

7-Axis, High Performance Integrated 6-Axis Inertial and Barometric Pressure Sensor

GENERAL DESCRIPTION

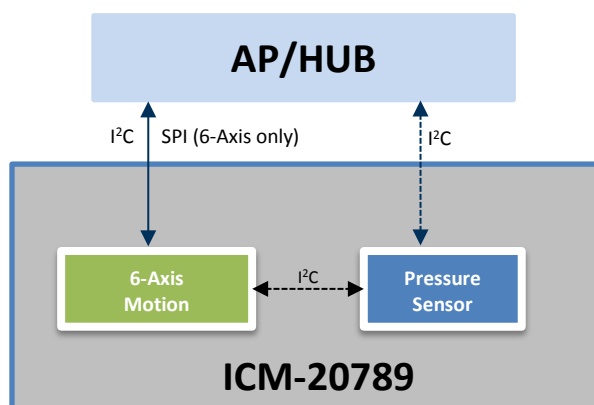
The 7-Axis ICM-20789 is an integrated 6-axis inertial device that combines a 3-axis gyroscope, 3-axis accelerometer, and an ultra-low noise MEMS capacitive pressure sensor in a 24-pin LGA package. This unique 7-Axis device offers performance of discrete components in a single small footprint for tracking rotational and linear motion as well as pressure differences with an accuracy of ± 1 Pa, an accuracy enabling altitude measurement differentials as small as 8.5 cm.

The pressure sensor's MEMS capacitive architecture provides the industry's lowest noise at the lowest power, high sensor throughput, and temperature coefficient offset of ± 0.5 Pa/ $^{\circ}$ C. The pressure sensor's combination of high accuracy elevation measurements, low power, and temperature stability complemented by the motion tracking 6-axis inertial sensor in a small footprint, make it ideal for a wide range of motion tracking applications.

The embedded 6-axis MotionTracking device combines a 3-axis gyroscope, 3-axis accelerometer, and a Digital Motion Processor™ (DMP). An available large 4 kB FIFO reduces traffic on the serial bus interface, and power consumption through burst sensor data transmission. The Gyroscope has programmable FSR of ± 250 dps, ± 500 dps, ± 1000 dps and ± 2000 dps. The Accelerometer FSR is programmable to $\pm 2g$, $\pm 4g$, $\pm 8g$ and $\pm 16g$

ICM-20789 has 16-bit ADC for the 6-axis inertial sensor and 24-bit ADC for the pressure Sensor, programmable digital filters, two temperature sensors – one each in 6-axis Inertial and Pressure sensor. The device features an operating voltage of 1.8V. Communication port includes I²C at 400 kHz (6-axis and Pressure) and 8 MHz SPI (6-axis only). The package is 4x4x1.365 mm 24-pin to minimize board area requirements.

BLOCK DIAGRAM



APPLICATIONS

- Drones and Flying Toys
- Motion-based gaming controllers
- Virtual Reality headsets and controllers
- Indoor/Outdoor Navigation (dead-reckoning, floor/elevator/step detection)

FEATURES

- Pressure operating range: 30 to 110 kPa
- Noise and current consumption
 - 3.2 Pa @ 1.3 μ A (LP mode)
 - 0.8 Pa @ 5.2 μ A (LN mode)
 - 0.4 Pa @ 10.4 μ A (ULN mode)
- Pressure Sensor Relative Accuracy: ± 1 Pa for any 10 hPa change over 950 hPa-1050 hPa at 25 $^{\circ}$ C
- Pressure Sensor Absolute Accuracy: ± 1 hPa over 950 hPa-1050 hPa, 0 $^{\circ}$ C to 65 $^{\circ}$ C
- Pressure Sensor Temperature Coefficient Offset: ± 0.5 Pa/ $^{\circ}$ C over 25 $^{\circ}$ C to 45 $^{\circ}$ C at 100 kPa
- Gyroscope programmable FSR of ± 250 dps, ± 500 dps, ± 1000 dps, and ± 2000 dps
- Accelerometer with Programmable FSR of $\pm 2g$, $\pm 4g$, $\pm 8g$, and $\pm 16g$
- Large 4 kB FIFO reduces traffic on the serial bus interface
- EIS FSYNC support
- User-programmable interrupts
- Wake-on-motion interrupt for low power operation of applications processor
- Host interface: 400 kHz Fast Mode I²C & 8 MHz SPI(see datasheet for ICM-20689)
- Digital-output temperature sensor (x2)
- Nominal VDD operation at 1.8V
- RoHS and Green compliant

ORDERING INFORMATION

PART	TEMP RANGE	PACKAGE
ICM-20789†	-40 $^{\circ}$ C to +85 $^{\circ}$ C	24-Pin LGA

†Denotes RoHS and Green-Compliant Package