

# HA17393B Series

## Dual Comparators

REA03D0002-0100

Rev.1.00

Dec 25, 2006

### Description

HA17393B is dual comparators designed for general purpose, especially for power control systems. This IC operates from a single power-supply voltage over a wide range of voltages. Operation from split power supply current is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators have the merit which ground is included in the common-mode input voltage range at a single-voltage power supply operation.

### Features

- Wide range of supply voltage  
Single supply: 2 V to 36 V, Dual supplies:  $\pm 1$  V to  $\pm 18$  V
- Very low supply current: 0.6 mA
- Small input bias current: 25 nA
- Small input offset voltage: 2 mV
- Common mode input voltage range includes ground.
- Low output saturation voltage: 200 mV at 4 mA
- Open collector output
- Package outline available in Pb free lead frame:  
DP-8  
SOP-8 (JEITA)  
SOP-8 (JEDEC)

### Applications

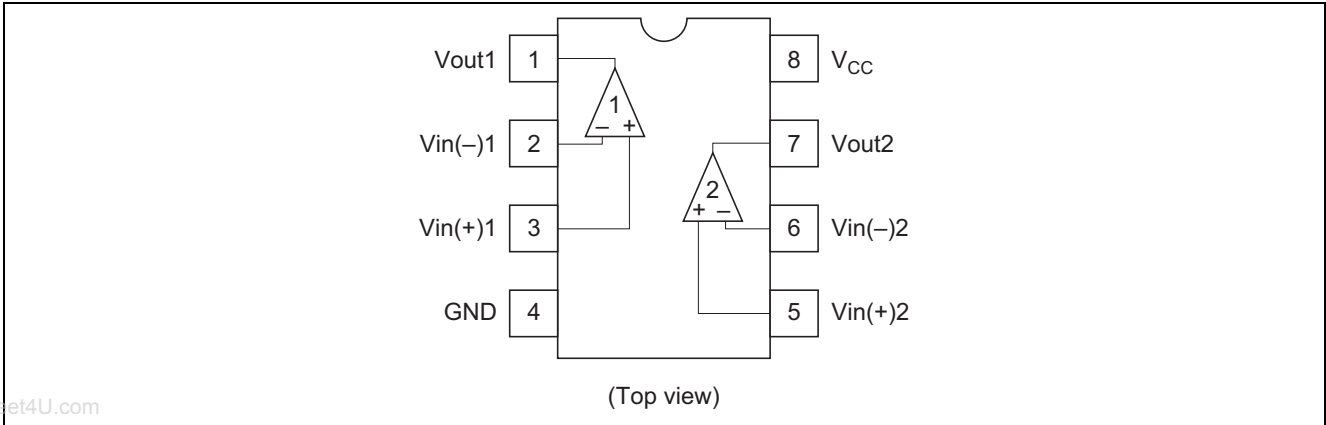
- Battery charger
- Cordless telephone
- Switching power supply
- DC/DC module
- PC motherboard
- Communication equipment

### Ordering Information

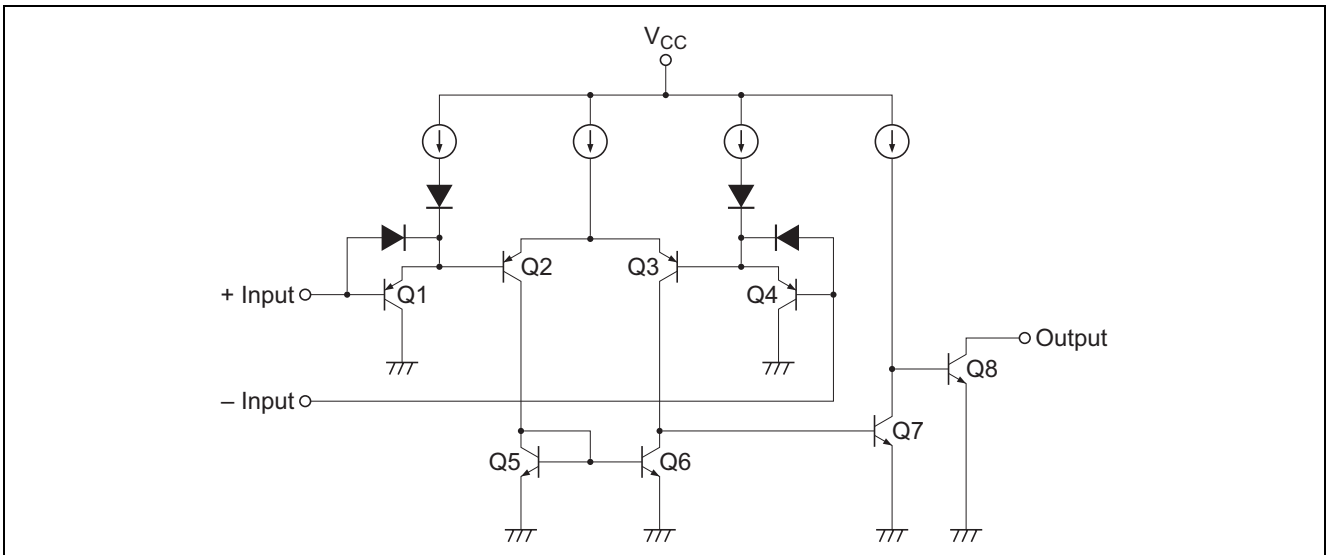
Type No.	Application	Package Code (Package Name)
HA17393B	Commercial use	PRDP0008AF-B (DP-8FV)
HA17393BF		PRSP0008DE-B (FP-8DGV)
HA17393BRP		PRSP0008DD-C (FP-8DCV)

Note: This product is designed for consumer use and not for automotive.

### Pin Arrangement



### Circuit Schematic (1/2)



## Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings			Unit
		HA17393B	HA17393BF	HA17393BRP	
Supply Voltage	V <sub>CC</sub>	36	36	36	V
Differential input voltage	V <sub>IN</sub> (diff)	V <sub>CC</sub>	V <sub>CC</sub>	V <sub>CC</sub>	V
Input voltage	V <sub>IN</sub>	-0.3 to V <sub>CC</sub>	-0.3 to V <sub>CC</sub>	-0.3 to V <sub>CC</sub>	V
Input current (V <sub>IN</sub> < -0.3 V)	I <sub>IN</sub>	50	50	50	mA
Power dissipation	P <sub>T</sub>	570 * <sup>1</sup>	385 * <sup>2</sup>	385 * <sup>2</sup>	mW
Output short-circuit to ground		Continuous	Continuous	Continuous	
Operating temperature	T <sub>opr</sub>	-40 to +85	-40 to +85	-40 to +85	°C
Storage temperature	T <sub>stg</sub>	-55 to +125	-55 to +125	-55 to +125	°C

Notes: 1. This is the allowable value up to Ta = 55°C. Derate by 8.3 mW/°C above that temperature.

2. These are the allowable values up to Ta = 25°C mounting in air. When it is mounted on glass epoxy board of 40 mm × 40 mm × 1.5 mm (t) with 30% wiring density, the allowable value is 570 mW up to Ta = 45°C. If Ta > 45°C, derate by 7.14 mW/°C.

## Electrical Characteristics

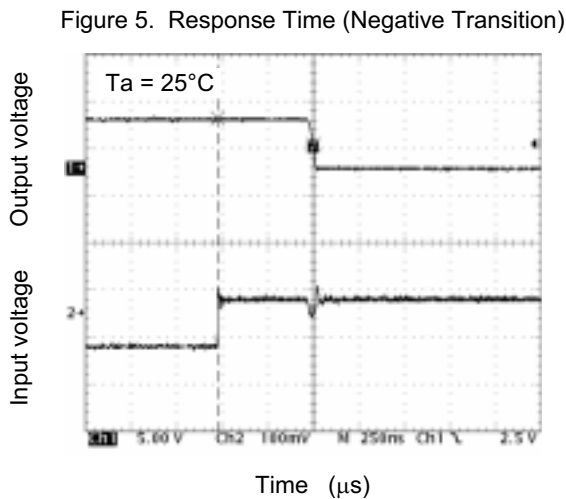
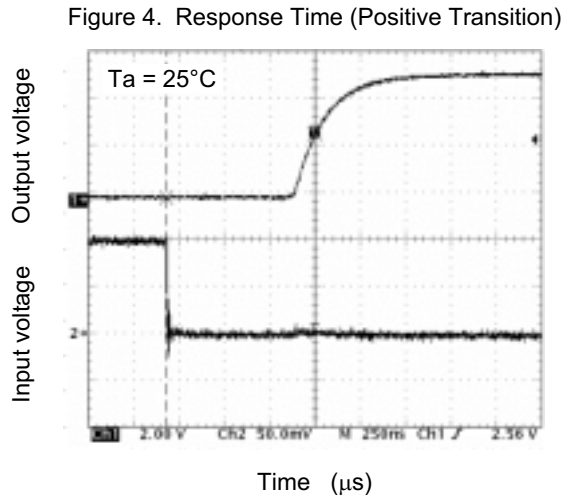
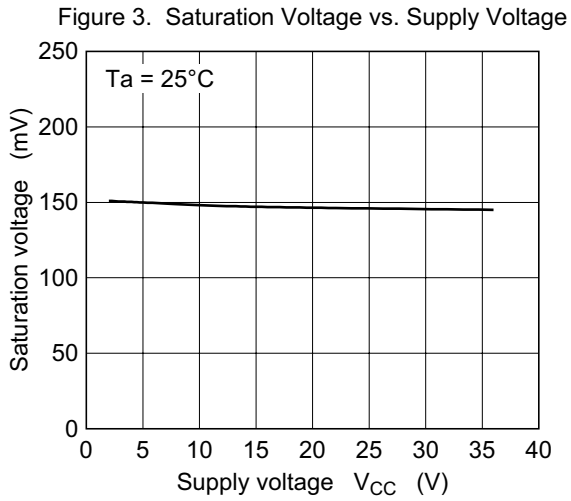
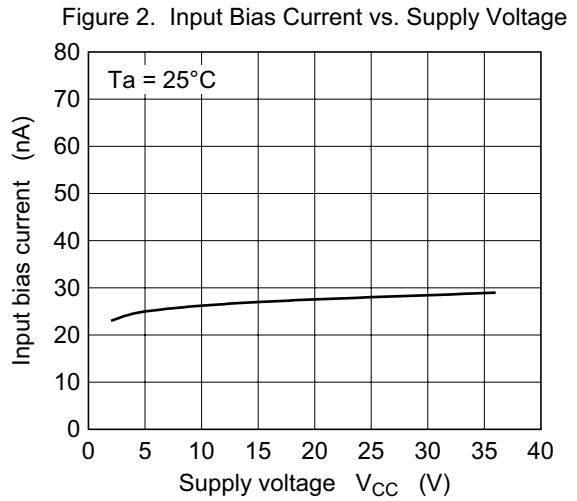
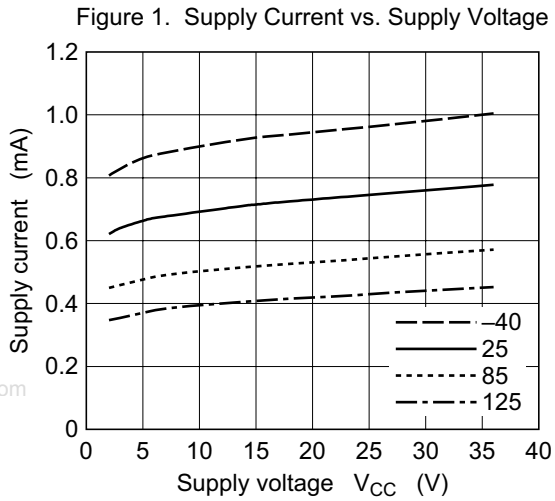
(Ta = 25°C, V<sub>CC</sub> = +5 V, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V <sub>IO</sub>	—	2	5	mV	V <sub>O</sub> = 1.4 V, R <sub>S</sub> = 0 Ω V <sub>CC</sub> = 5 V to 30 V
Input offset current	I <sub>IO</sub>	—	5	50	nA	V <sub>CM</sub> = 0 V
Input bias current	I <sub>IB</sub>	—	25	250	nA	V <sub>CM</sub> = 0 V, I <sub>IN(+)</sub> or I <sub>IN(-)</sub> with output in linear range
Voltage gain	A <sub>V</sub>	—	200	—	dB	V <sub>CC</sub> = 15 V, R <sub>L</sub> ≥ 15 kΩ, V <sub>O</sub> = 1 V to 11 V
Common mode input voltage range	V <sub>IR</sub>	0	—	V <sub>CC</sub> -1.5	V	V <sub>CC</sub> = 30 V
Supply current	I <sub>CC</sub>	—	0.6	1.0	mA	V <sub>CC</sub> = 5 V, R <sub>L</sub> = ∞
		—	0.8	1.7	mA	V <sub>CC</sub> = 36 V, R <sub>L</sub> = ∞
Response time	t <sub>R</sub>	—	1.3	—	μs	V <sub>RL</sub> = 5 V, R <sub>L</sub> = 5.1 kΩ
Large signal response time	t <sub>RL</sub>	—	200	—	ns	V <sub>IN</sub> = TTL logic swing, V <sub>REF</sub> = 1.4 V, V <sub>RL</sub> = 5 V, R <sub>L</sub> = 5.1 kΩ
Output sink current	I <sub>OSINK</sub>	6	16	—	mA	V <sub>IN(-)</sub> = 1 V, V <sub>IN(+)</sub> = 0 V, V <sub>O</sub> = 1.5 V
Output saturation voltage	V <sub>O(SAT)</sub>	—	200	400	mV	V <sub>IN(-)</sub> = 1 V, V <sub>IN(+)</sub> = 0 V, I <sub>OSINK</sub> ≤ 4 mA
Output leakage current	I <sub>LO</sub>	—	0.1	—	nA	V <sub>IN(-)</sub> = 0 V, V <sub>IN(+)</sub> = 1 V, V <sub>O</sub> = 5 V

## Table of Graphs

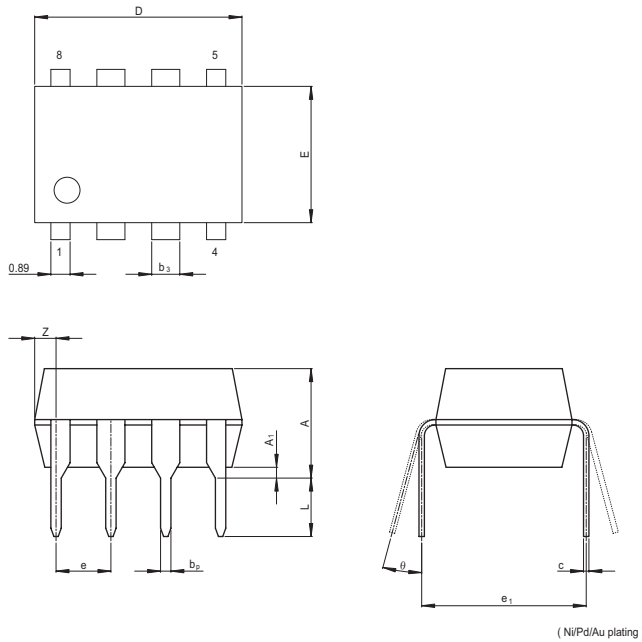
Electrical Characteristics		Figure
Supply current	vs. Supply voltage $\pm V_{CC}$	1
Input bias current	vs. Supply voltage $\pm V_{CC}$	2
Saturation voltage	vs. Supply voltage $\pm V_{CC}$	3
Response time (Positive transition)	vs. Time s	4
Response time (Negative transition)	vs. Time s	5

Typical Characteristics Curves



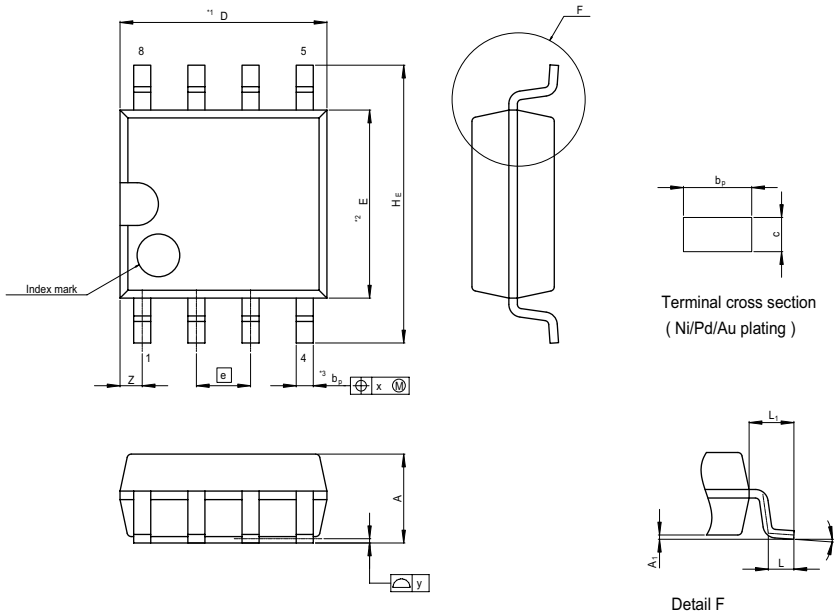
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP8-6.3x9.6-2.54	PRDP0008AF-B	DP-8FV	0.54g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e <sub>1</sub>	—	7.62	—
D	—	9.60	10.6
E	—	6.30	7.4
A	—	—	5.06
A <sub>1</sub>	0.5	—	—
b <sub>p</sub>	0.40	0.48	0.56
b <sub>3</sub>	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.27
L	2.54	—	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-B	FP-8DGV	0.1g

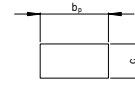
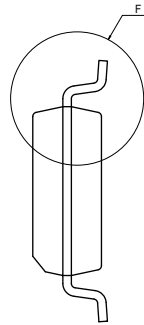
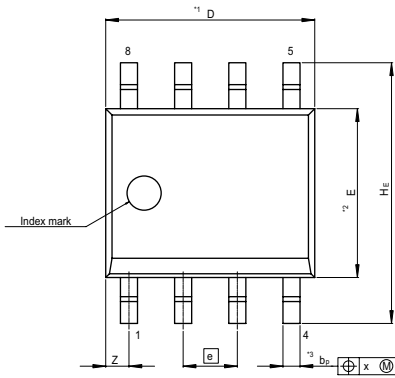


NOTE  
 1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\* DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION\*\*3\* DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.85	5.25
E	—	4.4	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.1	0.20
A	—	—	2.03
b <sub>p</sub>	0.35	0.4	0.45
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	6.35	6.5	6.75
Ⓧ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.75
L	0.42	0.60	0.85
L <sub>1</sub>	—	1.05	—

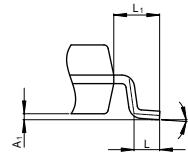
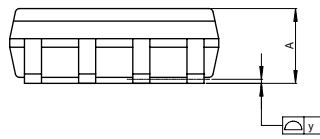
# HA17393B Series

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-3.95x4.9-1.27	PRSP0008DD-C	FP-8DCV	0.085g



Terminal cross section  
( Ni/Pd/Au plating )

NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2"  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3"DOES NOT  
INCLUDE TRIM OFFSET.



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.90	5.30
E	—	3.95	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
ⓐ	—	1.27	—
x	—	—	0.25
y	—	—	0.10
Z	—	—	0.75
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

Notes:

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