0.5  | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                               |      | 50   |      | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                           |      | -0.8 |      | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=10V-20V$ , $f=120Hz$ , $T_J=25^{\circ}C$        | 59   | 75   |      | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                       |      | 1.7  |      | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                        |      | 250  |      | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                       |      | 2.0  |      | V               |

For 78T08A ( $V_{IN}=14V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                          | MIN  | TYP  | MAX  | UNIT            |
|----------------------------------|-----------------------|----------------------------------------------------------|------|------|------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   | 7.68 | 8.0  | 8.32 | V               |
|                                  |                       | $V_{IN}=10.5V-23V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 7.60 |      | 8.40 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   |      |      | 80   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$                |      |      | 40   | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=10.5V-25V$ , $T_J=25^{\circ}C$                   |      |      | 80   | mV              |
|                                  |                       | $V_{IN}=10.5V-23V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |      |      | 80   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                  |      |      | 8.0  | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=10.5V-23V$                                       |      |      | 1.0  | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                       |      |      | 0.5  | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                                |      | 58   |      | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                            |      | -0.9 |      | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=11.5V-21.5V$ , $f=120Hz$ , $T_J=25^{\circ}C$     | 56   | 72   |      | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                        |      | 1.8  |      | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                         |      | 250  |      | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                        |      | 2.0  |      | V               |

For 78T09A ( $V_{IN}=15V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                          | MIN  | TYP  | MAX  | UNIT            |
|----------------------------------|-----------------------|----------------------------------------------------------|------|------|------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   | 8.64 | 9.0  | 9.36 | V               |
|                                  |                       | $V_{IN}=11.5V-24V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 8.55 |      | 9.45 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   |      |      | 90   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$                |      |      | 45   | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=11.5V-25V$ , $T_J=25^{\circ}C$                   |      |      | 90   | mV              |
|                                  |                       | $V_{IN}=11.5V-24V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |      |      | 90   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                  |      |      | 8.0  | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=11.5V-24V$                                       |      |      | 1.0  | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                       |      |      | 0.5  | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                                |      | 58   |      | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                            |      | -1.1 |      | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=12.5V-22.5V$ ,<br>$f=120Hz$ , $T_J=25^{\circ}C$  | 56   | 72   |      | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                        |      | 1.8  |      | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                         |      | 250  |      | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                        |      | 2.0  |      | V               |

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T10A ( $V_{IN}=16V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                          | MIN  | TYP  | MAX   | UNIT            |
|----------------------------------|-----------------------|----------------------------------------------------------|------|------|-------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   | 9.60 | 10.0 | 10.40 | V               |
|                                  |                       | $V_{IN}=12.5V-25V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 9.50 |      | 10.50 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   |      |      | 100   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$                |      |      | 50    | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=13V-25V$ , $T_J=25^{\circ}C$                     |      |      | 100   | mV              |
|                                  |                       | $V_{IN}=13V-25V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$    |      |      | 100   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                  |      |      | 8.0   | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=12.6V-25V$                                       |      |      | 1.0   | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                       |      |      | 0.5   | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                                |      | 58   |       | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                            |      | -1.1 |       | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=13V-23V$ , $f=120Hz$ , $T_J=25^{\circ}C$         | 56   | 72   |       | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                        |      | 1.8  |       | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                         |      | 250  |       | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                        |      | 2.0  |       | V               |

For 78T12A ( $V_{IN}=19V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                          | MIN   | TYP  | MAX   | UNIT            |
|----------------------------------|-----------------------|----------------------------------------------------------|-------|------|-------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   | 11.52 | 12.0 | 12.48 | V               |
|                                  |                       | $V_{IN}=14.5V-27V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 11.40 |      | 12.60 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   |       |      | 120   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$                |       |      | 60    | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=14.5V-30V$ , $T_J=25^{\circ}C$                   |       |      | 120   | mV              |
|                                  |                       | $V_{IN}=14.6V-27V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |       |      | 120   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                  |       |      | 8.0   | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=14.5V-30V$                                       |       |      | 1.0   | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                       |       |      | 0.5   | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                                |       | 75   |       | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                            |       | -1.5 |       | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=15V-25V$ , $f=120Hz$ , $T_J=25^{\circ}C$         | 55    | 72   |       | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                        |       | 1.8  |       | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                         |       | 250  |       | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                        |       | 2.0  |       | V               |

For 78T15A ( $V_{IN}=23V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                          | MIN   | TYP  | MAX   | UNIT            |
|----------------------------------|-----------------------|----------------------------------------------------------|-------|------|-------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   | 14.40 | 15.0 | 15.60 | V               |
|                                  |                       | $V_{IN}=17.5V-30V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 14.25 |      | 15.75 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                   |       |      | 150   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$                |       |      | 75    | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=18.5V-30V$ , $T_J=25^{\circ}C$                   |       |      | 150   | mV              |
|                                  |                       | $V_{IN}=17.7V-30V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |       |      | 150   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                  |       |      | 8.0   | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=17.5V-30V$                                       |       |      | 1.0   | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                       |       |      | 0.5   | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                                |       | 90   |       | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                            |       | -1.8 |       | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=18.5V-28.5V$ , $f=120Hz$ , $T_J=25^{\circ}C$     | 54    | 70   |       | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                        |       | 1.8  |       | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                         |       | 250  |       | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                        |       | 2.0  |       | V               |

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T18A ( $V_{IN}=27V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                        | MIN   | TYP  | MAX   | UNIT            |
|----------------------------------|-----------------------|--------------------------------------------------------|-------|------|-------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                 | 17.28 | 18.0 | 18.72 | V               |
|                                  |                       | $V_{IN}=21V-33V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 17.10 |      | 18.90 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                 |       |      | 180   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$              |       |      | 90    | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=21V-33V$ , $T_J=25^{\circ}C$                   |       |      | 180   | mV              |
|                                  |                       | $V_{IN}=21V-33V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |       |      | 180   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                |       |      | 8.0   | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=21.5V-33V$                                     |       |      | 1.0   | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                     |       |      | 0.5   | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                              |       | 110  |       | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                          |       | -2.2 |       | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=22V-32V$ , $f=120Hz$ , $T_J=25^{\circ}C$       | 53    | 69   |       | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                      |       | 1.8  |       | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                       |       | 250  |       | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                      |       | 2.0  |       | V               |

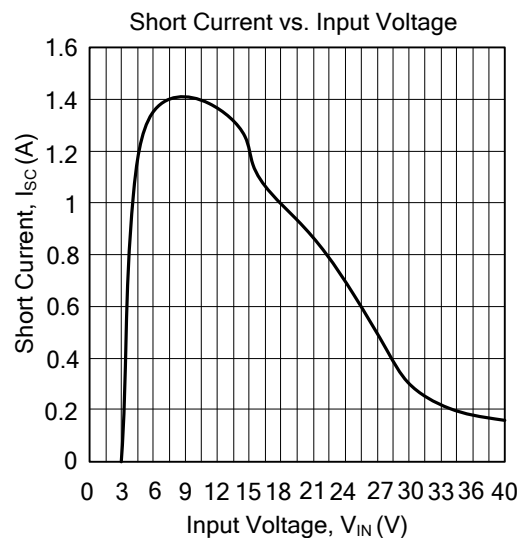
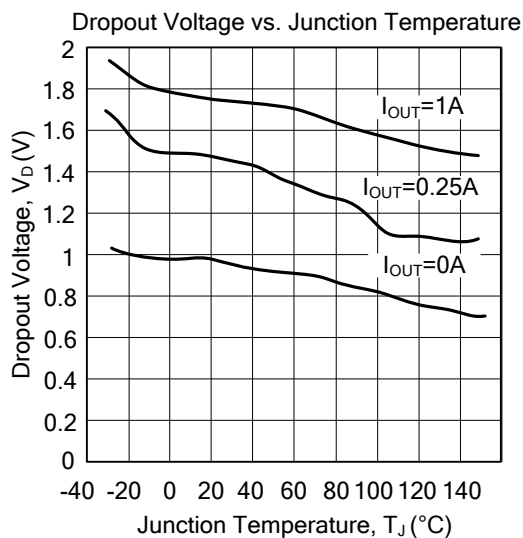
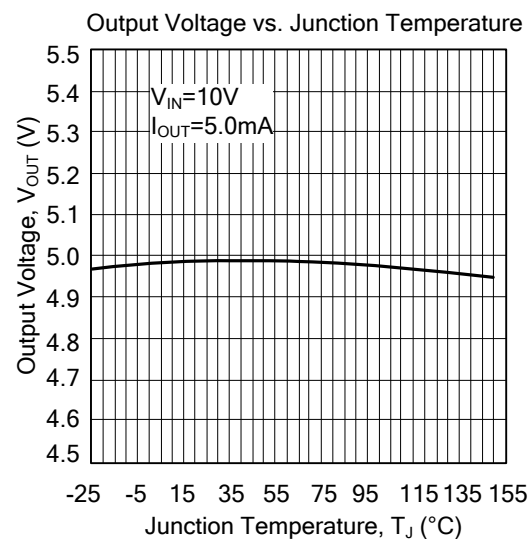
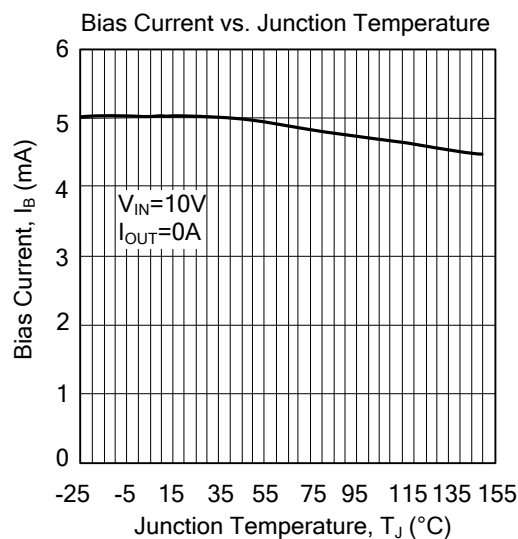
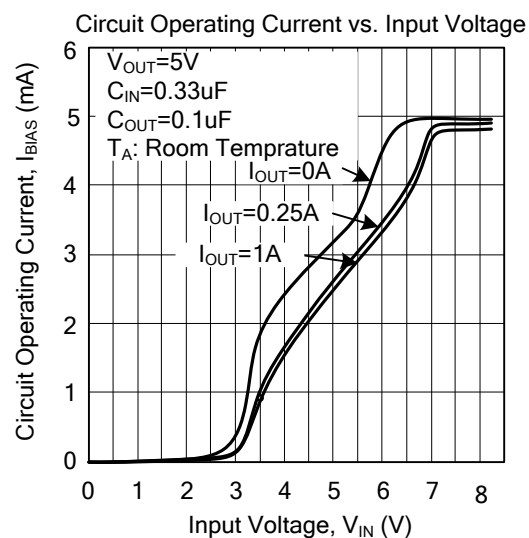
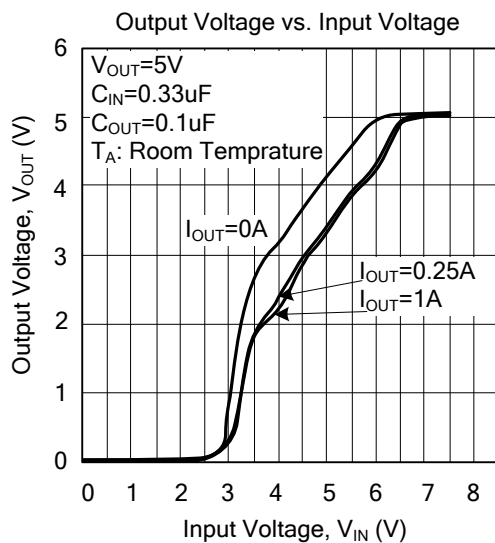
For 78T24A ( $V_{IN}=33V$ ,  $I_{OUT}=0.5A$ )

| PARAMETER                        | SYMBOL                | TEST CONDITIONS                                        | MIN   | TYP  | MAX   | UNIT            |
|----------------------------------|-----------------------|--------------------------------------------------------|-------|------|-------|-----------------|
| Output Voltage                   | $V_{OUT}$             | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                 | 23.04 | 24.0 | 24.96 | V               |
|                                  |                       | $V_{IN}=27V-38V$ , $I_{OUT}=5mA-1.0A$ , $P_D \leq 15W$ | 22.80 |      | 25.20 | V               |
| Load Regulation                  | $\Delta V_{OUT}$      | $T_J=25^{\circ}C$ , $I_{OUT}=5mA-1.0A$                 |       |      | 240   | mV              |
|                                  |                       | $T_J=25^{\circ}C$ , $I_{OUT}=0.25A-0.75A$              |       |      | 120   | mV              |
| Line regulation                  | $\Delta V_{OUT}$      | $V_{IN}=27V-38V$ , $T_J=25^{\circ}C$                   |       |      | 240   | mV              |
|                                  |                       | $V_{IN}=27V-38V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$  |       |      | 240   | mV              |
| Quiescent Current                | $I_Q$                 | $T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$                |       |      | 8.0   | mA              |
| Quiescent Current Change         | $\Delta I_Q$          | $V_{IN}=28V-38V$                                       |       |      | 1.0   | mA              |
|                                  |                       | $I_{OUT}=5mA-1.0A$                                     |       |      | 0.5   | mA              |
| Output Noise Voltage             | eN                    | $10Hz \leq f \leq 100kHz$                              |       | 170  |       | $\mu V$         |
| Temperature coefficient of $V_O$ | $\Delta V_O/\Delta T$ | $I_{OUT}=5mA$                                          |       | -2.8 |       | mV/ $^{\circ}C$ |
| Ripple Rejection                 | RR                    | $V_{IN}=28V-38V$ , $f=120Hz$ , $T_J=25^{\circ}C$       | 50    | 66   |       | dB              |
| Peak Output Current              | $I_{PEAK}$            | $T_J=25^{\circ}C$                                      |       | 1.8  |       | A               |
| Short-Circuit Current            | $I_{SC}$              | $V_{IN}=35V$ , $T_J=25^{\circ}C$                       |       | 250  |       | mA              |
| Dropout Voltage                  | $V_D$                 | $T_J=25^{\circ}C$                                      |       | 2.0  |       | V               |

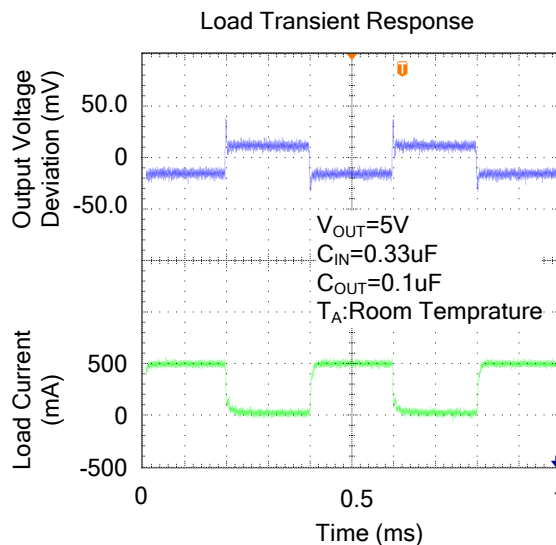
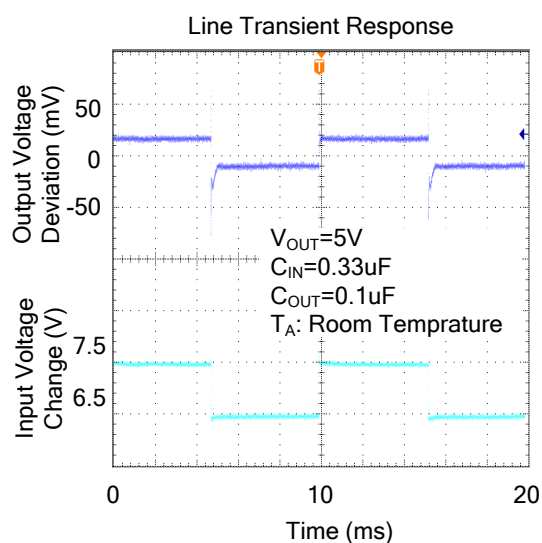
Note 1: The Maximum steady state usable output current are dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represents pulse test conditions with junction temperatures specified at the initiation of test.

2: Power dissipation < 0.5W

## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS(Cont.)



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