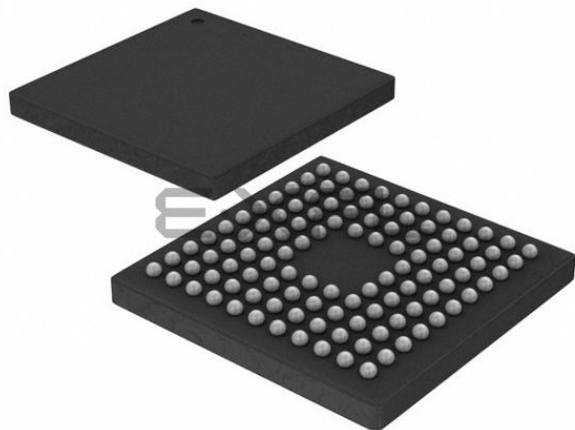




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Details

Product Status	Active
Core Processor	ARM® Cortex®-M3
Core Size	32-Bit Single-Core
Speed	32MHz
Connectivity	EBI/EMI, I ² C, IrDA, SmartCard, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, DMA, LCD, POR, PWM, WDT
Number of I/O	90
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	16K x 8
Voltage - Supply (Vcc/Vdd)	1.98V ~ 3.8V
Data Converters	A/D 8x12b; D/A 2x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	112-LFBGA
Supplier Device Package	112-BGA (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/silicon-labs/efm32g890f64g-e-bga112r

Table of Contents

1. Feature List	2
2. Ordering Information	4
3. System Overview	10
3.1 System Introduction	10
3.1.1 ARM Cortex-M3 Core	10
3.1.2 Debug Interface (DBG)	10
3.1.3 Memory System Controller (MSC)	10
3.1.4 Direct Memory Access Controller (DMA)	11
3.1.5 Reset Management Unit (RMU)	11
3.1.6 Energy Management Unit (EMU)	11
3.1.7 Clock Management Unit (CMU)	11
3.1.8 Watchdog (WDOG)	11
3.1.9 Peripheral Reflex System (PRS)	11
3.1.10 External Bus Interface (EBI)	11
3.1.11 Inter-Integrated Circuit Interface (I2C)	11
3.1.12 Universal Synchronous/Asynchronous Receiver/Transmitter (USART)	11
3.1.13 Pre-Programmed USB/UART Bootloader	11
3.1.14 Universal Asynchronous Receiver/Transmitter (UART)	12
3.1.15 Low Energy Universal Asynchronous Receiver/Transmitter (LEUART)	12
3.1.16 Timer/Counter (TIMER)	12
3.1.17 Real Time Counter (RTC)	12
3.1.18 Low Energy Timer (LETIMER)	12
3.1.19 Pulse Counter (PCNT)	12
3.1.20 Analog Comparator (ACMP)	12
3.1.21 Voltage Comparator (VCMP)	12
3.1.22 Analog to Digital Converter (ADC)	12
3.1.23 Digital to Analog Converter (DAC)	12
3.1.24 Advanced Encryption Standard Accelerator (AES)	13
3.1.25 General Purpose Input/Output (GPIO)	13
3.1.26 Liquid Crystal Display Driver (LCD)	13
3.2 Configuration Summary	14
3.2.1 EFM32G200	14
3.2.2 EFM32G210	15
3.2.3 EFM32G222	16
3.2.4 EFM32G230	17
3.2.5 EFM32G232	18
3.2.6 EFM32G280	19
3.2.7 EFM32G290	20
3.2.8 EFM32G840	21
3.2.9 EFM32G842	22
3.2.10 EFM32G880	23
3.2.11 EFM32G890	25
3.3 Memory Map	27
4. Electrical Characteristics	29

4.1	Test Conditions	.29
4.1.1	Typical Values	.29
4.1.2	Minimum and Maximum Values	.29
4.2	Absolute Maximum Ratings	.29
4.3	General Operating Conditions	.29
4.4	Current Consumption	.30
4.4.1	EM0 Current Consumption	.31
4.4.2	EM1 Current Consumption	.34
4.4.3	EM2 Current Consumption	.37
4.4.4	EM3 Current Consumption	.38
4.4.5	EM4 Current Consumption	.39
4.5	Transition between Energy Modes	.39
4.6	Power Management	.40
4.7	Flash	.41
4.8	General Purpose Input Output	.42
4.9	Oscillators	.50
4.9.1	LFXO	.50
4.9.2	HFXO	.51
4.9.3	LFRCO	.52
4.9.4	HFRCO	.53
4.9.5	AUXHFRCO	.57
4.9.6	ULFRCO	.57
4.10	Analog Digital Converter (ADC)	.58
4.10.1	Typical Performance	.67
4.11	Digital Analog Converter (DAC)	.71
4.12	Analog Comparator (ACMP)	.73
4.13	Voltage Comparator (VCMP)	.75
4.14	LCD	.76
4.15	I2C	.77
4.16	Digital Peripherals	.78
5.	Pin Definitions	79
5.1	EFM32G200 & EFM32G210 (QFN32)	.79
5.1.1	Pinout	.79
5.1.2	Alternate Functionality Pinout	.82
5.1.3	GPIO Pinout Overview	.84
5.2	EFM32G222 (TQFP48)	.85
5.2.1	Pinout	.85
5.2.2	Alternate Functionality Pinout	.88
5.2.3	GPIO Pinout Overview	.90
5.3	EFM32G230 (QFN64)	.91
5.3.1	Pinout	.91
5.3.2	Alternate Functionality Pinout	.94
5.3.3	GPIO Pinout Overview	.97

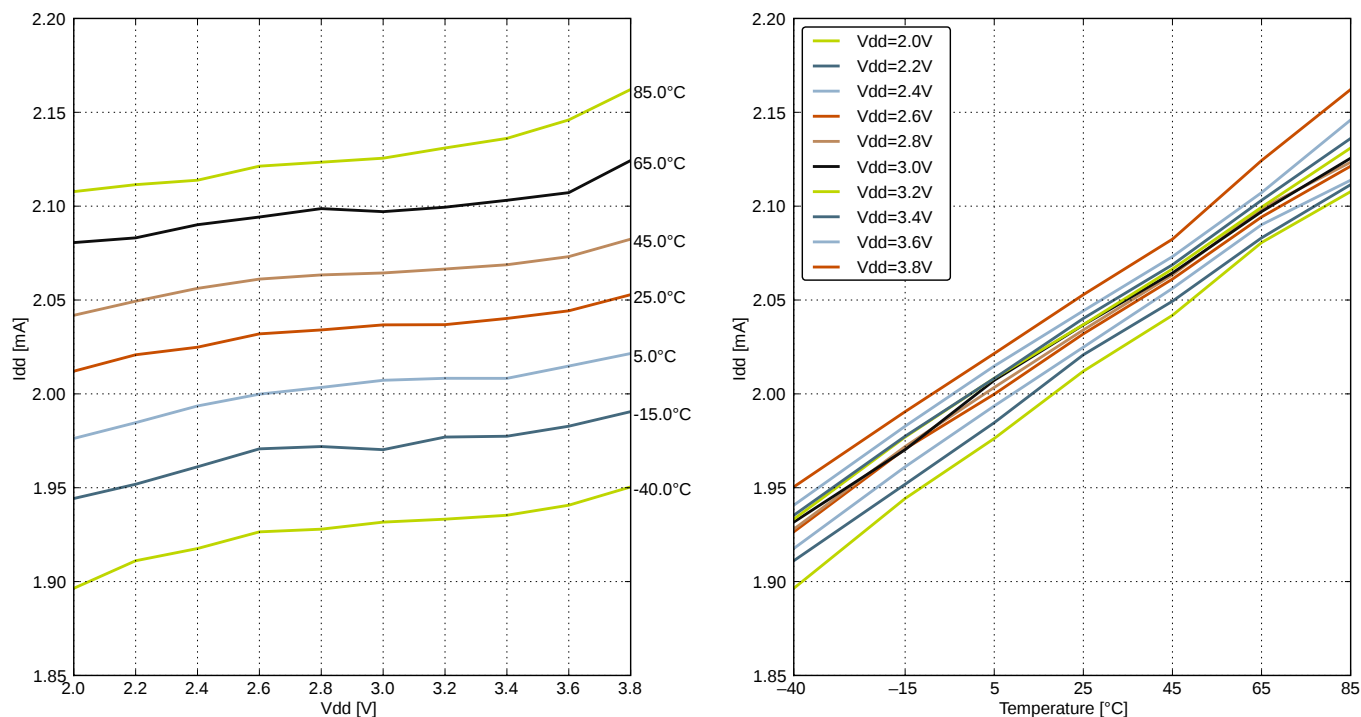


Figure 4.4. EM0 Current consumption while executing prime number calculation code from flash with HFRCO running at 11 MHz

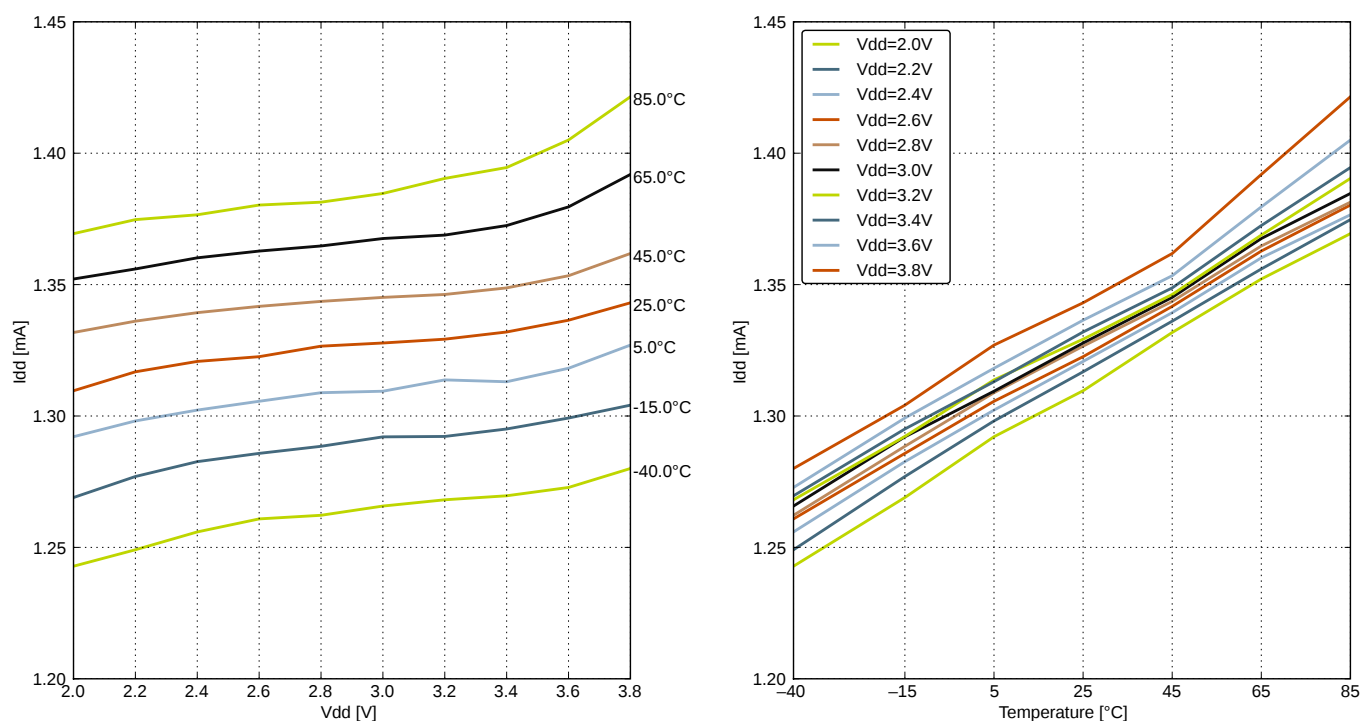


Figure 4.5. EM0 Current consumption while executing prime number calculation code from flash with HFRCO running at 7 MHz

4.11 Digital Analog Converter (DAC)

Table 4.15. DAC

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output voltage range	V_{DACOUT}	VDD voltage reference, single-ended	0	—	V_{DD}	V
		VDD voltage reference, differential	$-V_{DD}$	—	V_{DD}	V
Output common mode voltage range	V_{DACCM}		0	—	V_{DD}	V
Average active current	I_{DAC}	500 kSamples/s, 12 bit, internal 1.25 V reference, Continuous Mode	—	400 ¹	650 ¹	μA
		100 kSamples/s, 12 bit, internal 1.25 V reference, Sample/Hold Mode	—	200 ¹	250 ¹	μA
		1 kSamples/s 12 bit, internal 1.25 V reference, Sample/Off Mode	—	17 ¹	25 ¹	μA
Sample rate	SR_{DAC}		—	—	500	ksamples/s
DAC clock frequency	f_{DAC}	Continuous Mode	—	—	1000	kHz
		Sample/Hold Mode	—	—	250	kHz
		Sample/Off Mode	—	—	250	kHz
Clock cycles per conversion	$CYC_{DACCONV}$		—	2	—	cycles
Conversion time	$t_{DACCONV}$		2	—	—	μs
Settling time	$t_{DACSETTLE}$		—	5	—	μs
Signal-to-Noise Ratio (SNR)	SNR_{DAC}	500 kSamples/s, 12 bit, single-ended, internal 1.25 V reference	—	58	—	dB
		500 kSamples/s, 12 bit, single-ended, internal 2.5 V reference	—	59	—	dB
		500 kSamples/s, 12 bit, differential, internal 1.25 V reference	—	58	—	dB
		500 kSamples/s, 12 bit, differential, internal 2.5 V reference	—	58	—	dB
		500 kSamples/s, 12 bit, differential, V_{DD} reference	—	59	—	dB

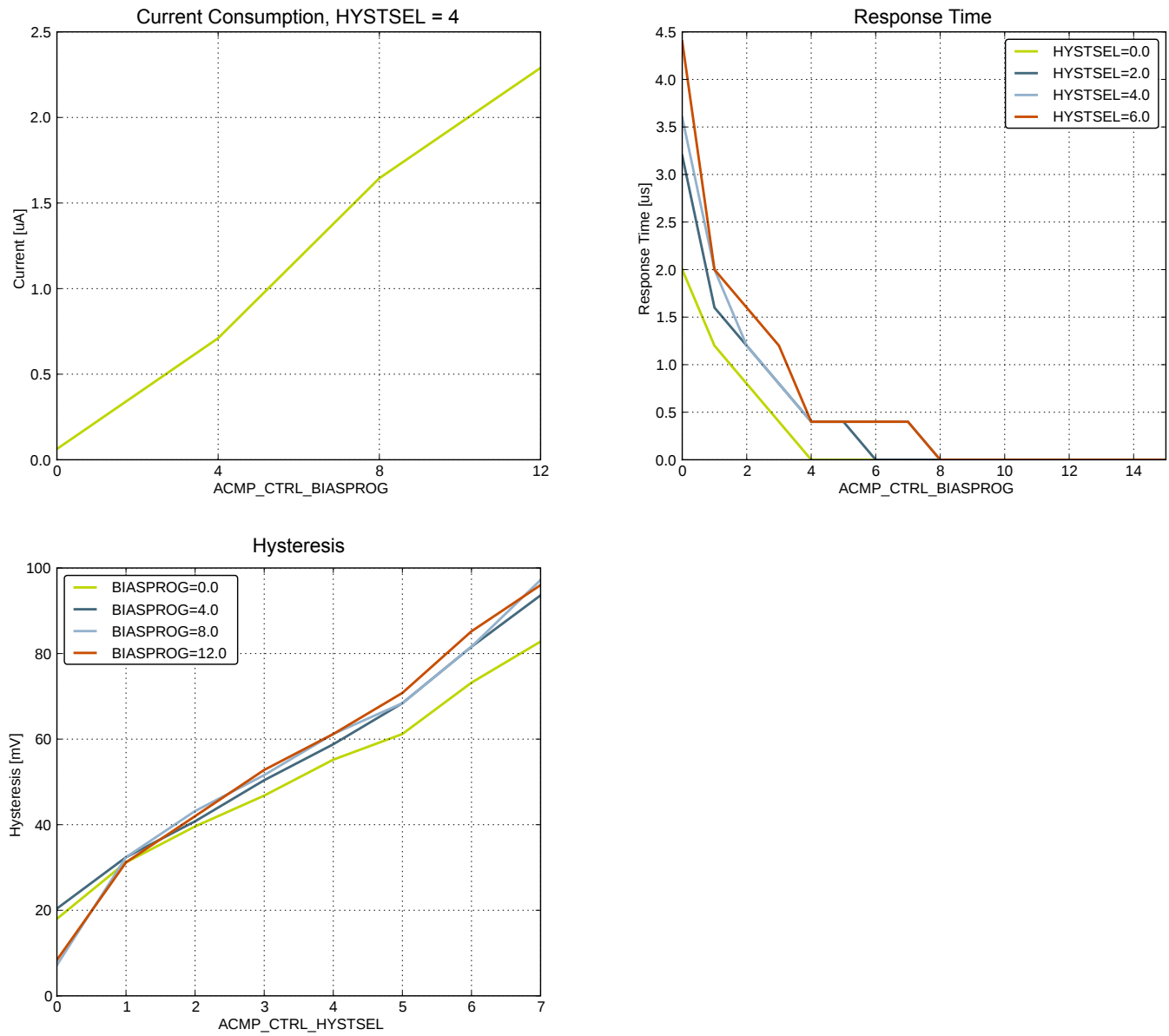


Figure 4.34. ACMP Characteristics, VDD = 3V, Temp = 25°C, FULLBIAS = 0, HALFBIAS = 1

5.3.3 GPIO Pinout Overview

The specific GPIO pins available in EFM32G230 is shown in the following table. Each GPIO port is organized as 16-bit ports indicated by letters A through F, and the individual pin on this port is indicated by a number from 15 down to 0.

Table 5.9. GPIO Pinout

Port	Pin 15	Pin 14	Pin 13	Pin 12	Pin 11	Pin 10	Pin 9	Pin 8	Pin 7	Pin 6	Pin 5	Pin 4	Pin 3	Pin 2	Pin 1	Pin 0
Port A	PA15	—	—	—	—	PA10	PA8	PA8 —	—	PA6	PA5	PA4	PA3	PA2	PA1	PA0
Port B	—	PB14	PB13	PB12	PB11	—	—	PB8	PB7	—	—	—	—	—	—	—
Port C	PC15	PC14	PC13	PC12	PC11	PC10	PC9	PC8	PC7	PC6	PC5	PC4	PC3	PC2	PC1	PC0
Port D	—	—	—	—	—	—	—	PD8	PD7	PD6	PD5	PD4	PD3	PD2	PD1	PD0
Port E	PE15	PE14	PE13	PE12	PE11	PE10	PE9	PE8	—	—	—	—	—	—	—	—
Port F	—	—	—	—	—	—	—	—	—	—	PF5	PF4	PF3	PF2	PF1	PF0

5.6 EFM32G290 (BGA112)

5.6.1 Pinout

The EFM32G290 pinout is shown in the following figure and table. Alternate locations are denoted by "#" followed by the location number (Multiple locations on the same pin are split with "/"). Alternate locations can be configured in the LOCATION bitfield in the *_ROUTE register in the module in question.

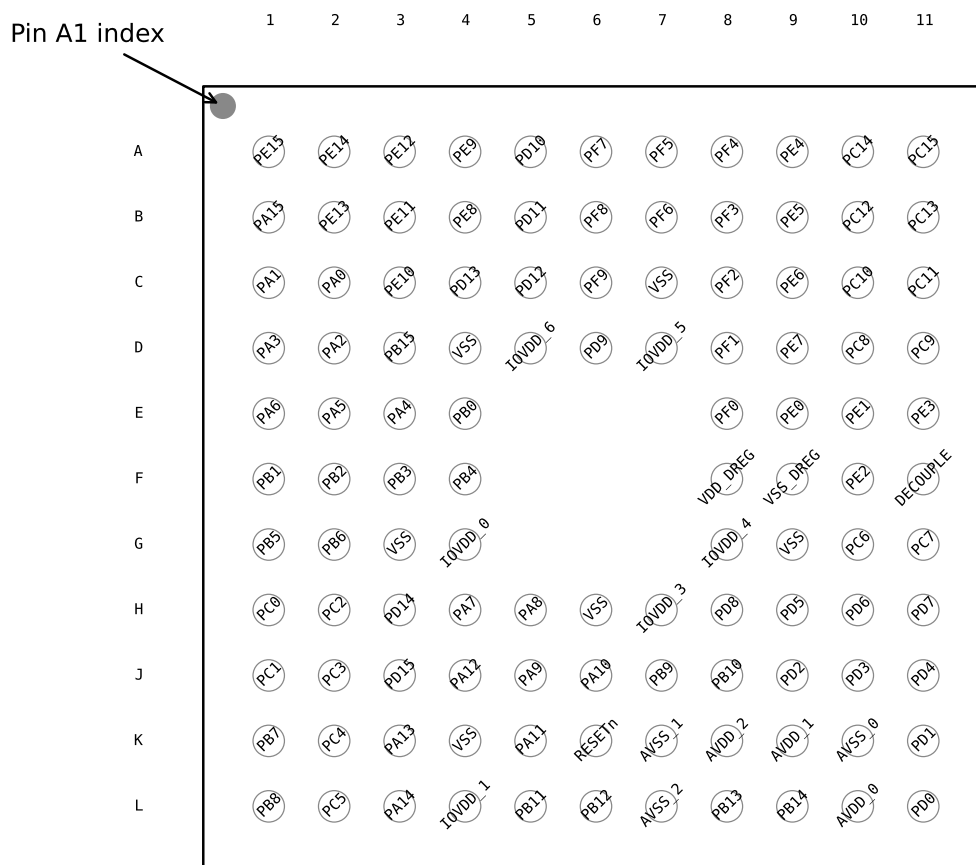


Figure 5.6. EFM32G280 Pinout (top view, not to scale)

Table 5.16. Device Pinout

BGA112 Pin# and Name		Pin Alternate Functionality / Description				
Pin #	Pin Name	Analog	EBI	Timers	Communication	Other
A1	PE15		EBI_AD07 #0		LEU0_RX #2	
A2	PE14		EBI_AD06 #0		LEU0_TX #2	
A3	PE12		EBI_AD04 #0	TIM1_CC2 #1	US0_CLK #0	
A4	PE9		EBI_AD01 #0	PCNT2_S1IN #1		
A5	PD10		EBI_CS1 #0			

BGA112 Pin# and Name		Pin Alternate Functionality / Description				
Pin #	Pin Name	Analog	EBI	Timers	Communication	Other
D3	PB15					
D4	VSS	Ground.				
D5	IOVDD_6	Digital IO power supply 6.				
D6	PD9	LCD_SEG 28	EBI_CS0 #0			
D7	IOVDD_5	Digital IO power supply 5.				
D8	PF1			LETIM0_OUT1 #2		DBG_SWIO #0/1
D9	PE7				US0_TX #1	
D10	PC8	ACMP1_C H0		TIM2_CC0 #2	US0_CS #2	
D11	PC9	ACMP1_C H1		TIM2_CC1 #2	US0_CLK #2	
E1	PA6		EBI_AD15 #0		LEU1_RX #1	
E2	PA5		EBI_AD14 #0	TIM0_CDTI2 #0	LEU1_TX #1	
E3	PA4		EBI_AD13 #0	TIM0_CDTI1 #0	U0_RX #2	
E4	PB0			TIM1_CC0 #2		
E8	PF0			LETIM0_OUT0 #2		DBG_SWCLK #0/1
E9	PE0			PCNT0_S0IN #1	U0_TX #1	
E10	PE1			PCNT0_S1IN #1	U0_RX #1	
E11	PE3					ACMP1_O #1
F1	PB1			TIM1_CC1 #2		
F2	PB2			TIM1_CC2 #2		
F3	PB3			PCNT1_S0IN #1	US2_TX #1	
F4	PB4			PCNT1_S1IN #1	US2_RX #1	
F8	VDD_DRE G	Power supply for on-chip voltage regulator.				
F9	VSS_DRE G	Ground for on-chip voltage regulator.				
F10	PE2					ACMP0_O #1
F11	DECOU- PLE	Decouple output for on-chip voltage regulator. An external capacitance of size C_{DECOUPLE} is required at this pin.				
G1	PB5				US2_CLK #1	
G2	PB6				US2_CS #1	
G3	VSS	Ground.				
G4	IOVDD_0	Digital IO power supply 0.				
G8	IOVDD_4	Digital IO power supply 4.				
G9	VSS	Ground.				

BGA112 Pin# and Name		Pin Alternate Functionality / Description				
Pin #	Pin Name	Analog	EBI	Timers	Communication	Other
K5	PA11					
K6	RESETn	Reset input, active low. To apply an external reset source to this pin, it is required to only drive this pin low during reset, and let the internal pull-up ensure that reset is released.				
K7	AVSS_1	Analog ground 1.				
K8	AVDD_2	Analog power supply 2.				
K9	AVDD_1	Analog power supply 1.				
K10	AVSS_0	Analog ground 0.				
K11	PD1	ADC0_CH 1		TIM0_CC0 #3 PCNT2_S1IN #0	US1_RX #1	
L1	PB8	LFXTAL_N			US1_CS #0	
L2	PC5	ACMP0_C H5		LETIM0_OUT1 #3 PCNT1_S1IN #0	US2_CS #0	
L3	PA14			TIM2_CC2 #1		
L4	IOVDD_1	Digital IO power supply 1.				
L5	PB11	DAC0_OU T0		LETIM0_OUT0 #1		
L6	PB12	DAC0_OU T1		LETIM0_OUT1 #1		
L7	AVSS_2	Analog ground 2.				
L8	PB13	HFXTAL_ P			LEU0_TX #1	
L9	PB14	HFXTAL_ N			LEU0_RX #1	
L10	AVDD_0	Analog power supply 0.				
L11	PD0	ADC0_CH 0		PCNT2_S0IN #0	US1_TX #1	

Alternate	LOCATION				
Functionality	0	1	2	3	Description
DBG_SWO	PF2	PC15			Debug-interface Serial Wire viewer Output. Note that this function is not enabled after reset, and must be enabled by software to be used.
HFX TAL_N	PB14				High Frequency Crystal negative pin. Also used as external optional clock input pin.
HFX TAL_P	PB13				High Frequency Crystal positive pin.
I2C0_SCL	PA1	PD7	PC7		I2C0 Serial Clock Line input / output.
I2C0_SDA	PA0	PD6	PC6		I2C0 Serial Data input / output.
LCD_BCAP_N	PA13				LCD voltage booster (optional), boost capacitor, negative pin. If using the LCD voltage booster, connect a 22 nF capacitor between LCD_BCAP_N and LCD_BCAP_P.
LCD_BCAP_P	PA12				LCD voltage booster (optional), boost capacitor, positive pin. If using the LCD voltage booster, connect a 22 nF capacitor between LCD_BCAP_N and LCD_BCAP_P.
LCD_BEXT	PA14				LCD voltage booster (optional), boost output. If using the LCD voltage booster, connect a 1 uF capacitor between this pin and VSS. An external LCD voltage may also be applied to this pin if the booster is not enabled. If AVDD is used directly as the LCD supply voltage, this pin may be left unconnected or used as a GPIO.
LCD_COM0	PE4				LCD driver common line number 0.
LCD_COM1	PE5				LCD driver common line number 1.
LCD_COM2	PE6				LCD driver common line number 2.
LCD_COM3	PE7				LCD driver common line number 3.
LCD_SEG0	PF2				LCD segment line 0. Segments 0, 1, 2 and 3 are controlled by SEGEN0.
LCD_SEG1	PF3				LCD segment line 1. Segments 0, 1, 2 and 3 are controlled by SEGEN0.
LCD_SEG2	PF4				LCD segment line 2. Segments 0, 1, 2 and 3 are controlled by SEGEN0.
LCD_SEG3	PF5				LCD segment line 3. Segments 0, 1, 2 and 3 are controlled by SEGEN0.
LCD_SEG4	PE8				LCD segment line 4. Segments 4, 5, 6 and 7 are controlled by SEGEN1.
LCD_SEG5	PE9				LCD segment line 5. Segments 4, 5, 6 and 7 are controlled by SEGEN1.
LCD_SEG6	PE10				LCD segment line 6. Segments 4, 5, 6 and 7 are controlled by SEGEN1.
LCD_SEG7	PE11				LCD segment line 7. Segments 4, 5, 6 and 7 are controlled by SEGEN1.
LCD_SEG8	PE12				LCD segment line 8. Segments 8, 9, 10 and 11 are controlled by SEGEN2.

Alternate	LOCATION				
Functionality	0	1	2	3	Description
LCD_SEG9	PE13				LCD segment line 9. Segments 8, 9, 10 and 11 are controlled by SEGEN2.
LCD_SEG10	PE14				LCD segment line 10. Segments 8, 9, 10 and 11 are controlled by SEGEN2.
LCD_SEG11	PE15				LCD segment line 11. Segments 8, 9, 10 and 11 are controlled by SEGEN2.
LCD_SEG12	PA15				LCD segment line 12. Segments 12, 13, 14 and 15 are controlled by SEGEN3.
LCD_SEG13	PA0				LCD segment line 13. Segments 12, 13, 14 and 15 are controlled by SEGEN3.
LCD_SEG14	PA1				LCD segment line 14. Segments 12, 13, 14 and 15 are controlled by SEGEN3.
LCD_SEG15	PA2				LCD segment line 15. Segments 12, 13, 14 and 15 are controlled by SEGEN3.
LCD_SEG16	PA3				LCD segment line 16. Segments 16, 17, 18 and 19 are controlled by SEGEN4.
LCD_SEG17	PA4				LCD segment line 17. Segments 16, 17, 18 and 19 are controlled by SEGEN4.
LCD_SEG18	PA5				LCD segment line 18. Segments 16, 17, 18 and 19 are controlled by SEGEN4.
LCD_SEG19	PA6				LCD segment line 19. Segments 16, 17, 18 and 19 are controlled by SEGEN4.
LCD_SEG20	PB3				LCD segment line 20. Segments 20, 21, 22 and 23 are controlled by SEGEN5.
LCD_SEG21	PB4				LCD segment line 21. Segments 20, 21, 22 and 23 are controlled by SEGEN5.
LCD_SEG22	PB5				LCD segment line 22. Segments 20, 21, 22 and 23 are controlled by SEGEN5.
LCD_SEG23	PB6				LCD segment line 23. Segments 20, 21, 22 and 23 are controlled by SEGEN5.
LETIM0_OUT0	PD6	PB11	PF0	PC4	Low Energy Timer LETIM0, output channel 0.
LETIM0_OUT1	PD7	PB12	PF1	PC5	Low Energy Timer LETIM0, output channel 1.
LEU0_RX	PD5	PB14	PE15		LEUART0 Receive input.
LEU0_TX	PD4	PB13	PE14		LEUART0 Transmit output. Also used as receive input in half duplex communication.
LEU1_RX	PC7	PA6			LEUART1 Receive input.
LEU1_TX	PC6	PA5			LEUART1 Transmit output. Also used as receive input in half duplex communication.
LFXTAL_N	PB8				Low Frequency Crystal (typically 32.768 kHz) negative pin. Also used as an optional external clock input pin.
LFXTAL_P	PB7				Low Frequency Crystal (typically 32.768 kHz) positive pin.
PCNT0_S0IN	PC13				Pulse Counter PCNT0 input number 0.
PCNT0_S1IN	PC14				Pulse Counter PCNT0 input number 1.

Alternate	LOCATION				
Functionality	0	1	2	3	Description
PCNT1_S0IN	PC4	PB3			Pulse Counter PCNT1 input number 0.
PCNT1_S1IN	PC5	PB4			Pulse Counter PCNT1 input number 1.
PCNT2_S0IN	PD0	PE8			Pulse Counter PCNT2 input number 0.
PCNT2_S1IN	PD1	PE9			Pulse Counter PCNT2 input number 1.
TIM0_CC0	PA0	PA0		PD1	Timer 0 Capture Compare input / output channel 0.
TIM0_CC1	PA1	PA1		PD2	Timer 0 Capture Compare input / output channel 1.
TIM0_CC2	PA2	PA2		PD3	Timer 0 Capture Compare input / output channel 2.
TIM0_CDTI0	PA3	PC13	PF3	PC13	Timer 0 Complimentary Deat Time Insertion channel 0.
TIM0_CDTI1	PA4	PC14	PF4	PC14	Timer 0 Complimentary Deat Time Insertion channel 1.
TIM0_CDTI2	PA5	PC15	PF5	PC15	Timer 0 Complimentary Deat Time Insertion channel 2.
TIM1_CC0	PC13	PE10			Timer 1 Capture Compare input / output channel 0.
TIM1_CC1	PC14	PE11			Timer 1 Capture Compare input / output channel 1.
TIM1_CC2	PC15	PE12			Timer 1 Capture Compare input / output channel 2.
TIM2_CC0		PA12			Timer 2 Capture Compare input / output channel 0.
TIM2_CC1		PA13			Timer 2 Capture Compare input / output channel 1.
TIM2_CC2		PA14			Timer 2 Capture Compare input / output channel 2.
US0_CLK	PE12	PE5			USART0 clock input / output.
US0_CS	PE13	PE4			USART0 chip select input / output.
US0_RX	PE11	PE6			USART0 Asynchronous Receive. USART0 Synchronous mode Master Input / Slave Output (MI-SO).
US0_TX	PE10	PE7			USART0 Asynchronous Transmit.Also used as receive input in half duplex communication. USART0 Synchronous mode Master Output / Slave Input (MOSI).
US1_CLK	PB7	PD2			USART1 clock input / output.
US1_CS	PB8	PD3			USART1 chip select input / output.
US1_RX		PD1			USART1 Asynchronous Receive. USART1 Synchronous mode Master Input / Slave Output (MI-SO).
US1_TX		PD0			USART1 Asynchronous Transmit.Also used as receive input in half duplex communication. USART1 Synchronous mode Master Output / Slave Input (MOSI).
US2_CLK	PC4	PB5			USART2 clock input / output.
US2_CS	PC5	PB6			USART2 chip select input / output.
US2_RX		PB4			USART2 Asynchronous Receive. USART2 Synchronous mode Master Input / Slave Output (MI-SO).

5.8.2 Alternate Functionality Pinout

A wide selection of alternate functionality is available for multiplexing to various pins. This is shown in the following table. The table shows the name of the alternate functionality in the first column, followed by columns showing the possible LOCATION bitfield settings.

Note: Some functionality, such as analog interfaces, do not have alternate settings or a LOCATION bitfield. In these cases, the pinout is shown in the column corresponding to LOCATION 0.

Table 5.23. Alternate functionality overview

Alternate	LOCATION				
Functionality	0	1	2	3	Description
ACMP0_CH4	PC4				Analog comparator ACMP0, channel 4.
ACMP0_CH5	PC5				Analog comparator ACMP0, channel 5.
ACMP0_CH6	PC6				Analog comparator ACMP0, channel 6.
ACMP0_CH7	PC7				Analog comparator ACMP0, channel 7.
ACMP0_O	PE13				Analog comparator ACMP0, digital output.
ACMP1_CH4	PC12				Analog comparator ACMP1, channel 4.
ACMP1_CH5	PC13				Analog comparator ACMP1, channel 5.
ACMP1_CH6	PC14				Analog comparator ACMP1, channel 6.
ACMP1_CH7	PC15				Analog comparator ACMP1, channel 7.
ACMP1_O	PF2				Analog comparator ACMP1, digital output.
ADC0_CH0	PD0				Analog to digital converter ADC0, input channel number 0.
ADC0_CH1	PD1				Analog to digital converter ADC0, input channel number 1.
ADC0_CH2	PD2				Analog to digital converter ADC0, input channel number 2.
ADC0_CH3	PD3				Analog to digital converter ADC0, input channel number 3.
ADC0_CH4	PD4				Analog to digital converter ADC0, input channel number 4.
ADC0_CH5	PD5				Analog to digital converter ADC0, input channel number 5.
ADC0_CH6	PD6				Analog to digital converter ADC0, input channel number 6.
ADC0_CH7	PD7				Analog to digital converter ADC0, input channel number 7.
BOOT_RX	PE11				Bootloader RX.
BOOT_TX	PE10				Bootloader TX.
CMU_CLK0	PA2	PC12			Clock Management Unit, clock output number 0.
CMU_CLK1	PA1	PD8			Clock Management Unit, clock output number 1.
DAC0_OUT0	PB11				Digital to Analog Converter DAC0 output channel number 0.
DBG_SWCLK	PF0	PF0			Debug-interface Serial Wire clock input. Note that this function is enabled to pin out of reset, and has a built-in pull down.
DBG_SWDIO	PF1	PF1			Debug-interface Serial Wire data input / output. Note that this function is enabled to pin out of reset, and has a built-in pull up.

Alternate	LOCATION				
Functionality	0	1	2	3	Description
DAC0_OUT0	PB11				Digital to Analog Converter DAC0 output channel number 0.
DAC0_OUT1	PB12				Digital to Analog Converter DAC0 output channel number 1.
DBG_SWCLK	PF0	PF0			Debug-interface Serial Wire clock input. Note that this function is enabled to pin out of reset, and has a built-in pull down.
DBG_SWDIO	PF1	PF1			Debug-interface Serial Wire data input / output. Note that this function is enabled to pin out of reset, and has a built-in pull up.
DBG_SWO	PF2	PC15			Debug-interface Serial Wire viewer Output. Note that this function is not enabled after reset, and must be enabled by software to be used.
EBI_AD00	PE8				External Bus Interface (EBI) address and data input / output pin 00.
EBI_AD01	PE9				External Bus Interface (EBI) address and data input / output pin 01.
EBI_AD02	PE10				External Bus Interface (EBI) address and data input / output pin 02.
EBI_AD03	PE11				External Bus Interface (EBI) address and data input / output pin 03.
EBI_AD04	PE12				External Bus Interface (EBI) address and data input / output pin 04.
EBI_AD05	PE13				External Bus Interface (EBI) address and data input / output pin 05.
EBI_AD06	PE14				External Bus Interface (EBI) address and data input / output pin 06.
EBI_AD07	PE15				External Bus Interface (EBI) address and data input / output pin 07.
EBI_AD08	PA15				External Bus Interface (EBI) address and data input / output pin 08.
EBI_AD09	PA0				External Bus Interface (EBI) address and data input / output pin 09.
EBI_AD10	PA1				External Bus Interface (EBI) address and data input / output pin 10.
EBI_AD11	PA2				External Bus Interface (EBI) address and data input / output pin 11.
EBI_AD12	PA3				External Bus Interface (EBI) address and data input / output pin 12.
EBI_AD13	PA4				External Bus Interface (EBI) address and data input / output pin 13.
EBI_AD14	PA5				External Bus Interface (EBI) address and data input / output pin 14.
EBI_AD15	PA6				External Bus Interface (EBI) address and data input / output pin 15.
EBI_ALE	PF3				External Bus Interface (EBI) Address Latch Enable output.

9.3 TQFP48 Package Marking

In the illustration below package fields and position are shown.

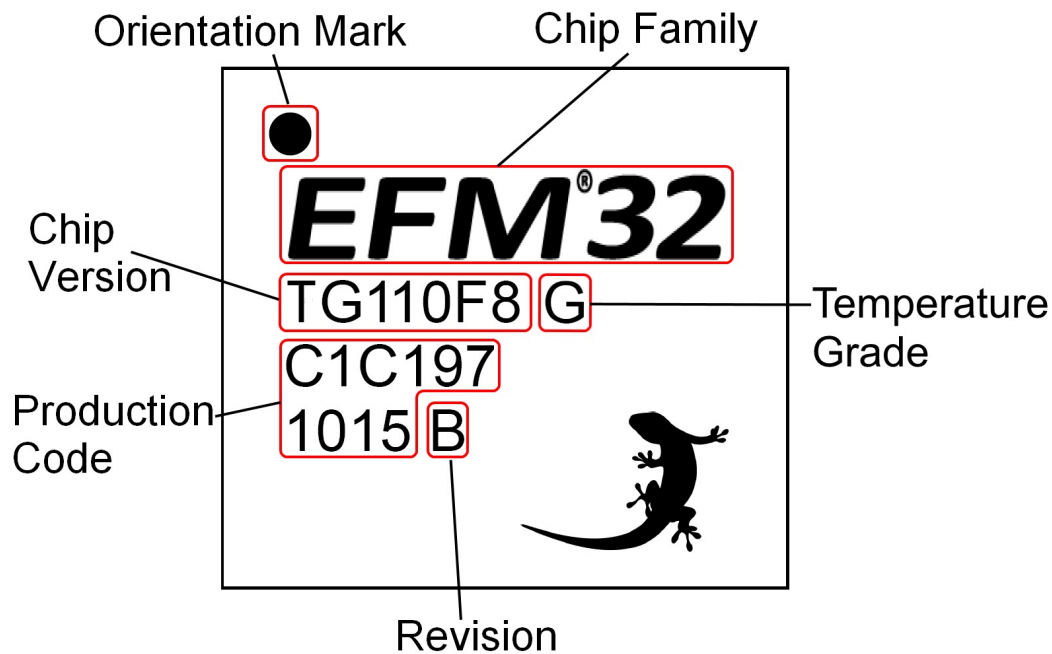


Figure 9.5. Example Chip Marking (Top View)

11.2 QFN32 PCB Layout

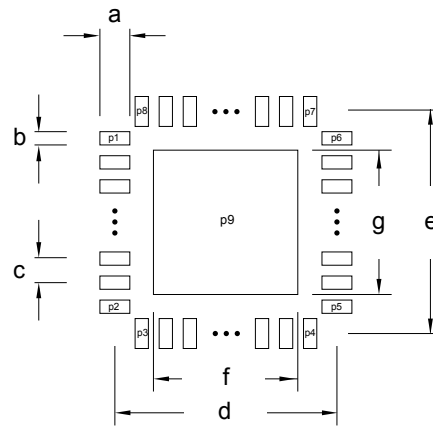


Figure 11.2. QFN32 PCB Land Pattern

Table 11.2. QFN32 PCB Land Pattern Dimensions (Dimensions in mm)

Symbol	Dim. (mm)	Symbol	Pin Number	Symbol	Pin Number
a	0.80	P1	1	P6	24
b	0.35	P2	8	P7	25
c	0.65	P3	9	P8	32
d	6.00	P4	16	P9	33
e	6.00	P5	17		
f	4.40				
g	4.40				

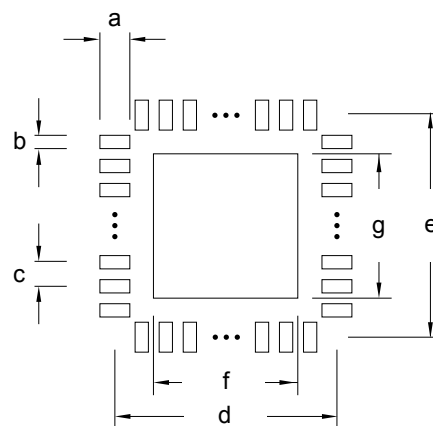


Figure 11.3. QFN32 PCB Solder Mask

Table 11.3. QFN32 PCB Solder Mask Dimensions (Dimensions in mm)

Symbol	Dim. (mm)
a	0.92
b	0.47
c	0.65

12. Chip Revision, Solder Information, Errata

12.1 Chip Revision

The revision of a chip can be determined from the "Revision" field in the package marking.

12.2 Soldering Information

The latest IPC/JEDEC J-STD-020 recommendations for Pb-Free reflow soldering should be followed.

12.3 Errata

Please see the errata document for description and resolution of device errata. This document is available in Simplicity Studio and on-line at: <http://www.silabs.com/support/pages/document-library.aspx?p=MCUs--32-bit>

13.2 Revision 2.00

May 10th, 2017

Consolidated all EFM32G data sheets:

- EFM32G200
- EFM32G210
- EFM32G222
- EFM32G230
- EFM32G232
- EFM32G280
- EFM32G290
- EFM32G840
- EFM32G842
- EFM32G880
- EFM32G890

New formatting throughout.

Added [1. Feature List](#).

Updated ordering codes in [2. Ordering Information](#) for Revision E and tape and reel.

Added [Figure 2.1 Ordering Code Decoder](#) on page 5.

Separated Memory Map figure into [Figure 3.2 System Address Space with Core and Code Space Listing](#) on page 27 and [Figure 3.3 System Address Space with Peripheral Listing](#) on page 28 for readability.

Removed footnote for storage temperature range in [4.2 Absolute Maximum Ratings](#).

In [4.6 Power Management](#):

- Updated EM0 condition for $V_{BODextthr-}$ specification.
- Added $V_{BODextthr-}$ in EM1 and EM2 specifications.
- Updated EM0 condition for $V_{BODextthr+}$ specification.

Updated Flash page erase time and device erase time in [4.7 Flash](#) and added footnotes.

Updated figures in [4.9.3 LFRCO](#).

Updated figures and HFRCO current consumption typical values in [4.9.4 HFRCO](#).

In [4.10 Analog Digital Converter \(ADC\)](#):

- Updated test conditions, updated specifications, and added footnote for average active current.
- Added input bias current.
- Added input offset current.
- Updated ADC clock frequency.
- Updated SNR, SINAD and SFDR.
- Updated offset voltage.
- Updated missing codes.
- Added gain error drift and offset error drift.
- Added VREF output voltage, VREF voltage drift, VREF temperature drift, VREF current consumption, and ADC and DAC VREF matching.

In [4.11 Digital Analog Converter \(DAC\)](#):

- Updated I_{DAC} parameter, test conditions, and footnote.
- Added DAC load current specification to [4.11 Digital Analog Converter \(DAC\)](#).
- Added VREF output voltage, VREF voltage drift, VREF temperature drift, VREF current consumption, and ADC and DAC VREF matching.

Updated ACMP active current (BIASPROG=0b1111, FULLBIAS=1 and HALFBIAS=0 in ACMPn_CTRL register) typical value in [4.12 Analog Comparator \(ACMP\)](#).

Updated VCMP hysteresis typical value in [4.13 Voltage Comparator \(VCMP\)](#).

13.19 Revision 0.82

December 9th, 2009

This revision applies the following devices:

- EFM32G200
- EFM32G210
- EFM32G230
- EFM32G280
- EFM32G290
- EFM32G840
- EFM32G880
- EFM32G890

For LQFP100 devices, incorrect pin 0 removed from pinout table.

Updated contact information.

ADC current consumption numbers updated in ADC Electrical Characteristics.

For devices with LCD, updated LCD supply voltage range in LCD Electrical Characteristics.

13.20 Revision 0.81

November 20th, 2009

This revision applies the following devices:

- EFM32G200
- EFM32G210
- EFM32G230
- EFM32G280
- EFM32G290
- EFM32G840
- EFM32G880
- EFM32G890

For devices without a differential DAC, System Summary updated.

Electrical Characteristics updated.

Storage temperature in Electrical Characteristics updated.

Temperature coefficient of band-gap reference in Electrical Characteristics added.

Erase times in Flash Electrical Characteristics updated.

Definitions of DNL and INL added in ADC section.

For devices with and LCD, LCD Electrical Characteristics added.

Current consumption of digital peripherals added in Electrical Characteristics.

For LQFP100 devices, package information in Pinout and Package corrected.

For BGA112 devices, pinout information in Pinout table corrected.

Updated errata section.

13.21 Revision 0.80

October 19th, 2009

This revision applies the following devices:

- EFM32G200
- EFM32G210
- EFM32G230
- EFM32G280
- EFM32G290
- EFM32G840
- EFM32G880
- EFM32G890

Initial preliminary revision