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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "<u>Embedded -</u> <u>Microcontrollers</u>"

Details

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Product Status	Discontinued at Digi-Key
Core Processor	ARM® Cortex®-M0+
Core Size	32-Bit Single-Core
Speed	25MHz
Connectivity	I ² C, IrDA, SmartCard, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, DMA, I ² S, POR, PWM, WDT
Number of I/O	17
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	8K x 8
Voltage - Supply (Vcc/Vdd)	1.98V ~ 3.8V
Data Converters	A/D 4x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	24-VQFN Exposed Pad
Supplier Device Package	24-QFN (5x5)
Purchase URL	https://www.e-xfl.com/product-detail/silicon-labs/efm32hg108f64g-b-qfn24r

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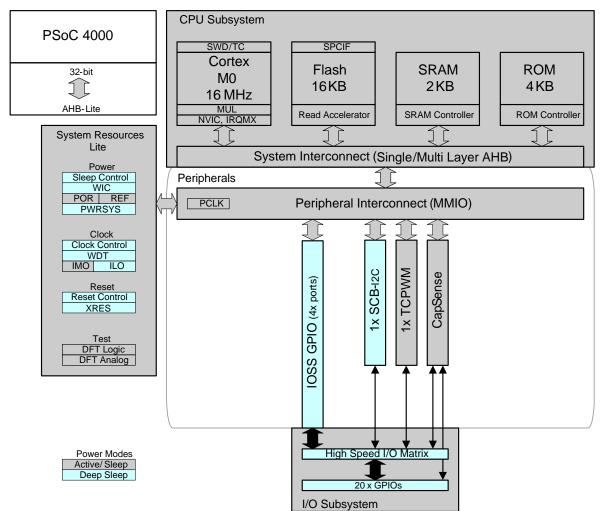


Figure 2. Block Diagram

PSoC 4000 devices include extensive support for programming, testing, debugging, and tracing both hardware and firmware.

The ARM Serial-Wire Debug (SWD) interface supports all programming and debug features of the device.

Complete debug-on-chip functionality enables full-device debugging in the final system using the standard production device. It does not require special interfaces, debugging pods, simulators, or emulators. Only the standard programming connections are required to fully support debug.

The PSoC Creator IDE provides fully integrated programming and debug support for the PSoC 4000 devices. The SWD interface is fully compatible with industry-standard third-party tools. The PSoC 4000 family provides a level of security not possible with multi-chip application solutions or with microcontrollers. It has the following advantages:

- Allows disabling of debug features
- Robust flash protection
- Allows customer-proprietary functionality to be implemented in on-chip programmable blocks

The debug circuits are enabled by default and can only be disabled in firmware. If they are not enabled, the only way to re-enable them is to erase the entire device, clear flash protection, and reprogram the device with new firmware that enables debugging.

Additionally, all device interfaces can be permanently disabled (device security) for applications concerned about phishing attacks due to a maliciously reprogrammed device or attempts to defeat security by starting and interrupting flash programming sequences. All programming, debug, and test interfaces are disabled when maximum device security is enabled. Therefore, PSoC 4000, with device security enabled, may not be returned for failure analysis. This is a trade-off the PSoC 4000 allows the customer to make.

Electrical Specifications

Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings^[4]

Spec ID#	Parameter	Description	Min	Тур	Мах	Units	Details/ Conditions
SID1	V _{DD_ABS}	Digital supply relative to V _{SS}	-0.5	_	6	V	
SID2	V _{CCD_ABS}	Direct digital core voltage input relative to V_{SS}	-0.5	_	1.95	V	
SID3	V _{GPIO_ABS}	GPIO voltage	-0.5	_	V _{DD} +0.5	V	
SID4	I _{GPIO_ABS}	Maximum current per GPIO	-25	-	25	mA	
SID5	I _{GPIO_injection}	GPIO injection current, Max for V _{IH} > V _{DD} , and Min for V _{IL} < V _{SS}	-0.5	_	0.5	mA	Current injected per pin
BID44	ESD_HBM	Electrostatic discharge human body model	2200	-	-	V	
BID45	ESD_CDM	Electrostatic discharge charged device model	500	-	-	V	
BID46	LU	Pin current for latch-up	-140	-	140	mA	

Device Level Specifications

All specifications are valid for –40 °C \leq T_A \leq 85 °C and T_J \leq 100 °C, except where noted. Specifications are valid for 1.71 V to 5.5 V, except where noted.

Table 4. DC Specifications

Typical values measured at V_{DD} = 3.3 V and 25 °C.

Spec ID#	Parameter	Description	Min	Тур	Max	Units	Details/ Conditions
SID53	V _{DD}	Power supply input voltage	1.8	-	5.5	V	With regulator enabled
SID255	V _{DD}	Power supply input voltage ($V_{CCD} = V_{DD}$)	1.71	-	1.89	V	Internally unreg- ulated supply
SID54	V _{DDIO}	V _{DDIO} domain supply	1.71	-	V _{DD}	V	
SID55	C _{EFC}	External regulator voltage bypass	-	0.1	-	μF	X5R ceramic or better
SID56	C _{EXC}	Power supply bypass capacitor	-	1	-	μF	X5R ceramic or better
Active Mode,	Active Mode, V _{DD} = 1.8 to 5.5 V						
SID9	I _{DD5}	Execute from flash; CPU at 6 MHz	-	2.0	2.85	mA	
SID12	I _{DD8}	Execute from flash; CPU at 12 MHz	-	3.2	3.75	mA	
SID16	I _{DD11}	Execute from flash; CPU at 16 MHz	-	4.0	4.5	mA	
Sleep Mode, V _{DD} = 1.71 to 5.5 V							
SID25	I _{DD20}	I ² C wakeup, WDT on. 6 MHz	-	1.1	-	mA	
SID25A	I _{DD20A}	I ² C wakeup, WDT on. 12 MHz	-	1.4	_	mA	
Deep Sleep Mode, V _{DD} = 1.8 to 3.6 V (Regulator on)							
SID31	I _{DD26}	I ² C wakeup and WDT on	-	2.5	8.2	μA	

Note

^{4.} Usage above the absolute maximum conditions listed in Table 1 may cause permanent damage to the device. Exposure to Absolute Maximum conditions for extended periods of time may affect device reliability. The Maximum Storage Temperature is 150 °C in compliance with JEDEC Standard JESD22-A103, High Temperature Storage Life. When used below Absolute Maximum conditions but above normal operating conditions, the device may not operate to specification.