

# 8-bit Microcontrollers

## ■ KLCS-870 Series

### KLCS-870 (KMP87XXXX)

#### ■ Basic functions

- **64k-byte memory space**

- : Products with 4k to 60k bytes of ROM and 256 bytes to 2k bytes of RAM

- **Architecture suitable for realtime control**

- : 0.5 $\mu$ S/instruction at 8MHz.

- : High-speed task switching, high-speed interrupt register save/ restore using register bank switching

- : Up to 15 interrupt vectors

- **Low-voltage, high-speed operation ; low power consumption**

- : Wide range of operation voltage 2.7 to 6.0V/5.5V (standard type)

- : 1.8V/0.95 $\mu$ S at 4.2MHz (low voltage type)

- : Clock gear, Low power consumption mode attained by switching the speed of the system clock.

- : Low-voltage A/D conversion operation

- : Dual clock system, main-clock for high-speed operation (8MHz) and sub-clock for low power consumption(32.8kHz) ; 5 different low power consumption modes.

- **Instruction set for embeded built-in controller : 412 instructions**

- : 1 byte jump/call instruction and memory to memory direct transfer/ arithmetic instructions to improve memory efficiency

- : Variety of bit operation instructions

- : 16-bit transfer/calculation instructions

- : Multiplication and division instructions

- **One-time PROM**

- : One-time PROM with features compatible with mask products.

- **Small package**

- : Microflat package/ Miniflat package

- **Well-developed support environment**

- : Assembler

- : High-level language

- (C-Like compiler, C compiler)

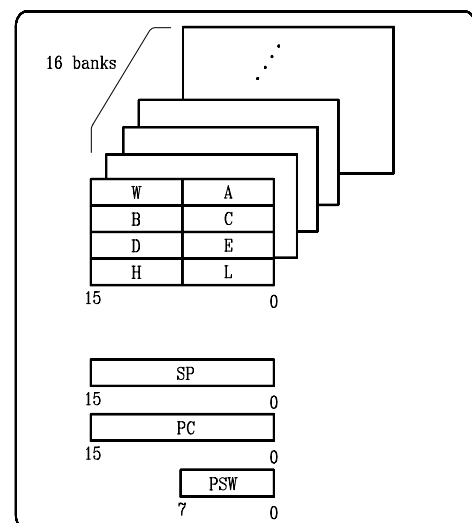
- : High-level language debugger

- : Real-Time emulator: RTE model 10

#### ■ Wide temperature range performance

Special products with a guaranteed operating temperature range of from -40°C to 85°C can also be supplied. If you are interested in using them, please contact your nearest KEC office or authorized KEC dealer.

#### ■ Register model(KLCS870)



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## KLCS-870 Series Selection Guide

ROM (byte)	RAM (nibbles)	Product No	Driver			SIO channels	UART	I <sup>2</sup> C bus	High-speed serial output	A/D converter		D/A converter	Timer / counter							Remote control pulse detector	Watchdog timer	OSD	Dial clock	Number of pins					
			LED	LCD	VFT					8-bit	10-bit		18-bit	16-bit	8-bit	Pulse output	Event counter	Divider output	Time base timer						Pulse	PPG	PWM		
4k	256	KMP87C408M/N/DM*	6			1			6				2		●	●	●	●	●	●	●	●	●	●	●	●	28		
		* KMP87C409M/N*	6				1		8		8		1	2	●	●	●	●	●	●	●	●	●	●	●	●	28		
		KMP87C444N				1		1	8			8		2		●	●	●	●	●	●	●	●	●	●	●	42		
	512	KMP87C446N	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	42	
		KMP87C447U	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	44	
8k	256	KMP87C800N/F/DF	8			2							2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87C807U	8			1		1					2	2	●	●	●	●	●	●	●	●	●	●	●	●	44		
		KMP87C808M/N	6			1		1		6				2		●	●	●	●	●	●	●	●	●	●	●	28		
		* KMP87C809M/N	6					1		8			1	2	●	●	●	●	●	●	●	●	●	●	●	●	28		
		KMP87C840N/F	8			2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87C841N/F/U	8			2			16				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
	512	KMP87C844N				1		1	4			8		2		●	●	●	●	●	●	●	●	●	●	●	42		
		KMP87C814N/F			16	1			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87C846N	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	42		
		KMP87C847U	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	44		
		* KMP87C874F	16		37	1	1		12				2	2	●	●	●	●	●	●	●	●	●	●	●	●	80		
		12k	256	KMP87CC31N	4								4		2	2	●	●	●	●	●	●	●	●	●	●	●	●	42
				KMP87CC40N/F	8			2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
512	KMP87CC41N/F/U		8			2			16				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
	KMP87CC78F				40	2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	100		
	KMP87CC20F		2	32		1							1	4	●	●	●	●	●	●	●	●	●	●	●	●	80		
16k	256	KMP87CH00N/F/DF	8			2							2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87CH00LF	4			2							2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87CH31N	4							4			2	2	●	●	●	●	●	●	●	●	●	●	●	●	42		
	512	KMP87CH14N/F			16	1			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87CH20F	2	32		1							1	4	●	●	●	●	●	●	●	●	●	●	●	●	80		
		KMP87CH38N/F	4			2		2	6				2	2	●	●	●	●	●	●	●	●	●	●	●	●	42		
		KMP87CH40N/F	8			2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87CH41N/F/U	8			2			16				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64		
		KMP87CH46N	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	42		
		KMP87CH47U	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	44		
		KMP87CH47LU	8			1			● 8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	44		
		KMP87CH48U/DF	8				1	1		16			2	2													64		
		* KMP87CH48IU	8				1	1		16			2	2													64		
		KMP87CH70BF			16	1			8		6		2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	80	
		* KMP87CH74F	16		37	1		1	12				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	80	
		* KMP87CH75F	16		51	1		1	16				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	100	
		KMP87CH78F			40	2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	100	
		1k	KMP87CH21F/DF	1	32		2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	●	80
			KMP87CH29N/U	3	24				1	5			1	4	●	●	●	●	●	●	●	●	●	●	●	●	●	64	
KMP87CH34BN	4						1			4		2	2	●	●	●	●	●	●	●	●	●	●	●	●	42			
KMP87CH36N	4									4		2	2	●	●	●	●	●	●	●	●	●	●	●	●	42			

Note) \* : Under Development

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ROM (byte)	RAM (bytes)	Product No	Driver			STO channels	UART	I <sup>2</sup> C bus	High-speed serial output	A/D converter		D/A converter	Timer / counter							Number of pins								
			LED	LCD	VFT					8-bit	10-bit		18-bit	16-bit	8-bit	Pulse output		Event counter	Divider output		Time base timer	Remote control pulse detector	Watchdog timer	OSD	Dual clock			
														PWM	PPG	Pulse												
24k	1k	512	KMP87CK38N/F	4		2	2		6				2	2	●			●			●	●	●	●	●	42		
			KMP87CK14N/F			16	1			8				2	2	●	●	●	●	●	●	●	●	●	●	●	64	
			KMP87CK20AF	2	32	1								1	4	●		●	●	●	●	●	●	●	●	●	●	80
			KMP87CK29N/U		24	1	1			5		1			4	●		●	●	●	●	●	●	●	●	●	●	64
			KMP87CK34BN	4				2			4			2	2	●			●			●	●	●	●	●	●	42
			KMP87CK36N	4		1	1				4			2	2	●			●			●	●	●	●	●	●	42
			KMP87CK40N/F	8		2				8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
			KMP87CK41N/F/U	8		2					16			2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
			KMP87CK43N					2		6				2	2	●			●			●	●	●	●	●	●	42
	KMP87CK78F			40	2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	100		
32k	1k	512	KMP87CM70BF			16	1		●		6		2	2	●		●	●	●	●	●	●	●	●	●	●	80	
			KMP87CK14N/F			16	1			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
			KMP87CM20AF	2	32	1								1	4	●		●	●	●	●	●	●	●	●	●	●	80
			KMP87CM21F/DF	1	32	2				8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	80
			KMP87CM23F	1	40	2				5				2	2	●	●	●	●	●	●	●	●	●	●	●	●	100
			KMP87CM29N/U	3	24		1			5		1			4	●		●	●	●	●	●	●	●	●	●	●	64
			KMP87CM34BN	4		2		4			4			2	2	●			●			●	●	●	●	●	●	42
			KMP87CM36N	4		1	4				4			2	2	●			●			●	●	●	●	●	●	42
			KMP87CM38N/F	4		2	2		6					2	2	●			●			●	●	●	●	●	●	42
			KMP87CM39N	4		2			8					2	2	●						●	●	●	●	●	●	64
			KMP87CM40AN/AF	8		2			8					2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
			KMP87CM41N/F/U	8		2				16				2	2	●	●	●	●	●	●	●	●	●	●	●	●	64
			KMP87CM43N			2	2		6					2	2	●			●	●	●	●	●	●	●	●	●	42
			* KMP87CM45N/F	4			2		8					2	2	●						●	●	●	●	●	●	64
			KMP87CM53F	7		1	1		8					2	2	●						●	●	●	●	●	●	80
			KMP87CM64F	16		3			16					2	3	●	●	●	●	●	●	●	●	●	●	●	●	100
			* KMP87CM75F	16	51	1	1		16					2	2	●		●	●	●	●	●	●	●	●	●	●	100
	KMP87CM78F			40	2		8					2	2	●	●	●	●	●	●	●	●	●	●	●	●	100		
	1.5k	KMP87CM71F			16	1		●		6		2	2	●		●	●	●	●	●	●	●	●	●	●	80		
	2k	* KMP87CM24F	1	40	2			8				2	2	●			●	●	●	●	●	●	●	●	●	64		
40k	1.5k	KMP87CN71F			16	1		●		6		2	2	●		●	●	●	●	●	●	●	●	●	●	80		
48k	2k	1.5k	KMP87CP71F			16	1		●		6		2	2	●		●	●	●	●	●	●	●	●	●	●	80	
			KMP87CP23F		40	2			8				2	2	●	●	●	●	●	●	●	●	●	●	●	●	100	
			KMP87CP39N	4		2			8					2	2							●	●	●	●	●	64	
			KMP87CP38N/F	4		2	2		6				2	2	●			●			●	●	●	●	●	●	42	
			KMP87CP64F	16		3			16				2	3	●	●	●	●	●	●	●	●	●	●	●	●	●	100
60k	2k		KMP87CS38N/F	4		2	2		8			2	2	●			●			●	●	●	●	●	●	●	42	
			KMP87CS39N/F*	4		2			8				2	2							●	●	●	●	●	●	64	
			KMP87CS64F	16		3			16				2	3	●	●	●	●	●	●	●	●	●	●	●	●	100	
			* KMP87CS68DF	7		1	1		8				2	2								●	●	●	●	●	80	
	KMP87CS71F			16	1			●		6		2	2	●		●	●	●	●	●	●	●	●	●	●	80		

Note) \* : Under Development

# 8-bit Microcontrollers

## KLCS-870 Series

Product No	Function	ROM (bytes)	RAM (bytes)	I/O port	Minimum instruction execution time (μs)	Power Supply Voltage (V)	Operating temperature (°C)	Built-in One-time PROM product	Package
KMP87C800N/F/DF	LED driver Timer/counter×4ch, Serial interface×2ch, watchdog timer, Time base timer	8k	256	58	0.50/122 0.95/122	4.5 to 6.0 2.7 to 6.0	-30 to 70	KMP87PH00N/F/DF	SDIP64 QFP64 LQFP64
KMP87CH00N/F/DF		16k							
KMP87CH00LF									
KMP87C408M/N/DM*	LED driver, 8-bit A/D converter×6ch, Timer/counter×2ch, Serial interface×1ch, Watchdog timer, Time base timer	4k	22	22	0.50 0.95	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87P808M/N	SOP28 SDIP28 SSOP30
KMP87C808M/N		8k							
* KMP87C409M/N	LED driver, I <sup>2</sup> C Bus support×1, 10bit A/D Product No×8ch, Timer counter 16bit×1ch, 8bit×2ch	4k	512	55	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	* KMP87P809M/N	SDIP64 QFP64
KMP87C809M/N		8k							
KMP87C814N/F	VFT driver (8 to 16seg×8 to 16dig), 8-bit A/D converter×8ch, Timer/counter×4ch, serial interface×1ch, Watchdog timer, Time base timer	8k	1k	55	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PM14N/F	SDIP64 QFP64
KMP87CH14N/F		16k							
KMP87CK14N/F		24k							
KMP87CM14N/F		32k							
KMP87CC20F	LCD driver (32 to 12seg×4com), Timer/counter×5ch, Serial interface×1ch, Watchdog timer, Time base timer	12k	1k	45	0.50/122 0.95/122	4.5 to 6.0 2.7 to 6.0	-30 to 70	KMP87PH20F	QFP80
KMP87CH20F		16k							
KMP87CK20AF		24k							
KMP87CM20AF		32k							
KMP87CH21F/DF	LCD driver (32 to 12seg×4com), 8-bit A/D converter×8ch, Timer/counter×4ch, Serial interface×2ch, Watchdog timer, Time base timer	16k	1k	52	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PP21F/DF	QFP80
KMP87CM21F/DF		32k							
KMP87CM23F	LCD driver (40 to 12seg×4com), 8-bit A/D converter×8ch, Timer/counter×4ch, Serial interface×2ch, Watchdog timer	32k	2k	70	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PP23F	QFP100
KMP87CP23F		48k							
KMP87CH29N/U	LCD driver (24 to 8seg×4com), 8-bit A/D converter×5ch, Timer/counter×5ch, Time base timer, Watchdog timer UART×1ch	16k	1k	43	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PM29N/U	SDIP64 μQFP64 (10×10mm)
KMP87CK29N/U		24k							
KMP87CM29N/U		32k							
KMP87CC31N	OSD circuit (24 char×4 line display) 6-bit A/D conversion input×4ch, PWM output (14 bit×1ch, 7bit×9ch), Remote control pulse detector	12k	256	34	0.50	4.5 to 5.5	-30 to 70	KMP87PM36N	SDIP42
KMP87CH31N		16k							
KMP87CH34BN	US closed caption TV support OSD circuit (built-in data slicer, 32 char×8 line display) serial bus interface (I <sup>2</sup> C bus support), 6-bit A/D conversion input×4ch, PWM output (14bit×1ch, 7bit× 9ch)	16k	1k	33	0.50	4.5 to 5.5	-30 to 70	KMP87PM34AN	SDIP42
KMP87CK34BN		24k							
KMP87CM34BN		32k							

Note) \* : Under Development

## 8-bit Microcontrollers

Product No	Function	ROM (bytes)	RAM (bytes)	I/O port	Minimum instruction execution time (μs)	Power Supply Voltage (V)	Operating temperature (°C)	Built-in One-time PROM product	Package
KMP87CH36N	OSD circuit (24 char×12 line display)	16k					-30 to 70	KMP87PM36N	SDIP42
KMP87CK36N	Serial bus interface (I <sup>2</sup> C bus support)	24k	1k	34	0.50	4.5 to 5.5			
KMP87CM36N	6-bit A/D conversion input×4ch, PWM output (14bit×1ch, 7bit×9ch), Remote control pulse detector	32k							
KMP87CH38N/F	OSD circuit (24 char×12 line) PWM output (14bit×1ch, 7 bit×9ch), Serial bus interface (I <sup>2</sup> bus support) 8-bit A/D converter×6ch	16k	512	33	0.50	4.5 to 5.5		KMP87PS38N/F*	SDIP42 QFP44
KMP87CK38N/F		24k	512						
KMP87CM38N/F		32k	1k						
KMP87CP38N/F		48k	2K						
KMP87CS38N/F		60k							
KMP87CM39N	LED driver, I <sup>2</sup> C Bus support×2, 8bit A/D Product No×8ch, Timer counter 16bit×2ch, 8bit×2ch	32k	1k	55	0.50/122 122	4.5 to 5.5 2.7 to 5.5		KMP87PS39N/F*	SDIP64 QFP64
KMP87CP39N		48k	2k						
KMP87CS39N/F*		60k							
KMP87C840N/F	LED driver, 8-bit A/D converter×8ch Timer-counter×4ch, Serial interface×2ch, Watchdog timer, Time base timer	8k	256	56	0.50/122 0.95/122	4.5 to 6.0 2.7 to 6.0	KMP87PH40AN/AF	SDIP64 QFP64	
KMP87CC40N/F		12k	512						
KMP87CH40N/F		16k							
KMP87CK40N/F		24k							
KMP87CM40AN/AF		32k	1k			4.5 to 5.5 2.7 to 5.5	KMP87PM40AN/AF		
KMP87C841N/F/U	LED driver, 10-bit A/D converter×16ch, High-speed PWM output×2ch, Timer-counter×4ch, Serial interface×2ch, Watchdog timer, Time base timer	8k	256	56	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-40 to 85	KMP87PM41N/F/U	SDIP64 QFP64 μQFP64 (10×10mm)
KMP87CC41N/F/U		12k	512						
KMP87CH41N/F/U		16k							
KMP87CK41N/F/U		24k							
KMP87CM41N/F/U		32k	1k						
KMP87CK43N	8-bit A/D converter×6ch serial bus interface (I <sup>2</sup> C bus support) PWM output	24k	1k	35	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	KMP87PM43N		
KMP87CM43N		32k							
KMP87C444N	8-bit D/A converter×8ch 8-bit A/D converter×4ch Serial bus interface (I <sup>2</sup> C bus support)	4k	256	34	0.50	4.5 to 5.5	-30 to 70	KMP87P844N	SDIP42
KMP87C844N		8k							
KMP87C446N	LED driver 8-bit A/D converter×8ch Timer/counter×4ch Serial interface×1ch Serial interface×1ch Serial output×1ch Watchdog timer Time base timer	4k	512	35	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	KMP87PH46N	SDIP42	
KMP87C846N		8k							
KMP87CH46N		16k							
KMP87C447U		4k							
KMP87C847U		8k		37	0.95/122	1.8 to 4.0	KMP87PH47U	μQFP44	
KMP87CH47U		16k							
KMP87CH47LU									

\* : Under development  
# : Sample available

Type suffix N : Plastic shrink dual in-line package (SDIP)  
F : Plastic flat package (QFP)  
U : Plastic micro flat package (μQFP)  
M : Plastic small outline package (SOP)

## 8-bit Microcontrollers

Product No	Function	ROM (bytes)	RAM (bytes)	I/O port	Minimum instruction execution time (μs)	Power Supply Voltage (V)	Operating temperature (°C)	Built-in One-time PROM product	Package					
KMP87CM64F	LED driver 8-bit A/D converter×16ch	32k	1k	90	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PS64F	QFP100					
KMP87CP64F	Timer/counter×5ch Serial interface×3ch	48k	2k											
KMP87CS64F	Watchdog timer Time base timer	60k												
KMP87CS68DF	LED driver UART×1 8bit A/D converter×8ch Timer counter 16bit×2ch 8bit×2ch	60k	2k	90	0.50/122 0.95/122	4.5 to 6.0 2.7 to 6.0	-30 to 70	* KMP87PS68DF	QFP80 (12×12mm)					
KMP87CH70BF	VFT driver (16seg×16dig) 6-bit A/D conversion input×6ch Timer/counter×4ch Serial interface Watchdog timer Time base timer	16k	512	73										
KMP87CM70BF		32k												
KMP87CM71F		40k	1.5k		0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PS71F	QFP80					
KMP87CN71F														
KMP87CP71F														
KMP87CS71F										60k	2k			
* KMP87CH74F	LED driver, VFT driver 51seg, I <sup>2</sup> S support	16k	512	71						0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PM74F	QFP80
* KMP87CH75F	LED driver, VFT driver 51seg, I <sup>2</sup> S support,	6k		89									0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5
* KMP87CM75F	8bit A/D converter×16ch	32k	1k											
KMP87CC78F	VFT driver (40 to 34seg×16 to 10dig) 8-bit A/D converter×8ch Time/counter×4ch Serial interface×2ch	12k	512		89									
KMP87CH78F		16k												
KMP87CK78F		24k	1k	0.50/122 0.95/122		4.5 to 5.5 2.7 to 5.5	-30 to 70	KMP87PM78F	QFP100					
KMP87CM78F		32k												

\* : Under development  
# : Sample available

Type suffix N : Plastic shrink dual in-line package (SDIP)  
F : Plastic flat package (QFP)  
U : Plastic micro flat package (μQFP)

### Wide-temperature range/High-quality products

Product No	Function	ROM (bytes)	RAM (bytes)	I/O port	Minimum instruction execution time (μs)	Power Supply Voltage (V)	Operating temperature (°C)	Built-in One-time PROM product	Package
* KMP87C840IN/IF	LED driver 8-bit A/D converter×8ch Timer/counter×4ch Serial interface×2ch	8k	256	56	0.50/122 0.95/122	4.5 to 6.0 2.7 to 6.0	-40 to 85	KMP87PH40AN/A F	SDIP64 QFP64
* KMP87C840WN							-40 to 110		
* KMP87CH400IN/IF							-40 to 85		
KMP87CH40WN	Watchdog timer timer base timer	16k					-40 to 110		
KMP87C447IU	LED driver 8-bit A/D converter×8ch Timer/counter×4ch Serial interface×1ch Serial output×1ch	4k	512	37	0.50/122 0.95/122	4.5 to 5.5 2.7 to 5.5	-40 to 85	KMP87PH47U	μQFP44
KMP87C847IU		8k							
KMP87CH47IU		16k							

\* : Under development

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

Note 2 : OTP products are standard version products only.

Type suffix N : Plastic shrink dual in-line package (SDIP), F : Plastic flat package (QFP), U : Plastic micro flat package (μQFP)