HA17L431/HA17L431A Series

Shunt Regulator

R03DS0089EJ0700
Rev.7.00
Jan 10, 2014

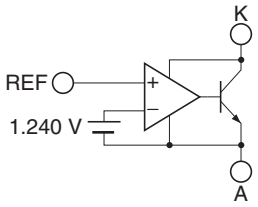
Description

The HA17L431 series and the HA17L431A series are temperature-compensated variable shunt regulators. These ICs can operate at about half voltage in comparison with HA17431 series. They can be replaced for simple Zener diode and they can also be used for switching power supply secondary-side error amplification circuit.

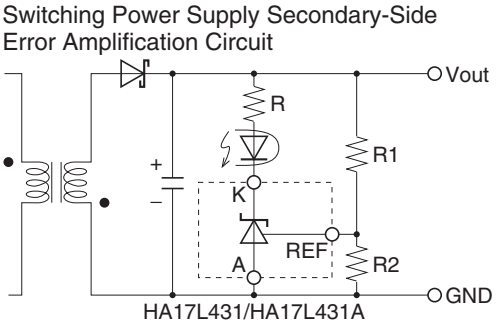
Features

- On-chip high-precision reference voltage source : 1.240 V ± 1.0% at Ta = 25°C (HA17L431A)
  : 1.240 V ± 1.5% at Ta = 25°C (HA17L431)
- Small reference voltage temperature coefficient: 30 ppm/°C Typ
- Maximum cathode voltage: 16 V
- Maximum cathode current: 50 mA
- Minimum cathode current: 200 µA Typ
- Operating temperature range: –20 to +85°C

Block Diagram



Application Circuit Example

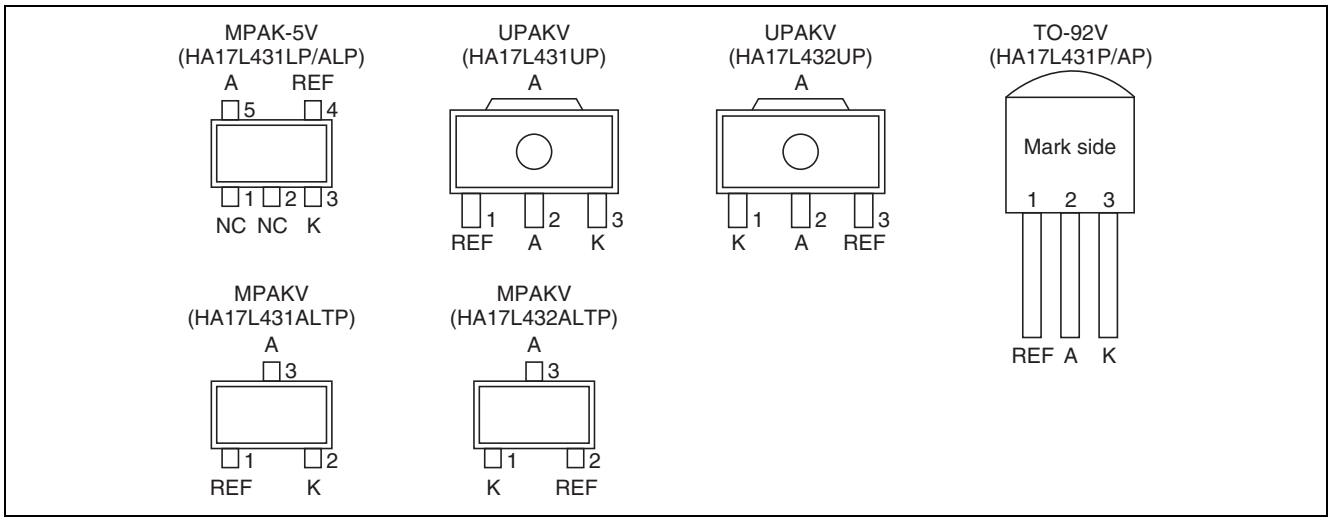


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Product Lineup

Item		Reference voltage (at 25°C)		Package Code (Previous Code)	Operating Temperature Range
		Normal Version ±1.5% 1.222V to 1.258V to 1.240V	A Version ±1.0% 1.227V to 1.253V to 1.240V		
Industrial use	HA17L431LP	O		PLSP0005ZB-A (MPAK-5V)	–20 to +85°C
	HA17L431ALP		O		
	HA17L431P	O		PRSS0003DA-A (TO-92V)	
	HA17L431AP		O		
	HA17L431UP	O		PLZZ0004CA-A (UPAKV)	
	HA17L432UP	O			
	HA17L431ALTP		O	PLSP0003ZB-A (MPAKV)	
	HA17L432ALTP		O		

Pin Arrangement



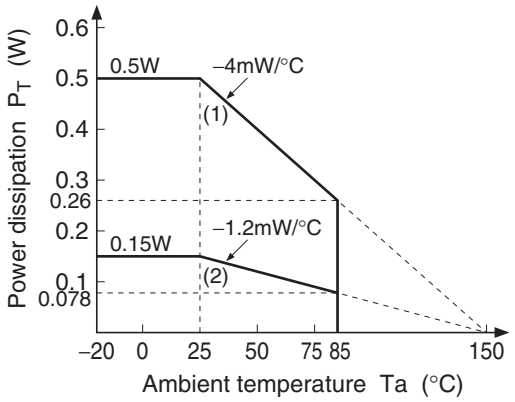
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Absolute Maximum Ratings

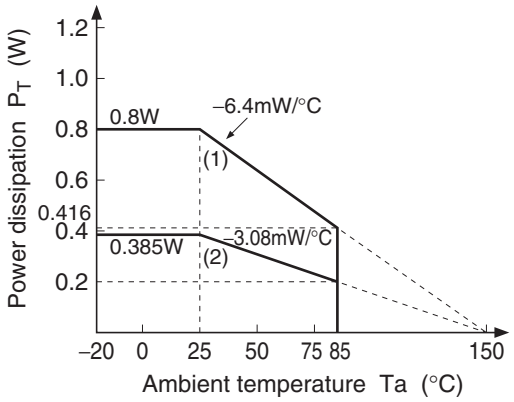
(Ta = 25°C)

Item	Symbol	Rated Value				Unit	Note
		HA17L431LP/ HA17L431ALP	HA17L431P/ HA17L431AP	HA17L431UP/ HA17L432UP	HA17L431ALTP/ HA17L432ALTP		
Cathode voltage	V_{KA}	16	16	16	16	V	1
Continuous cathode current	I_K	–30 to +50	–30 to +50	–30 to +50	–30 to +50	mA	
Reference input current	Iref	–0.05 to +5	–0.05 to +5	–0.05 to +5	–0.05 to +5	mA	
Power dissipation	P_T	150	500	800	150	mW	2
Operating temperature	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. The anode pin is used as the reference for voltage values.
2. These values apply when Ta ≤ 25°C. If Ta ≥ 25°C, derate by below figure.



(1): HA17L431P/AP
(2): HA17L431LP/ALP/ALTP/432ALTP



HA17L431UP/432UP
(1): With 15mm × 25mm × 0.7mm alumina ceramic board
(2): Without printed circuit board

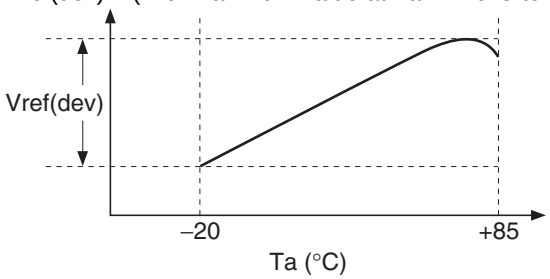
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Electrical Characteristics

($Ta = 25°C$, $I_K = 10$ mA)

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Remark
Reference voltage	Vref	1.222	1.240	1.258	V	V_{KA} = Vref	HA17L431
		1.227	1.240	1.253			HA17L431A
Reference voltage deviation	Vref(dev)	—	5	—	mV	V_{KA} = Vref, Ta = –20°C to +85°C	*1
Reference voltage temperature coefficient	ΔVref/ΔTa	—	±30	—	ppm/°C	V_{KA} = Vref, 0°C to 50°C gradient	
Reference voltage regulation	$\Delta Vref/\Delta V_{KA}$	—	1.0	2.0	mV/V	V_{KA} = Vref to 16V	
Reference input current	Iref	—	2	6	μA	R1 = 10 kΩ, R2 = ∞	
Reference current temperature deviation	Iref(dev)	—	0.5	—	μA	R1 = 10 kΩ, R2 = ∞, Ta = –20°C to +85°C	
Minimum cathode current	Imin	—	0.2	1.0	mA	V_{KA} = Vref	*2
Off cathode current	Ioff	—	0.001	1.0	μA	V_{KA} = 16 V, Vref = 0 V	
Dynamic impedance	Z_{KA}	—	0.2	0.5	Ω	V_{KA} = Vref, I_K = 1 mA to 50 mA	

Notes: 1. Vref(dev) = (Vref maximum value at Ta = –20°C to +85°C) – (Vref minimum value at Ta = –20°C to +85°C)

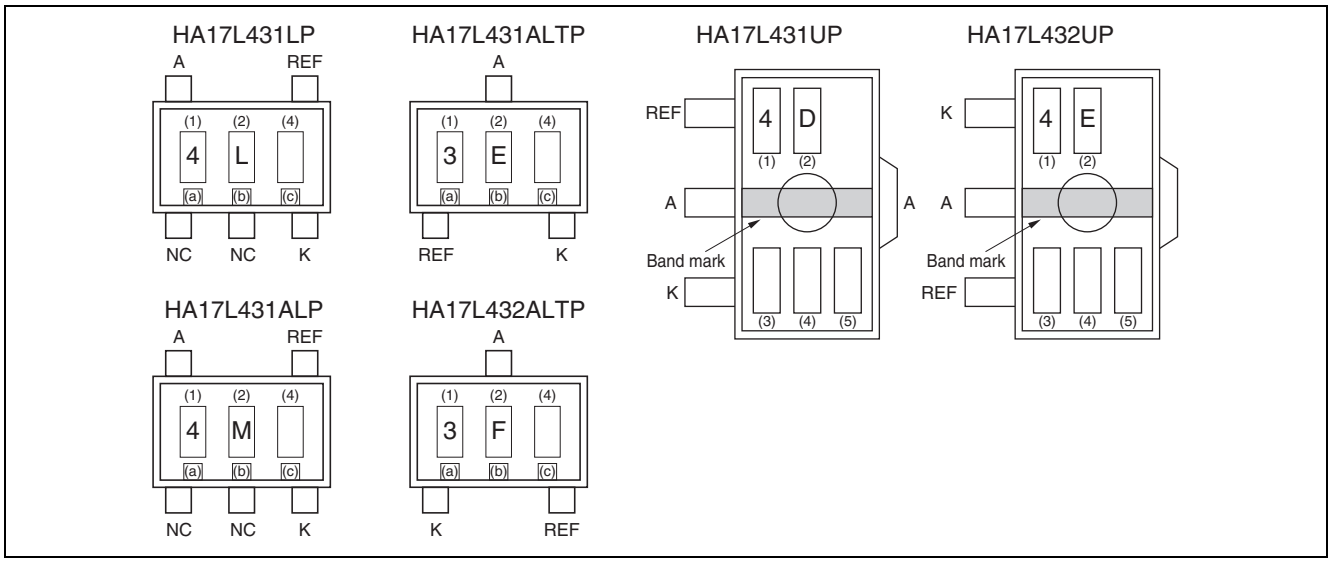


2. Definition of minimum cathode current.
   Imin is the cathode current value at which Vref = $Vref_{(Ik = 10\ mA)}$ – 15 mV.

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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)
HA17L431LP	4	L
HA17L431ALP	4	M
HA17L431ALTP	3	E
HA17L432ALTP	3	F
HA17L431UP	4	D
HA17L432UP	4	E

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

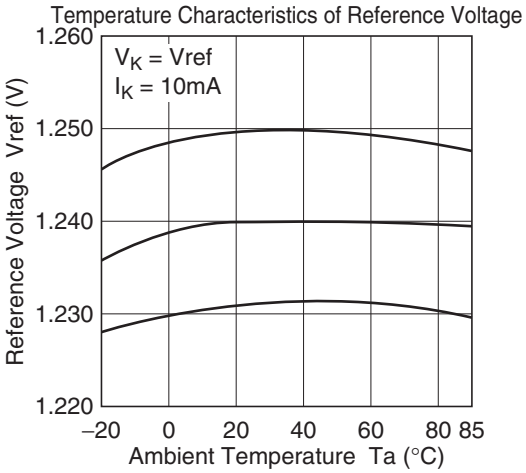
5. The letter (4) shows the production month code (see table below).

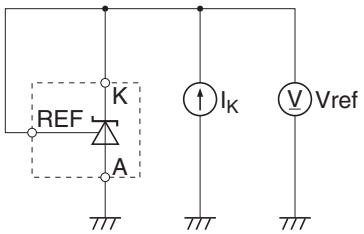
Production month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Marked code	A	B	C	D	E	F	G	H	J	K	L	M

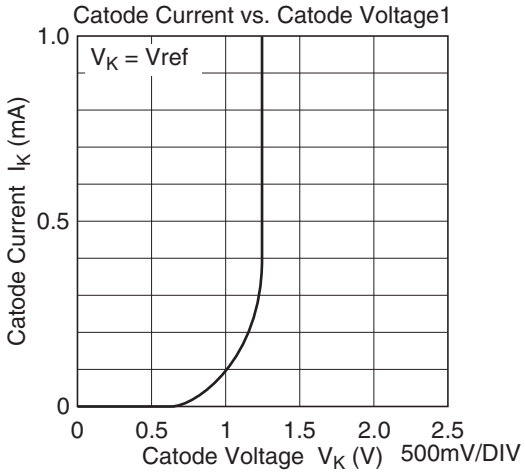
6. The letter (5) shows manufacturing code. For UPAKV products.

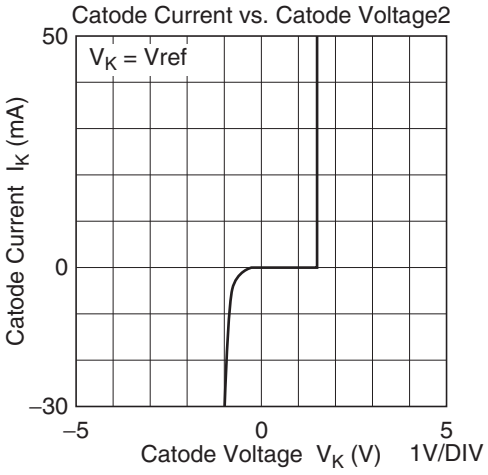
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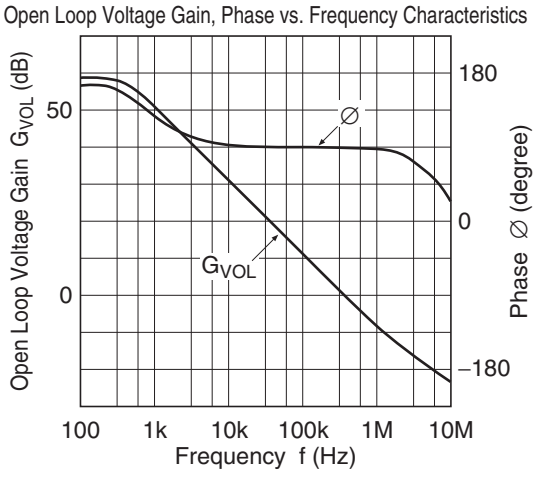
Characteristic Curves

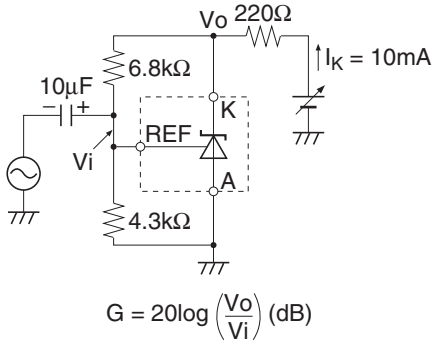












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Noise Recovery Characteristics of HA17L431A and HA17L431

The HA17L431A bettered V_{KA} and Vref recovery time against the HA17L431 when it was inputted noise.

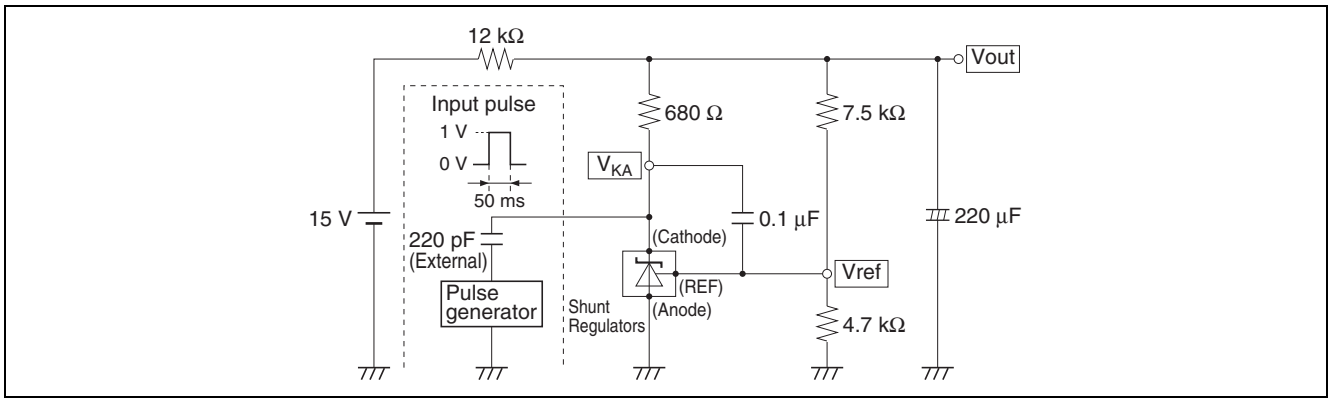


Figure 1 Noise Response Characteristics Measurement Circuit

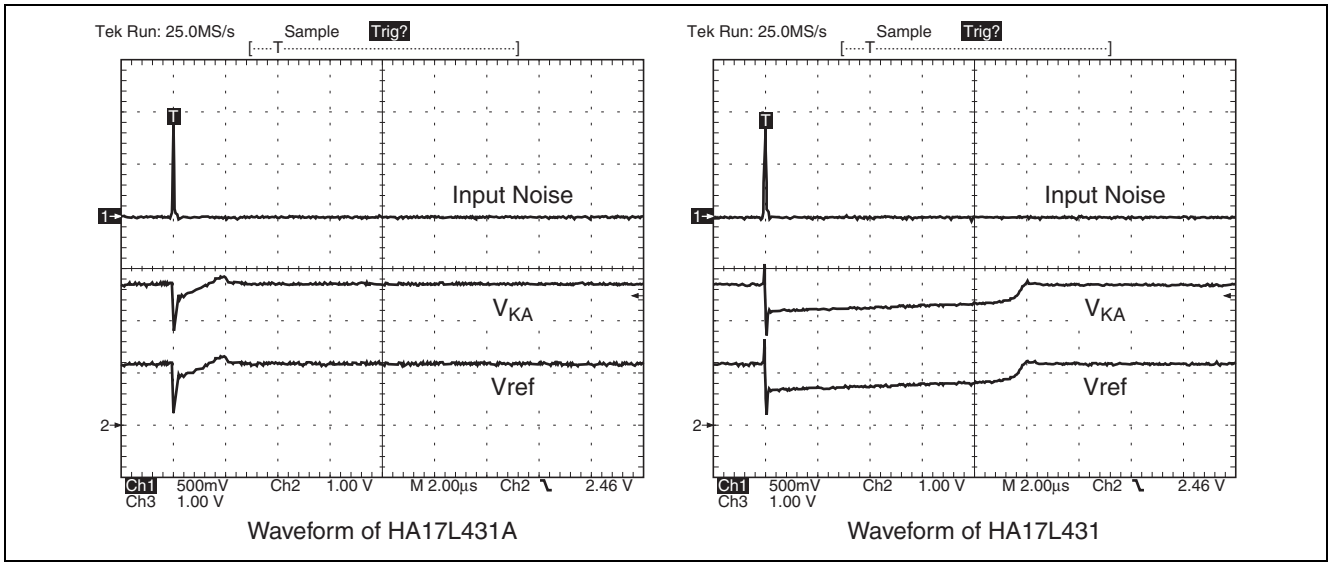
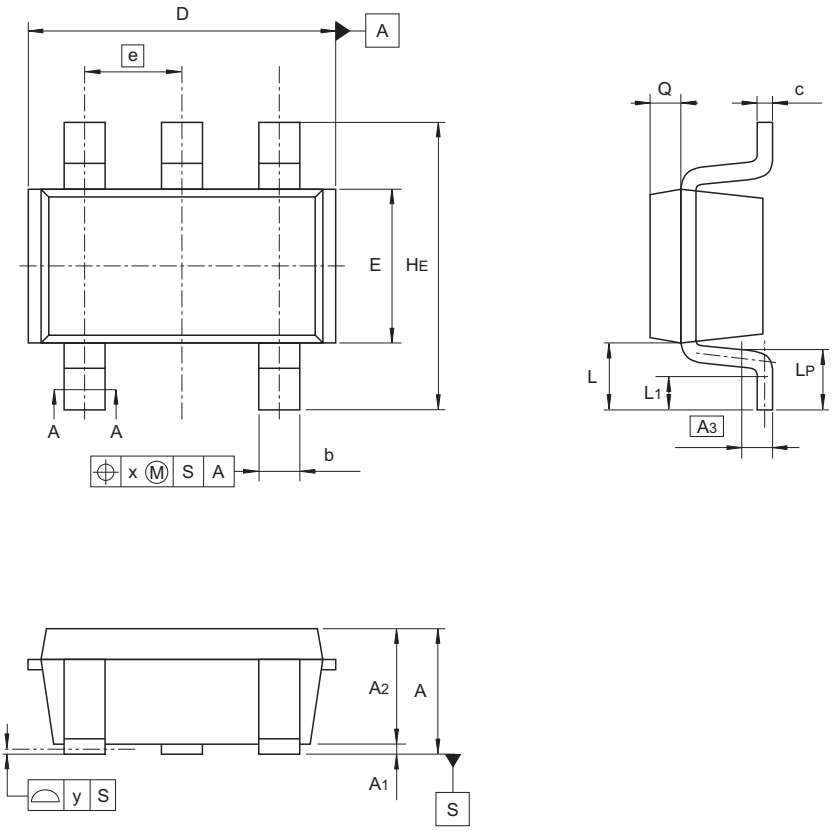


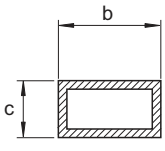
Figure 2 Noise Recovery Characteristics

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Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
SC-74A	PLSP0005ZB-A	MPAK-5 / MPAK-5V	0.015





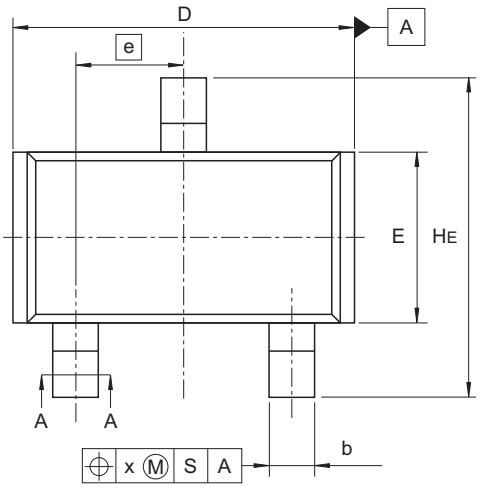
A-A Section

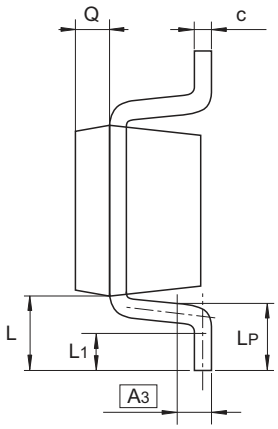
Reference Symbol	Dimensions in millimeters		
	Min	Nom	Max
A	1.0	—	1.4
A_1	0	—	0.1
A_2	1.0	1.1	1.3
$\boxed{A_3}$	—	0.25	—
b	0.35	0.4	0.5
c	0.11	0.16	0.26
D	2.8	2.95	3.1
E	1.5	1.6	1.8
$\boxed{e}$	—	0.95	—
H_E	2.5	2.8	3.0
L	0.3	—	0.7
L_1	0.1	—	0.5
L_P	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
Q	—	0.3	—

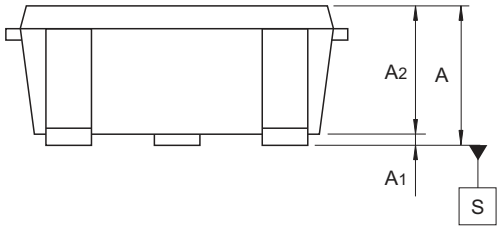
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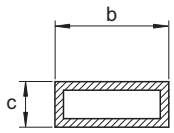
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JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
SC-59A	PLSP0003ZB-A	MPAK(T) / MPAK(T)V	0.011









A-A Section

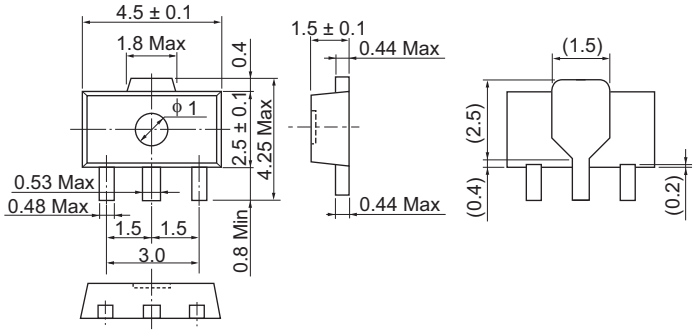
Reference Symbol	Dimensions in millimeters		
	Min	Nom	Max
A	1.0	—	1.3
A_1	0	—	0.1
A_2	1.0	1.1	1.2
A_3	—	0.25	—
b	0.35	0.4	0.5
c	0.1	0.16	0.26
D	2.7	—	3.1
E	1.35	1.5	1.65
e	—	0.95	—
H_E	2.2	2.8	3.0
L	0.35	—	0.75
L_1	0.15	—	0.55
L_P	0.25	—	0.65
x	—	—	0.05
Q	—	0.3	—

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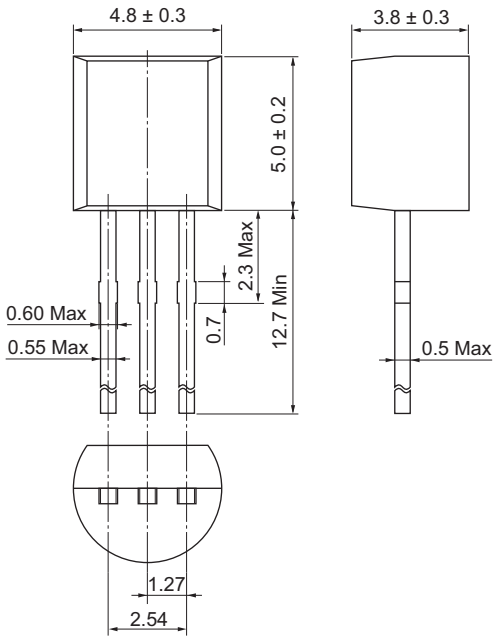
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
SC-62	PLZZ0004CA-A	UPAK / UPAKV	0.050g

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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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 LanGao Rd., Putuo District, Shanghai, China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

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Renesas Electronics Korea Co., Ltd.
12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
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