

# HA17431H Series

## Shunt Regulator

REJ03D0679-0200  
 (Previous: ADE-204-070A)  
 Rev.2.00  
 Jun 15, 2005

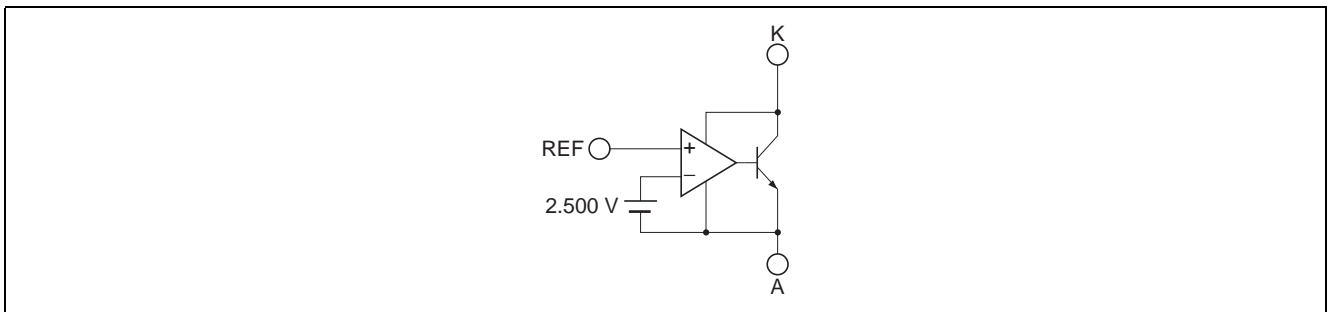
### Description

The HA17431H series is temperature-compensated variable shunt regulators. The main application of these products is in voltage regulators that provide a variable output voltage. The on-chip high-precision reference voltage source can provide  $\pm 1\%$  accuracy, which have a  $V_{KA}$  max of 36 volts.

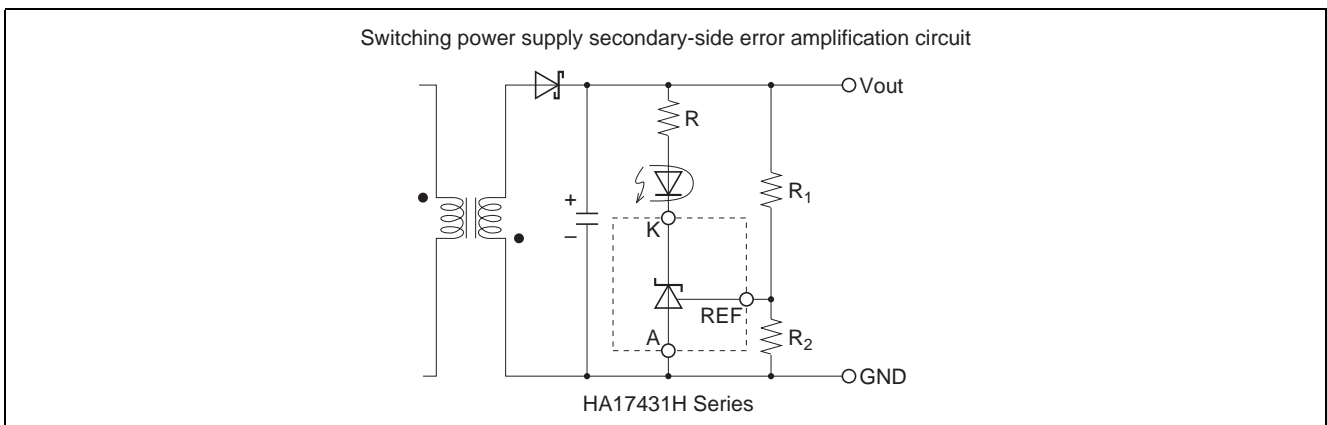
### Features

- The reference voltage provide 2.500 V  $\pm 1\%$  at  $T_a = 25^\circ\text{C}$
- The reference voltage has a low temperature coefficient
- The MPAK-5V (5 pin), MPAKV (3 pin) and UPAKV miniature packages are optimal for use on high mounting density circuit boards

### Block Diagram



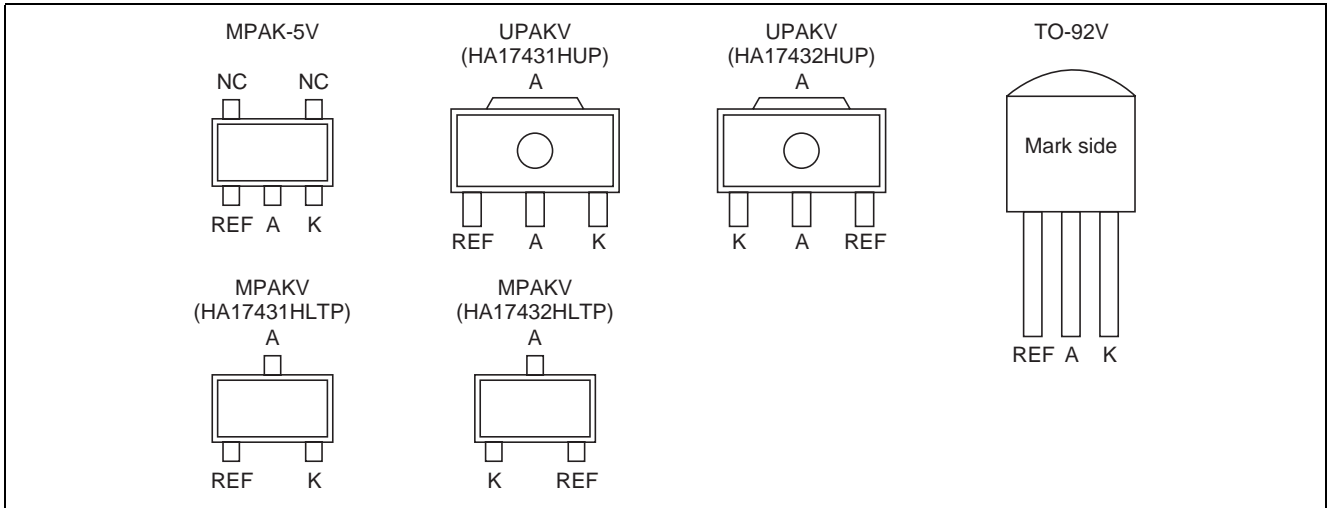
### Application Circuit Example



Ordering Information

| Item           |             | Package Code (Previous Code) | Temp. Range  |
|----------------|-------------|------------------------------|--------------|
| Industrial use | HA17431HLTP | PLSP0003ZB-A (MPAKV)         | -20 to +85°C |
|                | HA17432HLTP |                              |              |
|                | HA17431HLP  | PLSP0005ZB-A (MPAK-5V)       |              |
|                | HA17431HP   | PRSS0003DA-A (TO-92V)        |              |
|                | HA17431HUP  | PLZZ0004CA-A (UPAKV)         |              |
|                | HA17432HUP  |                              |              |

Pin Arrangement



**Absolute Maximum Ratings**

(Ta = 25°C)

| Item                        | Symbol           | Ratings            |                    |                           |                             | Unit | Notes |
|-----------------------------|------------------|--------------------|--------------------|---------------------------|-----------------------------|------|-------|
|                             |                  | HA17431HLP         | HA17431HP          | HA17431HUP/<br>HA17432HUP | HA17431HLTP/<br>HA17432HLTP |      |       |
| Cathode voltage             | V <sub>KA</sub>  | 36                 | 36                 | 36                        | 36                          | V    | 1     |
| Continuous cathode current  | I <sub>K</sub>   | -50 to +50         | -50 to +50         | -50 to +50                | -50 to +50                  | mA   |       |
| Reference input current     | I <sub>ref</sub> | -0.05 to +6        | -0.05 to +6        | -0.05 to +6               | -0.05 to +6                 | mA   |       |
| Power dissipation           | P <sub>T</sub>   | 150 * <sup>2</sup> | 500 * <sup>3</sup> | 800 * <sup>4</sup>        | 150 * <sup>2</sup>          | mW   | 2,3,4 |
| Operating temperature range | Topr             | -20 to +85         | -20 to +85         | -20 to +85                | -20 to +85                  | °C   |       |
| Storage temperature         | Tstg             | -55 to +150        | -55 to +150        | -55 to +150               | -55 to +150                 | °C   |       |

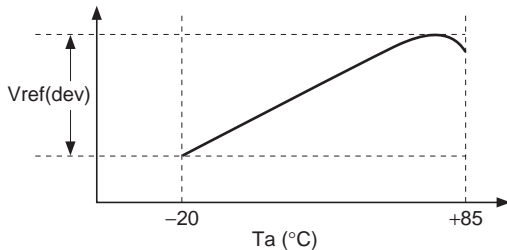
- Notes: 1. Voltages are referenced to anode.  
 2. Ta ≤ 25°C. If Ta > 25°C, derate by 1.2 mW/°C.  
 3. Ta ≤ 25°C. If Ta > 25°C, derate by 4.0 mW/°C.  
 4. 15 mm × 25 mm × 0.7mm alumina ceramic board, Ta ≤ 25°C. If Ta > 25°C, derate by 6.4 mW/°C.

**Electrical Characteristics**

(Ta = 25°C, I<sub>K</sub> = 10 mA)

| Item                                      | Symbol                              | Min   | Typ   | Max   | Unit   | Test Conditions  | Notes |
|---|-------------------------------------|-------|-------|-------|--------|--|-------|
| Reference voltage                         | V <sub>ref</sub>                    | 2.475 | 2.500 | 2.525 | V      | V <sub>KA</sub> = V <sub>ref</sub>                                     |       |
| Reference voltage temperature deviation   | V <sub>ref</sub> (dev)              | —     | 10    | —     | mV     | V <sub>KA</sub> = V <sub>ref</sub> ,<br>Ta = -20°C to +85°C            | 1     |
| Reference voltage temperature coefficient | ΔV <sub>ref</sub> /ΔTa              | —     | ±30   | —     | ppm/°C | V <sub>KA</sub> = V <sub>ref</sub> ,<br>0°C to 50°C gradient           |       |
| Reference voltage regulation              | ΔV <sub>ref</sub> /ΔV <sub>KA</sub> | —     | 2.0   | 3.7   | mV/V   | V <sub>KA</sub> = V <sub>ref</sub> to 36 V                             |       |
| Reference input current                   | I <sub>ref</sub>                    | —     | 0.6   | 3     | μA     | R <sub>1</sub> = 10 kΩ, R <sub>2</sub> = ∞                             |       |
| Reference current temperature deviation   | I <sub>ref</sub> (dev)              | —     | 0.5   | —     | μA     | R <sub>1</sub> = 10 kΩ, R <sub>2</sub> = ∞,<br>Ta = -20°C to +85°C     |       |
| Minimum cathode current                   | I <sub>min</sub>                    | —     | 0.06  | 0.2   | mA     | V <sub>KA</sub> = V <sub>ref</sub>                                     | 2     |
| Off state cathode current                 | I <sub>off</sub>                    | —     | 0.001 | 1.0   | μA     | V <sub>KA</sub> = 36 V, V <sub>ref</sub> = 0 V                         |       |
| Dynamic impedance                         | Z <sub>KA</sub>                     | —     | 0.2   | 0.5   | Ω      | V <sub>KA</sub> = V <sub>ref</sub> ,<br>I <sub>K</sub> = 1 mA to 50 mA |       |

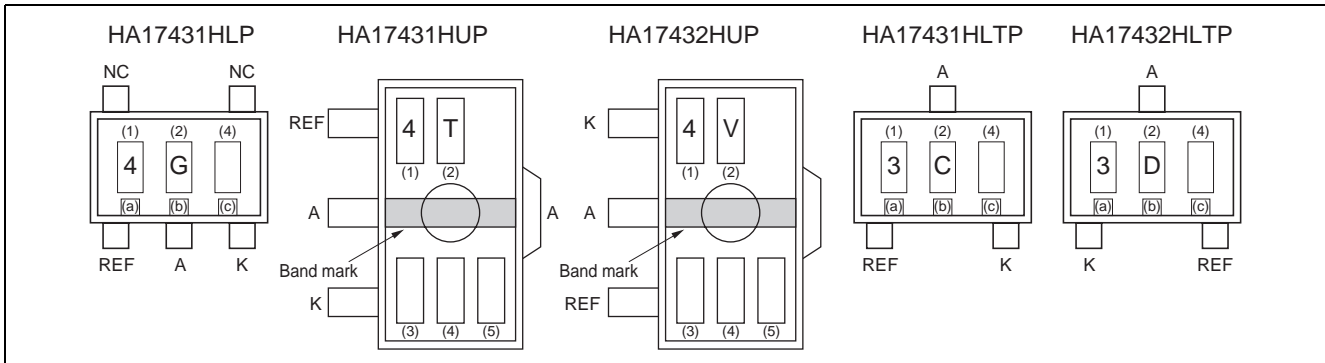
- Notes: 1. V<sub>ref</sub>(dev) = V<sub>ref</sub>(max) - V<sub>ref</sub>(min)



2. I<sub>min</sub> is given by the cathode current at V<sub>ref</sub> = V<sub>ref</sub>(I<sub>K</sub>=10mA) - 15 mV.

## MPAK-5V (5 pin), MPAKV (3 pin) and UPAKV Marking Patterns

The marking patterns shown below are used on MPAK-5V, MPAKV and UPAKV products. Note that the product code and mark pattern are different. The pattern is laser-printed.



Notes: 1. Boxes (1) to (5) in the figures show the position of the letters or numerals, and are not actually marked on the package.

2. The letters (1) and (2) show the product specific mark pattern.

| Product     | (1) | (2) |
|-------------|-----|-----|
| HA17431HLP  | 4   | G   |
| HA17431HUP  | 4   | T   |
| HA17432HUP  | 4   | V   |
| HA17431HLTP | 3   | C   |
| HA17432HLTP | 3   | D   |

3. The letter (3) shows the production year code (the last digit of the year) for UPAKV products.

4. The bars (a), (b) and (c) show a production year code for MPAK-5V and MPAKV products as shown below.

After 2010 the code is repeated every 8 years.

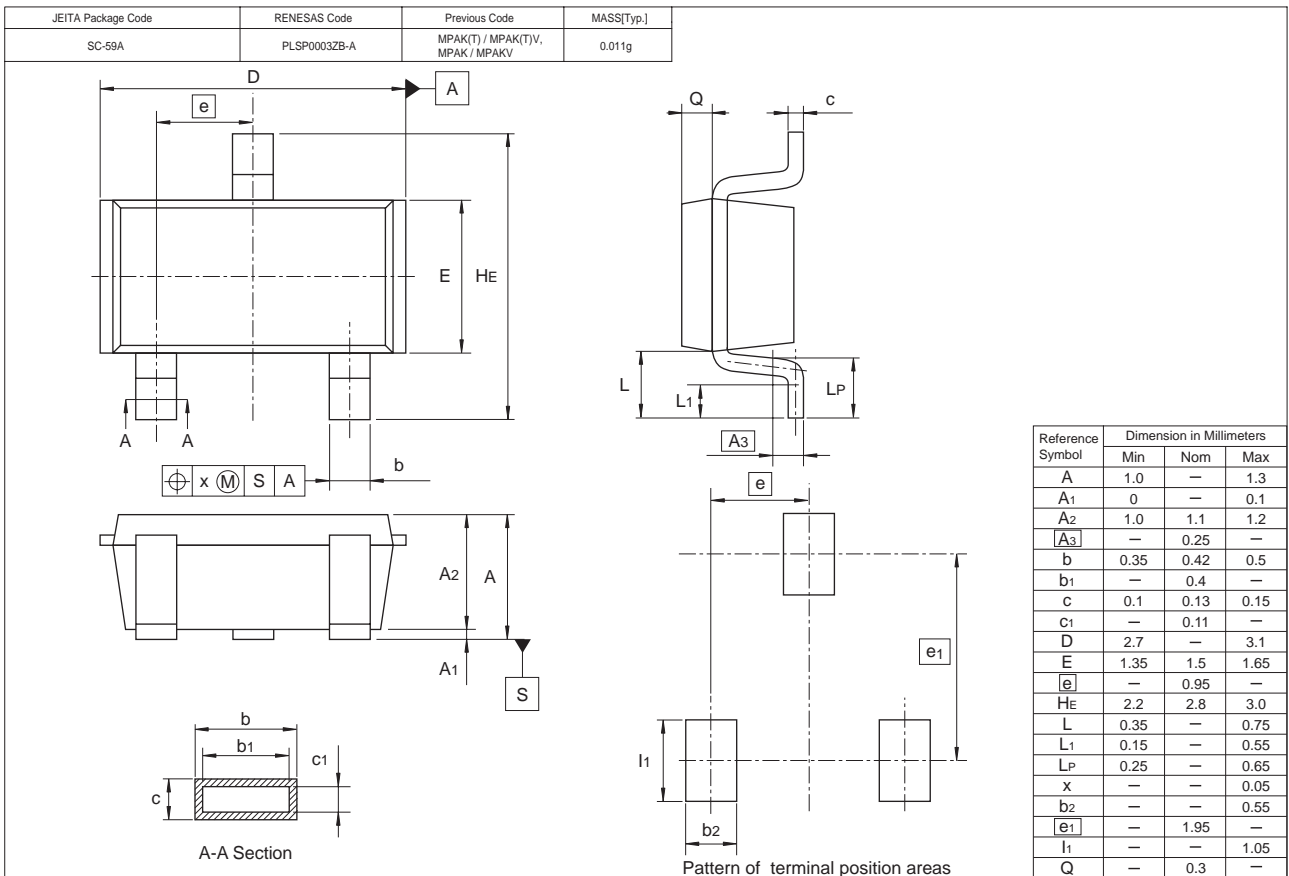
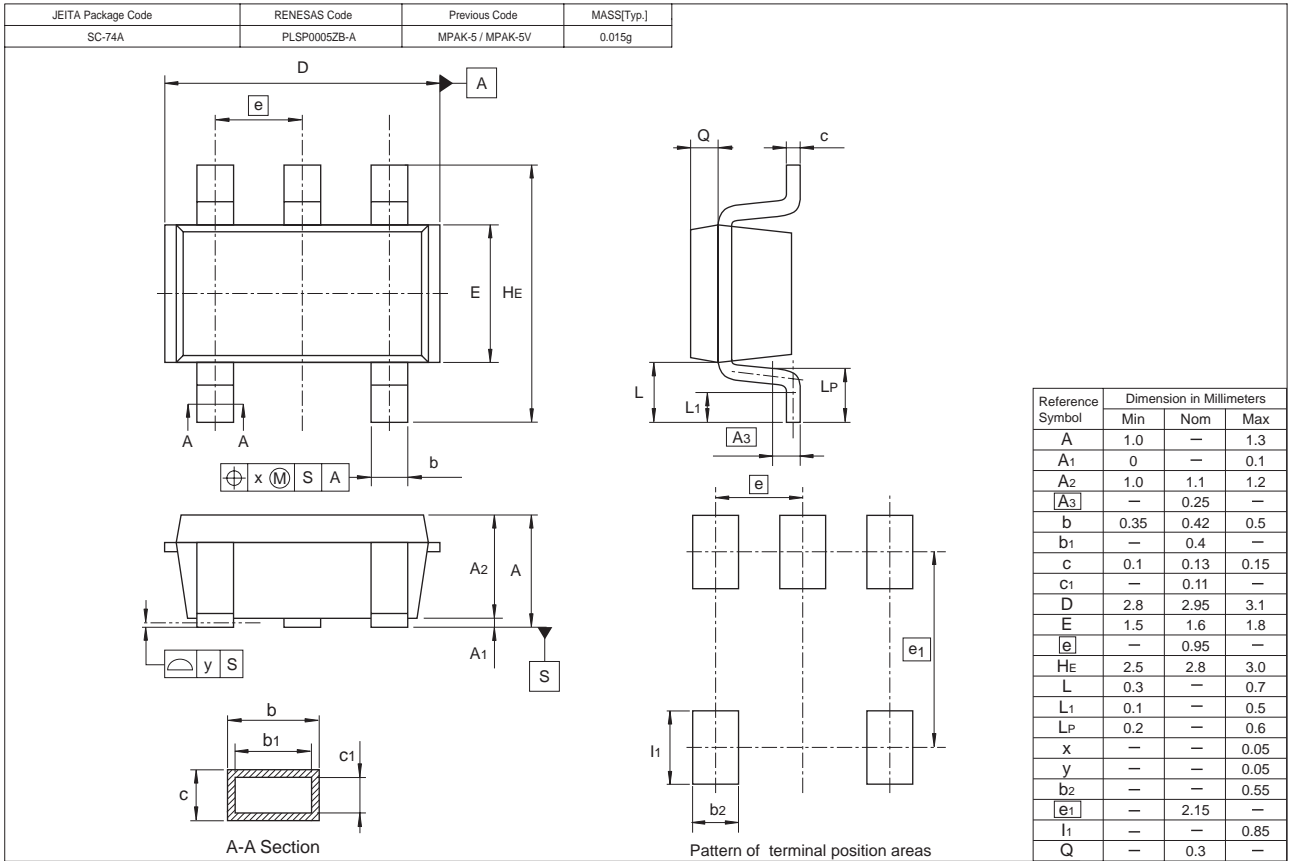
| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|
| (a)  | None | None | None | Bar  | Bar  | Bar  | Bar  | None |
| (b)  | None | Bar  | Bar  | None | None | Bar  | Bar  | None |
| (c)  | Bar  | None | Bar  | None | Bar  | None | Bar  | None |

5. The letter (4) shows the production month code (see table below).

| Production month | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Marked code      | A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M    |

6. The letter (5) shows manufacturing code. For UPAKV products.

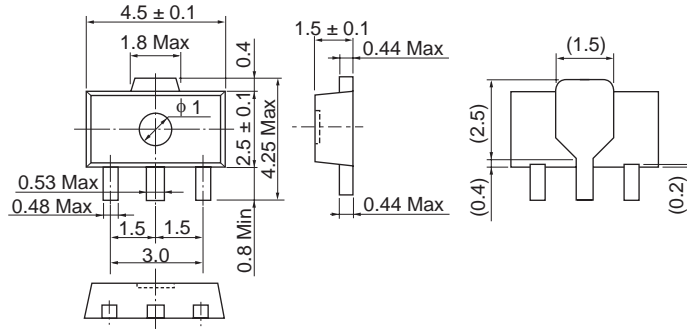
Package Dimensions



# HA17431H Series

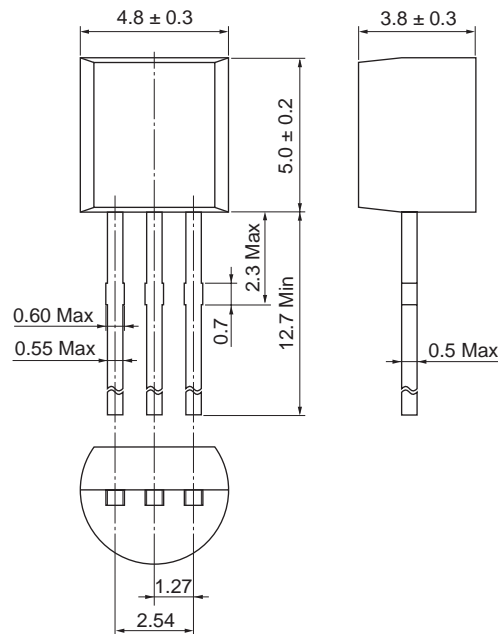
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------------|--------------|---------------|------------|
| SC-62              | PLZZ0004CA-A | UPAK / UPAKV  | 0.050g     |

Unit: mm



| JEITA Package Code | RENESAS Code | Previous Code        | MASS[Typ.] |
|--------------------|--------------|----------------------|------------|
| SC-43A             | PRSS0003DA-A | TO-92(1) / TO-92(1)V | 0.25g      |

Unit: mm



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Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China  
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