ADI High Temperature Products and Application

Application Introduction

As we know, the typical industry ambient temperature is –40°C to +85°C. However, there are some harsh industrial environments where the ambient temperature exceeds this range, such as in oil and gas exploration, or other heavy industrial activities. Because these temperatures can exceed more than 150°C, the following ADI high temperature products were designed for environments in the 175°C to 210°C range.

ADI High Temperature Products Value

Designed for High Temperature

ADI high temperature products are tested and designed for high temperatures through every step of the semiconductor creation process, from the circuit design and layout to the packaging technology. This process can help customers reduce the risk and time related to the screening of ICs. For more detailed information, please refer to the following *Analog Dialogue* article linked on Page 3.

Low Power Consumption

ADI high temperature products include low power consumption features to reduce self heating and fit battery-powered applications.

Repeatable and High Performance

The guaranteed specifications of ADI high temperature products will help system designers achieve repeatable high performance.

Small Packages

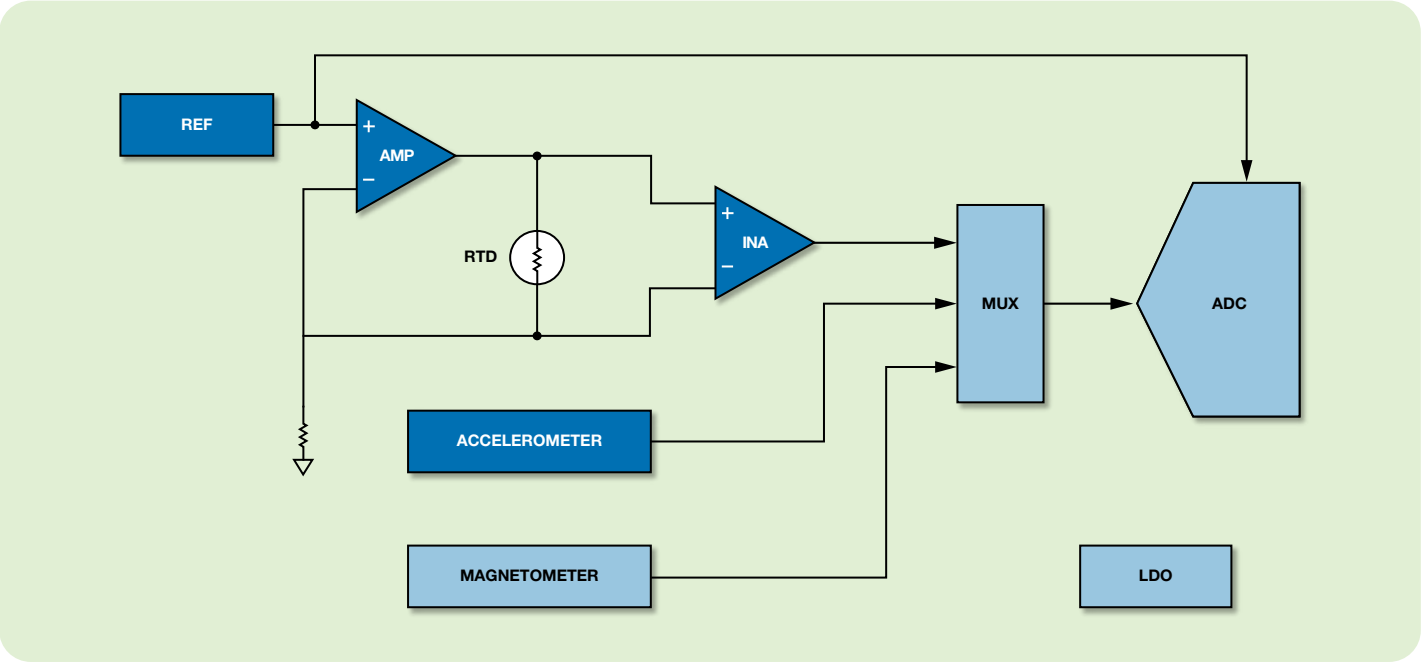
SOIC, SBDIP, and flatpack package technology is applied in ADI high temperature products so that they can meet small size PCB requirements.

Products

Part Number	Description	Key Spec	Power Consumption	Package
Amplifier (AMP)				
AD8634	Dual operational amplifier	Rail-to-rail output Power supply up to ±15 V Gain bandwidth product: 9.7 MHz Low offset: 250 µV maximum Noise: typical 4.2 nV/√Hz at 1 KHz	1.2 mA @ max, 175°C 1.3 mA @ max, 210°C	–40°C to +175°C, SOIC –40°C to +210°C, flatpack
Instrumentation Amplifier (INA)				
AD8229	Low drift and low noise INA	Power supply up to ±15 V 1 µV/°C input offset 1 nV/√Hz input noise 15 MHz bandwidth (G = 1) High CMRR 126 dB (G = 100)	7 mA @ max	–40°C to +175°C, SOIC –40°C to +210°C, SBDIP, known good die (KGD)
Voltage Reference (REF)				
ADR225	Precision 2.5 V micropower reference	High output current: 10 mA Temperature coefficient: 30 ppm/°C, 8-lead flatpack 10 ppm/°C, 8-lead SOIC	50 µA @ max, 175°C 60 µA @ max, 210°C	–40°C to +175°C, SOIC –40°C to +210°C, flatpack
Accelerometer				
ADXL206	Precision, dual-axis *i*MEMS® accelerometer	±5 g input range 1 mg resolution at 60 Hz 110 µg/√Hz rms noise	700 µA @ max, 175°C	–40°C to +175°C, SBDIP
Temperature Sensor				
ADT7312	Digital temperature sensor	±1°C accuracy from –55°C to +175°C 16-bit temp resolution: ±0.0078 °C SPI compatible interface	320 µA @ max, 175°C	Package: die

Application Example

The signal chain below is for the application of downhole geosteering. The accelerometer and magnetometer compose the geosteering system and RTD temperature measurement system used for calibration over temperature.



The signal chains above are representative of high temperature application systems. The technical requirements of the blocks vary, but the products listed in the table are representative of ADI's solutions that meet some of those requirements.

Other High Temperature Products

Product Name	Description
Temperature Sensor	
ADT7310/ADT7320/ ADT7410/ADT7420	150°C max, 16-bit digital temperature sensor, 0.25°C to 0.5°C accuracy
AD590	150°C max, temperature transducer, ±0.5°C accuracy, 2-lead flatpack, 4-lead LFCSP, 3-pin TO-52, 8-lead SOIC, and die form
Amplifier	
AD8556	140°C max, digitally programmable sensor signal amplifier with EMI filters
AD8643T	125°C max, low power, precision JFET quad op amp; 26 V supply, 250 μA max supply current, 1 pA max bias current, GBP:2.5 MHz, SR: 2 V/μs;
AD8574T	125°C max, zero drift, quad op amp; 5 V supply, 750 μA max supply current, 5 nV/°C typical, 1.3 μV p-p low frequency noise
ADC	
AD7655S	125°C max, 4-channel, 1 MSPS, 16-bit ADC, LFCSP package
AD7276S	125°C max, 1 MSPS, 12-bit ADC, SOT-23 package
AD7794C	125°C max, 24-bit ADC, six differential channels, 24-lead TSSOP package
DAC	
AD5666S	125°C max, 4-channel, 16-bit DAC, 5 ppm on-chip reference
AD5543S	125°C max, 1-channel, 16-bit DAC, MSOP package

Products (Continued)

Product Name	Description
Reference	
ADR435T	125°C max, 5 V reference, low drift, low noise; 3 ppm/°C max drift, 8 μV p-p noise, long time drift: 40 ppm/$\sqrt{1000}$ hr
Accelerometer	
ADIS16201	125°C max, digital controlled dual-axis inclinometer/accelerometer
ADXL001	125°C max, ±70 *g*, ±250 *g*, ±500 *g*, single axis, LCC, analog output

Design Resources

Analog Dialogue Article

- High Temperature Electronics Pose Design and Reliability Challenges, Analog Dialogue, vol46n4—*www.analog.com/ad-46-04*

Demo Video

- High Temperature Operation of an In Amp and Accelerometer—*www.analog.com/hightemp_video*

Design Tools

- ADIsimPower™: ADI Voltage Regulator Design Tool—*www.analog.com/adisimpower*
- ADIsimOpAmp™: ADI OpAmp Design Tool—*www.analog.com/adisimopamp*
- EngineerZone™: Online Technical Support Community—*ez.analog.com*

To view additional high temperature products resources, tools, and product information, please visit: *www.analog.com/hightemp*

Customer Interaction Center

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