Sensor Settings

The basic sensor setup includes the selection of the bandwidth and measurement range for accelerometer and gyroscope.

7.2.1 Accelerometer

The **bandwidth** (3db cutoff frequency) of the digital low-pass filter depends on the chosen ODR as well as on the over sampling ratio (OSR). Both can be configured in register ACC 0x40 (*ACC_CONF*). The following table lists the possible options:

7.2

Accelerometer ODR [Hz]	3dB cutoff frequency [Hz]		
	Normal	OSR = 2	OSR = 4
12.5	5.06	3	1
25	10.12	5	3
50	20.25	10	5
100	40.5	20	10
200	80	41	20
400	162 (155 for Z channel)	80	41
800	324 (252 for Z channel)	162 (155 for Z channel)	80
1600	684 (353 for Z channel)	324 (262 for Z channel)	162

The acceleration measurement **range** can be selected via bits <1:0> (*acc_range*) in register ACC 0x41 (*ACC_RANGE*) according to the table below.

acc_range <1:0>	Measurement Range	Resolution
00	± 2 g	16384 LSB/g
01	± 4 g	8192 LSB/g
10	± 8 g	4096 LSB/g
11	± 16 g	2048 LSB/g

7.2.2 Gyroscope

The **bandwidth** of filtered rate data is determined by setting bits <3:0> (*bw*) in register GYR 0x10 (*BW*) as shown in the following table.

bw <3:0>	Filter Bandwidth [Hz]	ODR [Hz]	Decimation Factor
0111	32	100	20
0110	64	200	10
0101	12	100	20
0100	23	200	10
0011	47	400	5
0010	116	1000	2
0001	230	2000	0
0000	523 (unfiltered)	2000	0
1xxx	reserved	reserved	reserved

The rate measurement **range** can be selected via bits <2:0> (*range*) in register GYR 0x0F (*RANGE*) according to the table below.

range <2:0>	Measurement Range	Resolution
000	±2000 °/s	16.38 LSB/°/s
001	±1000 °/s	32.77 LSB/°/s
010	±500 °/s	65.54 LSB/°/s
011	±250 °/s	131.07 LSB/°/s
100	±125 °/s	262.14 LSB/°/s
others	reserved	-

Power Modes

7.3.1 Power Modes Accelerometer

7.3 The power state of the SMI230 accelerometer is controlled through the register ACC_PWR_CTRL. The register ACC_PWR_CTRL enables and disables the accelerometer and the temperature sensor.

To enter **normal mode**, the value 0x04 must be written to ACC_PWR_CTRL.

To enter **suspend mode**, the register ACC_PWR_CTRL must be cleared.

The SMI230 accelerometer is in suspend mode after reset (POR or soft-reset), thus the user actively needs to enter normal mode in order to obtain acceleration values.

For the procedure of changing the power mode, please refer to 7.1 Device Initialization. Any communication with the sensor during this time should be avoided.

7.3.2 Power Modes Gyroscope

The gyroscope has 3 different power modes. Besides **normal mode**, which represents the fully operational state of the device, there are 2 energy saving modes: suspend mode and deep suspend mode.

After power-up the gyro is in normal mode so that all parts of the device are held powered-up and data acquisition is performed continuously.

In **suspend mode** the whole analog part is powered down. No data acquisition is performed. While in suspend mode the latest rate data and the content of all configuration registers are kept. The registers can still be read (though they are not updated).

The suspend mode is entered by writing 0x80 to the register GYRO_LPM1. It can be left by writing 0x00 to GYRO_LPM1 or by a soft reset.

Although write access to registers is supported at the full interface clock speed (SCL or SCK), a waiting period must be inserted between two consecutive write cycles.

In **deep suspend mode** the device reaches the lowest possible power consumption. Only the interface section is kept alive. No data acquisition is performed and the content of the configuration registers is lost.

The deep suspend mode is entered by writing 0x20 to the register GYRO_LPM1. It can be left by writing 0x00 to GYRO_LPM1 or by a soft reset.

Please note, that all application specific settings, which are not equal to the default settings, must be re-set to their designated values after leaving deep suspend mode.