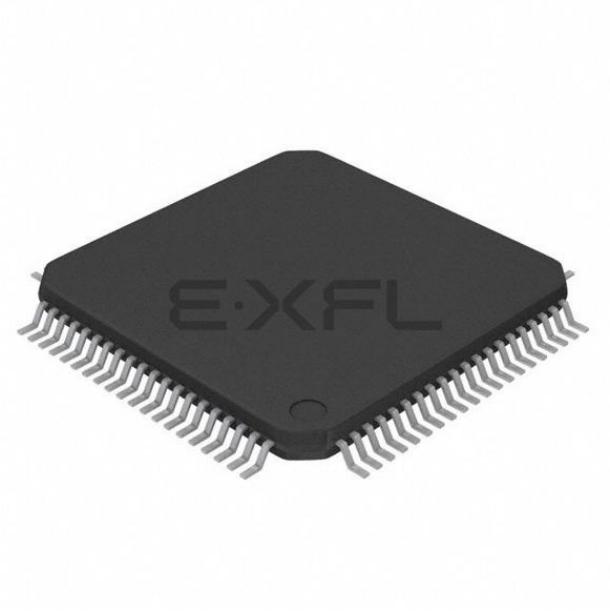
Infineon Technologies - CY9AF315MAPMC-G-MNE2 Datasheet



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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 "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	ARM® Cortex®-M3
Core Size	32-Bit Single-Core
Speed	40MHz
Connectivity	CSIO, EBI/EMI, I²C, LINbus, UART/USART, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	66
Program Memory Size	384KB (384K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	32K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 12x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	80-LQFP
Supplier Device Package	80-LQFP (12x12)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/cy9af315mapmc-g-mne2

[UART]

- Full duplex double buffer
- Selection with or without parity supported
- Built-in dedicated baud rate generator
- External clock available as a serial clock
- Hardware Flow control : Automatically control the transmission by CTS/RTS (only ch.4)*
- Various error detection functions available (parity errors, framing errors, and overrun errors)
  *: MB9AF311LA, F312LA and F314LA do not support Hardware Flow control

[CSIO]

- Full-duplex double buffer
- Built-in dedicated baud rate generator
- Overrun error detection function available

[LIN]

- LIN protocol Rev.2.1 supported
- Full-duplex double buffer
- Master/Slave mode supported
- LIN break field generation (can be changed 13-16bit length)
- LIN break delimiter generation (can be changed 1-4bit length)
- Various error detection functions available (parity errors, framing errors, and overrun errors)

[I^2C]

Standard-mode (Max 100kbps) / Fast-mode (Max 400kbps) supported

External Bus Interface*

- Supports SRAM, NOR Flash device
- Up to 8 chip selects
- 8/16-bit Data width
- Up to 25-bit Address bit
- Maximum area size : Up to 256 Mbytes
- Supports Address/Data multiplex
- Supports external RDY function
  *: MB9AF311LA, F312LA and F314LA do not support External Bus Interface

DMA Controller (8channels)

The DMA Controller has an independent bus from the CPU, so CPU and DMA Controller can process simultaneously.

- 8 independently configured and operated channels
- Transfer can be started by software or request from the built-in peripherals
- Transfer address area: 32bit (4Gbytes)
- Transfer mode: Block transfer/Burst transfer/Demand transfer
- Transfer data type: byte/half-word/word
- Transfer block count: 1 to 16
- Number of transfers: 1 to 65536

A/D Converter (Max 16channels)

[12-bit A/D Converter]

- Successive Approximation type
- Built-in 3units*
- Conversion time: 1.0μs@5V
- Priority conversion available (priority at 2levels)
- Scanning conversion mode
- Built-in FIFO for conversion data storage (for SCAN conversion: 16steps, for Priority conversion: 4 steps)
  *: MB9AF311LA, F312LA, F314LA built-in 2units

Base Timer (Max 8channels)

Operation mode is selectable from the followings for each channel.

- 16-bit PWM timer
- 16-bit PPG timer
- 16/32-bit reload timer
- 16/32-bit PWC timer

Pin No					Pin name	I/O circuit type	Pin state type
LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64			
7	85	D3	7	-	P55	E	I
					SCK6_0 (SCL6_0)		
					ADTG_1		
					RTO15_0 (PPG14_0)		
					MADATA05_1		
8	86	D5	8	-	P56	E	H
					INT08_2		
					DTTI1X_0		
					MADATA06_1		
9	87	E1	9	5	P30	E	H
					AIN0_0		
					TIOB0_1		
					INT03_2		
				-	MADATA07_1		
10	88	E2	10	6	P31	E	H
					BIN0_0		
					TIOB1_1		
					SCK6_1 (SCL6_1)		
					INT04_2		
				-	MADATA08_1		
11	89	E3	11	7	P32	E	H
					ZIN0_0		
					TIOB2_1		
					SOT6_1 (SDA6_1)		
					INT05_2		
				-	MADATA09_1		
12	90	E4	12	8	P33	E	H
					INT04_0		
					TIOB3_1		
					SIN6_1		
					ADTG_6		
				-	MADATA10_1		
13	91	F1	-	-	P34	E	I
					FRCK0_0		
					TIOB4_1		
					MADATA11_1		

Pin No					Pin name	I/O circuit type	Pin state type
LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64			
14	92	F2	-	-	P35	E	H
					IC03_0		
					TIOB5_1		
					INT08_1		
					MADATA12_1		
15	93	F3	-	-	P36	E	H
					IC02_0		
					SIN5_2		
					INT09_1		
					MADATA13_1		
16	94	G1	-	-	P37	E	H
					IC01_0		
					SOT5_2 (SDA5_2)		
					INT10_1		
					MADATA14_1		
17	95	G2	-	-	P38	E	H
					IC00_0		
					SCK5_2 (SCL5_2)		
					INT11_1		
					MADATA15_1		
18	96	F4	13	9	P39	E	I
					DTTI0X_0		
					ADTG_2		
19	97	G3	14	10	P3A	G	I
					RTO00_0 (PPG00_0)		
					TIOA0_1		
20	98	H1	15	11	P3B	G	I
					RTO01_0 (PPG00_0)		
					TIOA1_1		
21	99	H2	16	12	P3C	G	I
					RTO02_0 (PPG02_0)		
					TIOA2_1		
22	100	G4	17	13	P3D	G	I
					RTO03_0 (PPG02_0)		
					TIOA3_1		
-	-	B2	-	-	VSS	-	

Pin No					Pin name	I/O circuit type	Pin state type
LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64			
55	33	H10	45	37	P13	F	K
					AN03		
					SCK1_1 (SCL1_1)		
					IC01_2		
				-	MAD11_1		
56	34	H9	46	38	P14	F	L
					AN04		
					INT03_1		
					IC02_2		
				-	SIN0_1		
					MAD12_1		
57	35	H7	47	39	P15	F	K
					AN05		
					IC03_2		
				-	SOT0_1 (SDA0_1)		
					MAD13_1		
58	36	G10	48	-	P16	F	K
					AN06		
					SCK0_1 (SCL0_1)		
					MAD14_1		
59	37	G9	49	40	P17	F	L
					AN07		
					SIN2_2		
					INT04_1		
				-	MAD15_1		
60	38	H11	50	41	AVCC	-	
61	39	F11	51	42	AVRH	-	
62	40	G11	52	43	AVSS	-	
63	41	G8	53	44	P18	F	K
					AN08		
					SOT2_2 (SDA2_2)		
				-	MAD16_1		
64	42	F10	54	45	P19	F	K
					AN09		
					SCK2_2 (SCL2_2)		
				-	MAD17_1		
-	-	H8	-	-	VSS	-	

Module	Pin name	Function	Pin No				
			LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64
Multi Function Serial 6	SIN6_0	Multifunction serial interface ch.6 input pin	5	83	D1	5	-
	SIN6_1		12	90	E4	12	8
	SOT6_0 (SDA6_0)	Multifunction serial interface ch.6 output pin This pin operates as SOT6 when it is used in a UART/CSIO/LIN (operation modes 0 to 3) and as SDA6 when it is used in an I^2C (operation mode 4).	6	84	D2	6	-
	SOT6_1 (SDA6_1)		11	89	E3	11	7
	SCK6_0 (SCL6_0)	Multifunction serial interface ch.6 clock I/O pin This pin operates as SCK6 when it is used in a CSIO (operation modes 2) and as SCL6 when it is used in an I^2C (operation mode 4).	7	85	D3	7	-
	SCK6_1 (SCL6_1)		10	88	E2	10	6
Multi Function Serial 7	SIN7_1	Multifunction serial interface ch.7 input pin	45	23	K8	35	27
	SOT7_1 (SDA7_1)	Multifunction serial interface ch.7 output pin This pin operates as SOT7 when it is used in a UART/CSIO/LIN (operation modes 0 to 3) and as SDA7 when it is used in an I^2C (operation mode 4).	44	22	J7	34	26
	SCK7_1 (SCL7_1)	Multifunction serial interface ch.7 clock I/O pin This pin operates as SCK7 when it is used in a CSIO (operation modes 2) and as SCL7 when it is used in an I^2C (operation mode 4).	43	21	H6	33	25

Module	Pin name	Function	Pin No				
			LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64
Multi Function Timer 0	DTTI0X_0	Input signal of wave form generator to control outputs RTO00 to RTO05 of multi-function timer 0	18	96	F4	13	9
	DTTI0X_1		69	47	E9	-	-
	FRCK0_0	16-bit free-run timer ch.0 external clock input pin	13	91	F1	-	-
	FRCK0_1		70	48	D11	-	-
	FRCK0_2		53	31	J10	43	35
	IC00_0	16-bit input capture input pin of multi-function timer 0 ICxx describes channel number.	17	95	G2	-	-
	IC00_1		65	43	F9	55	-
	IC00_2		54	32	J8	44	36
	IC01_0		16	94	G1	-	-
	IC01_1		66	44	E11	56	-
	IC01_2		55	33	H10	45	37
	IC02_0		15	93	F3	-	-
	IC02_1		67	45	E10	-	-
	IC02_2		56	34	H9	46	38
	IC03_0		14	92	F2	-	-
	IC03_1		68	46	F8	-	-
	IC03_2		57	35	H7	47	39
	RTO00_0 (PPG00_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG00 when it is used in PPG 0 output modes.	19	97	G3	14	10
	RTO00_1 (PPG00_1)		71	49	D10	-	-
	RTO01_0 (PPG00_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG00 when it is used in PPG 0 output modes.	20	98	H1	15	11
	RTO02_0 (PPG02_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG02 when it is used in PPG 0 output modes.	21	99	H2	16	12
	RTO03_0 (PPG02_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG02 when it is used in PPG 0 output modes.	22	100	G4	17	13
	RTO04_0 (PPG04_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG04 when it is used in PPG 0 output modes.	23	1	H3	18	14
	RTO05_0 (PPG04_0)	Wave form generator output of multi-function timer 0 This pin operates as PPG04 when it is used in PPG 0 output modes.	24	2	J2	19	15

Pin name	Function	Pin No				
		LQFP-100	QFP-100	BGA-112	LQFP-80	LQFP-64 QFN-64
INITX	External Reset Input. A reset is valid when INITX=L	38	16	K4	28	21
MD0	Mode 0 pin During normal operation, MD0=L must be input. During serial programming to flash memory, MD0=H must be input.	47	25	L8	37	29
MD1	Mode 1 pin During serial programming to flash	46	24	K9	36	28
[redacted]				B1	1	1
[redacted]				J1	-	-
[redacted]				K1	25	18
[redacted]				K11	41	33
VCC	Power supply pin	76	54	A10	-	-
USBVCC	3.3V Power supply port for USB I/O	97	75	A4	77	61
VSS	GND Pin	-	-	B2	-	-
VSS	GND pin	25	3	L1	20	16
VSS	GND pin	-	-	K2	-	-
VSS	GND pin	-	-	J3	-	-
VSS	GND pin	-	-	H4	-	-
VSS	GND pin	34	12	L4	24	-
VSS	GND pin	50	28	L11	40	32
VSS	GND pin	-	-	K10	-	-

12.8 Flash Memory Write/Erase Characteristics

12.8.1 Write / Erase time

(Vcc = 2.7V to 5.5V, Ta = - 40°C to + 105°C)

Parameter		Value		Unit	Remarks
		Typ*	Max*		
Sector erase time	Large Sector	0.7	3.7	s	Includes write time prior to internal erase
	Small Sector	0.3	1.1		
Half word (16-bit) write time		12	384	µs	Not including system-level overhead time
Chip erase time	64K/128K/256KByte	5.2	23.6	s	Includes write time prior to internal erase
	384K/512KByte	8	38.4	s	

*: The typical value is immediately after shipment, the maximum value is guarantee value under 100,000 cycle of erase/write.

12.8.2 Erase/Write cycles and data hold time

Erase/write cycles (cycle)	Data hold time (year)	Remarks
1,000	20*	
10,000	10*	
100,000	5*	

*: At average + 85°C

12.9 Return Time from Low-Power Consumption Mode

12.9.1 Return Factor: Interrupt

The return time from Low-Power consumption mode is indicated as follows. It is from receiving the return factor to starting the program operation.

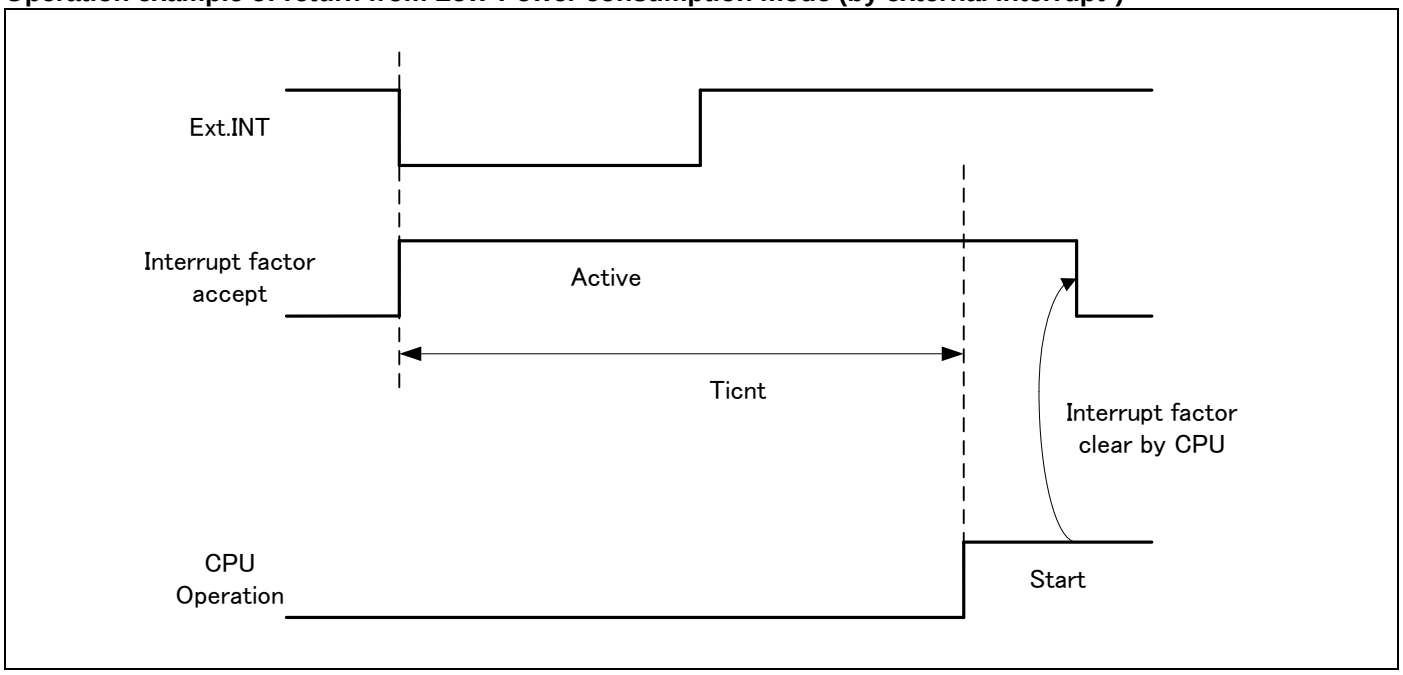
Return Count Time

(V_{CC} = 2.7V to 5.5V, Ta = - 40°C to + 105°C)

Parameter	Symbol	Value		Unit	Remarks
		Typ	Max*		
SLEEP mode	Ticnt	t_{CYCC}		ns	
High-speed CR TIMER mode, Main TIMER mode, PLL TIMER mode		40	80	µs	
Low-speed CR TIMER mode		453	737	µs	
Sub TIMER mode		453	737	µs	
STOP mode		453	737	µs	

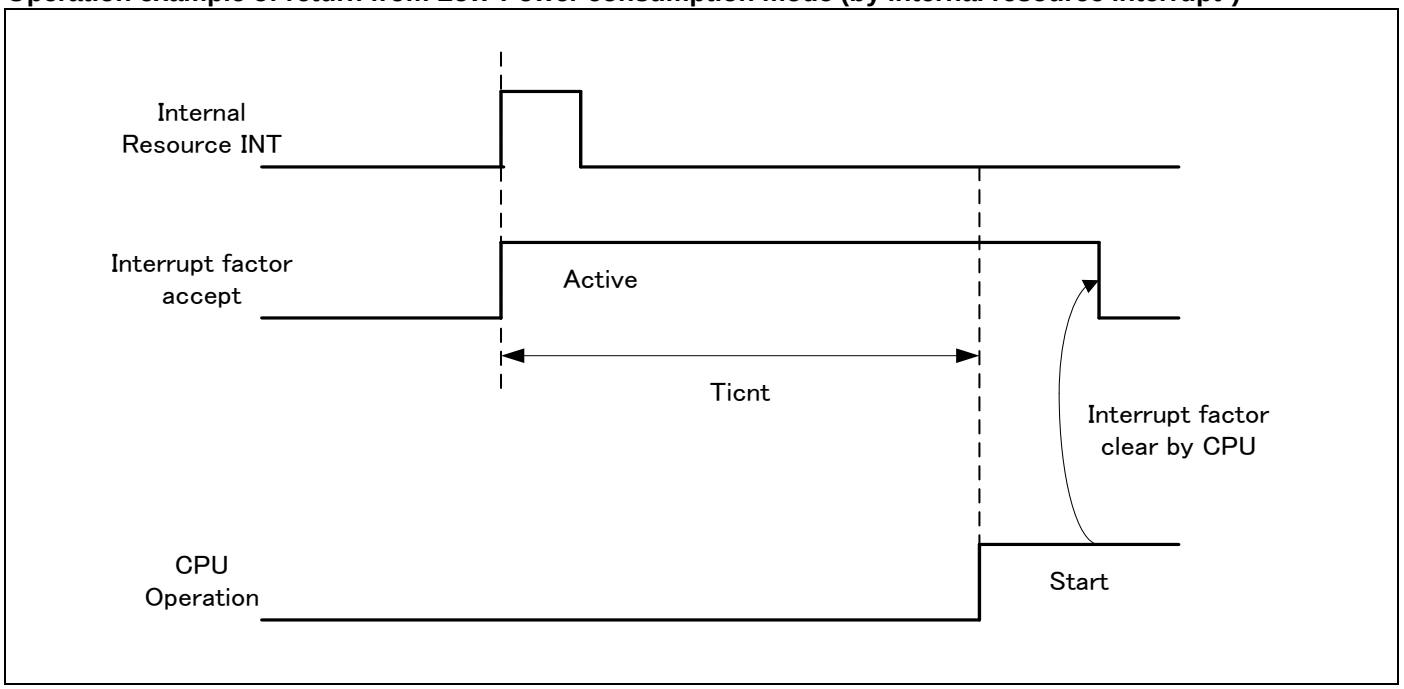
*: The maximum value depends on the accuracy of built-in CR.

Operation example of return from Low-Power consumption mode (by external interrupt*)



*: External interrupt is set to detecting fall edge.

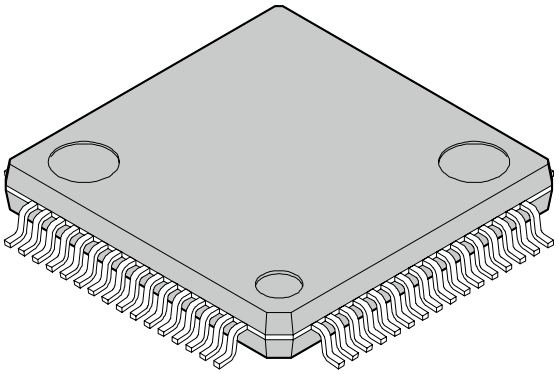
Operation example of return from Low-Power consumption mode (by internal resource interrupt*)



*: Internal resource interrupt is not included in return factor by the kind of Low-Power consumption mode.

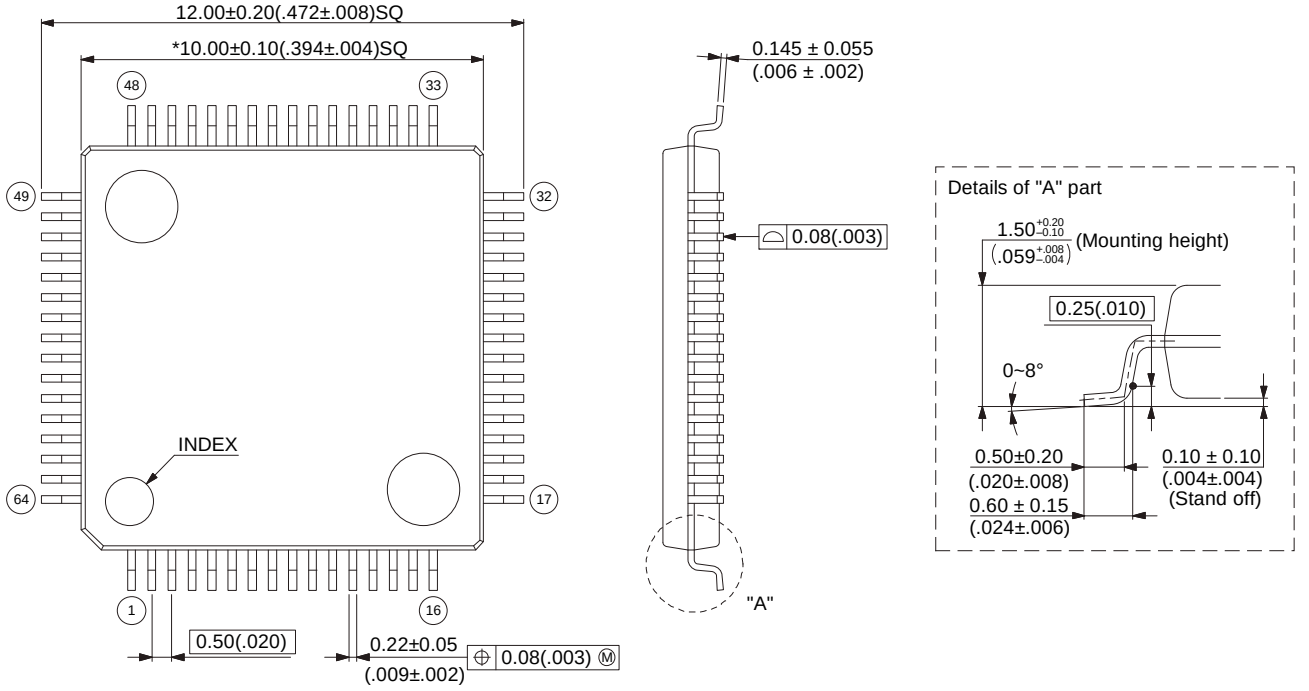
Notes:

- The return factor is different in each Low-Power consumption modes.
  See "Chapter 6: Low Power Consumption Mode" and "Operations of Standby Modes" in FM3 Family Peripheral Manual about the return factor from Low-Power consumption mode.
- When interrupt recoveries, the operation mode that CPU recoveries depends on the state before the Low-Power consumption mode transition. See "Chapter 6: Low Power Consumption Mode" in "FM3 Family Peripheral Manual".

64-pin plastic LQFP		
	Lead pitch	0.50 mm
	Package width × package length	10.00 mm × 10.00 mm
	Lead shape	Gullwing
	Lead bend direction	Normal bend
	Sealing method	Plastic mold
	Mounting height	1.70 mm MAX
(FPT-64P-M38)	Weight	0.32 g

64-pin plastic LQFP
(FPT-64P-M38)

Note 1) * : These dimensions do not include resin protrusion.
Note 2) Pins width and pins thickness include plating thickness.
Note 3) Pins width do not include tie bar cutting remainder.



Dimensions in mm (inches).
Note: The values in parentheses are reference values.

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