

HA17393A Series

Dual Comparators

REJ03D0677-0300

Rev.3.00

Mar 10, 2006

Description

The HA17393A series products are comparators designed for general purpose, especially for power control systems.

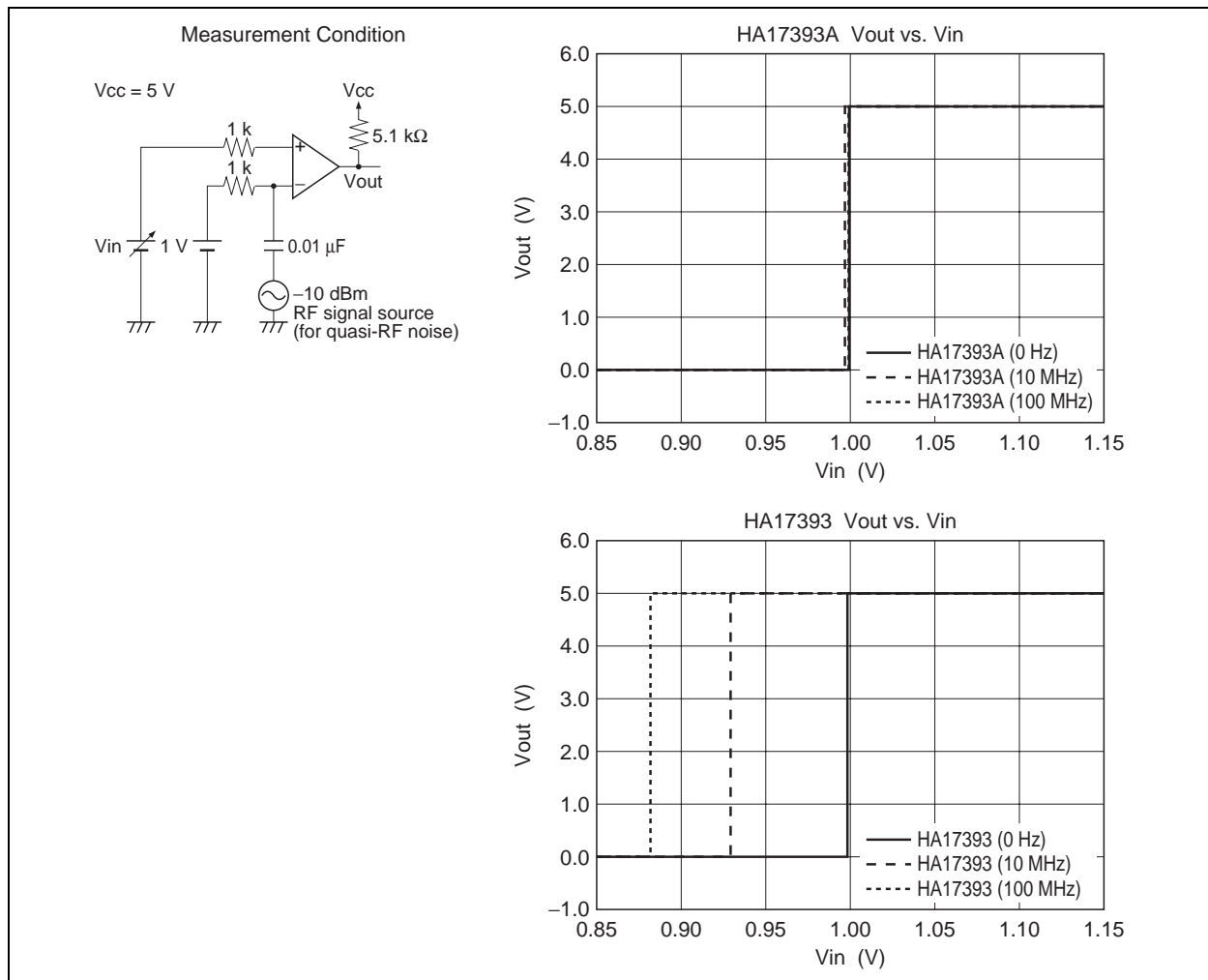
These ICs operate from a single power-supply voltage over a wide range of voltages, and feature a reduced power-supply current since the supply current is independent of the supply voltage.

These comparators have the merit which ground is included in the common-mode input voltage range at a single-voltage power supply operation. These products have a wide range of applications, including limit comparators, simple A/D converters, pulse/square-wave/time delay generators, wide range VCO circuits, MOS clock timers, multivibrators, and high-voltage logic gates.

Features

- Wide power-supply voltage range : 2 to 36 V
- Very low supply current : 0.8 mA Typ.
- Low input bias current : 25 nA Typ.
- Low input offset current : 3 nA Typ.
- Low input offset voltage : 2 mV Typ.
- The common-mode input voltage range includes ground
- Output voltages compatible with CMOS logic systems

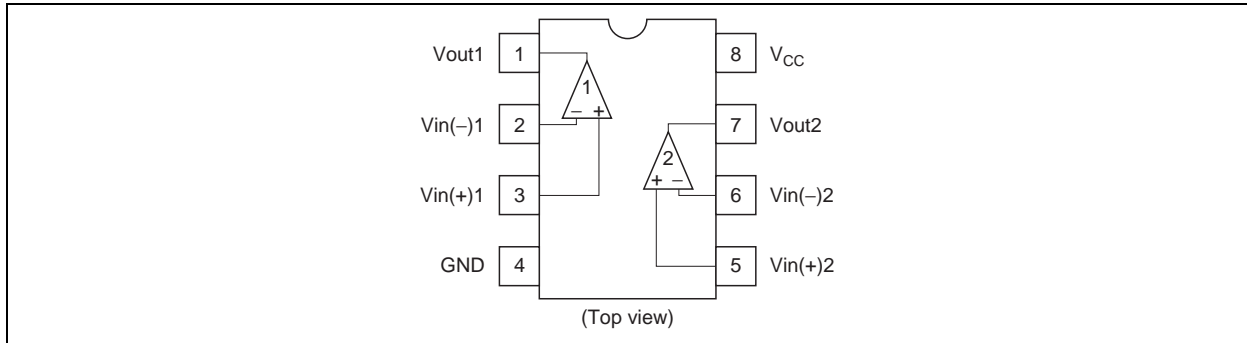
- Low electro-magnetic susceptibility



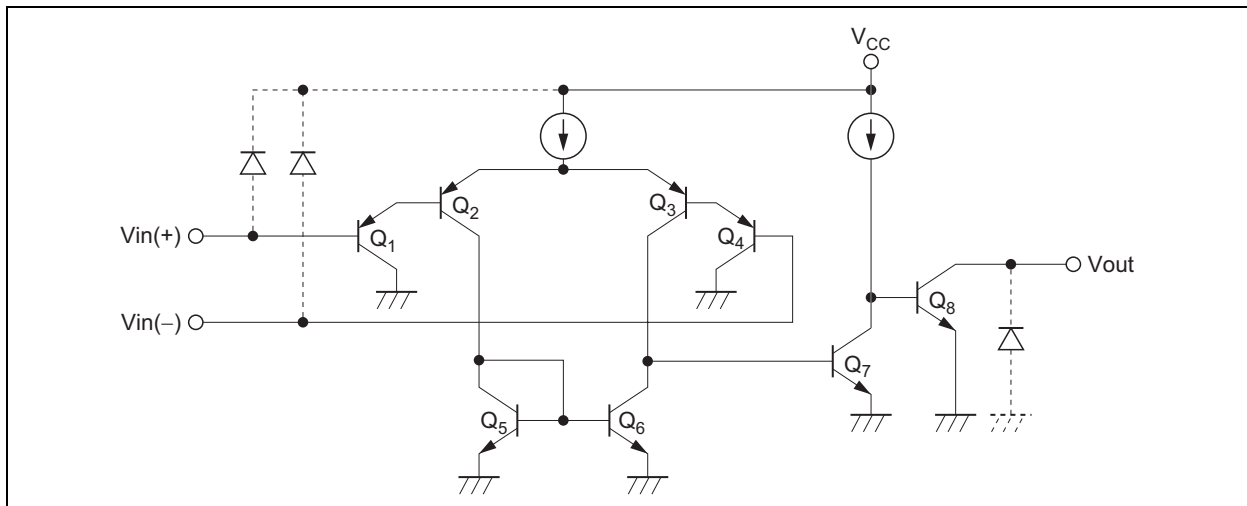
Ordering Information

| Type No. | Application | Package Name | Package Code |
|------------|----------------|-------------------|--------------|
| HA17393A | Commercial use | DIP-8 pin | PRDP0008AF-B |
| HA17393AF | | SOP-8 pin (JEITA) | PRSP0008DE-B |
| HA17393ARP | | SOP-8 pin (JEDEC) | PRSP0008DD-C |
| HA17393AT | | TSSOP-8 pin | PTSP0008JC-B |

Pin Arrangement



Circuit Schematic (1/2)



Note: If Input/Output terminals voltage over the absolute maximum ratings, there is possibility of mis-operation, characteristics deterioration and destruction, because of the current's flowing to parasitic diode in IC. The Input/Output terminals are recommended to be protected with the clamp circuit which using the diode with low forward voltage (like schottky barrier diode) when there is a possibility for the Input/Output terminals voltage exceeds the absolute maximum ratings.

Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Ratings | Unit | |
|-----------------------------|-------------------------------|--------------------------|-------------------|----|
| Power supply voltage | V _{CC} | 36 | V | |
| Differential input voltage | V _{in(diff)} | ±V _{CC} | V | |
| Input voltage | V _{in} | -0.3 to +V _{CC} | V | |
| Output pin voltage | V _{out} | -0.3 to +36 | V | |
| Output short current | I _{os} ^{*1} | constant | | |
| Allowable power dissipation | DIP | P _T | 570 ^{*2} | mW |
| | SOP | | 385 ^{*3} | |
| | TSSOP | | 192 ^{*4} | |
| Operating temperature | T _{opr} | -40 to +85 | °C | |
| Storage temperature | T _{stg} | -55 to +125 | °C | |

- Notes: 1. Short circuit between the output and V_{CC} will be a cause to destroy the circuit. The maximum output current is about 20 mA for any supply voltage.
2. HA17393A:
These are the allowable values up to Ta = 55°C. Derate by 8.3mW/°C above that temperature.
3. HA17393AF/ARP:
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 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.
4. HA17393AT:
These are the allowable values up to Ta = 25°C. Derate by 1.92 mW/°C above that temperature.

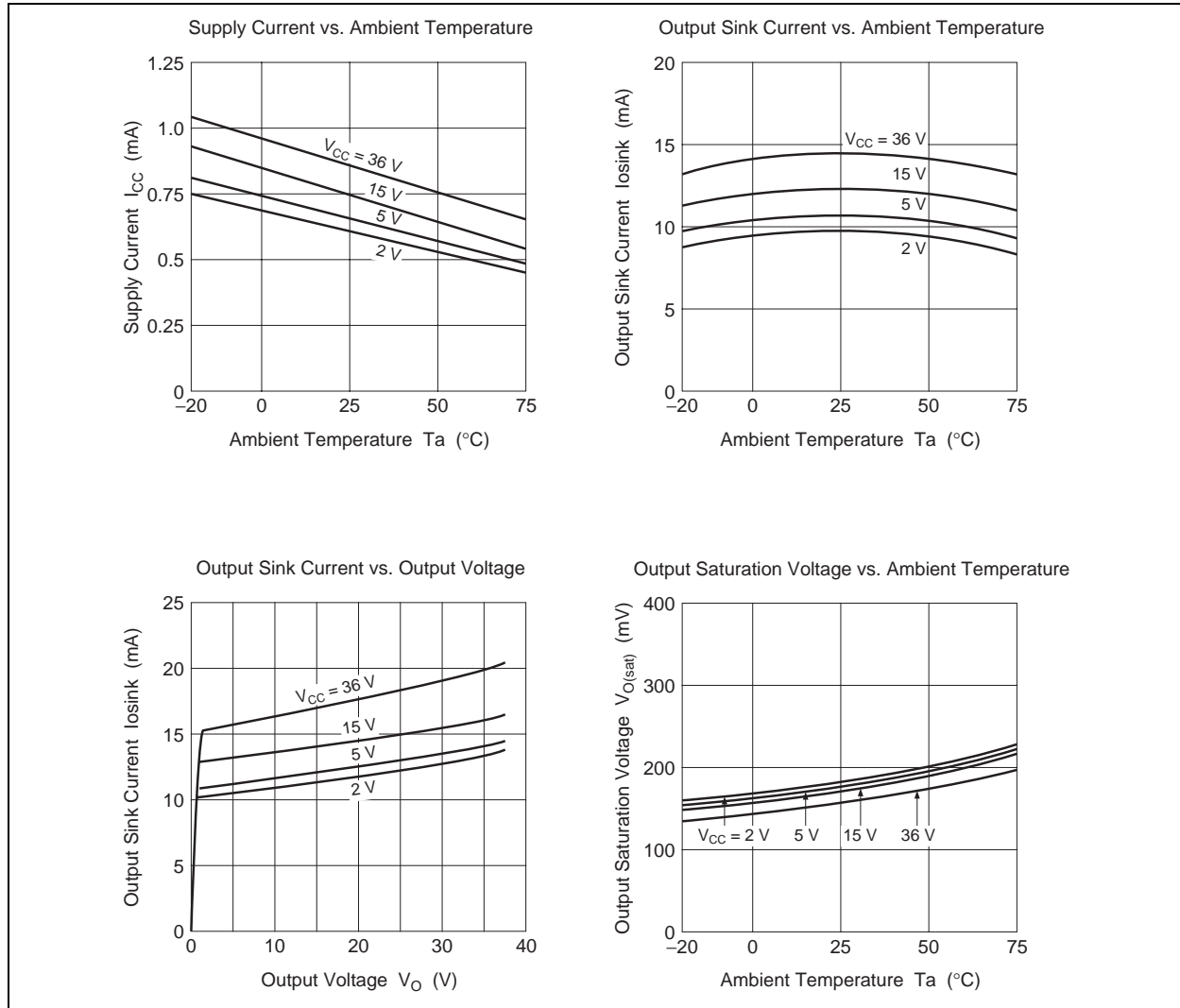
Electrical Characteristics

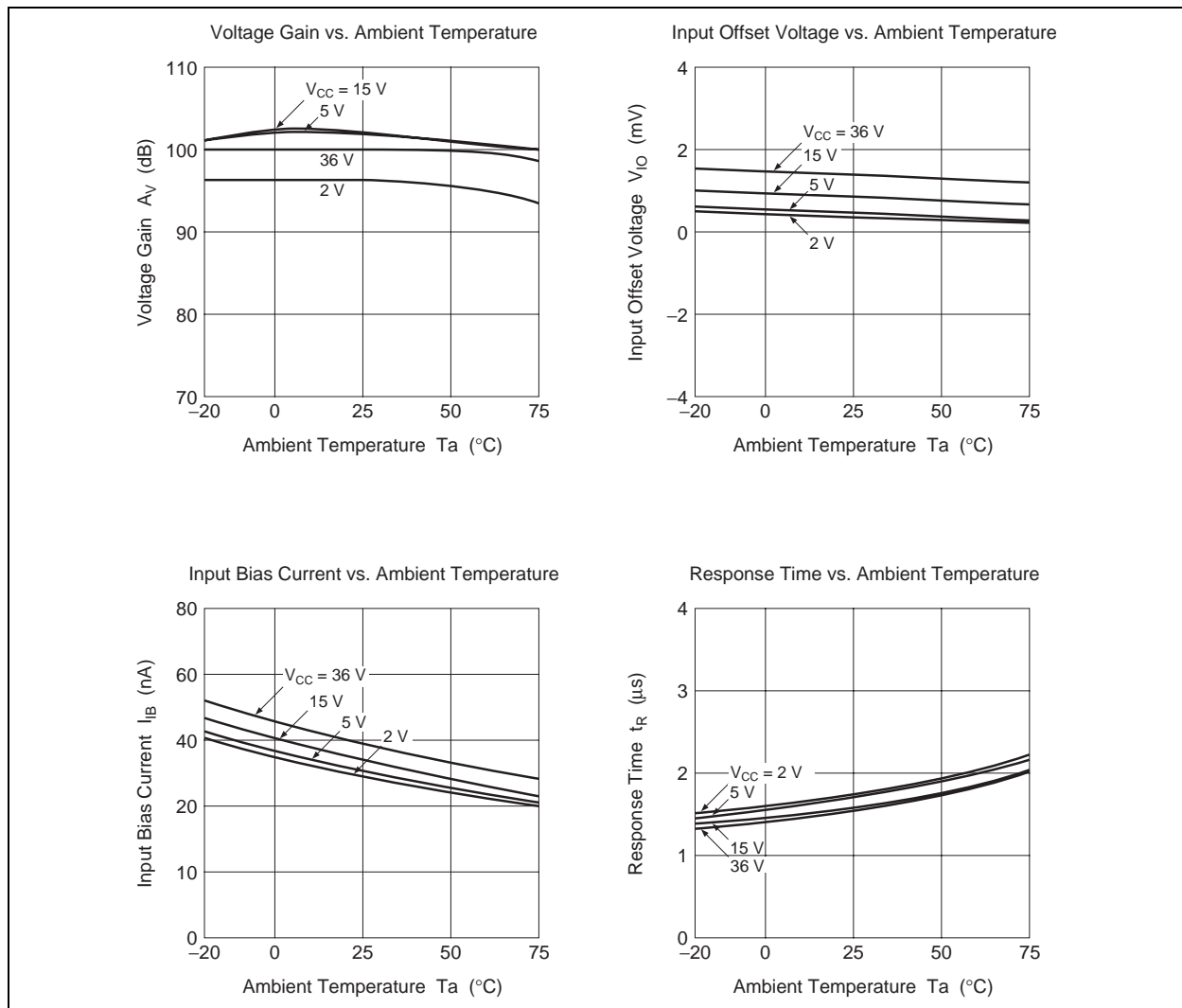
(V_{CC} = 5 V, Ta = 25°C)

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

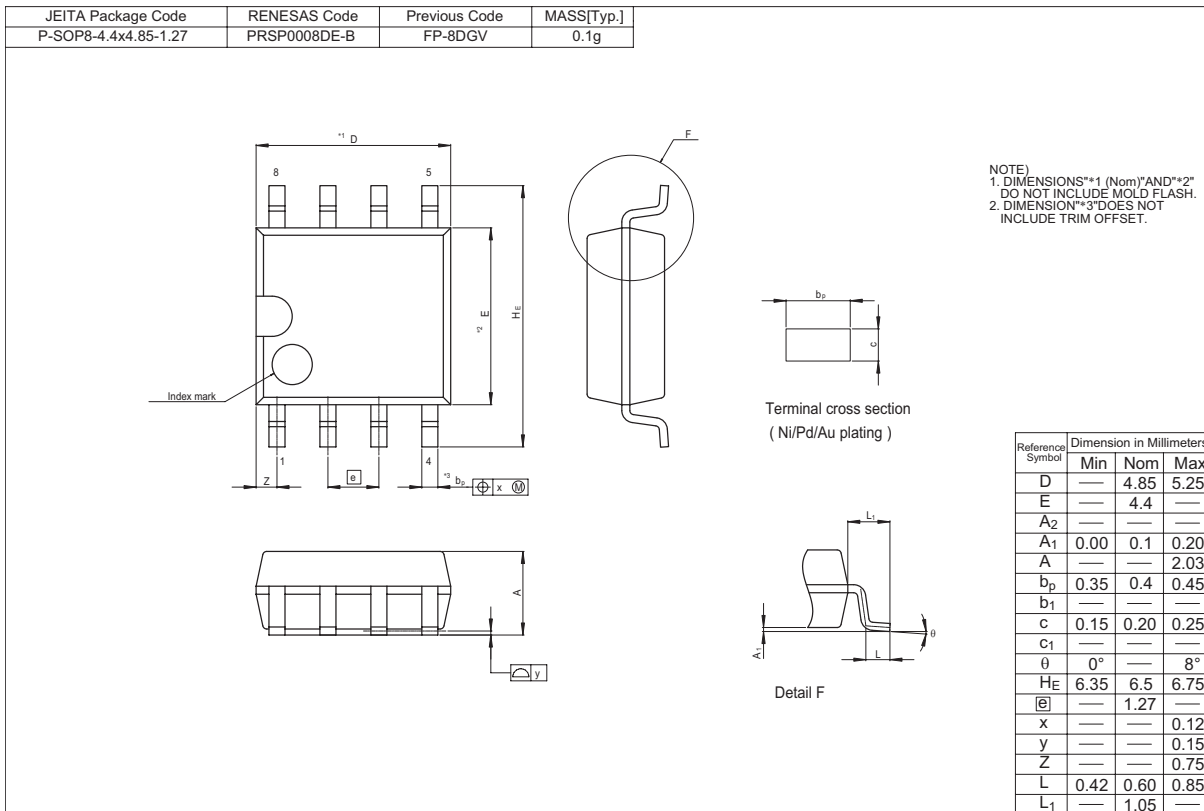
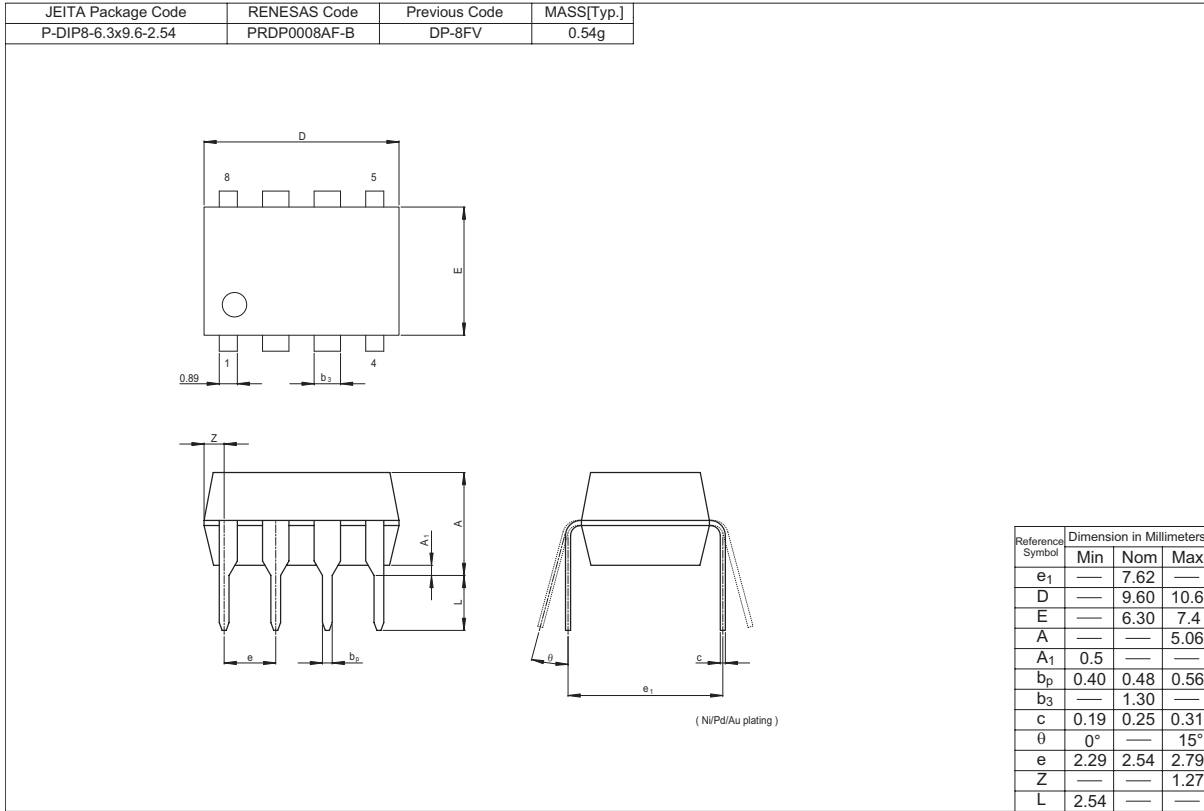
- Notes: 1. V_{REF} = 1.4 V and R_S = 50 Ω, when V_O = 1.4 V at output switching point.
2. Under linear operation.
3. Common mode input voltage or each one of the input signal should not be less than -0.3 V.
4. This is a value to 100 mV input step voltage with 5 mV over drive.
5. Design spec.

Characteristic Curves



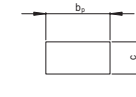
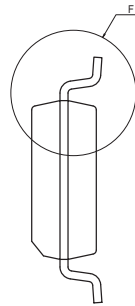
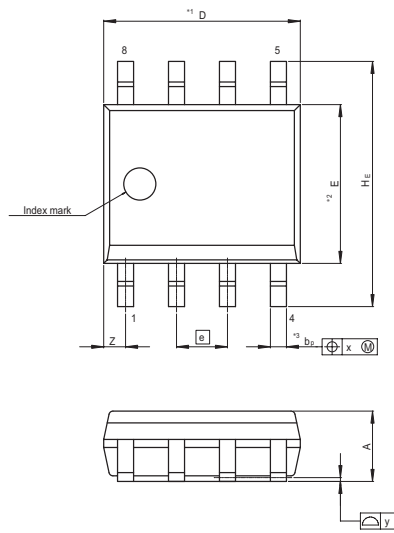


Package Dimensions

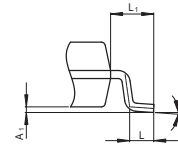


HA17393A Series

| | | | |
|----------------------|--------------|---------------|------------|
| 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)

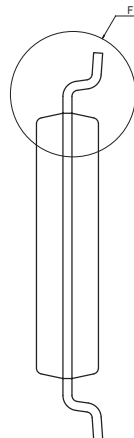
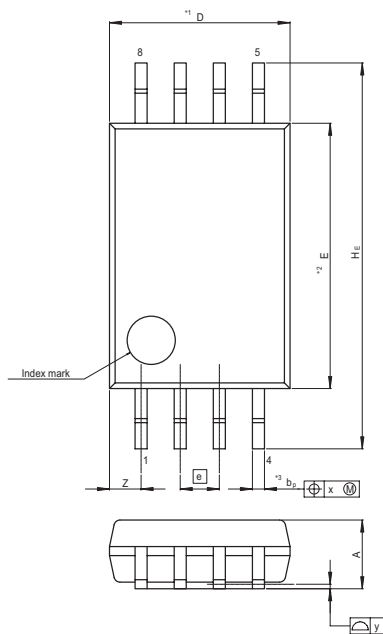


Detail F

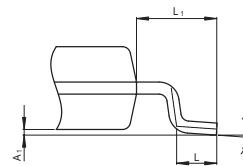
NOTE:
1. DIMENSIONS**1 (Nom)**AND**2*
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION**3*DOES NOT
INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| D | — | 4.90 | 5.30 |
| E | — | 3.95 | — |
| A ₂ | — | — | — |
| A ₁ | 0.10 | 0.14 | 0.25 |
| A | — | — | 1.75 |
| b _p | 0.34 | 0.40 | 0.46 |
| b ₁ | — | — | — |
| c | 0.15 | 0.20 | 0.25 |
| c ₁ | — | — | — |
| θ | 0° | — | 8° |
| H _E | 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 ₁ | — | 1.08 | — |

| | | | |
|---------------------|--------------|---------------|------------|
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
| P-TSSOP8-4.4x3-0.65 | PTSP0008JC-B | TTP-8DAV | 0.034g |



Terminal cross section
(Ni/Pd/Au plating)



Detail F

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 | — | 3.00 | 3.30 |
| E | — | 4.40 | — |
| A ₂ | — | — | — |
| A ₁ | 0.03 | 0.07 | 0.10 |
| A | — | — | 1.10 |
| b _p | 0.15 | 0.20 | 0.25 |
| b ₁ | — | — | — |
| c | 0.10 | 0.15 | 0.20 |
| c ₁ | — | — | — |
| θ | 0° | — | 8° |
| H _E | 6.20 | 6.40 | 6.60 |
| Ⓜ | — | 0.65 | — |
| x | — | — | 0.13 |
| y | — | — | 0.10 |
| z | — | — | 0.805 |
| L | 0.40 | 0.50 | 0.60 |
| L ₁ | — | 1.00 | — |

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