BMX055 MICA

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| --- |
| **Inertial Measurement Unit** |

# C:\Users\ccheney\AppData\Local\Microsoft\Windows\INetCache\Content.Word\MICA Logo Transparent.pngFeatures

* 12 Bit Accelerometer
* 16 Bit Gyroscope
* Geo-Magnetic sensor

# General Description

The BMX055 component provides an API implementation for dealing with the Bosch Sensortec BMX055 IMU. The current implementation is for I2C only, although SPI is also supported by the chip. Additionally, the I2C address are not dynamic at this point.

# Input/Output Connections

The BMX055 component is a software only API and contains no I/O connections

# Component Parameters

Double click on the BMX055 component to open the Configure dialog.

## Basic

**I2C Include File**

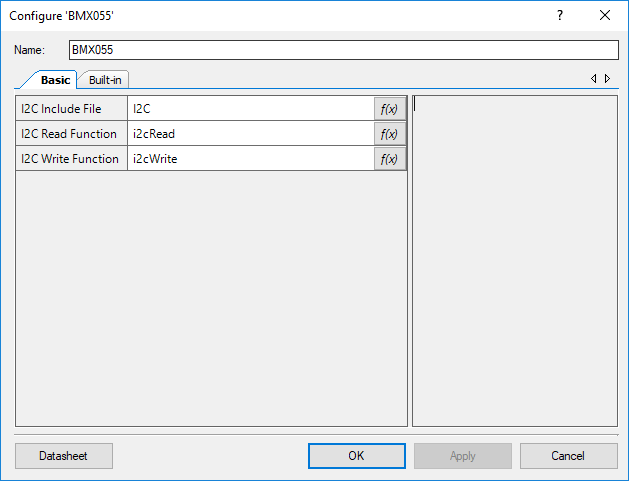
Name of the header file (excluding “.h”) that contains the declaration for the I2C Transport function

**I2C Read Function**

Name of the function that reads data from the device. Must have a signature   
uint32 `$i2cReadFunction`(uint8 deviceAddr, uint8 regAddr, uint8 \* readVal)).

**I2C Write Function**

Name of the function that writes data to the device. Must have a signature   
uint32 `$i2cWriteFunction`(uint8 deviceAddr, uint8 regAddr, uint8 val).



# Application Programming Interface (API)

API routines allows users to control the BMX055 from software. The default name for the component is “BMX055”, which can be changed in the configure dialogue. All functions and constants are generated based on this name.

**Functions**

|  |  |
| --- | --- |
| **Function** | **Description** |
| [BMX055\_Start()](#_uint32_BMX055_Start(void)) | Start the IMU (Acc, Gyr, Mag) |
| BMX055\_Stop() | Disable the IMU (Acc, Gyr, Mag) |
| BMX055\_Sleep() | Put the IMU (Acc, Gyr, Mag) to sleep |
| BMX055\_Wakeup() | Wakeup all of the IMU (Acc, Gyr, Mag) |
| BMX055\_SetParameters() | Writes the parameters out to the device specified |
| BMX055\_GetDeviceState() | Get the value of the power state for a device |
| [BMX055\_Acc\_Start()](#_uint32_BMX055_Acc_Start_(void)) | Start the Accelerometer |
| BMX055\_Acc\_Stop() | Stop the Accelerometer |
| BMX055\_Acc\_Sleep() | Put the Accelerometer into the specified sleep mode |
| BMX055\_Acc\_Wakeup() | Wakeup the Accelerometer |
| [BMX055\_Acc\_Read()](#_uint32_BMX055_Acc_Read(uint16*_data) | Read the value of the Accelerometer |
| [BMX055\_Gyr\_Start()](#_uint32_BMX055_Gyr_Start_(void)) | Start the Gyroscope |
| BMX055\_Gyr\_Stop() | Stop the Gyroscope |
| BMX055\_Gyr\_Sleep() | Put the Gyroscope to sleep |
| BMX055\_Gyr\_Wakeup() | Wakeup the Gyroscope |
| [BMX055\_Gyr\_Read()](#_uint32_BMX055_Gyr_Read(uint16*_data) | Read the value of the Gyroscope |
| [BMX055\_Mag\_Start()](#_uint32_BMX055_Mag_Start_(void)) | Start the Magnetometer |
| BMX055\_Mag\_Stop() | Stop the Magnetometer |
| BMX055\_Mag\_Sleep() | Put the Magnetometer into the specified sleep mode |
| BMX055\_Mag\_Wakeup() | Wakeup the Magnetometer |
| [BMX055\_Mag\_Read()](#_uint32_BMX055_Mag_Read(uint16*_data) | Read the value of Magnetometer |

## uint32 BMX055\_Start(void)

|  |  |
| --- | --- |
| **Description:** | Starts all three devices (Acc, GYR, and MAG). **Currently not implemented.** |
| **Return Value:** | An error code with the result of the start procedure. Possible errors:  BMX055\_ERR\_OK |

## 

## uint32 BMX055\_Stop(void)

|  |  |
| --- | --- |
| **Description:** | Stops all three devices (Acc, GYR, and MAG). **Currently not implemented.** |
| **Return Value:** | An error code with the result of the stop procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Sleep(void)

|  |  |
| --- | --- |
| **Description:** | Sets all three devices (Acc, GYR, and MAG) into sleep mode. **Currently not implemented.** |
| **Return Value:** | An error code with the result of the Sleep procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Wakeup(void)

|  |  |
| --- | --- |
| **Description:** | Wakes up all three devices (Acc, GYR, and MAG) into from mode. **Currently not implemented.** |
| **Return Value:** | An error code with the result of the wakeup procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_SetParameters(uint8 deviceAddr, uint8 numParams, uint8\* sensorParams)

|  |  |
| --- | --- |
| **Description:** | Writes the parameters out to the device specified |
| **Parameter** | **deviceAddr**: Address of the device in question, values are BMX055\_ACC\_ADDR, BMX055\_GYR\_ADDR, BMX055\_MAG\_ADDR  **numParams**: Number of parameters to be written to the device. The array sensor params should be double this length as each parameter is in the format (address, value) s**ensorParams**: An array containing the parameters. (address, value) |
| **Return Value:** | An error code with the result of the write procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_DEVICE\_UKNOWN, or an error from the I2C write function. |

## uint32 BMX055\_GetDeviceState(uint8 deviceAddr, uint8 \* returnState)

|  |  |
| --- | --- |
| **Description:** | Allows the user to get the power state for any of the three devices |
| **Parameter** | **deviceAddr**: Address of the device to query  **returnState**: Pointer to place result into. |
| **Return Value:** | An error code with the result of the get State procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_DEVICE\_UNKNOWN |

## uint32 BMX055\_Acc\_Start (void)

|  |  |
| --- | --- |
| **Description:** | Initializes the Accelerometer. Meant to be a one time initialization / reset. Use BMX055\_Acc\_Wakeup if the sensor needs to be woken up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Start procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Acc\_Stop(void)

|  |  |
| --- | --- |
| **Description:** | Shuts down the Accelerometer completely. Disables are interrupts. Use BMX055\_Acc\_Sleep if interrupts should be maintained. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Stop procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Acc\_Sleep(uint8 powerMode)

|  |  |
| --- | --- |
| **Description:** | Puts the Accelerometer into the low power mode specified. \*Limit implementation\* |
| **Parameter** | **powerMode**: The next power mode the device will enter |
| **Return Value:** | An error code with the result of the Sleep procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_MODE\_INVALID, BMX055\_ERR\_MODE\_UNKNOWN |

## uint32 BMX055\_Acc\_Wakeup(void)

|  |  |
| --- | --- |
| **Description:** | Wakes the Accelerometer up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Wakeup procedure. BMX055\_ERR\_OK |

## uint32 BMX055\_Acc\_Read(uint16\* dataArray, uint8 sensorChannels)

|  |  |
| --- | --- |
| **Description:** | Reads the specified channels of the Accelerometer. Places result into the dataArray |
| **Parameter** | **dataArray**: Pointer to array to place the data into.  **sensorChannels**: A bit mask of the channels to sample |
| **Return Value:** | An error code with the result of the get Read procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_CHANNELS\_NONE |

## uint32 BMX055\_Gyr\_Start (void)

|  |  |
| --- | --- |
| **Description:** | Initializes the Gyroscope. Meant to be a one time initialization / reset. Use BMX055\_Gyr\_Wakeup if the sensor needs to be woken up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Start procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Gyr\_Stop(void)

|  |  |
| --- | --- |
| **Description:** | Shuts down the Accelerometer completely. Disables are interrupts. Use BMX055\_Gyr\_Sleep if interrupts should be maintained. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Stop procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Gyr\_Sleep(uint8 powerMode)

|  |  |
| --- | --- |
| **Description:** | Puts the Gyroscope into the low power mode specified. \*Limit implementation\* |
| **Parameter** | **powerMode**: The next power mode the device will enter |
| **Return Value:** | An error code with the result of the Sleep procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_MODE\_INVALID, BMX055\_ERR\_MODE\_UNKNOWN |

## uint32 BMX055\_Gyr\_Wakeup(void)

|  |  |
| --- | --- |
| **Description:** | Wakes the Gyroscope up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Wakeup procedure. BMX055\_ERR\_OK |

## uint32 BMX055\_Gyr\_Read(uint16\* dataArray, uint8 sensorChannels)

|  |  |
| --- | --- |
| **Description:** | Reads the specified channels of the Gyroscope. Places result into the dataArray |
| **Parameter** | **dataArray**: Pointer to array to place the data into.  **sensorChannels**: A bit mask of the channels to sample |
| **Return Value:** | An error code with the result of the get Read procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_CHANNELS\_NONE |

## uint32 BMX055\_Mag\_Start (void)

|  |  |
| --- | --- |
| **Description:** | Initializes the Magnetometer. Meant to be a one time initialization / reset. Use BMX055\_Mag\_Wakeup if the sensor needs to be woken up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Start procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Mag\_Stop(void)

|  |  |
| --- | --- |
| **Description:** | Shuts down the Accelerometer completely. Disables are interrupts. Use BMX055\_Mag\_Sleep if interrupts should be maintained. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Stop procedure. Possible errors:  BMX055\_ERR\_OK |

## uint32 BMX055\_Mag\_Sleep(uint8 powerMode)

|  |  |
| --- | --- |
| **Description:** | Puts the Magnetometer into the low power mode specified. \*Limit implementation\* |
| **Parameter** | **powerMode**: The next power mode the device will enter |
| **Return Value:** | An error code with the result of the Sleep procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_MODE\_INVALID, BMX055\_ERR\_MODE\_UNKNOWN |

## uint32 BMX055\_Mag\_Wakeup(void)

|  |  |
| --- | --- |
| **Description:** | Wakes the Magnetometer up from sleep. \*CURRENTLY NOT IMPLEMENTED\* |
| **Return Value:** | An error code with the result of the Wakeup procedure. BMX055\_ERR\_OK |

## uint32 BMX055\_Mag\_Read(uint16\* dataArray, uint8 sensorChannels)

|  |  |
| --- | --- |
| **Description:** | Reads the specified channels of the Magnetometer. Places result into the dataArray |
| **Parameter** | **dataArray**: Pointer to array to place the data into.  **sensorChannels**: A bit mask of the channels to sample |
| **Return Value:** | An error code with the result of the get Read procedure. Possible errors:  BMX055\_ERR\_OK, BMX055\_ERR\_CHANNELS\_NONE |

# Component Macros

The following is a list of macros/constants that a user may find useful for interacting with the component. A component may contain macros not listed here.

|  |  |
| --- | --- |
| **Macro Name** | **Description** |
| BMX055\_PARAM\_BYTE\_LEN | Number of bytes contained in a dynamic param for a sensor (address & value) |
| BMX055\_CHANNEL\_INDEX\_X | Index of the X Channel |
| BMX055\_CHANNEL\_INDEX\_Y | Index of the Y Channel |
| BMX055\_CHANNEL\_INDEX\_Z | Index of the Z Channel |
| BMX055\_CHANNEL\_INDEX\_NUM\_CHAN | Index of the number of channels that data was collected from |
| BMX055\_CHANNEL\_INDEX\_DATA | Index of the start of data when reported by a sensor |
| BMX055\_CHANNEL\_MASK\_X | Mask of the X channel |
| BMX055\_CHANNEL\_MASK\_Y | Mask of the Y channel |
| BMX055\_CHANNEL\_MASK\_Z | Mask of the Z channel |
| BMX055\_ACC\_PM\_NORMAL | Accelerometer Power Mode - Normal |
| BMX055\_ACC\_PM\_STANDBY | Accelerometer Power Mode - Standby |
| BMX055\_ACC\_PM\_LP1 | Accelerometer Power Mode – Low Power 1 |
| BMX055\_ACC\_PM\_LP2 | Accelerometer Power Mode – Low Power 2 |
| BMX055\_ACC\_PM\_SUSPEND | Accelerometer Power Mode - Suspend |
| BMX055\_ACC\_PM\_DEEP\_SUSPEND | Accelerometer Power Mode – Deep Suspend |
| BMX055\_GYR\_PM\_NORMAL | Gyroscope Power Mode - Normal |
| BMX055\_GYR\_PM\_FAST\_POWERUP | Gyroscope Power Mode – Fast powerup |
| BMX055\_GYR\_PM\_SUSPEND | Gyroscope Power Mode - Suspend |
| BMX055\_GYR\_PM\_DEEP\_SUSPEND | Gyroscope Power Mode – Deep Suspend |
| BMX055\_MAG\_PM\_SUSPEND | Magnetometer Power Mode - Suspend |
| BMX055\_MAG\_PM\_SLEEP | Magnetometer Power Mode - Sleep |
| BMX055\_MAG\_PM\_NORMAL | Magnetometer Power Mode - Normal |
| BMX055\_MAG\_PM\_FORCED | Magnetometer Power Mode - Forced |

# Change Log

This sections lists changes to the component from previous versions

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Revision** | **Description of Changes** | **Reason for Changes / Impact** |
| v1.0 | r0 | Initial implementation of the component and datasheet |  |