Riga, Latvia www.alfarzpp.lv; alfa@alfarzpp.lv

# Matched NPN transistor pair

## Features

- Effectively "ideal" and identical transistors
- Emitter-base offset voltage temperature drift less than 1 mkV/$^{o}$C
- Current gain ($h_{FE}$) matched to 5%
- Parameters are guaranteed in the range of collector current of 10 mkA to 1 mA
- Noise Voltage Density of 1,8 nV/√Hz
- Ideal logarithmic properties

## General Description

The AS394 is a junction matched monolithic NPN transistor pair with an order of magnitude improvement in matching over conventional transistor pair.

Electrical characteristics of these devices, such as drift versus initial offset voltage, noise and the exponential relationship of base-emitter voltage to collector current, closely approach those of a theoretical transistor and gives extremely low noise and operation over a wide current range. Most parameters are guaranteed over a current range of 1mkA to 1mA and 0V up to 20V collector-base voltage.

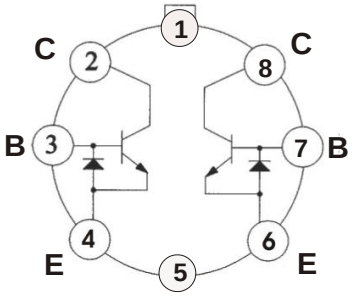
To guarantee long term stability of matching parameters, internal clamp diodes have been added across the emitter-base junction of each transistor. These prevent degradation due to reverse biased emitter current-the most common cause of field failures in matched devices. The parasitic isolation junction formed by the diodes also clamps the substrate region to the most negative emitter to ensure complete isolation between devices.

The AS394 will provide a considerable improvement in performance in most applications requiring a closely matched transistor pair. In many cases, trimming can be eliminated entirely, improving reliability and decreasing costs. Additionally, the low noise and high gain make this device attractive even where matching is not critical.

The AS394 is available in an isolated header 8-lead T0-5 metal can package.

**Connection Diagram**

**Top View**



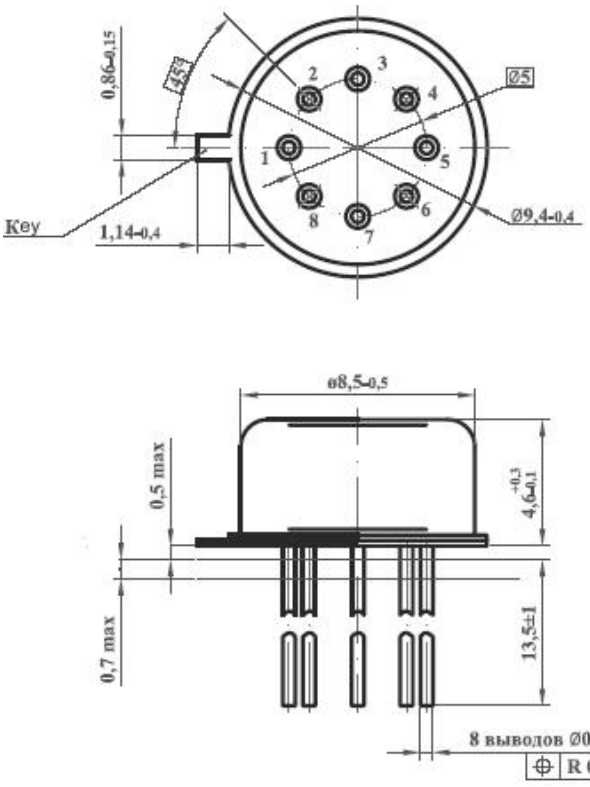

**AS394CH**

**8-lead T0-5 metal can package**

## Electrical performance characteristics

| Parameter, unit | Conditions | AS394CH | |
|---|---|---|---|
| | | Min | Max |
| Current Gain | $U_{CB}$ =0,5-20 V<br>$I_C$=1 mA<br>$I_C$=100 mkA<br>$I_C$=10 mkA | <br>225<br>200<br>150 | <br>-<br>-<br>- |
| Current Gain Ratio | $U_{CB}$ =0,5-20 V<br>$I_C$=1 mA<br>$I_C$=100 mkA<br>$I_C$=10 mkA | 0,95 | - |
| Collector-Base Leakage, nA | $U_{CB}$ = 20 V | - | 0,5 |
| Collector- Collector Leakage, nA | $U_{T1,T2}$ = 20 V | - | 5 |
| Change in Emitter-Base Offset Voltage, mkV | $U_{CB}$ = 0 V<br>$U_{CB}$ = 20 V<br>$I_C$=10 mkA to $I_C$=1 mA | -<br>- | 200<br>300 |
| Noise Voltage Density, nV/√Hz | $U_{CB}$=0 B, $I_C$=100 мкА<br>f = 100 Hz - 100 kHz | 1,8 (typ) | |
| Collector to Emitter Saturation Voltage, V | $I_C$=1 mA, $I_B$=10 мкА<br>$I_C$=1 mA, $I_B$=100 мкА | 0,2 (typ)<br>0,1 (typ) | |

## Physical Dimensions in millimeters




**8-lead T0-5 metal can package**