

# 4-bit Microcontrollers

## ■ KLCS-47E, 47, 470, 470A Series

### ■ Features

	47E Series	47 Series	470 Series	470A Series
Maximum ROM size	4K × 8		8K × 8	16K × 8
Maximum RAM size	256 × 4	768 × 4	1024 × 4	
Minimum instruction execution time	1.0μs (at 8MHz, V <sub>DD</sub> =2.7V~5.5V) 1.3μs (at 8MHz, V <sub>DD</sub> =4.5V~5.5V) 1.9μs (at 8MHz, V <sub>DD</sub> =2.7V~5.5V) 3.2μs (at 8MHz, V <sub>DD</sub> =2.7V~5.5V)	1.9μs (at 4.2MHz, V <sub>DD</sub> =4.5V~6V)	1.3μs (at 6MHz, V <sub>DD</sub> =4.5V~5.5V) 244μs (at 32.8MHz, V <sub>DD</sub> =2.7V~5.5V)	
Number of instructions	90		92	105
Number of interrupts	5/6	6		
Packages	DIP16~20 SOP16~28 SDIP28~42 SSOP30 QFP44	SDIP30~42 QFP44~80	SDIP28~64 QFP44~100	SDIP42~64 QFP44~80

### ■ Basic functions

- Instructions: maximum 105, minimum instruction execution time: 1.0μs
- ROM table look-up instruction
- 5-bit to 8-bit data conversion instruction
- Subroutine nesting: maximum 15 levels
- Interrupt sources: 2 external, 4 internal
- Interval timer
- Serial interface

### ■ Additional functions

- VFT driver
- LCD driver
- LED driver
- Hold function (low power consumption mode)
- Multi-pin input/output
- D/A conversion (PWM) output
- A/D conversion input
- A/D converter input
- E<sup>2</sup>PROM
- 16-bit high-speed event counter
- On-screen display circuit
- DTMF generator
- DTMF receiver
- Watchdog timer
- Pulse generator
- Remote control pulse detector
- High-speed timer/counter
- Dual clock system
- One-time PROM

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## KLCS-47E, 47 Series Selection Guide

ROM (byte)	RAM (mibbles)	Product No	Driver		SIO	A/D converter	A/D conversion input	Pulse output		Remote control pulse detector	Watchdog timer	High-speed event counter	DTMF generator	OSD	Dual clock	Hold function	Package		OTP type	Minimum operating voltage	(● : 2.7V, ○ : 2.2V)
			LED	LCD	VFT	4-bit	8-bit	PWM	Pulse	PPG	High-speed event counter	Character	Bar display	QFP(SOP)			QFP(SSOP)	SDIP(DIP)			
1k	64	KMP47C101P/M	4													●	16	16	●	●	●
		KMP47C102P/M	4								●					●	20	20	●	●	●
		KMP47C103N/M	8				1				●					●	28	28	●	●	●
		† KMP47E187M									●					●	16		●	●	●
		† KMP47E186M									●					●	16		●	●	●
2k	128	KMP47C201P/M	4													●	16	16	●	●	●
		KMP47C202P/M	4								●					●	20	20	●	●	●
		KMP47C203N/M	8				1				●					●	28	28	●	●	●
		KMP47C200BN/BF	8			1										●	42	44	●	●	●
		* KMP47C206P/M	5						1	●						●	20	20	●		
		KMP47C210AN/AF			20	1										●	42	44	●		
		KMP47C212AN			20	1										●	42				
		KMP47C231AN	8				1	5		●						●	30				
		KMP47C233AN	8					1								●	42				
		KMP47C241N/M	5			1	4			●						●	28	28	●	●	●
		KMP47C242BN	8				4		1	●						●	30		●	●	●
		KMP47C243N/M/DM	8				1	8		1	●					●	28	28	●	●	●
	192	KMP47C221ADF	24			1										●			●		
KMP47C222N/F		20			1	4		1	●					●	●	42	44	●	●	●	
4k	256	KMP47C400BN/BF	8			1										●	42	44	●	●	●
		KMP47C410AN/AF			20	1										●	42	44	●		
		KMP47C412AN			20	1										●	42				
		KMP47C421ADF		24		1										●	64		●		
		KMP47C422N/F		20			1	4		1	●				●	●	42	44	●	●	●
		KMP47C423ADF		24		1				1	●	1				●	64				
		KMP47C433AN		8				1								●	42				
		KMP47C440BN/BF		8			1		8		●					●	42	44	●		
		KMP47C441AN/AF			16	1	4				●					●	42	44	●	●	●
		KMP47C443N/M/DM		8			1	8		1	●					●	28	28	●	●	●
		KMP47C446ADF		24			1	4			●					●	64		●		
		* † KMP47E486M									●					●	28		●	●	●
	* † KMP47E487M									●					●	28		●	●	●	
	768	KMP47C407AN/AF				1			1					●		●	42	44	●	●	●
		KMP47C451BN							1					●		●	30		●	●	●
KMP47C452BN/BF					1			1					●		●	42	44	●	●	●	
KMP47C453AN/AF					1			1					●		●	42	44	●	●	●	
KMP47C454AN								1					●		●	30		●	●	●	
KMP47C456ADF			32		1			1	●		●			●		80			●	●	

\* : Under development † : USP4, 382, 279 owned by BULL CPU8

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## KLCS-47E Series

Product No	Function		ROM (bytes)	RAM (nibbles)	I/O port	Minimum instruction execution time (µs)	Power Supply Voltage (V)	Package	Built-in One-time PROM product		
KMP47C101P/M	LED driver		1k	64	11	1.3	2.2 to 5.5 (note2)	DIP16 SOP16	KMP47P201VP		
KMP47C201P/M			2k	128							
KMP47C102P/M			1k	64							
KMP47C202P/M			2k	128	15			1.0	4.0~5.7	DIP20 SOP20	KMP47P202VP/VM
KMP47C206P/M											
KMP47C103N/M	8-bit SIO	LCD driver	1k	64	23	1.3	2.2 to 5.5 (note2)	SDIP28 SOP28	KMP47P403VN/VM		
KMP47C203N/M	A/D converter		2k	128	21					1.0	2.2 to 5.5 (note 2)
KMP47C241N/M	A/D converter 8-bit SIO pulse output				4k	256	23				
KMP47C243N/M/DM			LCD driver	2k	192	22	1.0 (244)	2.2 to 5.5	SDIP42 QFP44	KMP47P422VN/VF	
KMP47C443N/M/DM	4k			256							
KMP47C222N/F	4k			256							
KMP47C422N/F											
*† KMP47E186M	E <sup>2</sup> PROM (16byte), SPI		1k	64	11	1.3	2.0 to 5.5 (note 3)	SOP16	KMP47P186M(note 4)		
KMP47E187M	E <sup>2</sup> PROM (16byte), SPI		1k	64	11	1.3	2.0 to 5.5 (note 3)	SOP16	KMP47P187M		
*† KMP47E486M	E <sup>2</sup> PROM		4k	256	21	1.3	2.7 to 5.5	SOP28	KMP47W486M		
*† KMP47E487M	E <sup>2</sup> PROM		4k	256	21	1.3	2.7 to 5.5	SOP28	KMP47W487M		

\* : Under development

† : USP4, 382, 279 owned by BULL CPU8

Note1 : ( ) ; the minimum instruction execution time when low-frequency clock is used.

Note2 : OTP built-in Type is under consideration for high-temperature range/high-quality applications.

Note3 : 2.7 to 5.5V when oscillator is connected, 2.0 to 3.4V during CR oscillation.

Note4 : KMP47P186M (CR oscillation), KMP47P187M (oscillator version)

## KLCS-47 Series

Product No	Function		ROM (bytes)	RAM (nibbles)	I/O port	Minimum instruction execution time (µs)	Power Supply Voltage (V)	Package	Built-in One-time PROM product	
KMP47C200BN/BF	Standard (LED driver)		2k	128	36	1.9	2.7 to 6.0	SDIP42 QFP44	KMP47P400VN/VF	
KMP47C400BN/BF			4k	256						
KMP47C210AN/AF	VFT driver		2k	128	36	1.9	4.5 to 6.0	SDIP42 QFP44	KMP47P410AN/AF	
KMP47C410AN/AF			4k	256						
KMP47C212AN			2k	128	35			SDIP42	-	
KMP47C412AN	4k	256								
KMP47C221ADF	LCD driver		2k	192	28	1.9	4.5 to 6.0	QFP64	KMP47P421ADF	
KMP47C421ADF			4k	256						
KMP47C423ADF		High-speed event counter	4k	256	28	1.9	4.5 to 6.0	QFP64	-	
KMP47C231AN	D/A conversion (PWM) output LED driver	4-bit A/D conversion input, remote control pulse detector	2k	128	24	1.9	2.7 to 6.0	SDIP30	-	
KMP47C233AN		3-bit A/D conversion input			36					
KMP47C433AN			4k	256						
KMP47C242BN	A/D converter, watchdog timer	LED driver	2k	128	23	1.9 (244)	4.5 to 6.0	SDIP30	KMP47P242VN	
KMP47C440AN/AF		VFT driver			34					24
KMP47C441AN/AF								LCD driver	24	
☆ KMP47C446ADF										
KMP47C451BN	DTMF generator		4k	768	23	16.7	2.2 to 6.0	SDIP30	KMP47P451VN	
KMP47C452BN/BF					35					8.3
KMP47C453AN/AF					23	2.1	SDIP30	KMP47P453VN/VF		
KMP47C454AN									35	2.7 to 6.0
KMP47C407AN/AF					34	8.3 (244)	QFP80	-		
KMP47C456ADF		LCD driver								

Note : ( ) ; the minimum instruction execution time when low-frequency clock is used.

☆ : These package types will be delivered in the short lead length package.

Type suffix P : Plastic dual in-line package (DIP)

N : Plastic shrink dual in-line package (SDIP)

F : Plastic flat package (QFP)

M : Plastic small outline package (SOP)

E : Ceramic shrink dual in-line package (SDIC)

G : Ceramic standard flat package (QFC)

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## KLCS-470A Series

Product No	Function	ROM (bytes)	RAM (nibbles)	I/O port	Minimum instruction execution time (µs)	Power Supply Voltage (V)	Package	Built-in One-time PROM product	
KMP47C623F	LCD driver (24 to 20×4), High-speed event counter	6k	384	32 to 28	1.3 (244)	4.5 to 6.0	QFP64	KMP47P823VF	
KMP47C823F		8k	512						
KMP47C1220F	LCD driver (32×4), High-speed timer/counter	12k	768	36			SDIP42	KMP47P1620VF	
KMP47C1620F		16k							
KMP47C637N	6k	384	32	SDIP42					KMP47P1637VN
KMP47C837N	8k								
KMP47C1237N	12k	512	41				SDIP54	KMP47P1638VN	
KMP47C1637N	16k								
KMP47C1238AN	12k								
KMP47C1638AN	16k								
KMP47C853N/F	DTMF generator	8k	1024	35	8.3 (244)	2.2 to 6.0	SDIP42 QFP44	KMP47P853VN/VF	
KMP47C457N/F		4k	768		2.1 (244)	2.7 to 6.0		KMP47P857VN/VF	
KMP47C857N/F		8k	1024						
KMP47C1260N/F	A/D converter (8bits×8ch), Remote control pulse detector, LED driver	12k	768	56	1.3 (244)	4.5 to 6.0	SDIP64 QFP64	KMP47P1660VN/VF	
KMP47C1660N/F		16k							
KMP47C1270AN	VFT driver (16×18 to 13×16), D/A conversion (PWM) output, 4-bit A/D conversion input, Remote control pulse detector	12k	53	SDIP64			KMP47P1670VN		
KMP47C1670AN		16k							

note : ( ) ; the minimum instruction execution time when low-frequency clock is used.

Type N : Plastic shrink dual in-line package (SDIP) E : Ceramic shrink dual in-line package (SDIC)

F : Plastic flat package (QFP)

G : Ceramic standard flat package (QFC)

## KLCS-47E, 47, 470 series (Wide-temperature range/High-quality products)

Product No	Function	ROM (bytes)	RAM (nibbles)	I/O port	Minimum instruction execution time (µs)	Power Supply Voltage (V)	Operating temperature (°C)	Package	Built-in One-time PROM product (note 2)
* KMP47C101WP	LED driver	1k	64	11	1.3	2.2 to 5.5 (note 3)	-40 to 110	DIP16 SOP16	KMP47P201VP
* KMP47C201WP		2k	128			-40 to 110			
† KMP47E186M	E <sup>2</sup> PROM (16 bytes), SPI	1k	64			(note 4)	-40 to 85	SOP16	KMP47P186M (note 5)
KMP47E187M	E <sup>2</sup> PROM (16 bytes), SPI	1k	64			(note 4)	-40 to 85	SOP16	KMP47P187M
KMP47C241IN/IM	A/D converter LED driver	2k	128			21	2.7 to 6.0	-40 to 85	SDIP28 SOP28
KMP47C241WM				-40 to 110					
† KMP47E885IF	E <sup>2</sup> PROM (64 bytes), PWM, UART A/D converter 16-bit timer/counter Input Capture, Output compare	8k	512	36		4.5 to 5.5	-40 to 85	QFP44	KMP47P885F
† KMP47E885WF							-40 to 110		

\* : Under development

† : USP4, 382, 279 owned by BULL CP8

Type suffix

P : Plastic dual in-line package (DIP)

M : Plastic small outline package (SOP)

N : Plastic shrink dual in-line package (SDIP)

F : Plastic flat package (QFP)

note 1 : If there is any further information you require when considering I/W version products, please contact our sales representative.

note 2 : OTP built-in type is under consideration for high-temperature range/high-quality applications.

note 3 : During CR oscillation (2.7 to 5.5V when oscillator is connected).

note 4 : 2.7 to 5.5V when oscillator is connected, 2.0 to 3.4V during CR oscillation.

note 5 : KMP47P186M (CR oscillation), KMP47P187M (oscillator version)