

#### FEATURES

- Low Temperature Coefficient
- Wide Operating Current Range: 50 $\mu$ A to 5mA
- Low Output Impedance: 0.6 $\Omega$  Typ.
- Superior Replacement for Other 1.2V References
- No Frequency Compensation Required
- Low Cost

#### APPLICATIONS

- Battery Powered Systems
- Instrumentation
- A/D, D/A Converters
- Monitors/ VCR/ TV
- Current sources

#### GENERAL DESCRIPTION

The AMS5010 is a two-terminal band-gap voltage reference diode, which provides a fixed 1.22V output voltage. This device features a low output impedance and low temperature coefficient, operating over a 50 $\mu$ A to 5mA current range. The AMS5010 is ideal for usage in battery power instrument application as well as a reference for CMOS A/D converters.

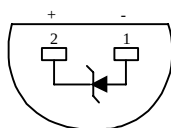
The AMS5010NT, MT, LN, HN, GH grades are specified operational over a temperature range of 0°C to 70°C while AMS5010LT, KT, JT grades are rated over the full -55°C to +125°C temperature range. The AMS5010 is available in TO-92 and TO-52 (metal can) packages.

#### ORDERING INFORMATION:

| MAX.<br>TEMPCO | PACKAGE TYPE |           | OPERATING<br>TEMPERATURE RANGE |
|----------------|--------------|-----------|--------------------------------|
|                | TO-92        | TO-52     |                                |
| 5ppm/°C        | -            | AMS5010NT | 0°C to 70°C                    |
| 10ppm/°C       | -            | AMS5010MT | 0°C to 70°C                    |
| 25ppm/°C       | AMS5010LN    | -         | 0°C to 70°C                    |
| 50ppm/°C       | AMS5010HN    | -         | 0°C to 70°C                    |
| 100ppm/°C      | AMS5010GN    | -         | 0°C to 70°C                    |
| 25ppm/°C       | -            | AMS5010LT | -55°C to +125°C                |
| 50ppm/°C       | -            | AMS5010KT | -55°C to +125°C                |
| 100ppm/°C      | -            | AMS5010JT | -55°C to +125°C                |

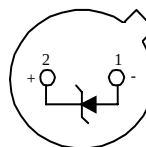
#### PIN CONNECTIONS

TO-92  
Plastic Package (N)



Bottom View

TO-52  
Metal Can Package (T)



Bottom View

## ABSOLUTE MAXIMUM RATINGS

|                             |                 |                                      |                 |
|-----------------------------|-----------------|--------------------------------------|-----------------|
| Reverse Current             | 10mA            | Storage Temperature TO-92 package    | -65°C to +150°C |
| Forward Current             | 10mA            | Storage Temperature TO-52 package    | -65°C to +200°C |
| Operating Temperature Range |                 | Lead Temperature (Soldering 25 sec.) | 265°C           |
| NT, MT, LN, HN, GN          | 0°C to 70°C     | Maximum Power Dissipation (at 25°C)  |                 |
| LT, KT, JT                  | -55°C to +125°C | TO-52                                | 750mW           |
|                             |                 | TO-92                                | 600mW           |

## ELECTRICAL CHARACTERISTICS

Electrical Characteristics at  $I_R = 500 \mu A$ , and  $T_A = +25^\circ C$  unless otherwise specified.

| Parameter                           | Conditions                                                     | AMS5010 |       |      | Units    |
|-------------------------------------|----------------------------------------------------------------|---------|-------|------|----------|
|                                     |                                                                | Min     | Typ   | Max  |          |
| Reference Voltage                   | $I_R = 100 \mu A$                                              | 1.20    | 1.220 | 1.25 | V        |
| Reference Current (Note 3)          |                                                                | 50      | 100   | 5000 | $\mu A$  |
| Reverse Current                     | To rated specs.                                                | 50      |       | 100  | $\mu A$  |
| Dynamic Output Impedance            | $I_R = 100 \mu A$                                              |         | .6    |      | $\Omega$ |
|                                     | $I_R = 500 \mu A$                                              |         | .6    | 2    | $\Omega$ |
| RMS Noise Voltage<br>(Note 4)       | $I_R = 500 \mu A$ ,<br>$10Hz \leq f \leq 10kHz$                |         | 5     |      | $\mu V$  |
| Temperature Coefficient<br>(Note 5) | $50\mu A \leq I_R \leq 5mA$<br>$T_{MIN} \leq T_A \leq T_{MAX}$ |         |       |      |          |
| AMS5010G – J                        |                                                                |         | 30    | 100  | ppm/°C   |
| AMS5010H – K                        |                                                                |         | 25    | 50   | ppm/°C   |
| AMS5010L                            |                                                                |         | 10    | 25   | ppm/°C   |
| AMS5010M                            |                                                                |         | 5     | 10   | ppm/°C   |
| AMS501N                             |                                                                |         | 3     | 5    | ppm/°C   |

**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed.

**Note 2:** For elevated temperature operation,  $T_{jmax}$  is  $\leq +150^\circ C$

| Thermal Resistance                | TO-92                  | TO-52   |
|-----------------------------------|------------------------|---------|
| $\phi_{JA}$ (junction to ambient) | 170°C/W (0.125" leads) | 140°C/W |

**Note 3:** Optimum performance is obtained at currents below 500 $\mu A$ . For current operation below 200 $\mu A$ , stray shunt capacitances should be limited to 20pF or increased to 1 $\mu F$ . If strays can not be avoided, a shunt capacitor of at least 1000pF is recommended.

**Note 4:** Guaranteed but not 100% production tested. These limits are not used to calculate average outgoing quality levels.

**Note 5:** The average temperature coefficient is defined as the maximum deviation of reference voltage at all measured temperatures between the operating

$T_{MAX}$   
and  $T_{MIN}$ , divided by  $T_{MAX} - T_{MIN}$ .