Application Note

# AS7265

## AT & I²C Commands for AS7265
## Overview, status and description

## Content Guide

## 1. General Description

This document describes all AT & I²C commands of AS7265 firmware version NEW (here 11.1.0) and their status compared with older firmware versions. The following codes for status are used:

No change – AT command was not changed in function, syntax, response, etc.. No adaptations in firmware are necessary.

Yes Change - AT command was changed in function, syntax, response, etc.. An adaptation in firmware are necessary.

New – AT command is new and was added in version NEW. The AT command can be used in future for customer firmware.

Deleted – AT command was deleted and does not exists in version NEW. Please, check older firmware and replace the deleted command by alternatives.

Adapted – AT command was changed. Please, check older firmware and adapt firmware t the new command, if necessary.

## 2. AT Commands Changes in AS7265

| Change<br>Yes<br>No<br>New | Old Commd | New Commd | Description | Changes Compared to Previous Release |
|---|---|---|---|---|
| **2.1 Status** | | | | |
| No | AT | AT | No operation (NOP) - returns 'OK' | |
| No | ATVERSW | ATVERSW | Return the current software version number | |
| Yes | ATVERHW | ATVERHW | Returns the system hardware as a HEX value of the form PRDTx where P=PartID and R=ChipRevision and DT= DeviceType | one byte changed to two byte and added Device type to LSB byte |
| No | ATTEMP | ATTEMP | Read the current device temperature in degrees Celsius | |
| Yes | ATDATA | ATDATA | Read all six raw values<br>65535 means saturation | Added Saturation beyond 65535 |
| Yes | ATCDATA | ATCDATA | Read calibrated data.<br>Returns comma-separated 32-bit floating-point values. | Changed from 16 bit to 323 bit floating point value |
| **2.2 Control** | | | | |
| No | ATINTTIME | ATINTTIME | Set sensor integration time.<br>Integration time = <value> * ~2.8msecs. | - |

| Change Yes No New | Old Commd | New Commd | Description | Changes Compared to Previous Release |
|---|---|---|---|---|
| No | ATGAIN | ATGAIN | Set sensor gain: 0=1X gain, 1=3.7X, 2=16X, 3=64X | |
| New | - | ATINTRP | Enable/Disable Interrupt Pin, Default pin state: low (pin disabled) or high (pin enabled).<br>Goes to low when new data are measured.<br>Will be reset to high, if raw data or calibrated data were read | |
| No | ATTCSMD | ATTCSMD | Set measurement mode | |
| No | ATINTRVL | ATINTRVL | Set the sampling interval as an integer multiple of the<br>Integration time. The <value> is an integer between [1..255].<br>A sampling interval=1 implies a sampling rate of 1x the<br>current integration time.<br>A sampling interval=255 implies a slow sampling rate of<br>255 times the current integration time. | |
| No | ATBURST | ATBURST | Sends a number of calibrated data without separate requests<br>second parameter for the burst mode is optionally<br>format:<br>Send: ATBURST=10,0 or ATBURST=10<br>Read: ATBURST => 10,0 OK | |
| Yes | ATLED0 | ATLED0 | Enables or disables the indication led | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| Yes | ATLED1 | ATLED1 | Enables or disables the driver led | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| Yes | ATLED2 | ATLED2 | Enables or disables the indication led for first I2C slave | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| Yes | ATLED3 | ATLED3 | Enables or disables the driver led for first I2C slave | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| Yes | ATLED4 | ATLED4 | Enables or disables the indication led for second I2C slave | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| Yes | ATLED5 | ATLED5 | Enables or disables the driver led for second I2C slave | Changed 0 -Led off, 1 - LED ON(before 100-ON) |
| No | ATLEDC | ATLEDC | Sets LED_IND and LED_DRV current | |
| No | ATLEDD | ATLEDD | Sets LED_IND and LED_DRV current for first I2C slave | |

| Change Yes No New | Old Commd | New Commd | Description | Changes Compared to Previous Release |
|---|---|---|---|---|
| No | ATLEDE | ATLEDE | Sets LED_IND and LED_DRV current for second I2C slave | |
| New | ATFRST | ATFRST | Factory Reset. Stored values are reset to 'Factory' defaults. Afterwards a software reset is started. | |
| Yes | ATRST | ATSRST | Software reset | AT command changed from ATRST to ATSRST |
| **2.3 Calibration Values** | | | | |
| New | - | ATSCLx | Read/Write scalar for the raw values<br>x = 0 .. 17 | |
| **2.4 Firmware Update** | | | | |
| No | ATFWU | ATFWU | Starts firmware update process and transfer the bin file checksum | - |
| No | ATFW | ATFW | Download new firmware<br>Up to 7 bytes of FW image at a time (14 hex bytes with no leading or trailing 0x)<br>Repeat command till all 56Kbytes of firmware are downloaded | - |
| No | ATFWS | ATFWS | Tests the checksum on the non-active FW partition and, if correct, switches active partition. This is a toggle and can be used to toggle between the 2 FW partitions. Note: the first 5 bytes in page 0 are not touched. It is only a temporary switch and must be used to check the new firmware whether the communication works! | - |
| New | ATFWL | ATFWL | This command locks the current firmware to starts on power cycles. It rewrites the first five bytes in page0! | This command locks the current firmware to starts on power cycles. It rewrites the first five bytes in page0! |
| New | ATFWC | ATFWC | This command gives information about the current firmware state | This command gives information about the current firmware state |
| No | ATFWA | ATFWA | Only for backward compatibility to support old firmware, update mechanism. Always returns with OK. Because of flash devices, it is not possible to increment the address separately (Page erase necessary!) | - |

## 3. I²C Command Changes in AS7265

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| Yes | HW_Version | | HW_VERSION_H | 0x00 | Device type | Address changed |
| | | 0x00: 0x05 | HW_VERSION_L | 0x01 | HW version | Address changed |
| Yes | FW_Version | | FW_VERSION_H | 0x02 | Set register 0x02 or 0x03 to 1 - 3 to get each firmware positions high byte<br>1: MAJOR version [15..8]<br>2: PATCH version [15..8]<br>3: BUILD version [15..8]<br>Other write values set registers 0x02/0x03 to zero | Address changed |
| | | 0x06: 0x07 | FW_VERSION_L | 0x03 | Set register 0x02 or 0x03 to 1 - 3 to get each firmware positions low byte<br>1: MAJOR version [7..0]<br>2: PATCH version [7..0]<br>3: BUILD version [7..0]<br>Other write values set registers 0x02/0x03 to zero | |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| Yes | Control_ Setup | 0X0C: 0X8C | CONFIGURATION | 0x04 | [7] SRST: [W] software reset [R] gain error<br>[6] INT: [R/W] enable interrupt pin<br>[5:4] GAIN: [R/W] gain configuration: b00=1x; b01=3.7x; b10=16x; b11=64x<br>[3:2] BANK: [R/W] measurement mode:<br>b00=Mode 0: 4 channels<br><br>b01=Mode 1: 4 channels<br><br>b10=Mode 2: all 6 channels<br><br>b11=Mode 3: One-Shot operation of mode 2<br>[1] DATA_RDY: [R] data ready to read<br>[0] FRST: [W] factory reset | [7] RST: [W] software reset [R]<br>[6] INT: [R/W] enable interrupt pin<br>[5:4] GAIN: [R/W] gain configuration: b00=1x; b01=3.7x; b10=16x; b11=64x<br>[3:2] BANK: [R/W] measurement mode:<br>b00=Mode 0: 4 channels<br><br>b01=Mode 1: 4 channels<br><br>b10=Mode 2: all 6 channels<br><br>b11=Mode 3: One-Shot operation of mode 2<br>[1] DATA_RDY: [R] data ready to read<br>[0] RSVD: [W] factory reset |
| Yes | INT_T | 0x0F: 0X8F | INTEGRATION_TIME | 0x05 | Integration time | |
| Yes | Device_ Temp | 0X12: 0x14 | TEMPERATURE | 0x06 | Temperature of the device in °C<br>Read value from every device in dependency of register DEV_SEL | |
| Yes | LED_ Control | 0x15/ 0X95, 0x16/ 0x96, 0x17/ 0X97 | LED_CONFIG | 0x07 | [7] [R] READ_ERR: error while reading status<br>[6] not used<br>[5:4] LED_DRV current limit: b00=12.5mA; b01=25mA; b10=50mA; b11=100mA<br>[3] Enable LED_DRV<br>[2:1] LED_IND current limit: b00=1mA; b01=2mA; b10=4mA; b11=8mA<br>[0] Enable LED_IND<br>Read/Write value from every device in dependency of register DEV_SEL | [7:6] RSVD<br>[5:4] ICL_DRV current limit: b00=12.5mA; b01=25mA; b10=50mA; b11=100mA<br>[3] Enable LED_DRV<br>[2:1] ICL_IND current limit: b00=1mA; b01=2mA; b10=4mA; b11=8mA<br>[0] Enable LED_IND |
| Yes | R_High Or J_High or D_High | 0x18, 0x2A, 0x36 | RAW_VALUE_ 0_H | 0x08 | R or J or D (depends on register DEV_SEL) | |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| Yes | R_Low Or J_Low Or D_Low | 0x19, 0x2B, 0x37 | RAW_VALUE_ 0_L | 0x09 | - | |
| Yes | S_High Or I_High or C_High | 0x1A, 0x28, 0x34 | RAW_VALUE_ 1_H | 0x0A | S or I or C (depends on register DEV_SEL) | |
| Yes | S_Low Or I_Low Or C_Low | 0x1B, 0x29, 0x35 | RAW_VALUE_ 1_L | 0x0B | - | |
| Yes | T_High Or G_High or A_High | 0x1C, 0x24, 0x30 | RAW_VALUE_ 2_H | 0x0C | T or G or A (depends on register DEV_SEL) | |
| Yes | T_Low Or G_Low Or A_Low | 0x1D, 0x25, 0x31 | RAW_VALUE_ 2_L | 0x0D | - | |
| Yes | U_High Or H_High or B_High | 0x1E, 0x26, 0x32 | RAW_VALUE_ 3_H | 0x0E | U or H or B (depends on register DEV_SEL) | |
| Yes | U_Low Or H_Low Or B_Low | 0x1F, 0x27, 0x33 | RAW_VALUE_ 3_L | 0x0F | - | |
| Yes | V_High Or K_High or E_High | 0x20, 0x2C, 0x38 | RAW_VALUE_ 4_H | 0x10 | V or K or E (depends on register DEV_SEL) | |
| Yes | V_Low Or K_Low Or E_Low | 0x21, 0x2D, 0x39 | RAW_VALUE_ 4_L | 0x11 | - | |
| Yes | W_High Or L_High or F_High | 0x22, 0x2E, 0x3A | RAW_VALUE_ 5_H | 0x12 | W or L or F (depends on register DEV_SEL) | |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| Yes | W_Low Or L_Low Or F_Low | 0x23, 0x2F, 0x3B | RAW_VALUE_5_L | 0x13 | - | |
| Yes | R_Cal, J_Cal, D_Cal | R-0x40: 0x43 | CAL_CHAN0_0 | 0x14 | Channel R\|J\|D Calibrated Data (float) | |
| | | J-0x4C: 0x4F | CAL_CHAN0_1 | 0x15 | - | |
| | | D-0x4C: 0x4F | CAL_CHAN0_2 | 0x16 | - | |
| | | | CAL_CHAN0_3 | 0x17 | - | |
| Yes | S_Cal, I_Cal, C_Cal | S-0x44: 0x47 | CAL_CHAN1_0 | 0x18 | Channel S\|I\|C Calibrated Data (float) | |
| | | I-0x48: 0x4B | CAL_CHAN1_1 | 0x19 | - | |
| | | C-0x48: 0x4B | CAL_CHAN1_2 | 0x1A | - | |
| | | | CAL_CHAN1_3 | 0x1B | - | |
| Yes | T_Cal, G_Cal, A_Cal | T-0x48: 0x4B | CAL_CHAN2_0 | 0x1C | Channel T\|G\|A Calibrated Data (float) | |
| | | G-0x40: 0x43 | CAL_CHAN2_1 | 0x1D | - | |
| | | A-0x40: 0x43 | CAL_CHAN2_2 | 0x1E | - | |
| | | | CAL_CHAN2_3 | 0x1F | - | |
| Yes | U_Cal, H_Cal, B_Cal | U-0x4C: 0x4F | CAL_CHAN3_0 | 0x20 | Channel U\|H\|B Calibrated Data (float) | |
| | | H-0x44: 0x47 | CAL_CHAN3_1 | 0x21 | - | |
| | | B-0x44: 0x47 | CAL_CHAN3_2 | 0x22 | - | |
| | | | CAL_CHAN3_3 | 0x23 | - | |
| Yes | V_Cal, K_Cal, E_Cal | V-0x50: 0x53 | CAL_CHAN4_0 | 0x24 | Channel V\|K\|E Calibrated Data (float) | |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| | | K-0x50:0x53 | CAL_CHAN4_1 | 0x25 | - | |
| | | E-0x50:0x53 | CAL_CHAN4_2 | 0x26 | - | |
| | | | CAL_CHAN4_3 | 0x27 | - | |
| Yes | W_Cal, L_Cal, F_Cal | W-0x54:0x57 | CAL_CHAN5_0 | 0x28 | Channel W\|L\|F Calibrated Data (float) | |
| | | L-0x54:0x57 | CAL_CHAN5_1 | 0x29 | - | |
| | | F-0x54:0x57 | CAL_CHAN5_2 | 0x2A | - | |
| | | | CAL_CHAN5_3 | 0x2B | - | |
| | | | not used | 0x2C | - | |
| | | | not used | 0x2D | - | |
| | | | not used | 0x2E | - | |
| | | | not used | 0x2F | - | |
| | | | not used | 0x30 | - | |
| | | | not used | 0x31 | - | |
| - | - | - | not used | 0x32 | - | - |
| - | - | - | not used | 0x33 | - | - |
| | | | not used | 0x34 | - | |
| | | | not used | 0x35 | - | |
| | | | not used | 0x36 | - | |
| | | | not used | 0x37 | - | |
| | | | not used | 0x38 | - | |
| | | | not used | 0x39 | - | |
| | | | not used | 0x3A | - | |
| | | | not used | 0x3B | - | |
| | | | not used | 0x3C | - | |
| | | | not used | 0x3D | - | |
| | | | not used | 0x3E | - | |
| | | | not used | 0x3F | - | |
| - | - | | not used | 0x40 | - | |
| - | - | | not used | 0x41 | - | |
| - | - | | not used | 0x42 | - | |
| - | - | | not used | 0x43 | - | |
| - | - | | not used | 0x44 | - | |
| - | - | | not used | 0x45 | - | |
| - | - | | not used | 0x46 | - | |
| - | - | | not used | 0x47 | - | |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| New | - | | FW_CNTRL | 0x48 | [7] START [R/W]: set bit once to configure the device for firmware update<br>[6] STOP [W]: Reset firmware update state machine<br>[5] BYTES_TRANSFERED [R]: all 56kBytes are transferred<br>[4] LOCK [R/W]: Lock this firmware for next start<br>[3] SWITCH [W]: Switch between both firmware<br>[2] BANK1 [R]: Set if bank 1 is active, else bank 2<br>[1] ERROR [R]: error occurred while firmware update<br>[0] CHKSUM [R]: Checksum of other bank is valid | Refer Description for details |
| New | - | | FW_BYTE_COUNT_H | 0x49 | Byte counter of transferred image | Refer Description for details |
| New | - | | FW_BYTE_COUNT_L | 0x4A | - | Refer Description for details |
| New | - | | FW_PAYLOAD | 0x4B | Transfer of the firmware byte | Refer Description for details |
| New | - | | not used | 0x4C | - | Refer Description for details |
| New | - | | not used | 0x4D | - | Refer Description for details |
| New | - | | not used | 0x4E | - | Refer Description for details |
| New | - | | DEV_SEL | 0x4F | Switch between the different devices.<br>This registers will be switched: 0x06: TEMPERATURE<br><br>0x07: LED_CONFIG<br><br>0x08 - 0x13: RAW_VAL<br><br>0x14 - 0x2B: CAL_CHAN | Refer Description for details |
| New | - | | COEF_DATA_0 | 0x50 | Data heap to read and write calibration data | Refer Description for details |
| New | - | | COEF_DATA_1 | 0x51 | - | Refer Description for details |
| New | - | | COEF_DATA_2 | 0x52 | - | Refer Description for details |
| New | - | | COEF_DATA_3 | 0x53 | - | Refer Description for details |

| Change Yes No New | Old Commd | Old Addr | Command name | New Addr | Description | Changes based on previous release |
|---|---|---|---|---|---|---|
| New | - | | COEF_READ | 0x54 | Set sub addresses to read different calibration data from COEF_DATA register | Refer Description for details |
| New | - | | COEF_WRITE | 0x55 | Set sub addresses to write different calibration data from COEF_DATA register to persistent memory | Refer Description for details |

## 4. Contact Information

**Buy our products or get free samples online at:**
www.ams.com/ICdirect

**Technical Support is available at:**
www.ams.com/Technical-Support

**Provide feedback about this document at:**
www.ams.com/Document-Feedback

**For further information and requests, e-mail us at:**
ams_sales@ams.com

**For sales offices, distributors and representatives, please visit:**
www.ams.com/contact

**Headquarters**
ams AG
Tobelbader Strasse 30
8141 Premstaetten
Austria, Europe

Tel: +43 (0) 3136 500 0
Website: www.ams.com

## 5. Copyrights & Disclaimer



Information in this document is believed to be accurate and reliable. However, ams AG does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Applications that are described herein are for illustrative purposes only. ams AG makes no representation or warranty that such applications will be appropriate for the specified use without further testing or modification. ams AG takes no responsibility for the design, operation and testing of the applications and end-products as well as assistance with the applications or end-product designs when using ams AG products. ams AG is not liable for the suitability and fit of ams AG products in applications and end products planned.

ams AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data or applications described herein. No obligation or liability to recipient or any third party shall arise or flow out of ams AG rendering of technical or other services.

ams AG reserves the right to change information in this document at any time and without notice.

## 6. Revision Information

| Changes from previous version to current revision 11-01 (2018-May-04) | Page |
|---|---|
| Initial version 1-00 | |

**Note:** Page numbers for the previous version may differ from page numbers in the current revision.
Correction of typographical errors is not explicitly mentioned.