Tactical Grade, Ten Degrees of Freedom Inertial Sensor

Silicon Anomaly

ADIS16488A

This anomaly list describes the known bugs, anomalies, and workarounds for the ADIS16488A.

Analog Devices, Inc., is committed, through future silicon revisions, to continuously improve silicon functionality. Analog Devices tries to ensure that these future silicon revisions remain compatible with your present software/systems by implementing the recommended workarounds outlined within this document.

PERFORMANCE ISSUES

Table 1. Error in Soft Iron Correction Factors [er001]

Background	The signal chain for the tri-axis magnetometer in the ADIS16488A includes a user-configurable, 3 × 3 soft iron correction matrix. Users configure each value in the soft iron correction matrix by writing to its corresponding register. For example, the SOFT_IRON_S12 register contains the value for correction factor S12. In these registers, 1 LSB = $100/2^{15}$.
Issue	On units that have firmware Revision 1.07 (or earlier), 1 LSB = $12.5/2^{15}$, which is eight times lower than the correct value, on the following registers: SOFT_IRON_S12, SOFT_IRON_S13, SOFT_IRON_S21, SOFT_IRON_S31, and SOFT_IRON_S32.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0108, clear all soft iron correction values (write 0x0000 to each SOFT_IRON_Sxy register) and perform the soft iron correction outside of the ADIS16488A.
Related Issues	None.

Table 2. User Offset Addition Error [er002]

Background	The ADIS16488A provides user-configurable bias correction values for each gyroscope and accelerometer(x, y, and z), through the following registers: XG_BIAS_HIGH, XG_BIAS_LOW, YG_BIAS_HIGH, YG_BIAS_LOW, ZG_BIAS_HIGH, ZG_BIAS_LOW, XA_BIAS_HIGH, XA_BIAS_LOW, YA_BIAS_HIGH, YA_BIAS_LOW, ZA_BIAS_HIGH, and ZA_BIAS_LOW.
Issue	On units that have firmware Revision 1.07 (or earlier), there is a computation error that results in a small error in the bias of each sensor (for example, less than 0.02°/sec for the gyroscopes).
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0108, write 0x0000 to XG_BIAS_HIGH, XG_BIAS_LOW, YG_BIAS_HIGH, YG_BIAS_LOW, ZG_BIAS_HIGH, ZG_BIAS_LOW, XA_BIAS_HIGH, XA_BIAS_LOW, YA_BIAS_HIGH, YA_BIAS_LOW, ZA_BIAS_HIGH, and ZA_BIAS_LOW. Apply the bias correction factors to the gyroscope and accelerometer signals outside of the ADIS16488A.
Related Issues	None.

Table 3. Temperature Compensation Error [er003]

Background	The ADIS16488A leverages internal temperature sensors as control inputs for the compensation of gyroscope and accelerometer measurements.
Issue	On units that have firmware Revision 1.08 (or earlier), one of the three temperature sensors can be corrupted when using an external clock to drive the sampling. The external clock causes elevated levels of sensitivity to variation in temperature.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, use the internal sample clock if the best temperature sensitivity is necessary.
Related Issues	None.

Table 4. Real-Time Clock (RTC) Functional Issues [er004]

Background	The ADIS16488A provides a RTC function that keeps track of time (seconds, minutes, hours, days, months, and years) while the main processor function is not operating (sleep, powered off).
Issue	On units that have firmware Revision 1.08 (or earlier), the days information in TIME_DH_OUT can experience an overflow condition when the device recovers from sleep mode.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, do not use sleep mode if the RTC function is critical for the application.
Related Issues	None.

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Table 5. Erroneous Barometer Self Test Result in DIAG_STS [er005]

Background	The DIAG_STS register provides an error flag for the self test function in Bit 11.
Issue	On units that have firmware Revision 1.08 (or earlier), Register DIAG_STS, Bit 11 may remain in a low state, even if the barometer is failing its self test routine.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, do not use Register DIAG_STS, Bit 11 to determine the health of the barometer for mission critical functions.
Related Issues	None.

Table 6. Barometer New Data Bit Continues Updating After Failure [er006]

Background	Register SYS_E_FLAG, Bit 9 indicates that there is new barometer data in the BAROM_OUT register when it is in a high state.
Issue	On units that have firmware Revision 1.08 (or earlier), Register SYS_E_FLAG, Bit 9 still indicates that new data is available, even if the barometer has experienced a failure.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, do not use Register SYS_E_FLAG, Bit 9 to determine the operational state of the barometer function.
Related Issues	None.

Table 7. Sleep Mode Recovery Causes Barometer Failure [er007]

Background	The ADIS16488A provides a sleep mode that has a faster recovery time than a complete restart (power-on or reset recovery).
Issue	On units that have firmware Revision 1.08 (or earlier), recovery from sleep mode can cause failure in the barometer function.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, do not use sleep mode if the barometer is important for the application.
Related Issues	None.

Table 8. Writing to Register FNCTIO_CTRL Causes Barometer Failure [er008]

Background	The FNCTIO_CTRL register provides a number of user configurations for the input/output lines (DIO1, DIO2, DIO3, and DIO4).
Issue	On units that have firmware Revision 1.08 (or earlier), writing to the FNCTIO_CTRL register can cause the barometer measurement function to lock up.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109 and the barometer function is important for the application, reset the operation after writing to Register FNCTIO_CTRL and after backing up those settings in the flash.
Related Issues	None

Table 9. Writing to Register GLOB_CMD, Bit 1 Causes Barometer Failure [er009]

Background	The Register GLOB_CMD, Bit 1 provides a trigger bit for running the self test function on all of the sensors inside of the ADIS16488A.
Issue	On units that have firmware Revision 1.08 (or earlier), running the self test routine by setting Register GLOB_CMD, Bit 1 equal to 1 can cause the barometer measurement function to lock up.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109 and the barometer function is important for the application, reset the operation after running the self test function.
Related Issues	None

Table 10. Daylight Savings Time Error in Real-Time Clock [er010]

Background	The ADIS16488A provides a RTC function that keeps track of time (seconds, minutes, hours, days, months, and years) while the main processor function is not operating (sleep, powered off). Register CONFIG, Bit 1 provides a control for managing against daylight savings time.
Issue	On units that have firmware Revision 1.08 (or earlier), turning daylight savings time on by setting Register CONFIG, Bit 1 equal to 1 causes a malfunction in the tracking of the RTC.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, do not use the daylight savings time setting of Register CONFIG, Bit 1 equal to 1.
Related Issues	None

Table 11. Flash Memory Corruption From Power Loss During Manual Flash Updates [er011]

Background	Setting Register GLOB_CMD, Bit 3 equal to 1 causes an update of the flash memory, which takes 375 ms to execute.
Issue	On units that have firmware Revision 1.09 (or earlier), power loss during manual flash execution has a 1 in 1000 chance of causing corruption in the flash memory, which destroys the device.
Workaround	Read FIRM_REV to determine the firmware revision of a unit. If FIRM_REV < 0x0109, keep VDD > 3.0 V during manual flash update process. Not that this best practice has broader application; however, it does address this specific sensitivity.
Related Issues	None

ANOMALY STATUS

Reference Number	Description	Status	Date Code
er001	Error in soft iron correction factors	Fixed	1438
er002	User offset addition error	Fixed	1438
er003	Temperature compensation error	Fixed	1514
er004	Real-time clock (RTC) functional issues	Fixed	1514
er005	Erroneous barometer self test result in DIAG_STS	Fixed	1514
er006	Barometer new data bit continues updating after failure	Fixed	1514
er007	Sleep mode recovery causes barometer failure	Fixed	1514
er008	Writing to Register FNCTIO_CTRL causes barometer failure	Fixed	1514
er009	Writing to Register GLOB_CMD, Bit 1 causes barometer failure	Fixed	1514
er010	Daylight savings time error in real-time clock	Fixed	1514
er011	Flash memory corruption from power loss during manual flash updates	Fixed	1526

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