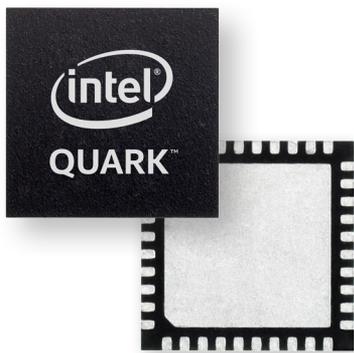


Intel® Quark™ microcontroller D2000 for IoT solutions

The newest Intel Quark microcontrollers provide flexible, low-power computing for a wide variety of vertical industry solutions—bringing low-cost integration and x86 architecture compatibility to the next wave of intelligent connected devices.

Internet of Things



Product Overview

Intel is proud to announce the first x86-based Intel® Quark™ microcontroller D2000, a low-power, battery-operated, 32-bit microcontroller with a more robust instruction set than other entry-level microcontrollers. The Intel Quark microcontroller D2000 also increases input/output options over other entry-level microcontrollers.

Within its small footprint, the Intel Quark microcontroller D2000 includes an ultra-low-power core running at 32 MHz, with 32k integrated flash and 8 KB OTP memory, and 8 KB SRAM.

Integrated Security Features

The Intel Quark microcontroller D2000 extends excellent Intel security down to the device level with software- and hardware-based features to help protect your data at every endpoint.

Intelligence at the Edge

The Intel Quark microcontroller D2000 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 more costly and potentially unnecessary gateways, depending on application.

THE INTEL® QUARK™ MICROCONTROLLER D2000 IS IDEAL FOR:



Smart tags/readers
for industrial applications



Sensor and device controllers
for medical and biometric use



Display controllers
for retail



Motor controllers
in smart buildings

Faster Time to Market

The Intel Quark microcontroller D2000 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.

Tremendous Flexibility

The Intel Quark microcontroller D2000 provides tremendous flexibility by requiring a single DC power source with an operating range of 2.0–3.3 volts and supporting the serial interfaces typically seen on sensors, wireless modules, flash devices, and EEPROMs. Additionally, all 25 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 19 analog comparators, 19 input channels for ADC, 2.28 MSps SAR ADC with selectable 6/8/10/12-bit resolution—and with 6 high-speed analog comparators and 13 low-power wake-up comparators—it boasts solid mixed-signal capabilities.

The Intel Quark microcontroller D2000 comes in a 6x6 mm 40-pin QFN and is qualified over an industrial temperature range (-40 °C to +85 °C), with 10-year reliability for IoT devices.

INTEL® QUARK™ MICROCONTROLLER D2000 FEATURES AT A GLANCE

FEATURE	SPECIFICATION
CPU	32-bit processor @ 32 MHz Intel® Pentium® x86-compatible without x87 floating point unit
Flash	32 KB instruction + 8 KB data
RAM	8 KB
General-use timers	2
PWM (Pulse width modulator)	2
Watchdog timer	Resolution from 8 µs to ~60 s (running at 32 Mhz)
Real-time clock	Sources a 32-bit counter running from 1 Hz up to 32.768 KHz
UARTs	2 16550-compliant interfaces
SPI	2 (1 master with up to 4 devices, 1 slave)
General-purpose I/O	25 independently configurable
I ² C	1 (master/slave)
ADC	19-channel SAR (12/10/8/6-bit@2.4/2.8/3.3 MSps)
Analog comparators	19 analog comparators: 6 high-performance 13 low-power
DMA	2 unidirectional channels

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.

FEATURE	SPECIFICATION
Security	Secure update 8k OTP JTAG lock Isolated SRAM regions On-die NVM read/write access control
Package type	40-pin QFN, 6x6 mm
Crystal oscillators (externally generated)	32 MHz 32.768 KHz
Silicon oscillator (internally generated)	32 MHz 32.768 KHz
ADC	Successive-approximation 19 single-ended inputs 1.8–3.6 V
CPU clock generator	4/8/16/32 MHz Low-power compute mode w/RTC clock source
Voltage	PCDD: 1.8–3.63 V AVDD: 2.0–3.63 V IOVDD: 1.8–3.63 V DVDD: 1.8 V +/- 10%
SoC states	Active, Sleep, and Off
Platform power	DC-DC 2.0 V, 3.3 V
Operating temperature	-40 °C to +85 °C

SPEC CODE	MM #	STEPPING	PACKAGE	FORMAT
SR2KF	946998	A0	40-pin QFN	T&R

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



INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order. Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or by visiting Intel's website at intel.com.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software, or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

Cost-reduction scenarios described are intended as examples of how a given Intel-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

Copyright © 2015 Intel Corporation. Intel, the Intel logo, Pentium, and Quark are trademarks of Intel Corporation in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.