

### Features

- Output voltage ranges: Fixed range of 1.8V, 2.5V, 2.7V, 3.0V, 3.3V, 5.0V type.
- Highly accuracy:  $\pm 2\%$
- Low voltage drop: 360mV (typ.),  $V_{OUT}=5.0V$  at 500mA
- Guaranteed output current: 500mA
- Low quiescent current: 4 $\mu$ A (typ.)
- Current limiting
- Over-temperature shutdown
- 5-pin SOT23 and 3-pin SOT89 Packages

### Applications

- Portable electronics
- Wireless devices
- Cordless phones
- PC peripherals
- Battery powered devices
- Electronic scales

### General Description

The HT78xx series of positive, linear regulators features low quiescent current (4 $\mu$ A typ.) with low dropout voltage, making them ideal for battery applications. The devices are capable of supplying 500mA of output current continuously.

They are available with several fixed output voltages ranging from 1.8V to 5.0V. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

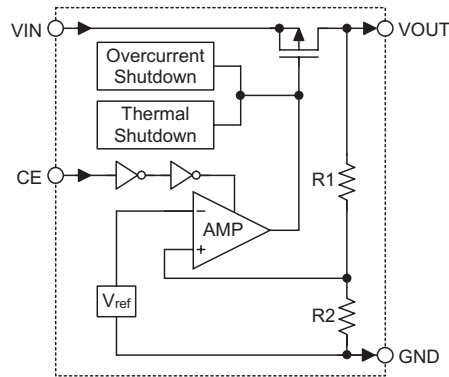
These rugged devices have Thermal Shutdown and Current Limiting to prevent device failure under the "Worst" of operating conditions.

### Selection Table

| Part No. | Output Voltage | Tolerance | Package          | Marking                                  |
|----------|----------------|-----------|------------------|--|
| HT7818   | 1.8V           | $\pm 2\%$ | SOT23-5<br>SOT89 | 78XX (for SOT23-5)<br>HT78XX (for SOT89) |
| HT7825   | 2.5V           |           |                  |  |
| HT7827   | 2.7V           |           |                  |  |
| HT7830   | 3.0V           |           |                  |  |
| HT7833   | 3.3V           |           |                  |  |
| HT7850   | 5.0V           |           |                  |  |

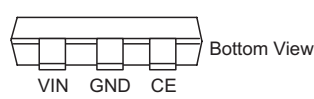
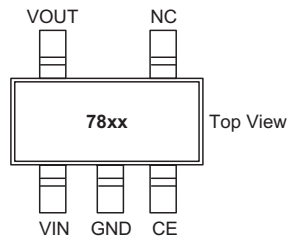
Note: "xx" stands for output voltages.

**Block Diagram**

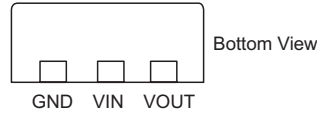
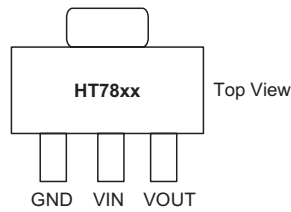


**Pin Assignment**

**SOT23-5**



**SOT89**



**Pin Description**

| Pin No. |       | Pin Name | Description                  |
|---------|-------|----------|------------------------------|
| SOT23-5 | SOT89 |          |                              |
| 3       | —     | CE       | Chip enable pin, high enable |
| 5       | 3     | VOUT     | Output pin                   |
| 1       | 2     | VIN      | Input pin                    |
| 2       | 1     | GND      | Ground pin                   |
| 4       | —     | NC       | No connection                |

## Absolute Maximum Ratings\*

|                              |               |                                    |                |
|------------------------------|---------------|------------------------------------|----------------|
| Maximum Supply Voltage ..... | Up to 8.5V    | Storage Temperature .....          | -50°C to 125°C |
| Operating Temperature .....  | -40°C to 85°C | Maximum Junction Temperature ..... | 150°C          |

Note: These are stress ratings only. Stresses exceeding the range specified under Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

\* Absolute maximum ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits.

The guaranteed specifications apply only for the test conditions listed.

## Thermal Information

| Symbol        | Parameter   | Package | Max. | Unit |
|---------------|---|---------|------|------|
| $\theta_{JA}$ | Thermal Resistance (Junction to Ambient)<br>(Assume no ambient airflow, no heat sink) | SOT23-5 | 500  | °C/W |
|               |   | SOT89   | 200  | °C/W |
| $P_D$         | Power Dissipation   | SOT23-5 | 0.20 | W    |
|               |   | SOT89   | 0.50 | W    |

Note:  $P_D$  is measured at  $T_a=25^\circ\text{C}$

## Electrical Characteristics

$T_j=25^\circ\text{C}$ ,  $V_{IN}=V_{OUT}+1.0\text{V}$ ,  $I_O=1\text{mA}$ , unless otherwise specified

| Symbol                              | Parameter                | Test Conditions                                    | Min.                                    | Typ.      | Max.  | Unit          |    |
|-------------------------------------|--------------------------|--|---|-----------|-------|---------------|----|
| $V_{IN}$                            | Input Voltage            | —  | —                                       | —         | 8     | V             |    |
| $\Delta V_{OUT}$                    | Output Voltage Tolerance | —  | -2                                      | —         | 2     | %             |    |
| $I_{SS}$                            | Quiescent Current        | $I_O=0\text{mA}$ , $V_{CE}=V_{IN}$                 | —                                       | 4         | 7     | $\mu\text{A}$ |    |
| $\Delta V_{LOAD}$                   | Load Regulation (Note1)  | $1\text{mA} \leq I_{OUT} \leq 500\text{mA}$        | —                                       | 0.004     | 0.008 | %/mA          |    |
| $V_{DROP}$                          | Dropout Voltage (Note2)  | $\Delta V_{OUT}=2\%$<br>$I_{OUT}=500\text{mA}$     | $V_O \leq 1.8\text{V}$                  | —         | 800   | 1200          | mV |
|                                     |                          |  | $2.5\text{V} \leq V_O \leq 2.7\text{V}$ | —         | 500   | 650           |    |
|                                     |                          |  | $3.0\text{V} \leq V_O \leq 5.0\text{V}$ | —         | 360   | 500           |    |
| $\Delta V_{LINE}$                   | Line Regulation          | $V_{OUT}+1.0\text{V} \leq V_{IN} \leq 8.0\text{V}$ | —                                       | 0.2       | 0.3   | %/V           |    |
| $I_{LIM}$                           | Current Limit (Note3)    | $\Delta V_{OUT}=10\%$                              | 500                                     | —         | —     | mA            |    |
| $V_{IH}$                            | CE Input High Threshold  | $V_{OUT} + 1\text{V} \leq V_{IN} \leq 8\text{V}$   | 2                                       | —         | —     | V             |    |
| $V_{IL}$                            | CE Input Low Threshold   | $V_{OUT} + 1\text{V} \leq V_{IN} \leq 8\text{V}$   | —                                       | —         | 0.8   | V             |    |
| $I_{SD}$                            | Shutdown Current         | CE input voltage $\leq 0.8\text{V}$                | —                                       | 0.5       | 1.0   | $\mu\text{A}$ |    |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$ | Temperature Coefficient  | $-40^\circ\text{C} < T_a < 85^\circ\text{C}$       | —                                       | $\pm 0.8$ | —     | mV/°C         |    |

Note: 1. Load regulation is measured at a constant junction temperature, using pulse testing with a low ON time and is guaranteed up to the maximum power dissipation. Power dissipation is determined by the input/output differential voltage and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range. The maximum allowable power dissipation at any ambient temperature is  $P_D = (T_{J(MAX)} - T_a) / \theta_{JA}$ .

2. Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at  $V_{IN} = V_{OUT}+1\text{V}$  with a fixed load.

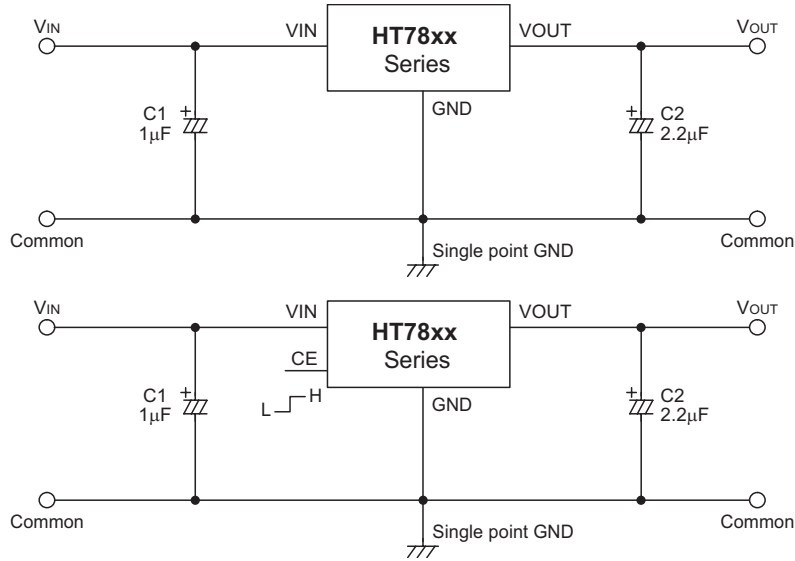
3. Current limit is measured by pulsing for a short time.

## Application Circuit

The circuits provided in this section are for reference only.

For the purposes of clarity some of the detailed components parameters shall depend on the application.

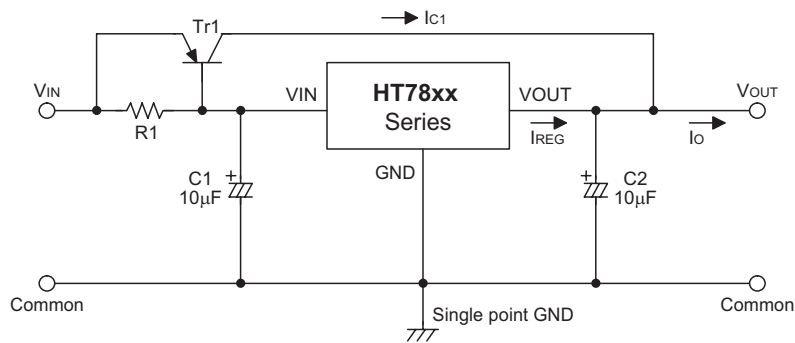
### Basic Circuits



$\frac{R2}{R1}$

### Typical Application Circuits

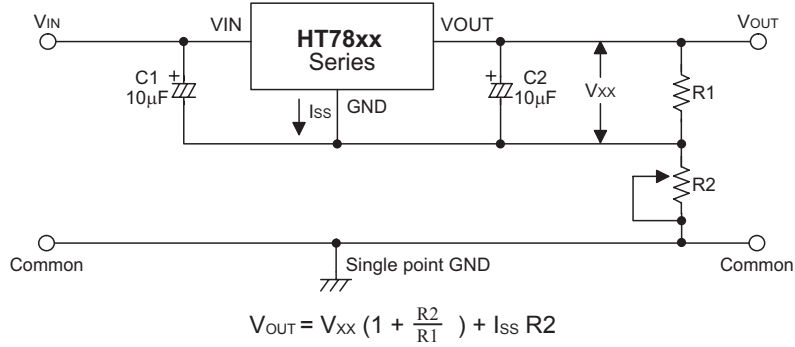
#### High Output Current Positive Voltage Regulator



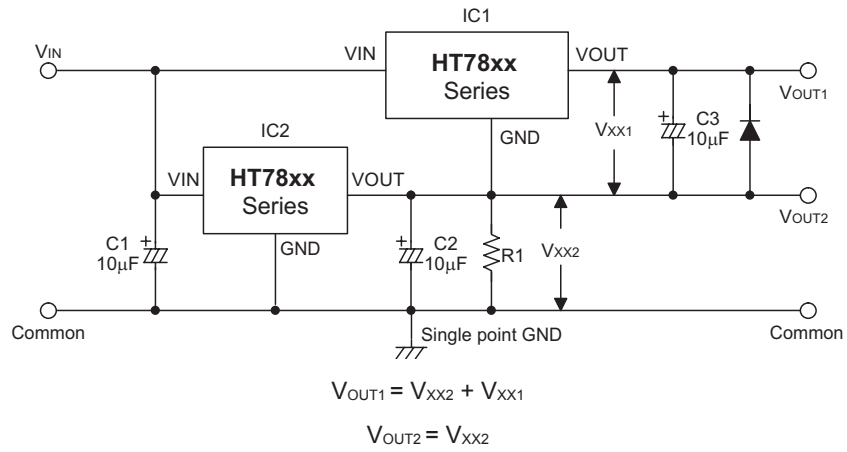
$$R1 = \frac{V_{BE1}}{I_{REG} - \frac{I_{C1}}{(1+\beta)}} ,$$

$$I_o = I_{C1} + I_{REG}$$

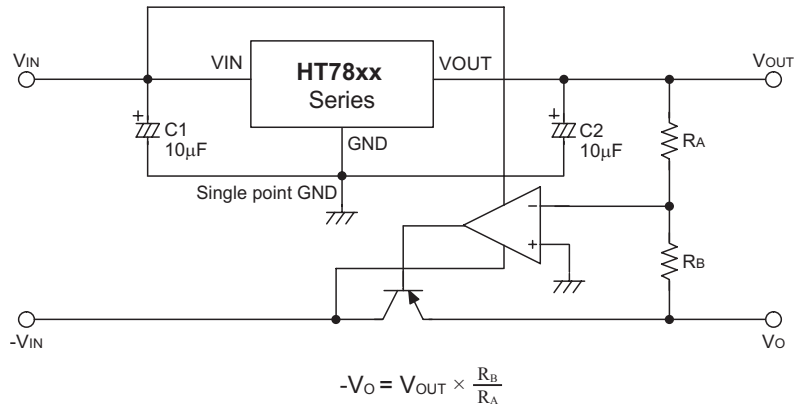
Increased Output Voltage Circuit



Dual Supply Circuit



Tracking Voltage Regulator



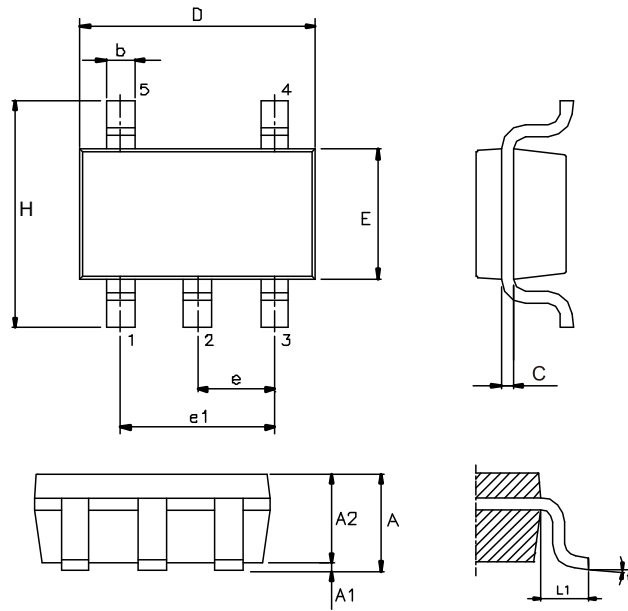
## Package Information

Note that the package information provided here is for consultation purposes only. As this information may be updated at regular intervals users are reminded to consult the [Holtek website](#) for the latest version of the [Package/ Carton Information](#).

Additional supplementary information with regard to packaging is listed below. Click on the relevant section to be transferred to the relevant website page.

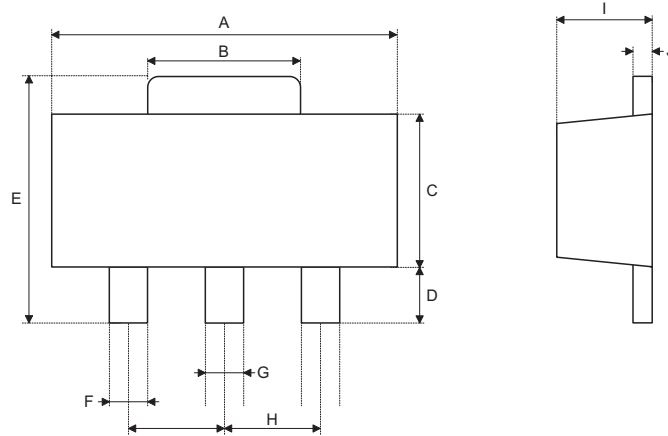
- Package Information (include Outline Dimensions, Product Tape and Reel Specifications)
- The Operation Instruction of Packing Materials
- Carton information

## 5-pin SOT23 Outline Dimensions



| Symbol | Dimensions in inch |           |       |
|--------|--------------------|-----------|-------|
|        | Min.               | Nom.      | Max.  |
| A      | —                  | —         | 0.057 |
| A1     | —                  | —         | 0.006 |
| A2     | 0.035              | 0.045     | 0.051 |
| b      | 0.012              | —         | 0.020 |
| C      | 0.003              | —         | 0.009 |
| D      | —                  | 0.114 BSC | —     |
| E      | —                  | 0.063 BSC | —     |
| e      | —                  | 0.037 BSC | —     |
| e1     | —                  | 0.075 BSC | —     |
| H      | —                  | 0.110 BSC | —     |
| L1     | —                  | 0.024 BSC | —     |
| θ      | 0°                 | —         | 8°    |

| Symbol | Dimensions in mm |          |      |
|--------|------------------|----------|------|
|        | Min.             | Nom.     | Max. |
| A      | —                | —        | 1.45 |
| A1     | —                | —        | 0.15 |
| A2     | 0.90             | 1.15     | 1.30 |
| b      | 0.30             | —        | 0.50 |
| C      | 0.08             | —        | 0.22 |
| D      | —                | 2.90 BSC | —    |
| E      | —                | 1.60 BSC | —    |
| e      | —                | 0.95 BSC | —    |
| e1     | —                | 1.90 BSC | —    |
| H      | —                | 2.80 BSC | —    |
| L1     | —                | 0.60 BSC | —    |
| θ      | 0°               | —        | 8°   |

**3-pin SOT89 Outline Dimensions**


| Symbol | Dimensions in inch |           |       |
|--------|--------------------|-----------|-------|
|        | Min.               | Nom.      | Max.  |
| A      | 0.173              | —         | 0.185 |
| B      | 0.053              | —         | 0.072 |
| C      | 0.090              | —         | 0.106 |
| D      | 0.031              | —         | 0.047 |
| E      | 0.155              | —         | 0.173 |
| F      | 0.014              | —         | 0.019 |
| G      | 0.017              | —         | 0.022 |
| H      | —                  | 0.059 BSC | —     |
| I      | 0.055              | —         | 0.063 |
| J      | 0.014              | —         | 0.017 |

| Symbol | Dimensions in mm |          |      |
|--------|------------------|----------|------|
|        | Min.             | Nom.     | Max. |
| A      | 4.40             | —        | 4.70 |
| B      | 1.35             | —        | 1.83 |
| C      | 2.29             | —        | 2.70 |
| D      | 0.80             | —        | 1.20 |
| E      | 3.94             | —        | 4.40 |
| F      | 0.36             | —        | 0.48 |
| G      | 0.44             | —        | 0.56 |
| H      | —                | 1.50 BSC | —    |
| I      | 1.40             | —        | 1.60 |
| J      | 0.35             | —        | 0.44 |



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