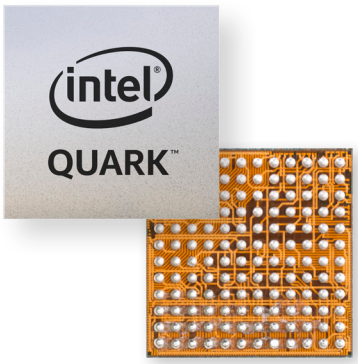
PRODUCT BRIEF

Intel® Quark™ SE microcontroller

The newest Intel Quark SE microcontrollers bring always-sensing intelligence and powerful peripheral support to the next generation of intelligent connected devices.

Internet of Things



THE INTEL® QUARK™ SE MICROCONTROLLER IS IDEAL FOR:

Smart tags/readers for industrial applications

Display controllers for retail

Sensor and device controllers for medical and biometric use

Motor controllers in smart buildings

Product Overview

Intel is proud to announce the Intel® Quark™ SE microcontroller, bringing intelligent power to the edge by combining a microcontroller with an onboard sensor subsystem to manage power consumption through programmable wake cues. The Intel Quark SE microcontroller also features pattern matching technology that allows it to learn and differentiate. The result is always-sensing intelligence, bringing real-time response down to the next generation of intelligent devices.

Pattern Matching Technology

The Intel Quark SE microcontroller includes sophisticated pattern matching technology that allows it to learn through pattern recognition and differentiate appropriate response events. Having decision-making ability at the edge can provide a more real-time response, such as in an industrial setting, monitoring energy consumption and triggering an event if an anomalous event occurs. It can also reduce costs by lowering the number of gateways required to manage edge data.

Internal Sensor Hub

The Intel Quark SE microcontroller includes an internal sensor hub, which manages multiple sensors—allowing it to support more peripherals. It also allows the main CPU to sleep, until the sensor controller wakes it up based on programmable cues, resulting in very low energy consumption.

Intel-Class Security Features

The Intel Quark SE microcontroller extends rock-solid Intel security down to the device level with software- and hardware-based features to help protect data at every endpoint.

Intelligence at the Edge

The Intel Quark SE microcontroller brings intelligence to the edge for real-world applications. It is interoperable with other Intel®-based systems, simplifying integration of edge products in end-to-end IoT architectures. More can be handled at the device level, reducing the need for larger gateways.

Faster Time to Market

The Intel Quark SE microcontroller simplifies design and reduces bill of materials (BOM) by minimizing external components required on the platform. The Intel® System Studio integrated development environment is included with all Intel® microcontrollers. This maximizes investment of time and money by reusing software to scale up or down to any Intel® processor without additional costs.

The Intel Quark SE microcontroller provides tremendous flexibility by requiring a single DC power source with an operating range of 1.8–3.3 volts and supporting the serial interfaces typically seen on sensors, wireless modules, flash devices, and EEPROMs. Additionally, all 32 of its bidirectional I/O pins can be used as general purpose I/O (GPIO). With programmable drive strength and integrated pull-ups, they can be connected directly to LEDs, relays, H-bridges, or switches.

Moreover, with a 19-channel ADC with selectable 6/8/10/12-bit resolution instantiated in the Sensor Subsystem—and with 6 high-speed analog comparators and 13 low-power wake-up comparators—it boasts solid mixed signal capabilities.

The Intel Quark SE microcontroller comes in a 10x10 mm 144-pin BGA and is qualified over an industrial temperature range (-40 °C to +85 °C).

INTEL® QUARK™ SE MICROCONTROLLER FEATURES AT A GLANCE

FEATURE	SPECIFICATION
CPU	32-bit processor @ 32 MHz Intel® Pentium® x86-compatible without x87 floating point unit 8 KB instruction cache, 2-way associative
Sensor subsystem	32-bit DSP core @ 32 MHz Supporting ARCv2 ISA and floating point unit 8 KB instruction cache, 2-way associative 8 KB DCCM
Pattern-matching accelerator	Hardware pattern recognition IP 128 neurons with 128 components per neuron
Flash	384 KB on-die flash 192 KB dedicated to host processor 192 KB dedicated to sensor system 8 KB OTP
RAM	80 KB on-die SRAM
General-use timers	4
Watchdog timer	1
Real-time clock	Sources a 32-bit counter running from 1 Hz up to 32.768 KHz
UARTs	2 16550-compliant interfaces Baud rates from 300 to 2M
SPI	2 masters with up to 4 devices per master 1 slave
General purpose I/O	32 independently configurable 16 additional available via sensor subsystem
USB controller	1.1 device-only controller
I^2C	2 general-purpose I^2C interfaces, configurable either as master or slave 2 master-only interfaces available in the sensor subsystem Interface speeds: 100 kbps, 400 kbps, and 1 Mbps

FEATURE	SPECIFICATION
I^2S	2 I^2S interfaces: 1 transmit interface 1 receive interface
ADC	Single ADC controller instantiated in the sensor subsystem 19 single-ended inputs 12-bit resolution
Analog comparators	19 analog comparators: 6 high-performance 13 low-power
DMA	8 unidirectional channels
Security	8k OTP JTAG lock On-die NVM read/write access control
Package type	10x10 mm, 144-BGA pkg
Crystal oscillators	32 MHz 32.768 KHz
Silicon oscillator	32 MHz 32.768 KHz
CPU clock generator	4/8/16/32 MHz Low-power compute mode w/RTC clock source
SoC states	Active, Sleep, and Off Host processor states: C0–C2 Sensor subsystem states: Sensing Active, Sensing Wait, and Sensing Standby
Platform power	DC-DC 1.8 V, 3.3 V
Operating temperature	-40 °C to +85 °C

Notes

1. Power is measured at 25 °C on typical devices with a 3.3 V supply and static I/O.
2. Active power is measured while executing a 64-point FFT.
3. Power and latency figures assume silicon oscillator is used.
4. Standby and retention w/o RTC assume one low-power wake-up comparator is enabled.

Learn more about Intel IoT solutions at intel.com/iot.

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