ICs

Microcontroller

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High Performance & Ultra Low Power MCU

16bit ML620500 Series

Standard Type 16bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features							
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	Co-processor for multiplication and division	port			8bit timer	16bit timer	PWM	
		Low speed	High speed									Input	Output	Input/Output				
☆ML620Q503	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation/ External input)	16MHz	62.5 ns 30.5μs	0.45μA	−40 to +85	Flash	32K	2K	2K	✓	2	—	36	8 (16bit×4)	4	16bit×4 (use 16bit timer)	
New ML620Q504	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation/ External input)	16MHz	62.5 ns 30.5μs	0.45μA	−40 to +85	Flash	64K	2K	6K	✓	2	—	36	8 (16bit×4)	4	16bit×4 (use 16bit timer)	
☆ML620Q506	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation/ External input)	16MHz	62.5 ns 30.5μs	0.45μA	−40 to +85	Flash	128K	2K	12K	✓	2	—	36	8 (16bit×4)	4	16bit×4 (use 16bit timer)	
☆ML620Q546	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation/ External input)	16MHz	62.5 ns 30.5μs	0.45μA	−40 to +85	Flash	128K	2K	10K	✓	—	—	70	12 (16bit×6)	8	16bit×8 (use 16bit timer) 3 phase motor PWM×1	
☆ML620Q558	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation/ External input)	16MHz	62.5 ns 30.5μs	0.45μA	−40 to +85	Flash	256K	2K	20K	✓	—	—	90	12 (16bit×6)	8	16bit×8 (use 16bit timer) 3 phase motor PWM×1	

Ultra Low Operating Voltage & Ultra Low Power MCU

8bit ML610400 Series

Standard Type 8bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features								
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port			8bit timer	1kHz timer	PWM	Capture	WDT	
		Low speed	High speed								Input	Output	Input/Output						
ML610482	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Mask	64K	—	4K	6	4	22	4 (16bit×2)	—	16bit×1	—	1	
ML610482P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Mask	64K	—	4K	6	4	22	4 (16bit×2)	—	16bit×1	—	1	
ML610Q482	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	64K	—	4K	6	4	22	4 (16bit×2)	—	16bit×1	—	1	
ML610Q482P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Flash	64K	—	4K	6	4	22	4 (16bit×2)	—	16bit×1	—	1	
New ML610Q485	1.25 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.25μs/2μs/ 30.5μs	0.35μA	−20 to +70	Flash	32K	—	2K	4	6	16	6 (16bit× 3)	—	16bit×1	2	1	
New ML610Q485P	1.25 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.25μs/2μs/ 30.5μs	0.35μA	−40 to +85	Flash	32K	—	2K	4	6	16	6 (16bit× 3)	—	16bit×1	2	1	

Built-in LCD driver Dot Matrix Type 8bit Low power MCU

ML610421	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Mask	32K	—	2K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610421P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Mask	32K	—	2K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q421	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	32K	—	2K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q421P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Flash	32K	—	2K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q422	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	32K	—	2K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q422P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Flash	32K	—	2K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q422B	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	32K	—	2K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q422PB	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Flash	32K	—	2K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610426	1.1 to 3.6	32.768kHz (Crystal oscillation)	1MHz	1μs/ 30.5μs	0.5μA	−20 to +70	Mask	40K	—	2K	5	—	7	4 (16bit×2)	1	16bit×1	—	1	
ML610Q426	1.1 to 3.6	32.768kHz (Crystal oscillation)	1MHz	1μs/ 30.5μs	0.5μA	−20 to +70	Flash	40K	—	2K	5	—	7	4 (16bit×2)	1	16bit×1	—	1	
ML610Q426C	1.1 to 3.6	32.768kHz (Crystal oscillation)	1MHz	1μs/ 30.5μs	0.5μA	−20 to +70	Flash	40K	—	2K	7	—	13	4 (16bit×2)	1	16bit×1	—	1	
ML610Q428	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−20 to +70	Flash	48K	—	4K	6	3	14	2 (16bit×1)	1	16bit×3	—	1	
ML610429	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−20 to +70	Mask	48K	—	4K	10	3	20	2 (16bit×1)	1	16bit×3	—	1	
ML610Q429	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−20 to +70	Flash	48K	—	4K	10	3	20	2 (16bit×1)	1	16bit×3	—	1	
ML610Q431	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	64K	—	3K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q431A	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	64K	—	3K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q431PA	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−40 to +85	Flash	64K	—	3K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q432	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	64K	—	3K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q432A	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	64K	—	3K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q435	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	96K	—	3K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q435A	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	96K	—	3K	6	3	22	4 (16bit×2)	1	16bit×1	2	1	
ML610Q436	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	96K	—	3K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q436A	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/2μs/ 30.5μs	0.5μA	−20 to +70	Flash	96K	—	3K	6	3	14	4 (16bit×2)	1	16bit×1	2	1	
ML610Q438	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−20 to +70	Flash	128K	—	7K	10	3	20	4 (16bit×2)	1	16bit×3	2	1	
ML610Q438P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−40 to +85	Flash	128K	—	7K	10	3	20	4 (16bit×2)	1	16bit×3	2	1	
ML610Q439	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−20 to +70	Flash	128K	—	7K	10	3	20	4 (16bit×2)	1	16bit×3	2	1	
ML610Q439P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 2MHz	0.244μs/0.5μs/ 30.5μs	0.5μA	−40 to +85	Flash	128K	—	7K	10	3	20	4 (16bit×2)	1	16bit×3	2	1	

(LAPIS Semiconductor products)

Functions / Features											Industrial Equipment	Notes	Package	Chip Support
Capture	WDT	ADC (method)	Serial port			Supply voltage detection	LCD driver	External interrupt sources	Others					
			I²C	SSIO (SPI)	UART									
16bit×4 (use 16bit timer)	1	2 (RC type) 12bit×12 (SA type)	2	2	2	VLS×1 LLD×1	–	8	Low speed frequency correction/ Analog comparator×2/Melody : Buzzer		✓	–	P-TQFP48-0707-0.50	✓
16bit×4 (use 16bit timer)	1	2 (RC type) 12bit×12 (SA type)	2	2	2	VLS×1 LLD×1	–	8	Low speed frequency correction/ Analog comparator×2/Melody : Buzzer		✓	–	P-TQFP48-0707-0.50	✓
16bit×4 (use 16bit timer)	1	2 (RC type) 12bit×12 (SA type)	2	2	2	VLS×1 LLD×1	–	8	Low speed frequency correction/ Analog comparator×2/Melody : Buzzer		✓	–	P-TQFP48-0707-0.50	✓
16bit×8 (use 16bit timer)	1	2 (RC type) 10bit×20 (SA type)	2	2	5	VLS×1	–	8	RTC/Low speed frequency correction/ Analog comparator×2/Melody : Buzzer		✓	–	P-TQFP80-1212-0.50	–
16bit×8 (use 16bit timer)	1	2 (RC type) 10bit×20 (SA type)	2	2	5	VLS×1	–	8	RTC/Low speed frequency correction/ Analog comparator×2/Melody : Buzzer		✓	–	P-TQFP100-1414-0.50	–

☆ : Under development

(LAPIS Semiconductor products)

Functions / Features								Industrial Equipment	Notes	Package	Chip Support
ADC (method)	Serial port			Supply voltage detection	LCD driver	External interrupt sources	Others				
	I²C	SSIO	UART								
2 (RC type)	1	1	1	BLD×1	–	5	Low speed frequency correction /Buzzer	–	–	–	✓
2 (RC type)	1	1	1	BLD×1	–	5	Low speed frequency correction /Buzzer	✓	–	–	✓
2 (RC type)	1	1	1	BLD×1	–	5	Low speed frequency correction /Buzzer	–	–	P-TQFP48-0707-0.50	✓
2 (RC type)	1	1	1	BLD×1	–	5	Low speed frequency correction /Buzzer	✓	–	P-TQFP48-0707-0.50	✓
–	–	1	1	–	–	12 (include 8bit-OR input)	Low speed frequency correction / Analog comparator / Melody : Buzzer / RTC / RNG (Random Number Generator)	–	–	–	✓
–	–	1	1	–	–	12 (include 8bit-OR input)	Low speed frequency correction / Analog comparator / Melody : Buzzer / RTC / RNG (Random Number Generator)	✓	–	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.400dot 50seg.×8com.	5	Low speed frequency correction/ Melody : Buzzer	–	–	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.400dot 50seg.×8com.	5	Low speed frequency correction/ Melody : Buzzer	✓	–	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.400dot 50seg.×8com.	5	Low speed frequency correction/ Melody : Buzzer	–	–	P-TQFP120-1414-0.40	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.400dot 50seg.×8com.	5	Low speed frequency correction/ Melody : Buzzer	✓	–	P-TQFP120-1414-0.40	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable	P-TQFP120-1414-0.40	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : enable	P-TQFP120-1414-0.40	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : disenable	–	✓
1 (RC type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/Melody : Buzzer/ EL Driver/External input voltage detecttion	–	–	–	✓
1 (RC type)	1	1	1	BLD×1	Max.800dot 50seg.×16com.	5	Low speed frequency correction/Melody : Buzzer/ EL Driver/External input voltage detection	–	–	–	✓
1 (RC type)	1	1	1	BLD×1	Max.672dot 42seg.×16com.	8	Low speed frequency correction/Melody : Buzzer/ EL Driver/External input voltage detecttion	–	–	–	✓
2 (RC type)	1	1	1	BLD×1	Max.1392dot 58seg.×24com.	5	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable/disable according to mask option	TQFP128-P-1414-0.40	✓
2 (RC type)	1	1	1	BLD×1	Max.512dot 64seg.×8com.	9	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable/disable according to mask option	–	✓
2 (RC type)	1	1	1	BLD×1	Max.512dot 64seg.×8com.	9	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable/disable according to mask option	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : disenable	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1536dot 64seg.×24com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1536dot 64seg.×24com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1536dot 64seg.×24com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable	–	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1536dot 64seg.×24com.	5	RTC/Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1344dot 56seg.×24com.	9	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable/disable according to mask option	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1344dot 56seg.×24com.	9	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable/disable according to mask option	P-LQFP144-2020-0.50	–
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	9	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable/disable according to mask option	P-LQFP144-2020-0.50	✓
2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.1024dot 64seg.×16com.	9	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable/disable according to mask option	P-LQFP144-2020-0.50	✓

8bit ML610400 Series

Built-in LCD driver Segments type Low power 8bit MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features							
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port			8bit timer	1kHz timer	PWM	Capture	WDT
		Low speed	High speed								Input	Output	Input/Output					
ML610401	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−20 to +70	Mask	6K	–	192	4	12	18	2 (16bit×1)	–	–	2	1
ML610401P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−40 to +85	Mask	6K	–	192	4	12	18	2 (16bit×1)	–	–	2	1
ML610402	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−20 to +70	Mask	6K	–	192	4	8	18	2 (16bit×1)	–	–	2	1
ML610402P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−40 to +85	Mask	6K	–	192	4	8	18	2 (16bit×1)	–	–	2	1
ML610403	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−20 to +70	Mask	6K	–	192	4	4	18	2 (16bit×1)	–	–	2	1
ML610403P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.9μA	−40 to +85	Mask	6K	–	192	4	4	18	2 (16bit×1)	–	–	2	1
ML610404	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	8K	–	256	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610404P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	8K	–	256	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610405	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	8K	–	256	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610405P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	8K	–	256	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610406	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	8K	–	256	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610406P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	8K	–	256	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610407	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610407P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q407	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q407P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Flash	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q407A	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q407PA	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Flash	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q407D	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	12	22	4 (16bit×2)	–	16bit×1	2	1
ML610408	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	16K	–	1K	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610408P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	16K	–	1K	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q408	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q408P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Flash	16K	–	1K	5	8	22	4 (16bit×2)	–	16bit×1	2	1
ML610409	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Mask	16K	–	1K	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610409P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Mask	16K	–	1K	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q409	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q409P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−40 to +85	Flash	16K	–	1K	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q409A	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz	0.5μs/ 30.5μs	0.9μA	−20 to +70	Flash	16K	–	1K	5	4	22	4 (16bit×2)	–	16bit×1	2	1
ML610Q411	1.1 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.5μA	−20 to +70	Flash	16K	–	1K	6	3	22	4 (16bit×2)	1	16bit×1	2	1
ML610Q411P	1.1 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.5μA	−40 to +85	Flash	16K	–	1K	6	3	22	4 (16bit×2)	1	16bit×1	2	1
ML610Q411PA	1.1 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.5μA	−40 to +85	Flash	16K	–	1K	6	3	22	4 (16bit×2)	1	16bit×1	2	1
ML610Q412	1.1 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.5μA	−20 to +70	Flash	16K	–	1K	6	3	14	4 (16bit×2)	1	16bit×1	2	1
ML610Q412P	1.1 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2μs/ 30.5μs	0.5μA	−40 to +85	Flash	16K	–	1K	6	3	14	4 (16bit×2)	1	16bit×1	2	1
ML610Q419	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/ 2μs/ 30.5μs	0.9μA	−20 to +70	Flash	64K	4K	2K	6	3	18	4 (16bit×2)	–	16bit×1	2	1
ML610Q419P	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244μs/ 2μs/ 30.5μs	0.9μA	−40 to +85	Flash	64K	4K	2K	6	3	18	4 (16bit×2)	–	16bit×1	2	1

(LAPIS Semiconductor products)

Functions / Features												
	ADC (method)	Serial port			Supply voltage detection	LCD driver	External interrupt sources	Others	Industrial Equipment	Notes	Package	Chip Support
		I²C	SSIO	UART								
	2 (RC type)	–	–	1	–	Max.55dot 11seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	–	1	–	Max.55dot 11seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	–	1	–	Max.75dot 15seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	–	1	–	Max.75dot 15seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	–	1	–	Max.95dot 19seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	–	1	–	Max.95dot 19seg.×5com.	8 (include 4bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.105dot 21seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.105dot 21seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.125dot 25seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.125dot 25seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : disenable LCD bias : 1/2, 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.145dot 29seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable LCD bias : 1/2, 1/3	–	✓
	2(RC type)	–	2	1	–	Max.165dot 33seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2(RC type)	–	2	1	–	Max.165dot 33seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.165dot 33seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.165dot 33seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.185dot 37seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.185dot 37seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Selectable oscillation stop detection reset : function enable according to software LCD bias : 1/3	–	✓
	2 (RC type)	–	2	1	–	Max.185dot 37seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.185dot 37seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	✓	Low-speed scillation stop detect reset : enable LCD bias : 1/3	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	2	1	–	Max.185dot 37seg.×5com.	13 (include 8bit-OR input)	Low speed frequency correction/ Melody : Buzzer	–	Low-speed scillation stop detect reset : disenable LCD bias : 1/2, 1/3	–	✓
	2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.144dot 36seg.×4com.	5	Low speed frequency correction/ Buzzer	–	Low-speed scillation stop detect reset : enable	P-TQFP120-1414-0.40	✓
	2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.144dot 36seg.×4com.	5	Low speed frequency correction/ Buzzer	✓	Low-speed scillation stop detect reset : enable	P-TQFP120-1414-0.40	✓
	2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.144dot 36seg.×4com.	5	Low speed frequency correction/ Buzzer	✓	Low-speed scillation stop detect reset : disenable	–	✓
	2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.176dot 44seg.×4com.	5	Low speed frequency correction/ Buzzer	–	–	P-TQFP120-1414-0.40	✓
	2 (RC type) 12bit×2 (SA type)	1	1	1	BLD×1	Max.176dot 44seg.×4com.	5	Low speed frequency correction/ Buzzer	✓	–	P-TQFP120-1414-0.40	✓
	2 (RC type) 12bit×4 (SA type)	1	2	1	BLD×1	Max.192dot 48seg.×4com.	5	Low speed frequency correction/ Melody : Buzzer	–	–	P-TQFP100-1414-0.50	✓
	2 (RC type) 12bit×4 (SA type)	1	2	1	BLD×1	Max.192dot 48seg.×4com.	5	Low speed frequency correction/ Melody : Buzzer	✓	–	P-TQFP100-1414-0.50	✓

8bit ML610400 Series

Built-in LCD driver Segments type Low power 8bit MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features							
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port			8bit timer	1kHz timer	PWM	Capture	WDT
		Low speed	High speed								Input	Output	Input/Output					
ML610Q419C	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244µs/ 2µs/ 30.5µs	0.9µA	−20 to +70	Flash	64K	4K	2K	6	3	26	4 (16bit×2)	–	16bit×1	2	1
ML610Q419PC	1.1 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz 500kHz	0.244µs/ 2µs/ 30.5µs	0.9µA	−40 to +85	Flash	64K	4K	2K	6	3	26	4 (16bit×2)	–	16bit×1	2	1
ML610Q461	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.9µA	−20 to +70	Flash	16K	–	1K	5	10	14	4 (16bit×2)	–	16bit×1	2	1
ML610Q462	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.9µA	−20 to +70	Flash	16K	–	1K	5	6	14	4 (16bit×2)	–	16bit×1	2	1
ML610Q463	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.9µA	−20 to +70	Flash	16K	–	1K	5	2	14	4 (16bit×2)	–	16bit×1	2	1
ML610471	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Mask	8K	–	512	4	10	7	2 (16bit×1)	–	–	2	1
ML610Q471	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Flash	8K	–	512	4	10	7	2 (16bit×1)	–	–	2	1
ML610Q471P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−40 to +85	Flash	8K	–	512	4	10	7	2 (16bit×1)	–	–	2	1
ML610472	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Mask	8K	–	512	4	6	7	2 (16bit×1)	–	–	2	1
ML610Q472	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Flash	8K	–	512	4	6	7	2 (16bit×1)	–	–	2	1
ML610Q472P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−40 to +85	Flash	8K	–	512	4	6	7	2 (16bit×1)	–	–	2	1
ML610473	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Mask	8K	–	512	4	2	7	2 (16bit×1)	–	–	2	1
ML610Q473	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−20 to +70	Flash	8K	–	512	4	2	7	2 (16bit×1)	–	–	2	1
ML610Q473P	1.25 to 3.6	32.768kHz (Crystal oscillation)	500kHz	2µs/ 30.5µs	0.8µA	−40 to +85	Flash	8K	–	512	4	2	7	2 (16bit×1)	–	–	2	1
ML610474	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Mask	16K	–	1K	4	10	10	6 (16bit×3)	–	–	2	1
ML610Q474	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Flash	16K	–	1K	4	10	10	6 (16bit×3)	–	–	2	1
ML610475	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Mask	16K	–	1K	4	6	10	6 (16bit×3)	–	–	2	1
ML610Q475	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Flash	16K	–	1K	4	6	10	6 (16bit×3)	–	–	2	1
ML610476	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Mask	16K	–	1K	4	2	10	6 (16bit×3)	–	–	2	1
ML610Q476	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.25µA	−20 to +70	Flash	16K	–	1K	4	2	10	6 (16bit×3)	–	–	2	1
ML610477	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.51µA	−20 to +70	Mask	24K	–	2K	4	10	15	6 (16bit×3)	–	–	2	1
ML610Q477	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−20 to +70	Flash	24K	–	2K	4	10	15	6 (16bit×3)	–	–	2	1
ML610Q477P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−40 to +85	Flash	24K	–	2K	4	10	15	6 (16bit×3)	–	–	2	1
ML610478	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.51µA	−20 to +70	Mask	24K	–	2K	4	6	15	6 (16bit×3)	–	–	2	1
ML610Q478	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−20 to +70	Flash	24K	–	2K	4	6	15	6 (16bit×3)	–	–	2	1
ML610Q478P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−40 to +85	Flash	24K	–	2K	4	6	15	6 (16bit×3)	–	–	2	1
ML610479	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.51µA	−20 to +70	Mask	24K	–	2K	4	2	15	6 (16bit×3)	–	–	2	1
ML610Q479	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−20 to +70	Flash	24K	–	2K	4	2	15	6 (16bit×3)	–	–	2	1
ML610Q479P	1.25 to 3.6	32.768kHz (Crystal oscillation)	2MHz 500kHz	0.5µs/ 2µs/ 30.5µs	0.8µA	−40 to +85	Flash	24K	–	2K	4	2	15	6 (16bit×3)	–	–	2	1

(LAPIS Semiconductor products)

	Functions / Features											
	ADC (method)	Serial port			Supply voltage detection	LCD driver	External interrupt sources	Others	Industrial Equipment	Notes	Package	Chip Support
		I²C	SSIO	UART								
	2 (RC type) 12bit×4 (SA type)	1	2	1	BLD×1	Max.160dot 40seg.×4com.	5	Low speed frequency correction/ Melody : Buzzer	–	–	P-TQFP100-1414-0.50	✓
	2 (RC type) 12bit×4 (SA type)	1	2	1	BLD×1	Max.160dot 40seg.×4com.	5	Low speed frequency correction/ Melody : Buzzer	✓	–	P-TQFP100-1414-0.50	✓
	2 (RC type)	–	1	1	–	Max.64dot 16seg.×4com.	5	Low speed frequency correction	–	–	P-TQFP64-1010-0.50	–
	2 (RC type)	–	1	1	–	Max.80dot 20seg.×4com.	5	Low speed frequency correction	–	–	P-TQFP64-1010-0.50	–
	2 (RC type)	–	1	1	–	Max.96dot 24seg.×4com.	5	Low speed frequency correction	–	–	P-TQFP64-1010-0.50	–
	1 (RC type)	–	–	1	–	Max.55dot 11seg.×5com.	4	Low speed frequency correction	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.55dot 11seg.×5com.	4	Low speed frequency correction/ No debugging function	–	–	P-TQFP48-0707-0.50	✓
	1 (RC type)	–	–	1	–	Max.55dot 11seg.×5com.	4	Low speed frequency correction/ No debugging function	✓	–	P-TQFP48-0707-0.50	✓
	1 (RC type)	–	–	1	–	Max.75dot 15seg.×5com.	4	Low speed frequency correction	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.75dot 15seg.×5com.	4	Low speed frequency correction/ No debugging function	–	–	P-TQFP48-0707-0.50	✓
	1 (RC type)	–	–	1	–	Max.75dot 15seg.×5com.	4	Low speed frequency correction/ No debugging function	✓	–	P-TQFP48-0707-0.50	✓
	1 (RC type)	–	–	1	–	Max.95dot 19seg.×5com.	4	Low speed frequency correction	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.95dot 19seg.×5com.	4	Low speed frequency correction/ No debugging function	–	–	P-TQFP48-0707-0.50	✓
	1 (RC type)	–	–	1	–	Max.95dot 19seg.×5com.	4	Low speed frequency correction/ No debugging function	✓	–	P-TQFP48-0707-0.50	✓
	–	–	–	1	–	Max.135dot 27seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	–	–	–	1	–	Max.135dot 27seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	–	–	–	1	–	Max.155dot 31seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	–	–	–	1	–	Max.155dot 31seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	–	–	–	1	–	Max.175dot 35seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	–	–	–	1	–	Max.175dot 35seg.×5com.	10 (include 6bit-OR input)	Low speed frequency correction/ Melody : Buzzer/ Analog comparator	–	Selectable oscillation stop detection reset : function enable according to software	–	✓
	1 (RC type)	–	–	1	–	Max.135dot 27seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.135dot 27seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.135dot 27seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	✓	–	–	✓
	1 (RC type)	–	–	1	–	Max.155dot 31seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.155dot 31seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.155dot 31seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	✓	–	–	✓
	1 (RC type)	–	–	1	–	Max.175dot 35seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.175dot 35seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	–	–	–	✓
	1 (RC type)	–	–	1	–	Max.175dot 35seg.×5com.	12 (include 8bit-OR input)	Low speed frequency correction/Analog comparator	✓	–	–	✓

High Noise Immunity MCU

8bit ML610100 Series

Standard Type 8bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port		
		Low speed	High speed								Input	Output	Input/Output
ML610Q101	2.7 to 5.5	32.768kHz (Internal RC oscillation)	8.192MHz	0.122μs/ 30.5μs	–	−40 to +85	Flash	4K	–	256	–	–	11
ML610Q102	2.7 to 5.5	32.768kHz (Internal RC oscillation)	8.192MHz	0.122μs/ 30.5μs	–	−40 to +85	Flash	6K	–	256	–	–	11
ML610Q111	2.7 to 5.5	32.768kHz (Internal RC oscillation)	8.192MHz	0.122μs/ 30.5μs	–	−40 to +105	Flash	24K	4K	2K	–	–	15
ML610Q112	2.7 to 5.5	32.768kHz (Internal RC oscillation)	8.192MHz	0.122μs/ 30.5μs	–	−40 to +105	Flash	32K	4K	4K	–	–	25

Built-in LCD driver Segments type Low power 8bit MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port		
		Low speed	High speed								Input	Output	Input/Output
ML610Q172	2.2 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.0μA	−40 to +85	Flash	128K	2K	4K	6	2	37
ML610Q173	2.2 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.0μA	−40 to +85	Flash	128K	2K	4K	6	2	37
ML610Q174	2.2 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.0μA	−40 to +85	Flash	128K	2K	4K	6	6	49
ML610Q178	2.2 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.0μA	−40 to +85	Flash	128K	–	4K	7	8	59

16bit ML620100 Series

Standard Type 16bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port		
		Low speed	High speed								Input	Output	Input/Output
☆ML620Q131	1.6 to 5.5	32.768kHz (Internal RC oscillation)	16.384MHz	61.0 ns/ 30.5μs	3.5 (T.B.D)	−40 to +105	Flash	8K	4K	2K	–	–	11
☆ML620Q132	1.6 to 5.5	32.768kHz (Internal RC oscillation)	16.384MHz	61.0 ns/ 30.5μs	3.5 (T.B.D)	−40 to +105	Flash	16K	4K	2K	–	–	11
☆ML620Q133	1.6 to 5.5	32.768kHz (Internal RC oscillation)	16.384MHz	61.0 ns/ 30.5μs	3.5 (T.B.D)	−40 to +105	Flash	20K	4K	2K	–	–	11
☆ML620Q134	1.6 to 5.5	32.768kHz (Internal RC oscillation)	16.384MHz	61.0 ns/ 30.5μs	3.5 (T.B.D)	−40 to +105	Flash	16K	4K	2K	–	–	15
☆ML620Q135	1.6 to 5.5	32.768kHz (Internal RC oscillation)	16.384MHz	61.0 ns/ 30.5μs	3.5 (T.B.D)	−40 to +105	Flash	20K	4K	2K	–	–	15
New ML620Q151	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	32K	2K	2K	5 (Use crystal oscillation) 6 (Not use crystal oscillation)	4	30 (Use crystal oscillation) 31 (Not use crystal oscillation)
New ML620Q152	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	48K	2K	2K	5 (Use crystal oscillation) 6 (Not use crystal oscillation)	4	30 (Use crystal oscillation) 31 (Not use crystal oscillation)
New ML620Q153	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	64K	2K	2K	5 (Use crystal oscillation) 6 (Not use crystal oscillation)	4	30 (Use crystal oscillation) 31 (Not use crystal oscillation)
New ML620Q154	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	32K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	33 (Use crystal oscillation) 34 (Not use crystal oscillation)
New ML620Q155	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	48K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	33 (Use crystal oscillation) 34 (Not use crystal oscillation)
New ML620Q156	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	64K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	33 (Use crystal oscillation) 34 (Not use crystal oscillation)
New ML620Q157	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	32K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	45 (Use crystal oscillation) 46 (Not use crystal oscillation)
New ML620Q158	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	48K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	45 (Use crystal oscillation) 46 (Not use crystal oscillation)
New ML620Q159	1.8 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5 (Crystal oscillation)(T.B.D) 3.5 (Internal RC oscillation)(T.B.D)	−40 to +105	Flash	64K	2K	2K	6 (Use crystal oscillation) 7 (Not use crystal oscillation)	4	45 (Use crystal oscillation) 46 (Not use crystal oscillation)

(LAPIS Semiconductor products)

8bit timer	16bit timer	PWM	WDT	ADC(method)	Serial port I²C	Serial port SSIO	Serial port UART	Supply voltage detection	LCD driver	External interrupt sources	Others	Industrial Equipment	Notes	Package	Chip Support
Functions / Features															
6 (16bit×3)	–	16bit×1 (with dead time)	1	10bit×6 (SA type)	–	–	1	VLS×2	–	5	Analog comparator×2	✓	–	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	–
6 (16bit×3)	–	16bit×1 (with dead time)	1	10bit×6 (SA type)	–	–	1	VLS×2	–	5	Analog comparator×2	✓	–	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	–
6 (16bit×3)	–	16bit×4 (Complementary type)	1	10bit×6 (SA type)	1	1	2	VLS×2	–	7	Analog comparator×2	✓	–	P-TSSOP20-0225-0.65	–
6 (16bit×3)	–	16bit×4 (Complementary type)	1	10bit×8 (SA type)	1	1	2	VLS×2	–	7	Analog comparator×2	✓	–	P-LQFP32-0707-0.80	–
6 (16bit×3)	–	16bit×3 (Supports IGBT control)	1	10bit×12 (SA type)	1	2	2	BLD×1	Max. 96dot 24seg. ×4com.	4	Low speed frequency correction	–	–	QFP64-P-1414-0.80	–
6 (16bit×3)	–	16bit×3 (Supports IGBT control)	1	10bit×8 (SA type)	1	2	2	BLD×1	Max. 96dot 24seg. ×4com.	4	Low speed frequency correction/ Analog comparator	–	–	QFP64-P-1414-0.80	–
6 (16bit×3)	–	16bit×3 (Supports IGBT control)	1	10bit×12 (SA type)	1	2	2	BLD×1	Max. 128dot 32seg. ×4com.	4	Low speed frequency correction/ Analog comparator	–	–	QFP80-P-1420-0.80	–
6 (16bit×3)	–	16bit×2 (Supports IGBT control)	1	10bit×16 (SA type)	1	2	2	BLD×1	Max. 160dot 40seg. ×4com.	5	Low speed frequency correction/ Analog comparator	–	–	P-QFP100-1420-0.65	–

(LAPIS Semiconductor products)

8bit timer	16bit timer	PWM	WDT	ADC(method)	Serial port I²C	Serial port SSIO	Serial port UART	Supply voltage detection	LCD driver	External interrupt sources	Others	Industrial Equipment	Notes	Package	Chip Support
Functions / Features															
8 (16bit×4)	–	16bit×1 (Complementary type)	1	10bit×6 (SA type)	1	1	1	LLD×1 VLS×1	–	5	Analog comparator×2	✓	–	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	–
8 (16bit×4)	–	16bit×1 (Complementary type)	1	10bit×6 (SA type)	1	1	1	LLD×1 VLS×1	–	5	Analog comparator×2	✓	–	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	–
8 (16bit×4)	–	16bit×1 (Complementary type)	1	10bit×6 (SA type)	1	1	1	LLD×1 VLS×1	–	5	Analog comparator×2	✓	–	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	–
8 (16bit×4)	–	16bit×1 (Complementary type)	1	10bit×8 (SA type)	1	1	1	LLD×1 VLS×1	–	5	Analog comparator×2	✓	–	P-TSSOP20-0225-0.65	–
8 (16bit×4)	–	16bit×1 (Complementary type)	1	10bit×8 (SA type)	1	1	1	LLD×1 VLS×1	–	5	Analog comparator×2	✓	–	P-TSSOP20-0225-0.65	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	7	Analog comparator	–	–	P-TQFP48-0707-0.50	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	7	Analog comparator	–	–	P-TQFP48-0707-0.50	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	7	Analog comparator	–	–	P-TQFP48-0707-0.50	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-TQFP52-1010-0.65	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-TQFP52-1010-0.65	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-TQFP52-1010-0.65	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-QFP64-1414-0.80	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-QFP64-1414-0.80	–
2 (16bit×1)	4	16bit×4 (Complementary type)	1	10bit×12 (SA type)	1	1	1	LLD×1	–	8	Analog comparator	–	–	P-QFP64-1414-0.80	–

☆: Under development

Built-in Speech Output Function MCU

8bit ML610300 Series

Standard Type 8bit Low power MCU

Part No.	Operating Conditions						ROM/RAM					Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	Memory for sound	RAM capacity (Byte)	port		
		Low speed	High speed									Input	Output	Input/Output
New ML610Q304	2.0 to 5.5	32.768kHz (Internal RC oscillation)	8.192MHz	0.122μs/ 30.5μs	2.7μA	−40 to +85	Flash	96K	2K	Flash ROM	1K	1	3	11
ML610Q359	2.2 to 3.6	32.768kHz (Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	1.7μA	−40 to +85	Flash	160K	3K	Flash ROM	2K	8	3	29
ML610Q360	2.2 to 3.6	32.768kHz (Crystal oscillation)	8.192MHz	0.122μs/ 30.5μs	1.7μA	−40 to +85	Flash P2ROM	160K	3K	P2ROM: 16M bit	2K	8	3	29

Built-in LCD driver Segments type Low power 8bit MCU

Part No.	Operating Conditions						ROM/RAM					Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	Memory for sound	RAM capacity (Byte)	port		
		Low speed	High speed									Input	Output	Input/Output
ML610Q380	2.2 to 5.5	32.768kHz (Internal RC oscillation/ Crystal oscillation)	8.192MHz	0.122μs 30.5μs	2.0μA	−40 to +70	Flash	128K	—	Flash ROM	2K	7	4	34

Sensor Hub MCU

8bit ML610790 Family

U8 Core Based Standard Type 8bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@HALT)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port		
		Low speed	High speed								Input	Output	Input/ Output
ML610Q793	VDD:1.7 to 1.9 AVDD:2.5 to 3.6	32.768kHz (External clock)	4.096MHz	0.25μs/ 30.5μs	0.6μA	−30 to +85	Flash	64K	—	4K	—	—	21
ML610Q794G	2.5 to 3.6	32.768kHz (Crystal oscillation)	4.096MHz	0.25μs/ 30.5μs	1.1μA	−30 to +85	Flash	64K	—	4K	—	—	21

32bit ML630790 Family

ARM Cortex-M0 Based Standard Type 32bit Low power MCU

Part No.	Operating Conditions						ROM/RAM				Functions / Features		
	Operating voltage (V)	Operating frequency (Max.)		Minimum instruction execution time	Current consumption (Typ.@SLEEPDEEP)	Operating temperature (°C)	ROM Type	ROM capacity (Byte)	Data Flash capacity (Byte)	RAM capacity (Byte)	port		
		Low speed	High speed								Input	Output	Input/ Output
New ML630Q791	VDD:1.7 to 1.9	32.768kHz (External clock)	32MHz	—	2.5μA	−40 to +85	Flash	128K	—	16K	—	—	7

ARM-Based MCU

32bit MCU ML674xxx/ML675xxx

For General-purpose Applications

Part No.	Built-in Memory			CPU Core	Operating Frequency (Max.)	Operating Condition		
	ROM/Flash	RAM	Cash			Supply Voltage (V)	Operating Temperature (°C)	Supply Currency (Typ.)
ML674001	—	32KByte	—	ARM7TDMI	33MHz	I/O:3.0 to 3.6 core:2.25 to 2.75	−40 to 85	52mA (33MHz, when using external ROM)
ML675001			8KByte unified		60MHz			92mA (60MHz, when using external ROM)

(LAPIS Semiconductor products)

	Functions / Features											Industrial Equipment	Notes	Package	Chip Support
	8bit timer	PWM	WDT	ADC (method)	Serial port			Supply voltage detection	LCD driver	External interrupt sources	SP Amp Output(W)/Class	Others				
					I²C	SSIO	UART									
	4 (16bit×2)	—	1	10bit×3 (SA type)	1	2	1	—	—	9	1.0 (@5V) /D class	Speech function/ ADPCM decoder/ Built-in speaker amp	✓	—	P-QFN28-0505-0.50	—
	8 (16bit×4)	—	1	12bit×4 (SA type)	—	2	2	VLS×1	—	7	0.5 (@3V) /AB class	Speech function/ ADPCM decoder/ Built-in speaker amp	✓	—	P-TQFP64-1010-0.50	—
	8 (16bit×4)	—	1	12bit×4 (SA type)	—	2	2	VLS×1	—	7	0.5 (@3V) /AB class	Speech function/ ADPCM decoder/ Built-in speaker amp	✓	—	P-TQFP64-1010-0.50	—
	6 (16bit×3)	16bit×2	1	10bit×8 (SA type)	1	2	2	BLD×1	Max. 96dot 24seg. ×4com.	5	0.6 (@5V) /AB class	Speech function/ ADPCM decoder/ Built-in speaker amp	—	—	P-QFP80-1414-0.65	—

(LAPIS Semiconductor products)

	Functions / Features										Industrial Equipment	Notes	Package	Chip Support
	8bit timer	PWM	WDT	ADC (method)	Serial port				External interrupt sources	Others				
					I²C	SSIO	UART	I²C/SPI (for Host Communication)						
	6 (16bit×3)	—	1	12bit×3 (SA type)	1	1	2	1	16	16bit Square Root, Multiply, Divider, Host I/F (SPI/I²C/Logging RAM:8KB)	—	—	S-UFLGA48-3.06×2.96-0.40 (WCSP48)	—
	6 (16bit×3)	—	1	12bit×2 (SA type)	1	1	2	1	16	16bit Square Root, Multiply, Divider, Host I/F (SPI/I²C/Logging RAM:8KB)	—	—	TQFP-48-P-0707-0.50	—

(LAPIS Semiconductor products)

	Functions / Features										Industrial Equipment	Notes	Package	Chip Support
	8bit timer	PWM	WDT	ADC (method)	Serial port				External interrupt sources	Others				
					I²C	SSIO	UART	I²C/SPI (for Host Communication)						
	8 (16bit×4)	1	1	—	2	—	1	1	7	Square Root, Division operations,Host I/F (Built-in 512 byte communication register)	—	—	(WCSP)	—

(LAPIS Semiconductor products)

	Peripherals								Package
	General-purpose Ports	Timer	PWM	WDT	A/D	Serial Ports	Interrupt Internal/ External	Additional Peripheral Functions	
	42	7	16bit×2	16bit×1	10bit A/D 4ch	UART 2ch SSIO 2ch I²C 1ch	23/5	DMA controller 2ch External memory controller [ROM (Flash), SRAM, DRAM (EDO/SDRAM), IO] STOP mode	LQFP144-P-2020-0.50 P-LFBGA144-1111-0.8

Power-Saving Solar Power Supply Control LSI (LAPIS Semiconductor products)

Secondary battery control LSI

Part No.	Operating Conditions				Functions/Features			
	Operating voltage VBAT (V)	Operating voltage VSC (V)	VBAT side Current consumption (A)	Operating temperature (°C)	VBAT-VDO Output Impedance	VSC-VBAT Input Impedance	OCP (Overcharge prevention) voltage (V)	BOD (Brown out detection) voltage (V)
ML9077	0.0 to 3.2	0.0 to 3.6	80n	−20 to +70	2.5Ω or less/20mA @VBAT ≥1.8V	100Ω or less /1mA @VSC ≥2V	2.6/3.1	1.15/1.8

Primary battery control LSI

Part No.	Operating Conditions				Functions/Features		
	Operating voltage VBAT (V)	Operating voltage VSC (V)	VBAT side Current consumption (A)	Operating temperature (°C)	VBAT-VDO Output Impedance	VSC-VDO Output Impedance	Regulator voltage solar limiter voltage (V)
ML9078-001	1.1 to 3.6	0.0 to 4.0	80n	−20 to +70	75Ω or less/2mA @VBAT ≥2V	65Ω or less/2mA @VBAT ≥2V	3.3/1.65
ML9078-002	1.1 to 3.6	0.0 to 4.0	80n	−20 to +70	75Ω or less/2mA @VBAT ≥2V	65Ω or less/2mA @VBAT ≥2V	3.0/1.5
ML9078-003	1.1 to 3.6	0.0 to 4.0	80n	−20 to +70	75Ω or less/2mA @VBAT ≥2V	65Ω or less/2mA @VBAT ≥2V	VBAT