256-Position Two-Time Programmable I²C Digital Potentiometer

Preliminary Technical Data — AD5170

FEATURES

256-position
TTP(Two-Time Programmable) Set-and-Forget sesistance setting allows second chance permanent programming
End-to-end resistance 2.5 kΩ, 10 kΩ, 50 kΩ, 100 kΩ
Compact MSOP-10 (3 mm × 4.9 mm) Package
Fast Settling Time: t_S = 5µs Typ in Power-Up
Full read/write of wiper register
Power-on preset to midscale
Extra package address decode pins AD0 and AD1
Computer Software Replaces µC in Factory Programming Applications
Single supply 2.7 V to 5.5 V
Low temperature coefficient 35 ppm/°C
Low power, I_{DD} = 5 µA
Wide operating temperature –40°C to +125°C
Evaluation board available

APPLICATIONS

Systems Calibrations
Electronics Level Settings
Mechanical Trimmers® Replacement in New Designs
Permamenent Factory PCB Setting
Transducer adjustment of pressure, temperature, position, chemical, and optical sensors
RF amplifier biasing
Automotive electronics adjustment
Gain control and offset adjustment

GENERAL OVERVIEW

The AD5170 is a 256-position, Two-Time Programmable(TTP) digital potentiometer that employs fuse link technology to enable *two* opportunities at permanently programming the resistance setting. This device performs the same electronic adjustment function as mechanical potentiometers or variable resistors, with enhanced resolution, solid-state reliability, and superior low temperature coefficient performance.

The AD5170 is controlled using a 2-wire, I²C compatible digital interface. It allows unlimited adjustments before "permanently"(you really have two opportunities) setting the resistance value. After the final value is determined, a fuse blow command is executed which freezes the wiper position(analogous to placing epoxy on a mechanical trimmer).

In addition, for applications that program the AD5170 at the factory, Analog Devices offers device programming software running on Windows® NT, 2000, and XP operating systems. This software effectively replaces any external I²C controllers, which in turn enhances users' systems time-to-market.

An AD5170 evaluation kit and software are available. The kit includes the connector and cable that can be converted for further factory programming applications.

FUNCTIONAL BLOCK DIAGRAMS

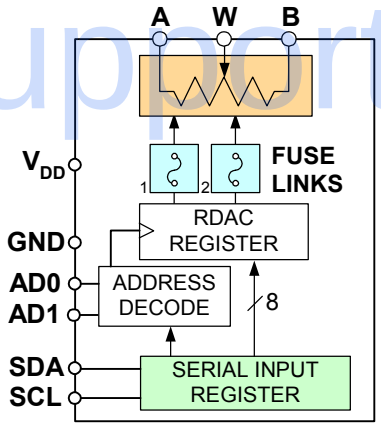

Figure 1. AD5170

Note:
The terms *digital potentiometer*, *VR*, and *RDAC* are used interchangeably.

Purchase of licensed I²C components of Analog Devices or one of its sublicensed Associated Companies conveys a license for the purchaser under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

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OUTLINE DIMENSIONS

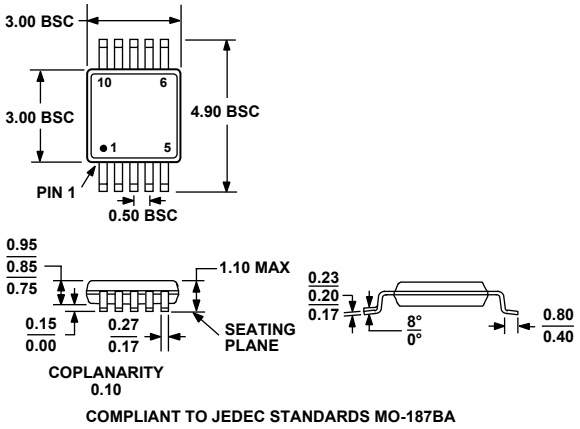

Figure 22. 10-Lead Mini Small Outline Package [MSOP] (RM-10)
Dimensions shown in millimeters

ORDERING GUIDE

Model	R_{AB} (Ω)	Temperature	Package Description	Package Option	Branding
AD5170BRM2.5-R2	2.5k	–40°C to +125°C	MSOP-10	RM-10	D0Y
AD5170BRM2.5-RL7	2.5k	–40°C to +125°C	MSOP-10	RM-10	D0Y
AD5170BRM10-R2	10k	–40°C to +125°C	MSOP-10	RM-10	D0Z
AD5170BRM10-RL7	10k	–40°C to +125°C	MSOP-10	RM-10	D0Z
AD5170BRM50-R2	50k	–40°C to +125°C	MSOP-10	RM-10	D0W
AD5170BRM50-RL7	50k	–40°C to +125°C	MSOP-10	RM-10	D0W
AD5170BRM100-R2	100k	–40°C to +125°C	MSOP-10	RM-10	D0X
AD5170BRM100-RL7	100k	–40°C to +125°C	MSOP-10	RM-10	D0X
AD5170EVAL	See Note 1		Evaluation Board		

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

The AD5170 contains 2532 transistors. Die size: 30.7 mil × 76.8 mil = 2,358 sq. mil.

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.