

Transitioning from ADXL202 to ADXL213 or ADXL203

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INTRODUCTION

The ADXL202 is a low cost, ± 2 g dual-axis accelerometer with analog and duty cycle outputs. Due to improvements in MEMS design methodology and processing technology since its introduction, the ADXL202 is currently being phased out and is not recommended for new designs.

To facilitate a seamless transition, Analog Devices, Inc., has developed new sensors that can directly replace the ADXL202. Suggested replacements are the ADXL203 for applications that use the ADXL202 analog outputs, and the ADXL213 for applications that use the ADXL202 duty cycle outputs. These newer products provide several performance enhancements over the ADXL202 (listed in Table 1). This application note describes some of these specification differences and outlines the main considerations to be taken into account when making the transition.

TRANSITION TO ADXL213

The ADXL213 is a pin-compatible replacement for the ADXL202, featuring both analog and duty cycle outputs. The g -range is narrowed to ± 1.2 g on the ADXL213, allowing for an increased sensitivity of 30% duty cycle per g , up from 12.5%/g on the ADXL202. This sensitivity change needs to be accounted for in the algorithm that interprets the accelerometer's output.

Bandwidth is set by Capacitors C_x and C_y ; the same capacitance values produce the same bandwidth as on the ADXL202. Due to new mechanical sensor construction, the maximum bandwidth available on the ADXL213 is 2.5 kHz, as compared to 6 kHz on the ADXL202. A minimum output capacitance of 2000 pF is required. The same supply voltage can be used, or the supply can be increased to a maximum of 6 V.

Advances in design of the mechanical element enable reduced temperature drift of both sensitivity and zero- g offset (see Table 1). Noise density is also decreased, allowing for a resolution of 1 mg, an improvement over the 2 mg resolution of the ADXL202.

TRANSITION TO ADXL203

Applications that use the analog outputs of the ADXL202 should transition to using the ADXL203. The ADXL203 is also a pin-compatible replacement to the ADXL202. Pin 2, Pin 4, and Pin 5, which corresponded to the duty cycle functionality on the ADXL202, remain unconnected. The g -range is slightly narrowed to ± 1.7 g, increasing the sensitivity to 1000 mV/g. Again, this change in sensitivity needs to be accounted for when interpreting the accelerometer's output.

Bandwidth is set using the same capacitor values used with the ADXL202. Bandwidth is limited to 2.5 kHz as on the ADXL213, and a minimum output capacitance of 2000 pF is required. The supply voltage can be kept the same or increased up to 6 V.

As with the ADXL213, resolution of the ADXL203 is improved to 1 mg at 60 Hz due to a lower noise density. Temperature drift of both sensitivity and zero- g offset are also improved over the ADXL202 (see Table 1).

SUMMARY

Table 1 highlights the main specification differences between the ADXL202 and its replacements, the ADXL213 and ADXL203. For more detailed information, refer to the product data sheets.

Samples and evaluation boards are available for both the ADXL213 and the ADXL203. Visit www.analog.com, to place an order and use the following list for the appropriate part numbers.

- ADXL203CE
- ADXL203CE-REEL
- ADXL203EB
- ADXL213AE
- ADXL213AE-REEL
- ADXL213EB

Table 1. Specification Differences for the ADXL202, ADXL213 and ADXL203

	ADXL202	ADXL213	ADXL203
<i>g</i> -Range	±2 <i>g</i>	±1.2 <i>g</i>	±1.7 <i>g</i>
Zero- <i>g</i> Offset Temperature Drift	2 mg/°C	0.25 mg/°C	0.1 mg/°C
Sensitivity at $V_s = 5\text{ V}$	12.5%/g 312 mV/g	30%/g	1000 mV/g
Sensitivity Change over Temperature	±0.5%	±0.3%	±0.3%
Noise Density	200 $\mu\text{g}/\sqrt{\text{Hz}}$ rms	160 $\mu\text{g}/\sqrt{\text{Hz}}$ rms	110 $\mu\text{g}/\sqrt{\text{Hz}}$ rms
Resolution at 60 Hz	2 mg	1 mg	1 mg
Maximum Bandwidth	6 kHz	2.5 kHz	2.5 kHz
Supply Voltage, Minimum	3 V	3 V	3 V
Supply Voltage, Maximum	5.25 V	6 V	6 V
Sensor Resonance	10 kHz	5.5 kHz	5.5 kHz