

# HA17431H Series

## Shunt Regulator

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

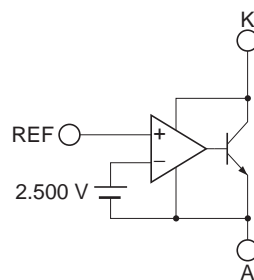
### Description

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

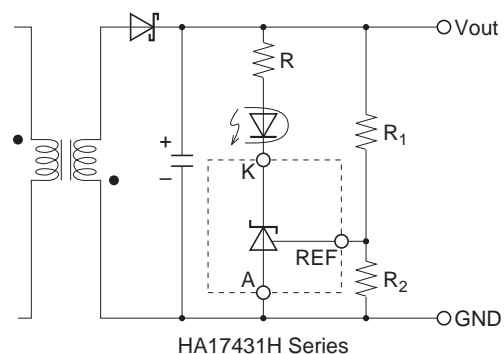
- The reference voltage provide 2.500 V  $\pm 1\%$  at  $T_a = 25^\circ\text{C}$
- The reference voltage has a low temperature coefficient
- The MPAK-5V (5 pin), MPAKV (3 pin) and UPAKV miniature packages are optimal for use on high mounting density circuit boards

### Block Diagram



### Application Circuit Example

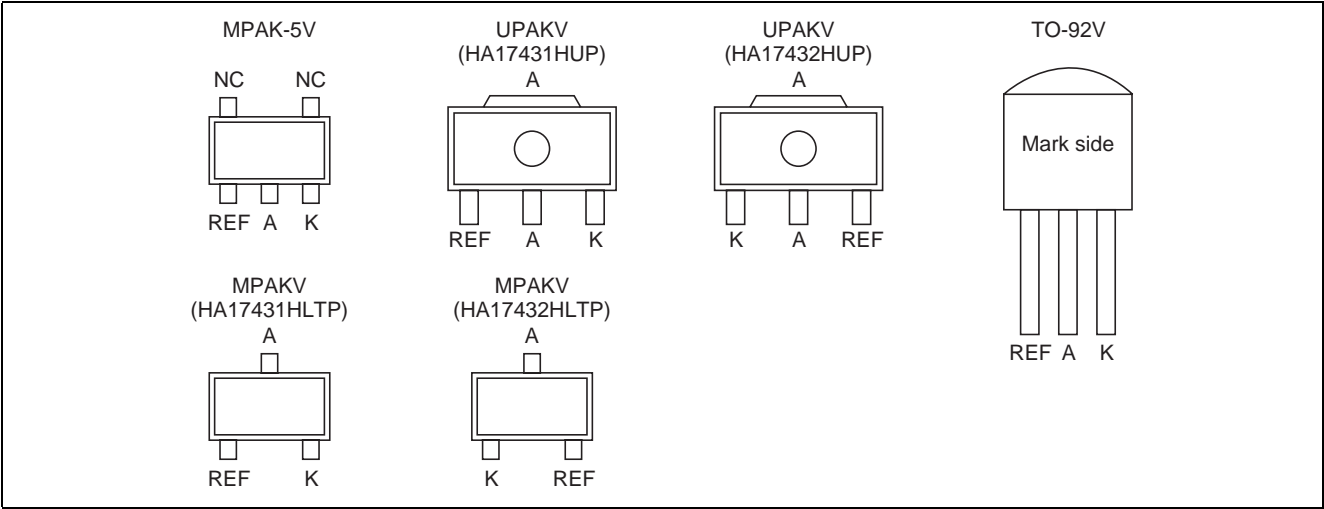
Switching power supply secondary-side error amplification circuit



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/ HA17432HUP	HA17431HLTP/ HA17432HLTP		
Cathode voltage	$V_{KA}$	36	36	36	36	V	1
Continuous cathode current	$I_K$	-50 to +50	-50 to +50	-50 to +50	-50 to +50	mA	
Reference input current	$I_{ref}$	-0.05 to +6	-0.05 to +6	-0.05 to +6	-0.05 to +6	mA	
Power dissipation	$P_T$	150 * <sup>2</sup>	500 * <sup>3</sup>	800 * <sup>4</sup>	150 * <sup>2</sup>	mW	2,3,4
Operating temperature range	$T_{opr}$	-20 to +85	-20 to +85	-20 to +85	-20 to +85	°C	
Storage temperature	$T_{stg}$	-55 to +150	-55 to +150	-55 to +150	-55 to +150	°C	

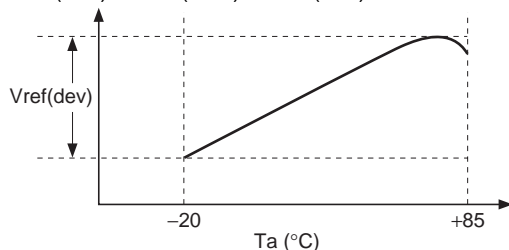
Notes: 1. Voltages are referenced to anode.

2.  $T_a \leq 25^\circ\text{C}$ . If  $T_a > 25^\circ\text{C}$ , derate by 1.2 mW/°C.3.  $T_a \leq 25^\circ\text{C}$ . If  $T_a > 25^\circ\text{C}$ , derate by 4.0 mW/°C.4. 15 mm × 25 mm × 0.7mm alumina ceramic board,  $T_a \leq 25^\circ\text{C}$ . If  $T_a > 25^\circ\text{C}$ , derate by 6.4 mW/°C.

## Electrical Characteristics

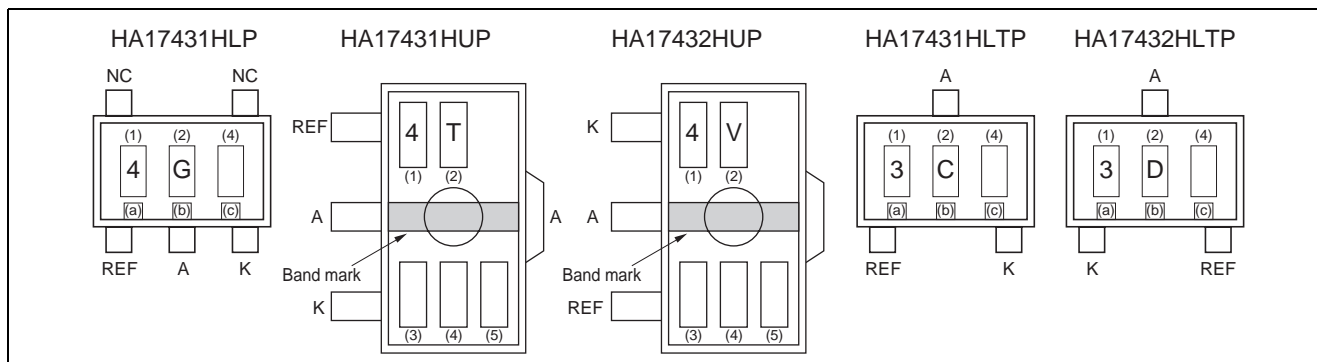
(Ta = 25°C,  $I_K = 10\text{ mA}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Notes
Reference voltage	$V_{ref}$	2.475	2.500	2.525	V	$V_{KA} = V_{ref}$	
Reference voltage temperature deviation	$V_{ref}(\text{dev})$	—	10	—	mV	$V_{KA} = V_{ref}$ , $T_a = -20^\circ\text{C}$ to $+85^\circ\text{C}$	1
Reference voltage temperature coefficient	$\Delta V_{ref}/\Delta T_a$	—	±30	—	ppm/°C	$V_{KA} = V_{ref}$ , $0^\circ\text{C}$ to $50^\circ\text{C}$ gradient	
Reference voltage regulation	$\Delta V_{ref}/\Delta V_{KA}$	—	2.0	3.7	mV/V	$V_{KA} = V_{ref}$ to 36 V	
Reference input current	$I_{ref}$	—	0.6	3	μA	$R_1 = 10\text{ k}\Omega$ , $R_2 = \infty$	
Reference current temperature deviation	$I_{ref}(\text{dev})$	—	0.5	—	μA	$R_1 = 10\text{ k}\Omega$ , $R_2 = \infty$ , $T_a = -20^\circ\text{C}$ to $+85^\circ\text{C}$	
Minimum cathode current	$I_{min}$	—	0.06	0.2	mA	$V_{KA} = V_{ref}$	2
Off state cathode current	$I_{off}$	—	0.001	1.0	μA	$V_{KA} = 36\text{ V}$ , $V_{ref} = 0\text{ V}$	
Dynamic impedance	$Z_{KA}$	—	0.2	0.5	Ω	$V_{KA} = V_{ref}$ , $I_K = 1\text{ mA}$ to $50\text{ mA}$	

Notes: 1.  $V_{ref}(\text{dev}) = V_{ref}(\text{max}) - V_{ref}(\text{min})$ 2.  $I_{min}$  is given by the cathode current at  $V_{ref} = V_{ref}(I_K=10\text{mA}) - 15\text{ mV}$ .

## 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.

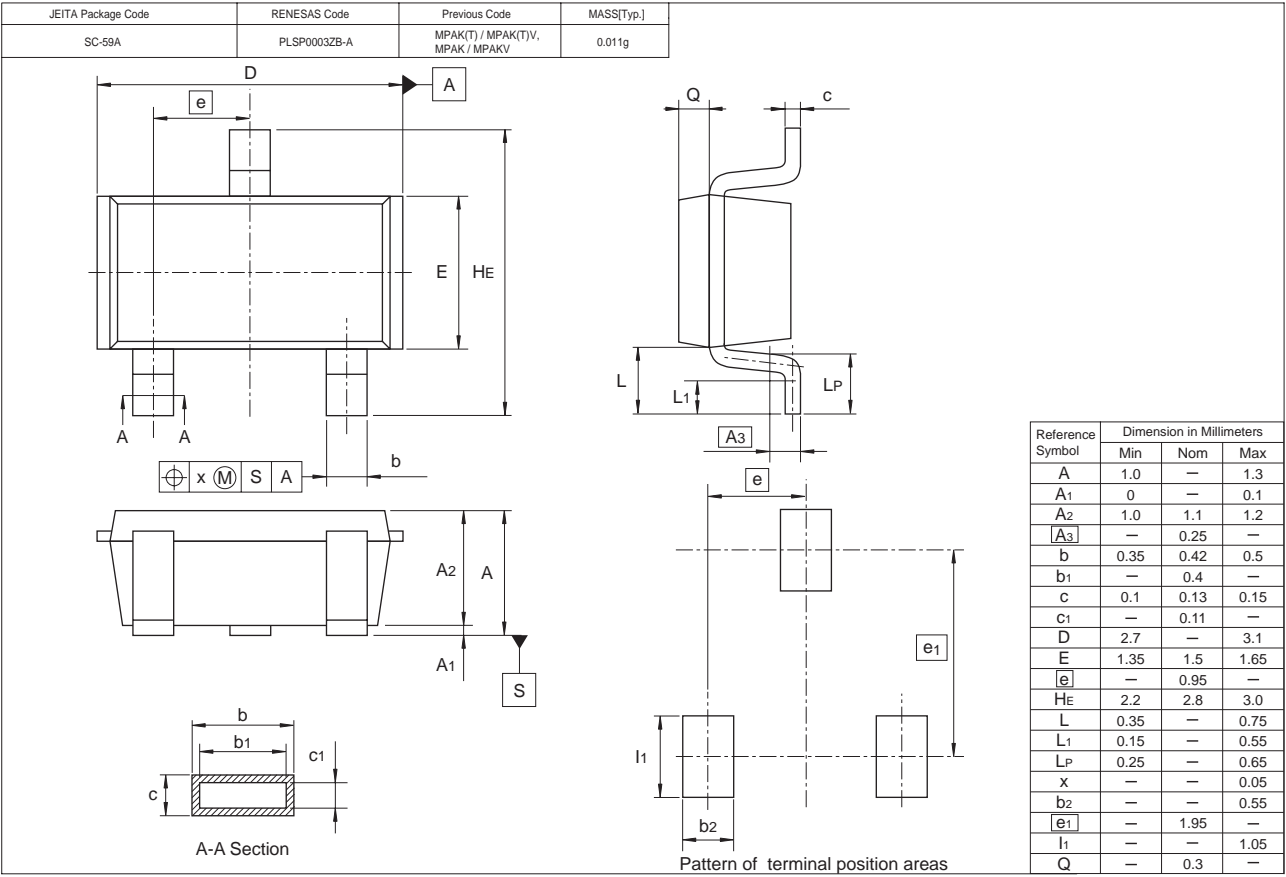
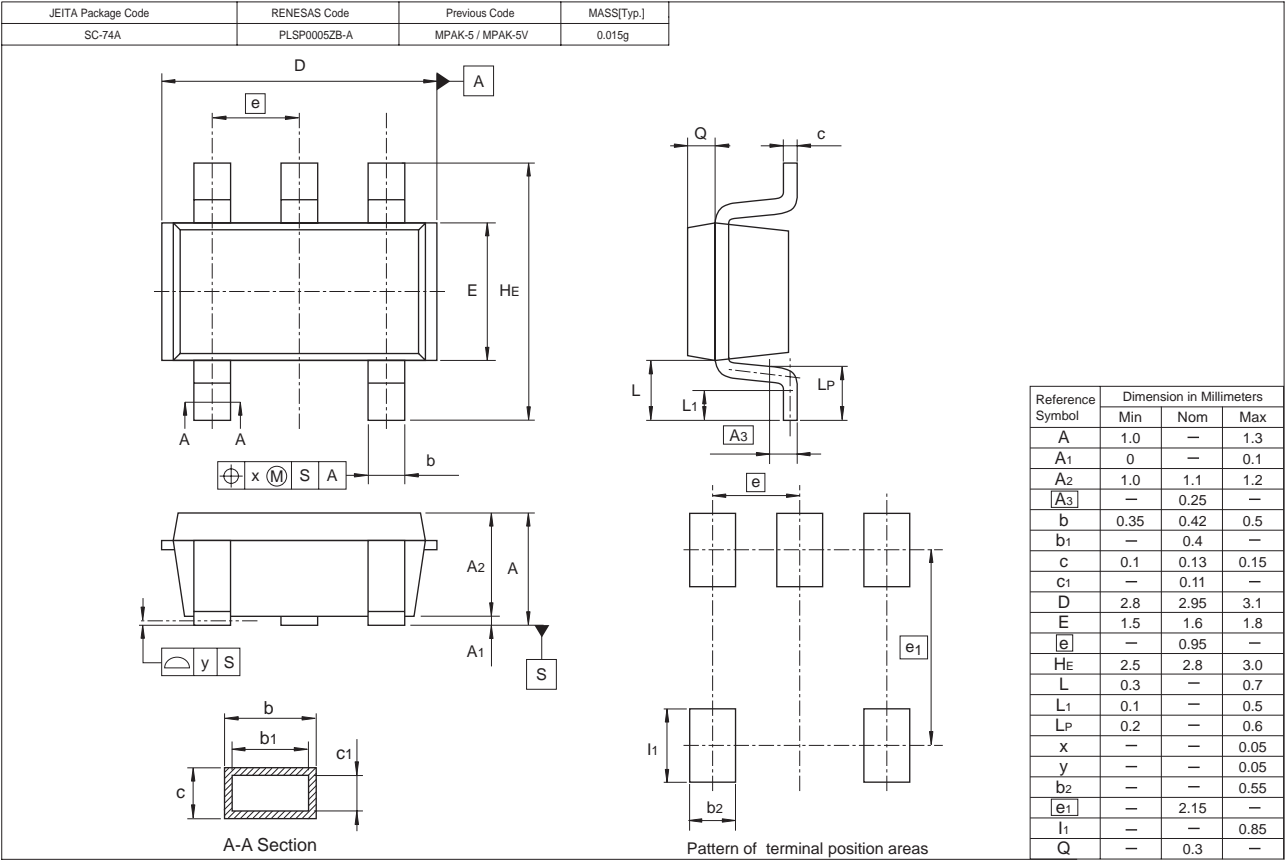
Year	2002	2003	2004	2005	2006	2007	2008	2009
(a)	None	None	None	Bar	Bar	Bar	Bar	None
(b)	None	Bar	Bar	None	None	Bar	Bar	None
(c)	Bar	None	Bar	None	Bar	None	Bar	None

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

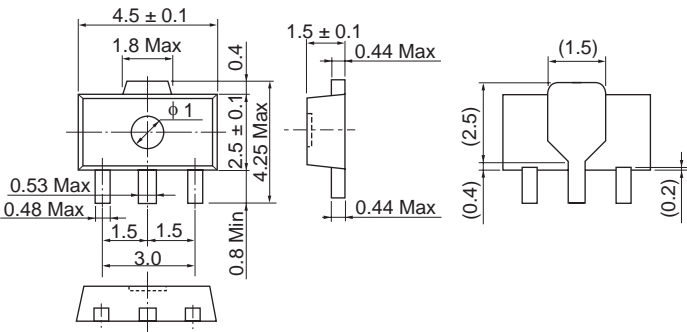
6. The letter (5) shows manufacturing code. For UPAKV products.

Package Dimensions



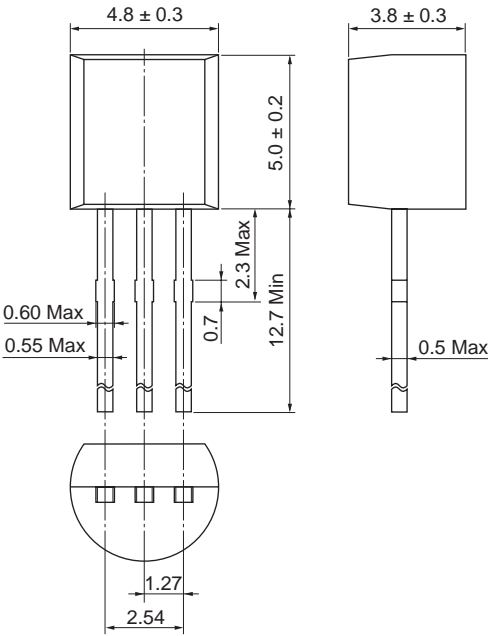
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
SC-62	PLZZ0004CA-A	UPAK / UPAKV	0.050g

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



## Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.  
Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.  
The information described here may contain technical inaccuracies or typographical errors.  
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.  
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.  
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



### RENESAS SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/en/network>" for the latest and detailed information.

#### **Renesas Technology America, Inc.**

450 Holger Way, San Jose, CA 95134-1368, U.S.A  
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

#### **Renesas Technology Europe Limited**

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

#### **Renesas Technology Hong Kong Ltd.**

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong  
Tel: <852> 2265-6688, Fax: <852> 2730-6071

#### **Renesas Technology Taiwan Co., Ltd.**

10th Floor, No.99, Fushing North Road, Taipei, Taiwan  
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

#### **Renesas Technology (Shanghai) Co., Ltd.**

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China  
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

#### **Renesas Technology Singapore Pte. Ltd.**

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632  
Tel: <65> 6213-0200, Fax: <65> 6278-8001