BHI360
Programmable sensor system
1 General description

The BHI360 is a highly integrated, ultra-low power, customizable smart sensor system consisting of a best-in-class 6-axis IMU, a programmable 32-bit microcontroller (Fuser2 Core), a second ultra-low power MCU, with a powerful software framework containing pre-installed sensor fusion and other sensor data processing software within a 2.5 mm x 3 mm LGA package, Pin2pin backward compatible with Bosch Sensortec IMUs.

The Fuser2 Core in the BHI360 is intended to be used as co-processor, offloading the main CPU from sensor data processing tasks, like sensor fusion, position tracking, activity and gesture detection with high precision and low latency while significantly reducing the overall system power consumption.

2 Overview features

Hardware features
- ARC EM4 CPU (up to 3.6 CoreMark/MHz)
- Floating Point Unit (FPU)
- Memory Protection Unit (MPU)
- 4-channel micro-DMA Controller
- ARCv2 16/32-bit instruction set

Low Power CPU (Bosch Sensortec Core):
- Optimized for accelerometer based always-on algorithms

Memory
- 256 kB on-chip SRAM
- 144 kB on-chip ROM preloaded with software

Connectivity
- Host interface configurable as SPI or I2C
- 2 secondary master interfaces (one I2C interface, and one selectable SPI or I2C)
- Up to 14 GPIOs
- Fast I/O operations:
  - SPI and GPIOs up to 50 MHz
  - I2C up to 3.4 MHz

Integrated sensor (6-DoF IMU)
- 16-bit 3-axis accelerometer
- 16-bit 3-axis gyroscope

BHI360 TARGET APPLICATIONS
- Wrist wearables such as smartwatches, fitness bands and smart hybrid watches
- Head mounted devices such as headsets, truly wireless in-ear devices and smart sunglasses
- Smartphones and other mobile communication devices
- AR/VR/MR headset and controller devices

Software features
- Open sensor platform for development of custom embedded algorithms for Fuser2 Core (MCU)
- Integrated event-driven software framework and OpenRTOS™ with virtual sensor stack
- Integrated BSX sensor fusion software library including dynamic offset auto-calibration algorithms, 6DoF and 9DoF 3D device orientation, gravity vector, etc.
- Support for high-performance mode as well as several low-power modes
- Integrated head orientation algorithm featuring sensor fusion and head misalignment correction
- Optimized algorithms running on ultra-low power Bosch Sensortec Core including step counter, tap detection, gesture detection, and activity recognition
- Powerful SDK for easy customization with support for
  - Metaware C Compiler for ARC
  - GNU C Compiler for ARC
3 Technical specifications

### BHI360 technical data

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HSDO</td>
<td>Host Interface SPI MISO / I2C address select</td>
</tr>
<tr>
<td>2</td>
<td>ASDX</td>
<td>OIS MOSI / Aux I2C SDA M2: SPI MOSI / I2C SDA</td>
</tr>
<tr>
<td>3</td>
<td>ASCX</td>
<td>OIS Clock / Aux I2C SCL M2: SPI SCK / I2C SCL</td>
</tr>
<tr>
<td>4</td>
<td>HIRQ</td>
<td>Host Interrupt Output</td>
</tr>
<tr>
<td>5</td>
<td>VDDIO</td>
<td>Digital IO and Fuser Supply</td>
</tr>
<tr>
<td>6</td>
<td>GNDIO</td>
<td>Digital IO and Fuser Ground</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Analog Sensor Ground</td>
</tr>
<tr>
<td>8</td>
<td>VDD</td>
<td>Analog Sensor Supply</td>
</tr>
<tr>
<td>9</td>
<td>VREG</td>
<td>Voltage regulator output</td>
</tr>
<tr>
<td>10</td>
<td>OCSB</td>
<td>OIS Chip Select Input M2: SPI Chip Select 1</td>
</tr>
<tr>
<td>11</td>
<td>OSDO</td>
<td>OIS MISO M2: SPI MISO / I2C unused</td>
</tr>
<tr>
<td>12</td>
<td>HCSB</td>
<td>Host Interface SPI CSN / Protocol Select</td>
</tr>
<tr>
<td>13</td>
<td>HSCX</td>
<td>Host Interface SPI SCK, I2C SCL</td>
</tr>
<tr>
<td>14</td>
<td>HSDX</td>
<td>Host Interface SPI MOSI, I2C SDA</td>
</tr>
<tr>
<td>15</td>
<td>JTAG_CLK/M3SCL</td>
<td>Fuser Debug Clock / M3 I2C SCL</td>
</tr>
<tr>
<td>16</td>
<td>JTAG_DIO</td>
<td>Fuser Debug Data</td>
</tr>
<tr>
<td>17</td>
<td>RESETN</td>
<td>Reset input, active low</td>
</tr>
<tr>
<td>18</td>
<td>M3SDA</td>
<td>M3 I2C SDA</td>
</tr>
<tr>
<td>19</td>
<td>RESV2</td>
<td>Reserved: do not connect</td>
</tr>
<tr>
<td>20</td>
<td>RESV1</td>
<td>Reserved: do not connect</td>
</tr>
</tbody>
</table>

**Pin configuration**

```
  11  12  13  14  1
  10  18  19  20  2
   9  17  16  15  3
   8   7   6   5   4
```

**Headerquartes**

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