

# 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

# 4-bit Microcontrollers

## KLCS-47E, 47 Series Selection Guide

ROM (byte)	RAM (nibbles)	Product No	Driver			SIO	A/D conversion input	Pulse output			Remote control pulse detector	Watchdog timer	High-speed event counter	DTMF generator	OSD Bar display	Dual clock	Hold function	Package		OTP type	Minimum operating voltage  (● : 2.7V, ○ : 2.2V)	
			LED	LCD	VFT	4-bit		8-bit	Pulse	PPG								PWM	QFP(SSOP)			QFP(SQP)
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 develop † : USP4, 382, 279 owned by BULL CPU8

## 4-bit Microcontrollers

### 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	KMP47P201VP		
KMP47C201P/M		2k	128				SOP16			
KMP47C102P/M		1k	64	15			DIP20	KMP47P202VP/VM		
KMP47C202P/M		2k	128				SOP20			
KMP47C206P/M		2k	128		1.0	4.0~5.7	DIP20 SOP20	TMP47P206VP/VM		
KMP47C103N/M	8-bit SIO	1k	64	23	1.3	2.2 to 5.5 (note2)	SDIP28 SOP28	KMP47P403VN/VM		
KMP47C203N/M										
KMP47C241N/M	A/D converter	2k	128	21			1.0	2.2 to 5.5 (note 2)	SDIP28 SOP28 SSOP30	KMP47P241VN/VM
KMP47C243N/M/DM										
KMP47C443N/M/DM	A/D converter 8-bit SIO pulse output	4k	256	23						
KMP47C222N/F	LCD driver	2k	192	22	1.0 (244)	2.2 to 5.5	SDIP42 QFP44	KMP47P422VN/VF		
KMP47C422N/F		4k	256							
*† 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	2.7 to 6.0	SDIP42 QFP44	KMP47P410AN/AF	
KMP47C410AN/AF		4k	256								
KMP47C212AN		2k	128	35	4.5 to 6.0	SDIP42			-		
KMP47C412AN		4k	256								
KMP47C221ADF	LCD driver	2k	192	28			1.9	4.5 to 6.0		QFP64	KMP47P421ADF
KMP47C421ADF											
KMP47C423ADF	High-speed event counter	4k	256								
KMP47C231AN	D/A conversion (PWM) output LED driver	2k	128	24	1.9	2.7 to 6.0			SDIP30	-	
KMP47C233AN		3-bit A/D conversion input	4k	256			36	SDIP42			
KMP47C433AN											
KMP47C242BN	A/D converter, watchdog timer	2k	128	23	1.9 (244)	2.7 to 6.0	SDIP30	KMP47P242VN			
KMP47C440AN/AF				LED driver			34	4.5 to 6.0	SDIP42 QFP44	KMP47P440AN/AF	
KMP47C441AN/AF		VFT driver	24	1.9 (244)							QFP64
☆ KMP47C446ADF		LCD driver									
KMP47C451BN	DTMF generator	4k	768	23	16.7	2.2 to 6.0	SDIP30	KMP47P451VN			
KMP47C452BN/BF				35			8.3	SDIP42 QFP44	KMP47P452VN/VF		
KMP47C453AN/AF					23					2.1	SDIP30
KMP47C454AN				35			2.1	SDIP42 QFP44	KMP47P454VN		
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)

M : Plastic small outline package (SOP)

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)

## 4-bit Microcontrollers

### 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	On-screen display circuit, D/A conversion (PWM) output, 4-bit A/D conversion input, Remote control pulse detector	6k	384	32			SDIP42	KMP47P1637VN		
KMP47C837N		8k								
KMP47C1237N		12k								
KMP47C1637N		16k	512	41					SDIP54	KMP47P1638VN
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
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	768	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)