

Preliminary Technical Data

AD5172/AD5173

FEATURES

- 2-Channel, 256-position**
- OTP(One-Time Programmable) Set-and-Forget Resistance Setting — low cost alternative over EEMEM**
- Unlimited adjustments prior to OTP activation**
- OTP overwriting function allows temporary adjustments¹**
- End-to-end resistance 2.5 kΩ, 10 kΩ, 50 kΩ, 100 kΩ**
- Compact MSOP-10 (3 mm × 4.9 mm) Package**
- Low tempco 5 ppm/°C in potentiometer mode**
- Low tempco 35 ppm/°C in rheostat mode**
- Fast Settling Time: $t_s = 5\mu s$ Typ in Power-Up**
- Full read/write of wiper register**
- Power-on preset to midscale¹**
- Extra package address decode pins AD0 and AD1(AD5173)**
- Computer Software Replaces μC in Factory Programming Applications**
- 6 V one-time programming voltage**
- Single supply 2.7 V to 5.5 V**
- Low power, $I_{DD} = 5 \mu A$**
- Wide operating temperature $-40^\circ C$ to $+125^\circ C$**

APPLICATIONS

- Systems Calibrations**
- Mechanical Potentiometers and Trimmers[®] Replacements**
- Transducer adjustment**
- RF amplifier biasing**
- Automotive electronics adjustment**
- Gain control and offset adjustment**
- Electronics Level Settings**

GENERAL OVERVIEW

The AD5172/73 are dual channel 256-position, one-time programmable (OTP) digital potentiometers², which employ fuse link technology to achieve the memory retention of resistance setting function. OTP is a cost-effective alternative over the EEMEM approach for users who do not need to program the digital potentiometer setting in memory for more than once. These devices perform the same electronic adjustment functions like most mechanical trimmers and variable resistors do but offer enhanced resolution, solid-state reliability, and superior low temperature coefficient performance.

Rev. PrF 8/14/03

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The AD5172/73 are programmed using a 2-wire I²C compatible digital control. They allow unlimited adjustments before permanently setting the resistance value. During the OTP activation, a permanent fuse blown command is sent after the final value is determined; therefore freezing the wiper position at a given setting (analogous to placing epoxy on a mechanical trimmer). Unlike other OTP digital potentiometers in the same family, AD5172/73 have unique temporary OTP overwriting feature that new adjustments if desired but the OTP setting is restored during subsequent power up conditions. To verify the success of permanent programming, Analog Devices patterned the OTP validation such that the fuse status can be discerned from two validation bits in read mode.

For applications that program AD5172/73 in the factories, Analog Devices offers a device programming software, which operates across Windows[®] 95 to XP[®] platforms including Windows NT[®]. This software application effectively replaces the need for external I²C controllers or host processors and therefore significantly reduces users' development time.

An AD5172/73 evaluation kit is available, which include the software, connector, and cable that can be converted for the factory programming applications.

The AD5172/73 are available in a MSOP-10 package. All parts are guaranteed to operate over the automotive temperature range of $-40^\circ C$ to $+125^\circ C$. Besides their unique OTP features, the AD5172/73 lend themselves well to other general-purpose digital potentiometer applications due to their programmable preset, superior temperature stability, and small form factor.

FUNCTIONAL BLOCK DIAGRAMS

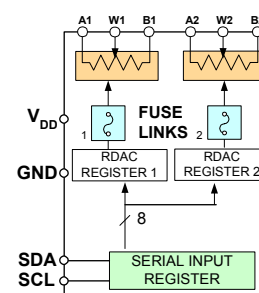


Figure 1. AD5172

OUTLINE DIMENSIONS

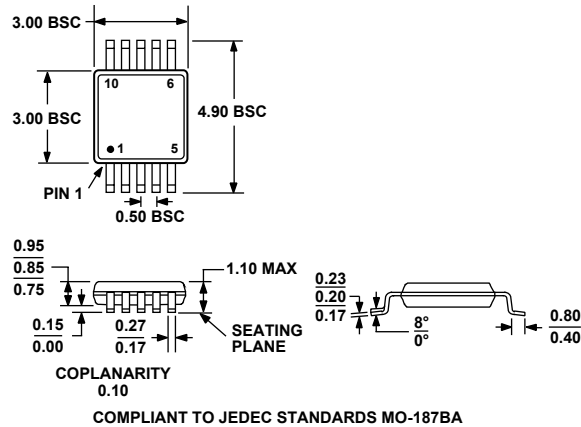


Figure 54. 10-Lead Mini Small Outline Package [MSOP] (RM-10)
Dimensions shown in millimeters

ORDERING GUIDE

Model	R _{AB} (Ω)	Temperature	Package Description	Package Option	Branding
AD5172BRM2.5-R2	2.5k	-40°C to +125°C	MSOP-10	RM-10	D0U
AD5172BRM2.5-RL7	2.5k	-40°C to +125°C	MSOP-10	RM-10	D0U
AD5172BRM10-R2	10k	-40°C to +125°C	MSOP-10	RM-10	D0V
AD5172BRM10-RL7	10k	-40°C to +125°C	MSOP-10	RM-10	D0V
AD5172BRM50-R2	50k	-40°C to +125°C	MSOP-10	RM-10	D10
AD5172BRM50-RL7	50k	-40°C to +125°C	MSOP-10	RM-10	D10
AD5172BRM100-R2	100k	-40°C to +125°C	MSOP-10	RM-10	D11
AD5172BRM100-RL7	100k	-40°C to +125°C	MSOP-10	RM-10	D11
AD5172EVAL	See Note 1		Evaluation Board		

Model	R _{AB} (Ω)	Temperature	Package Description	Package Option	Branding
AD5173BRM2.5-R2	2.5k	-40°C to +125°C	MSOP-10	RM-10	D1K
AD5173BRM2.5-RL7	2.5k	-40°C to +125°C	MSOP-10	RM-10	D1K
AD5173BRM10-R2	10k	-40°C to +125°C	MSOP-10	RM-10	D1L
AD5173BRM10-RL7	10k	-40°C to +125°C	MSOP-10	RM-10	D1L
AD5173BRM50-R2	50k	-40°C to +125°C	MSOP-10	RM-10	D1M
AD5173BRM50-RL7	50k	-40°C to +125°C	MSOP-10	RM-10	D1M
AD5173BRM100-R2	100k	-40°C to +125°C	MSOP-10	RM-10	D1N
AD5173BRM100-RL7	100k	-40°C to +125°C	MSOP-10	RM-10	D1N
AD5173EVAL	See Note 1		Evaluation Board		

¹The evaluation board is shipped with the 10 kΩ R_{AB} resistor option; however, the board is compatible with all available resistor value options.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



NOTES