

# HA17903 Series

## Dual Comparator

REJ03D0687-0100  
(Previous: ADE-204-048)  
Rev.1.00  
Jun 15, 2005

### Description

HA17903 are comparators designed for car use and control system use.

They provide wide voltage range with single power source, and the change of supply current is small, because it is independent of the supply voltage. They can be widely applied, such as limit comparator, simple analog/digital converter, pulse/square wave/time delay generator, wide range VCO, MOS clock timer, multivibrator, high voltage logic gate, etc.

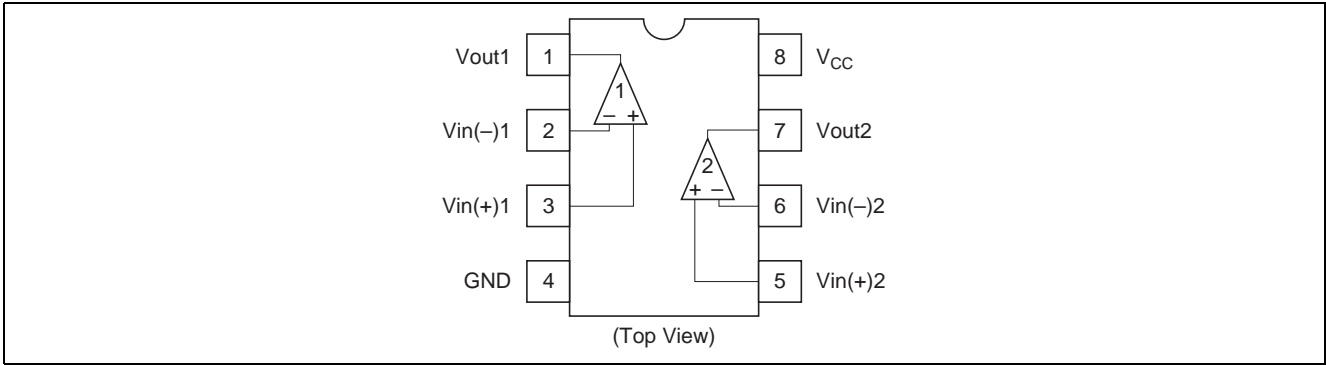
### Features

- Wide supply voltage: 2 to 36V
- Very low supply current: 0.8mA
- Small input bias: 25nA
- Small input offset current: 3nA
- Small input offset voltage: 2mV
- Common mode input voltage range including ground.
- Small output saturation voltage: 1mV (5 $\mu$ A)
- 70mV (1mA)
- Output voltage is compatible with CMOS logic system.

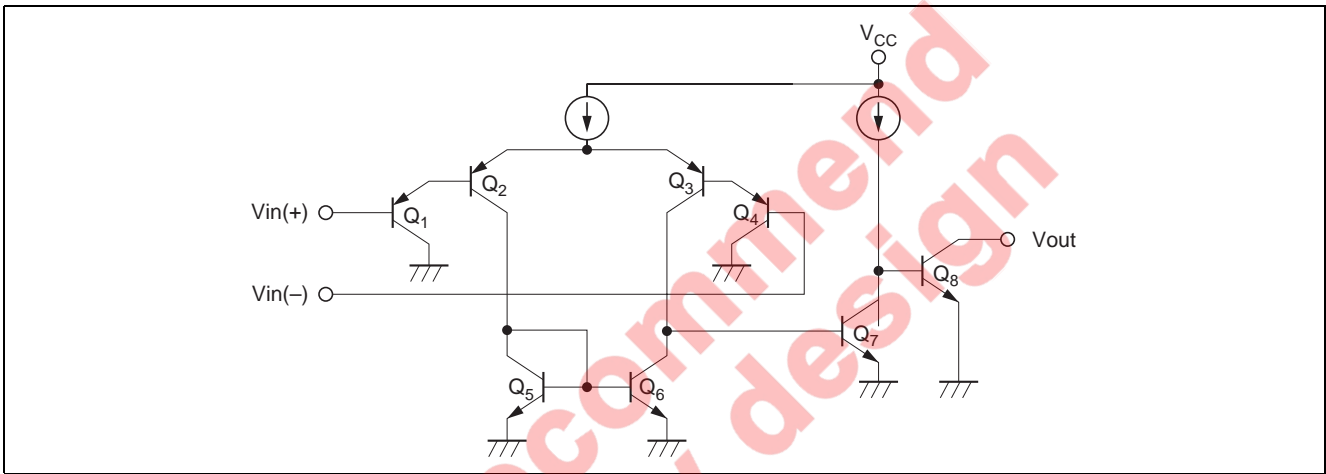
### Ordering Information

Type No.	Application	Package Code (Previous Code)
HA17903PSJ	Car use	PRDP0008AF-A (DP-8B)
HA17903FPJ		PRSP0008DE-B (FP-8DGV)
HA17903FPK		PRSP0008DE-B (FP-8DGV)

### Pin Arrangement



### Circuit Schematic (1/2)



**Absolute Maximum Ratings**

(Ta = 25°C)

Item	Symbol	Ratings			Unit
		HA17903PSJ	HA17903FPJ	HA17903FPK	
Supply voltage	V <sub>CC</sub>	36	36	36	V
Dfferential input voltage	V <sub>IN(diff)</sub>	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
Output short current	I <sub>OS</sub> *3	constant	constant	constant	
Power dissipation	P <sub>T</sub>	570*1	385*1	385*2	mW
Operating temperature	Topr	-40 to +85	-40 to +85	-40 to +125	°C
Storage temperature	Tstg	-55 to +125	-55 to +125	-55 to +150	°C

- Note:
1. These are the allowable values up to Ta = 55 °C. Derate by 8.3mW/°C above that temperature.
  2. These are the allowable values up to Ta = 45 °C mounting on 30% wiring density glass epoxy board. Derate by 7.14mW/°C above that temperature.
  3. Short circuit between the output and VCC will be a cause to destory the circuit. The maximum output current is about 20mA for any supply voltage.

**Electrical Characteristics-1**

(V<sub>CC</sub> = 5V, Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test condition
Input offset voltage*1	V <sub>IO</sub>	—	2.0	5.0	mV	
Input bias current*2	I <sub>IB</sub>	—	25	250	nA	I <sub>IN(+)</sub> or I <sub>IN(-)</sub>
Input offset current	I <sub>IO</sub>	—	3	50	nA	I <sub>IN(+)</sub> - I <sub>IN(-)</sub>
Common mode input voltage*3	V <sub>CM+</sub>	3.5	—	—	V	
	V <sub>CM-</sub>	—	—	0	V	
Supply current	I <sub>CC</sub>	—	0.8	2.0	mA	All comparators: R <sub>L</sub> = ∞, All channels on
Voltage gain	A <sub>VD</sub>	—	200	—	V/mV	V <sub>CC</sub> = 15V, R <sub>L</sub> ≥ 15kΩ
Response time*4	t <sub>R</sub>	—	1.3	—	μs	V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1kΩ
Large signal response time	t <sub>RI</sub>	—	300	—	ns	V <sub>IN</sub> = TTL Threshold width, V <sub>REF</sub> = 1.4V
Out put sink current	I <sub>OSINK</sub>	6	16	—	mA	V <sub>IN(-)</sub> ≥ 1V, V <sub>IN(+)</sub> = 0, V <sub>O</sub> ≤ 1.5V
Output saturation voltage	V <sub>O(sat)</sub>	—	—	400	mA	V <sub>IN(-)</sub> ≥ 1V, V <sub>IN(+)</sub> = 0, I <sub>OSINK</sub> = 4mA
Output leak current	I <sub>LO</sub>	—	0.1	—	nA	V <sub>IN(-)</sub> = 0, V <sub>IN(+)</sub> ≥ 1V, V <sub>O</sub> = 5V

- Notes:
1. V<sub>REF</sub> = 1.4V and R<sub>S</sub> = 50Ω, when V<sub>O</sub> = 1.4V at output switching point.
  2. Under linear operation.
  3. Common mode input voltage or each one of the input signal should not be less than -0.3V.
  4. This is a value to 100mV input step voltage with 5mV over drive.

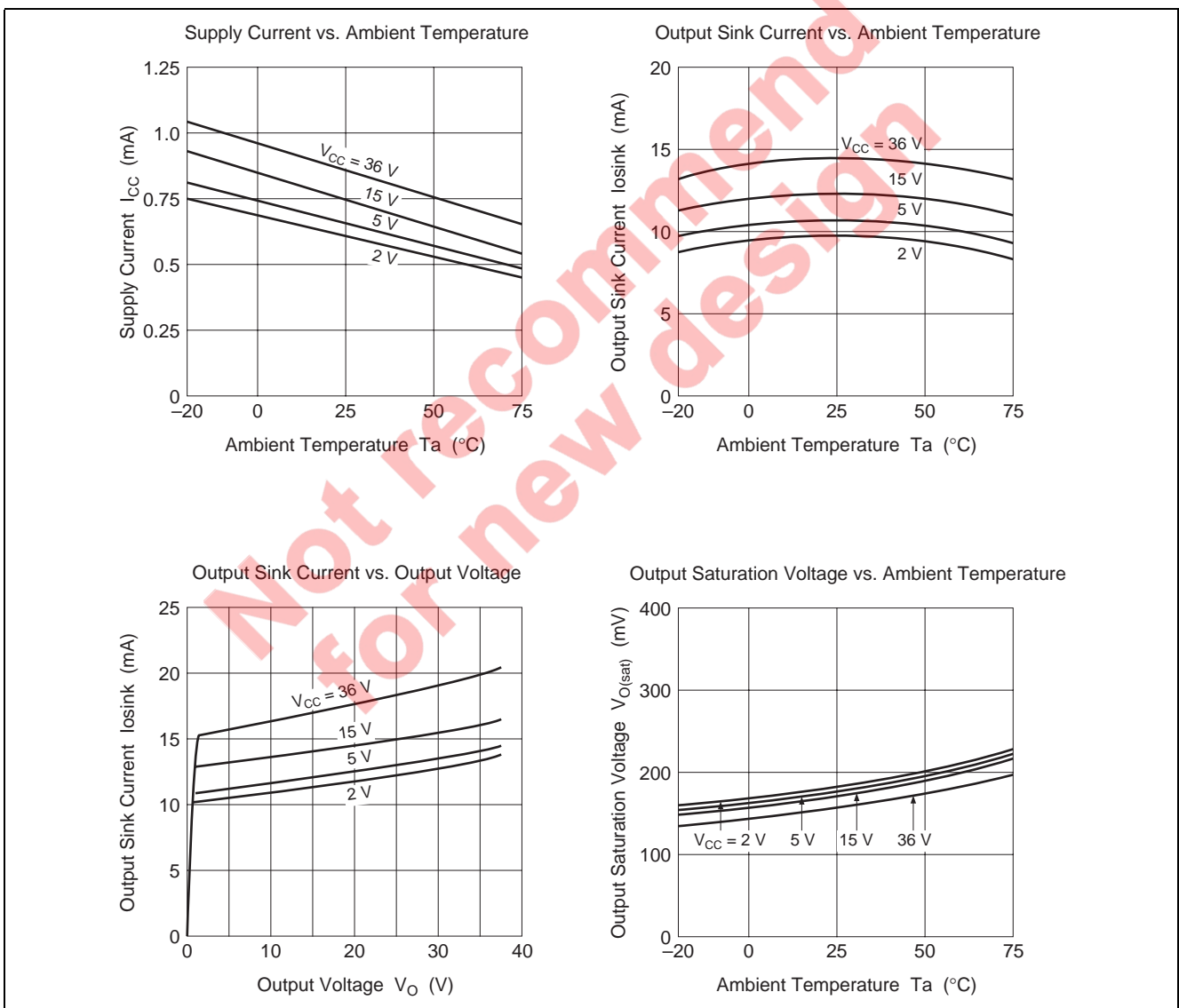
Electrical Characteristics-2

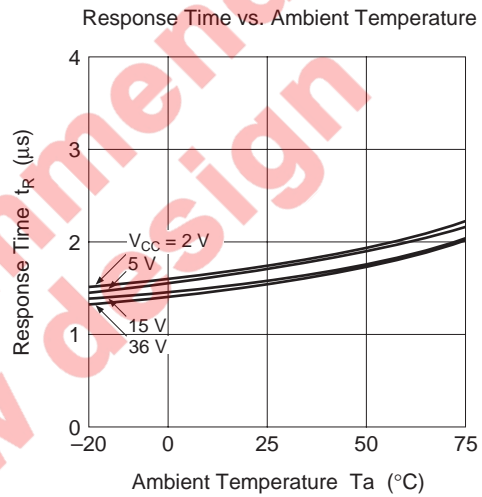
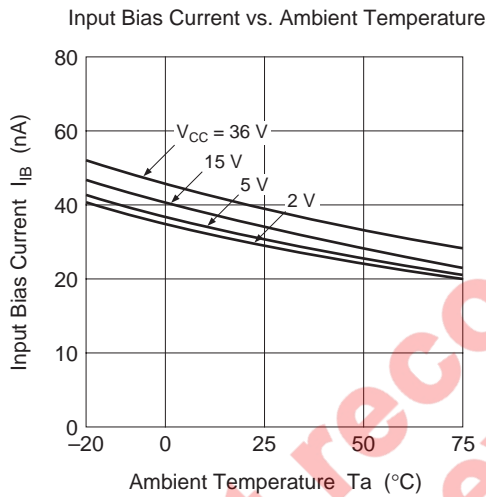
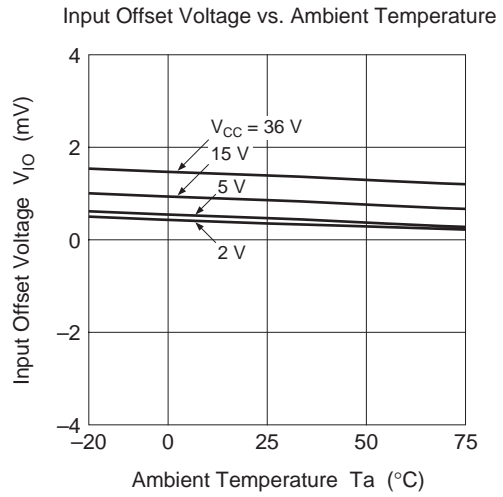
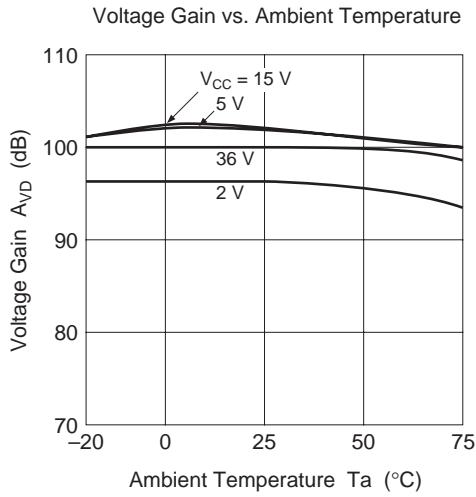
( $V_{CC} = 5V, T_a = -40 \text{ to } +125^\circ\text{C}$ )

Item	Symbol	Min	Typ	Max	Unit	Test condition
Input offset voltage*1	$V_{IO}$	—	—	5.0	mV	
Input offset current	$I_{IO}$	—	—	200	nA	$ I_{IN(+)} - I_{IN(-)} $
Input bias current	$I_{IB}$	—	—	500	nA	Output linear range
Common mode input voltage	$V_{CM}$	0	—	$V_{CC} - 2.0$	V	
Output saturation voltage	$V_O(\text{sat})$	—	—	440	mV	$V_{IN(-)} \geq 1V, V_{IN(+)} = 0, I_{\text{osink}} \leq 4\text{mA}$
Output leak current	$I_{LO}$	—	1.0	—	$\mu\text{A}$	$V_{IN(-)} = 0, V_{IN(+)} \geq 1V, V_O = 30V$
Supply current	$I_{CC}$	—	—	4.0	mA	All comparators: $R_L = \infty$ , All channels on

Note: 1.  $V_{REF} = 1.4V$  and  $R_S = 50\Omega$ , when  $V_O = 1.4V$  at the output switching point.

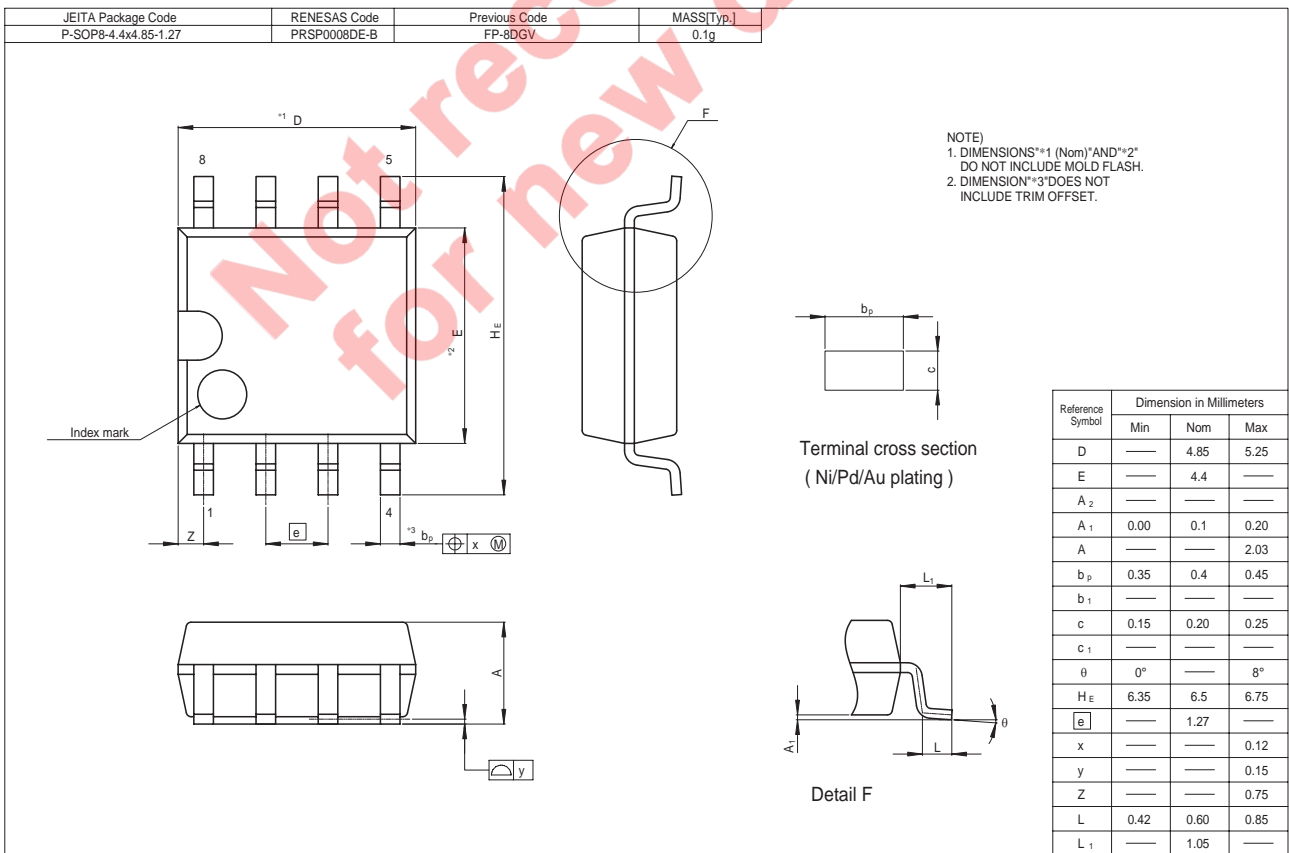
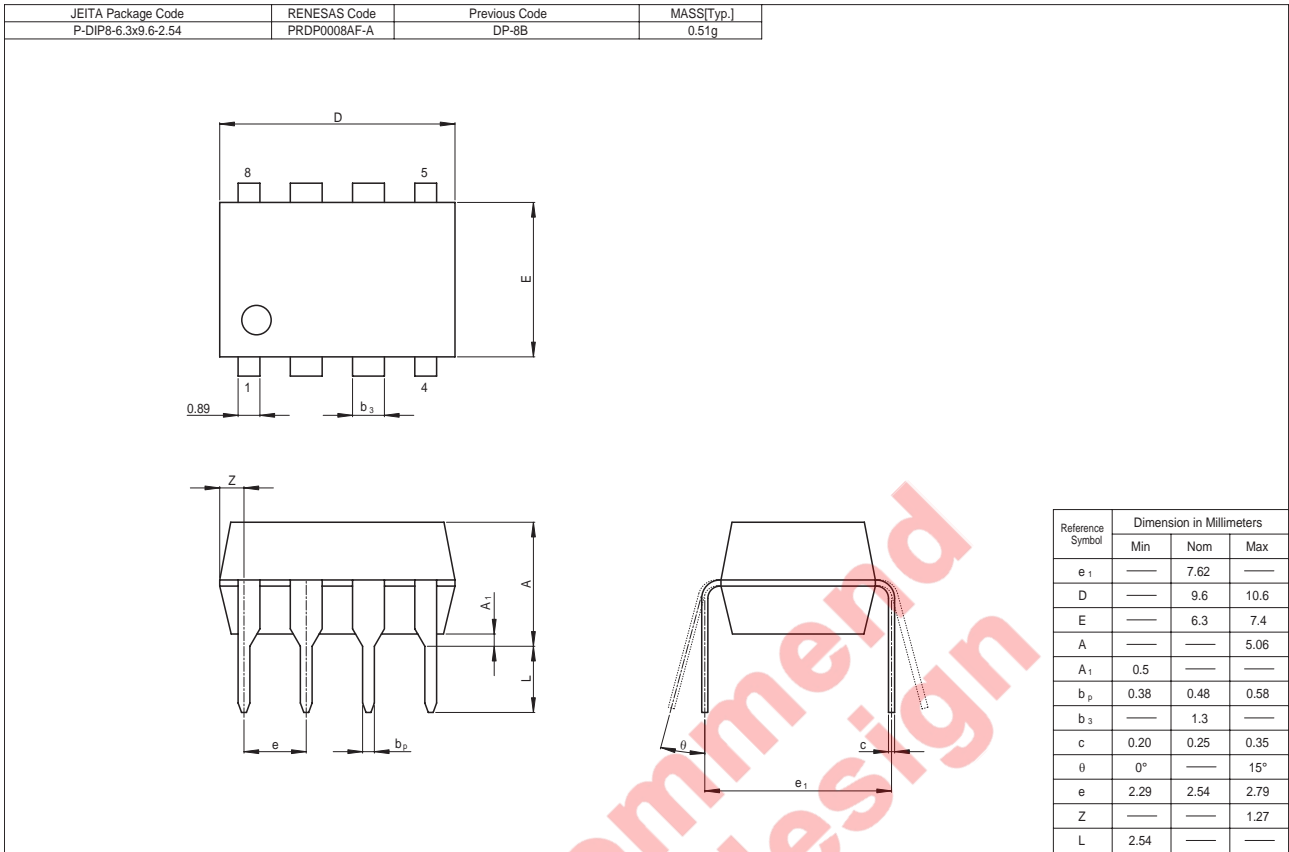
Characteristics Curve





Not recommended for new design

Package Dimensions



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