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4-Bit Microcontrollers

TLCS-47E Series (CMOS)

ROM (bytes)	RAM (nibbles)	Product No.	Minimum Instruction Execution Time (μs)	Driver		SIO		4-Bit Channels	8-Bit Channels	AD Converter Channels	Pulse Output Channels	Watchdog Timer	E ² PROM	Dual Clock	Hold Function	Number of I/O Ports	Wide operating temperature range	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD																
1K	64	TMP47C101P/M	1.3	4											●	11	2.2 to 5.5 (Note 2)	-30 to 70	TMP47P201VP	DIP16/SOP16	
		TMP47C102P/M		4						●		●	15							TMP47P202VP/NM	DIP20/SOP20
		TMP47C103N/M		8						●		●	23								TMP47P403VN/NM
		TMP47E186M (Note 3)								1	●	●	●					2.0 to 5.5	-40 to 85	TMP47P186M	SOP16
		TMP47E187M (Note 3)								1	●	●	●					2.7 to 5.5		TMP47P187M	
2K	128	TMP47C201P/M	1.0	4											●	11	2.2 to 5.5 (Note 2)	-30 to 70	TMP47P201VP	DIP16/SOP16	
		TMP47C202P/M		4						●		●	15							TMP47P202VP/NM	DIP20/SOP20
		TMP47C203N/M		8						1	●		●	23							TMP47P403VN/NM
		TMP47C206P/M	5							1	●		●	15	4.0 to 5.7	-40 to 85	TMP47P206VP/NM	DIP20/SOP20			
		TMP47C241N/M	5	1			4		●		●	21	2.7 to 6.0						TMP47P241VN/NM	SDIP28/SOP28	
		TMP47C243N/M/DM (Note 5)	8		1	8	1	●		●	23								TMP47P443VN/NM/VDM	SDIP28/SOP28/ SSOP30	
192	TMP47C222N/F/U (Note 5)	20	1	4	1	●	●	●	(Note 6)							2.7 to 5.5 (2.2 to 5.5)	-30 to 70	TMP47P422VN/VF/VU	SDIP42/ QFP44 (14 × 14 mm)/ QFP44 (10 × 10 mm)		
4K	256	TMP47C422N/F/U (Note 5)	1.0 (244)	20	1	4	1	●	●	●	20/22										
		TMP47C443N/M/DM (Note 5)		8						1	8	1	●		●	23				TMP47P443VN/NM/VDM	SDIP28/SOP28/ SSOP30

Note 1: Product number suffixes
 P: Plastic standard dual in-line package (DIP)
 N: Plastic shrink dual in-line package (SDIP)
 M: Plastic small-outline package (SOP), Dry-packed product
 F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: When using CR circuit (2.7 V to 5.5 V when using resonator)

Note 3: TMP47E186M (CR version),
 TMP47E187M (resonator version)

Note 4: Numbers in () show the minimum instruction execution time when operating at a low clock frequency.

Note 5: The CPU core used is that of the 470 Series.

Note 6: 20 for SDIP; 22 for QFP

◆ Not recommended for automotive applications.

TLCS-47/470 Series (CMOS)

ROM (bytes)	RAM (nibbles)	Product No.	Minimum Instruction Execution Time (μs)	Driver			AD Converter Channels	AD Conversion Input Channels	Pulse Output			Remote Control/Pulse Detector	Watchdog Timer	High-Speed Event Counter Channels	DTMF		Dual Clock	Hold Function	Number of I/O Ports	Wide operating temperature range	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD	VFT (fluor. tube)			4-Bit SIO Channels	8-Bit SIO Channels	UART				PWM Channels	PPG Channels								
2K	128	TMP47C215N	1.0 (244)	1	23	1		4				●					●	●	36	4.5 to 5.5 (2.7 to 5.5)	-30 to 70	TMP47P415VN	SDIP42	
		TMP47C216F		1	24	1		4				●					●	●	38			TMP47P416VF	QFP44 (14 × 14 mm)	
4K	256	TMP47C415N	1.0 (244)	1	23	1		4				●					●	●	36	2.7 to 5.5	-30 to 70	TMP47P415VN	SDIP42	
		TMP47C416F		1	24	1		4				●				●	●	38	TMP47P416VF			QFP44 (14 × 14 mm)		
		TMP47C440BN/BF	1.9	8		1		8				●					●	●	34			TMP47P440VN/VF	SDIP42/ QFP44 (14 × 14 mm)	
6K	384	TMP47C660AN/AF	1.3 (244)	8		1		8			●	●					●	●	56	4.5 to 5.5 (2.7 to 5.5)	-40 to 70	TMP47P860VN/VF	SDIP64/ QFP64 (14 × 20 mm)	
8K	512	TMP47C800N/F		8		1						●						●	●	36		4.5 to 6.0 (2.7 to 6.0)	TMP47P800N/F	SDIP42/ QFP44(14 × 14 mm)
		TMP47C860AN/AF	8		1		8				●	●						●	●	56	4.5 to 5.5 (2.7 to 5.5)	TMP47P860VN/VF	SDIP64/ QFP64 (14 × 20 mm)	

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)

F: Plastic quad flat package (QFP), Dry-packed product

Note 2: Numbers in () show the minimum instruction execution time when operating at a low clock frequency.

◆ Not recommended for automotive applications.

8-Bit Microcontrollers

TLCS-870 Series (CMOS)

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs)	Driver			SIO Channels	I ² C Bus Channels (Note 2)	High-Speed Serial Output	AD Converter	DA Converter Channels	Timer/ Counter	Remote Control Pulse Detector	Watchdog Timer	OSD	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package	
				LED	LCD	VFT (fluor. tube)																	
4K	256	TMP87C405AM	0.50 0.95	6								2		●				22	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87P808M	SOP28	
		TMP87C408M/N/DM (Note 3)		6		1		6				2		●							TMP87P808N/M	SOP28/SDIP28/ SSOP30	
		TMP87C408LM/LN	0.95	6		1		6				2		●				1.8 to 4.0	TMP87P808LM/LN		SOP28/SDIP28		
		TMP87C409BM/BN	0.50 0.95	6			1	8			1	2		●				4.5 to 5.5 2.2 to 5.5	TMP87P809M/N				
		TMP87C444N	0.50				1	1	4		8	2		●					4.5 to 5.5		TMP87P844N	SDIP42	
	TMP87C446N	0.50/122 0.95/122	8		1	1	8				2	2		●	●		35	4.5 to 5.5 2.7 to 5.5	TMP87PH46N		QFP44 (10 × 10 mm)		
	TMP87C447U		8		1	1	8				2	2		●	●		37	TMP87PH47U					
	8K	256	TMP87C800N/F/DF	0.50/122 0.95/122	8		2						2	2	●	●		58	4.5 to 6.0 2.7 to 6.0		-30 to 70	TMP87PH00N/F/DF	SDIP64/ QFP64 (14 × 20 mm)/ QFP64 (14 × 14 mm)
			TMP87C807U		8		1	1					2	2		●	●		37			4.5 to 5.5 2.7 to 5.5	TMP87PH47U
			TMP87C808M/N	0.50 0.95	6		1		6				2		●				1.8 to 4.0			TMP87P808M/N	SOP28/SDIP28
TMP87C808LM/LN			0.95	6		1		6				2		●				4.5 to 5.5 2.2 to 5.5	TMP87P808LM/LN				
TMP87C809BM/BN			0.50 0.95	6			1	8			1	2		●				4.5 to 6.0 2.7 to 6.0	TMP87P809M/N	SDIP64/ QFP64 (14 × 20 mm)			
TMP87C840N/F		0.50/122 0.95/122	8		2		8				2	2		●	●		56	4.5 to 5.5 2.7 to 5.5	TMP87PH40AN/AF				
TMP87C841N/F/U		0.50 0.95/122	8		2		16				2	2		●	●			4.5 to 5.5 2.7 to 5.5	-40 to 85	TMP87PM41N/F/U		SDIP64/ QFP64 (14 × 20 mm)/ LQFP64 (10 × 10 mm)	
TMP87C844N			0.50			1	1	4		8	2		●				34	4.5 to 5.5		TMP87P844N		SDIP42	
512		TMP87C814N/F	0.50/122 122			16	1		8				2	2		●	●		55	-30 to 70		TMP87PM14N/F	SDIP64/ QFP64 (14 × 20 mm)
		TMP87C846N	0.50/122 0.95/122	8		1	1	8				2	2		●	●		35	4.5 to 5.5 2.7 to 5.5			TMP87PH46N	SDIP42
	TMP87C847U	0.50/122 0.95/122	8		1	1	8				2	2		●	●		37	1.8 to 4.0	TMP87PH47U		QFP44 (10 × 10 mm)		
	TMP87C847LU	0.95/122	8		1	1	8				2	2		●	●			4.5 to 6.0 2.7 to 6.0	TMP87PH47LU		SDIP64/ QFP64 (14 × 20 mm)/ LQFP64 (10 × 10 mm)		
	TMP87CC31N	0.50	4						4		2	2	●	●	●		34	4.5 to 5.5	TMP87PM36N			SDIP42	
12K	512	TMP87CC20F	0.50/122 0.95/122	2	32	1						1	4		●	●		45	4.5 to 6.0 2.7 to 6.0	-40 to 85	TMP87PH20F	QFP80 (14 × 20 mm)	
		TMP87CC40N/F		8		2		8				2	2		●	●			4.5 to 5.5 2.7 to 5.5		TMP87PH40AN/AF	SDIP64/ QFP64 (14 × 20 mm)	
		TMP87CC41N/F/U	8		2		16				2	2		●	●			4.5 to 5.5 2.7 to 5.5	TMP87PM41N/F/U		SDIP64/ QFP64 (14 × 20 mm)/ LQFP64 (10 × 10 mm)		
		TMP87CC78F	0.50/122 122		40	2		8				2	2		●	●		89	4.5 to 6.0 2.7 to 6.0		TMP87PM78F	QFP100 (14 × 20 mm)	
16K	256	TMP87CH00N/F/DF	0.50/122 0.95/122	8		2						2	2		●	●		58	4.5 to 6.0 2.7 to 6.0	-30 to 70	TMP87PH00N/F/DF	SDIP64/ QFP64 (14 × 20 mm)/ QFP64 (14 × 14 mm)	
		TMP87CH00LF	8		2						2	2		●	●			4.5 to 5.5 1.8 to 5.5	TMP87PH00LF		QFP64 (14 × 14 mm)		
		TMP87CH31N	0.50	4					4			2	2	●	●	●		34	4.5 to 5.5		TMP87PM36N	SDIP42	

Note 1: Product number suffixes

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

M: Plastic small-outline package (SOP), Dry-packed product

F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: I²C bus circuit can be switched between I²C bus circuit and SIO circuit in software.

Note 3: There is also a 125°C version of the TMP87C408DM. For further information about the 125°C version, please contact your nearest Toshiba office or authorized Toshiba dealer.

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs)	Driver		VFT (flour. tube)	SIO Channels	UART Channels	I ² C Bus Channels (Note 2)	High-Speed Serial Output	8-Bit Channels	10-Bit Channels	AD Converter	DA Converter Channels	18-bit channels	16-bit channels	8-bit channels	Timer/ Counter	Remote Control Pulse Detector	Watchdog Timer	OSD	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package		
				LED	LCD																									
16K	512	TMP87CH14N/F	0.50/122 122		16	1					8					2	2							55	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87PM14N/F	SDIP64/ QFP64 (14 × 20 mm)		
		TMP87CH20F	0.50/122 0.95/122	2	32	1										1	4							45	4.5 to 6.0 2.7 to 6.0		TMP87PH20F	QFP80 (14 × 20 mm)		
		TMP87CH38N/F	0.50	4				2		6						2	2							33	4.5 to 5.5		TMP87PS38N/F	SDIP42/ QFP44 (14 × 14 mm)		
		TMP87CH40N/F	0.50/122 0.95/122	8		2				8						2	2										56	4.5 to 6.0 2.7 to 6.0	TMP87PH40AN/AF	SDIP64/ QFP64 (14 × 20 mm)
		TMP87CH41N/F/U		8		2				16						2	2									35	4.5 to 5.5 2.7 to 5.5	TMP87PM41N/F/U	SDIP64/ QFP64 (14 × 20 mm)/ LOFP64 (10 × 10 mm)	
		TMP87CH46N		8		1		1	8							2	2									37	1.8 to 4.0	TMP87PH46N	SDIP42	
		TMP87CH47U	8		1		1	8							2	2											-30 to 70	TMP87PH47U	QFP44 (10 × 10 mm)	
		TMP87CH47LU	0.95/122	8		1		1	8							2	2											TMP87PH47LU	QFP44 (10 × 10 mm)	
		TMP87CH48U/DF	0.50/122 0.95/122	8			1	1		16						2	2									56		-40 to 85	TMP87PH48U/DF	LOFP64 (10 × 10 mm)/ QFP64 (14 × 14 mm)
		TMP87CH70BF	0.50/122 122		16	1		1		6						2	2									73	4.5 to 5.5	TMP87PM70F	QFP80 (14 × 20 mm)	
		TMP87CH74AF		16	37	1		1	12							2	2									71	2.7 to 5.5	TMP87PM74F	QFP80 (14 × 20 mm)	
		TMP87CH75F		16	51	1		1	16							2	2									89		TMP87PM75F	QFP100 (14 × 20 mm)	
	TMP87CH78F			40	2			8								2	2											TMP87PM78F	QFP100 (14 × 20 mm)	
	768	1K	TMPA8701CHN/F	0.50	4			2		6					2	2									33	4.5 to 5.5	TMPA8700PSN/F	SDIP42/ QFP44 (14 × 14 mm)		
	512		TMP87CH21CF/CDF	0.50/122 0.95/122	1	32	2				8					2	2									52	4.5 to 5.5 2.7 to 5.5	TMP87PP21F/DF	QFP80 (14 × 20 mm)/ LOFP80 (12 × 12 mm)	
			TMP87CH29N/U	3	24		1		5						1	4										43		TMP87PM29N/U	SDIP64/ LOFP64 (10 × 10 mm)	
TMP87CH34BN			4			2		4							2	2									33	4.5 to 5.5	TMP87PM34AN	SDIP42		
TMP87CH36N			4			1		4							2	2									34		TMP87PM36N	SDIP42		
768	TMPA8700CHN/F	0.50	4			2		6						2	2									33		TMPA8700PSN/F	SDIP42/ QFP44 (14 × 14 mm)			
24K	1K	512	TMP87CK38N/F	0.50/122 122	4		2		6						2	2									33		TMP87PS38N/F	QFP44 (14 × 14 mm)		
		768	TMPA8701CKN/F		4		2		6							2	2								33		TMPA8700PSN/F	QFP44 (14 × 14 mm)		
		TMP87CK14N/F	0.50/122 122		16	1				8					2	2									55	4.5 to 5.5 2.7 to 5.5	TMP87PM14N/F	SDIP64/ QFP64 (14 × 20 mm)		
		TMP87CK20AF	0.50/122 0.95/122	2	32	1									1	4									45		TMP87PM20F	QFP80 (14 × 20 mm)		
		TMP87CK29N/U	3	24		1		5						1	4										43		TMP87PM29N/U	SDIP64/ LOFP64 (10 × 10 mm)		
		TMP87CK34BN	0.50	4			2		4						2	2										33	4.5 to 5.5	TMP87PM34AN	SDIP42	
		TMP87CK36N		4			1		4							2	2									34		TMP87PM36N	SDIP42	
		TMP87CK40AN/AF	0.50/122 0.95/122	8		2				8						2	2									56	4.5 to 5.5 2.7 to 5.5	TMP87PM40AN/AF	SDIP64/ QFP64 (14 × 20 mm)	
		TMP87CK41N/F/U	8		2				16							2	2										-40 to 85	TMP87PM41N/F/U	SDIP64/ QFP64 (14 × 20 mm)/ LOFP64 (10 × 10 mm)	
		TMP87CK43N					2		6							2	2									35		TMP87PM43N	SDIP42	
TMP87CK78F	0.50/122 122		40	2				8						2	2									89		TMP87PM78F	QFP100 (14 × 20 mm)			
TMPA8700CKN/F	0.50	4			2		6							2	2									33	4.5 to 5.5	TMPA8700PSN/F	SDIP42/ QFP44 (14 × 14 mm)			
32K	512	TMP87CM70BF	0.50/122 0.95/122		16	1			1					2	2										73	4.5 to 5.5 2.7 to 5.5	TMP87PM70F	QFP80 (14 × 20 mm)		
	768	TMPA8701CMN/F	0.50	4			2		6					2	2										33	4.5 to 5.5	TMPA8700PSN/F	SDIP42/ QFP44 (14 × 14 mm)		

Note 1: Product number suffixes
N: Plastic shrink dual in-line package (SDIP)
M: Plastic small-outline package (SOP), Dry-packed product
F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: I²C bus circuit can be switched between I²C bus circuit and SIO circuit in software.

TLCS-870 Series (CMOS) (continued)

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μ s)	Driver											Power Supply Voltage (V)	Operating Temperature ($^{\circ}$ C)	Version with OTP	Package												
				LED	LCD	VFT (fluor. tube)	SIO Channels	UART Channels	I ² C Bus Channels (Note 2)	High-Speed Serial Output	8-bit channels	10-bit channels	AD Converter	18-bit channels					16-bit channels	8-bit channels	Timer/ Counter	Remote Control Pulse Detector	Watchdog Timer	OSD	Dual Clock	Clock Gear	Number of I/O Ports			
32K	1K	TMP87CM14N/F	0.50/122 122			16	1						8		2	2						55	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87PM14N/F	SDIP64/ QFP64 (14 x 20 mm)				
		TMP87CM20AF	0.50/122	2	32	1									1	4						45			TMP87PM20F	QFP80 (14 x 20 mm)				
		TMP87CM21CF/CDF		1	32	2				8						2	2								52	TMP87PP21F/DF	QFP80 (14 x 20 mm)/ LOFP80 (12 x 12 mm)			
		TMP87CM23AF	0.95/122	1	40	2				8					2	2									70	TMP87PP23F	QFP100 (14 x 20 mm)			
		TMP87CM29N/U		3	24			1			5				1	4									43	TMP87PM29N/U	SDIP64/ LOFP64 (10 x 10 mm)			
		TMP87CM34BN	0.50	4					2					4	2	2									33	TMP87PM34AN	SDIP42			
		TMP87CM36N		4				1					4	2	2										34	TMP87PM36N				
		TMP87CM38N/F		4				2		6				2	2											33	TMP87PS38N/F	SDIP42/ QFP44 (14 x 14 mm)		
		TMP87CM39N/F	0.50/122 122	4				2		8				2	2										55	TMP87PS39N/F	SDIP64/ QFP64 (14 x 20 mm)			
		TMP87CM40AN/AF	0.50/122 0.95/122	8		2				8				2	2											56	4.5 to 5.5 2.7 to 5.5	-40 to 85	TMP87PM40AN/AF	SDIP64/ QFP64 (14 x 20 mm)
		TMP87CM41N/F/U		8		2			16				2	2																
		TMP87CM43N	0.50/122 122					2		6				2	2											35	-30 to 70	TMP87PM43N	SDIP42	
		TMP87CM45N		4				2		8				2	2											55		TMP87PS39N	SDIP64	
		TMP87CM48U/DF	0.50/122 0.95/122	8			1	1		16				2	2											56	-40 to 85	TMP87PM48U/DF	LOFP64 (10 x 10 mm)/ QFP64 (14 x 14 mm)	
		TMP87CM53F		7		1	1		8				2	2												72		TMP87PM53F	QFP80 (14 x 20 mm)	
		TMP87CM64F		16		3			16					2	3													90	TMP87PS64F	QFP100 (14 x 20 mm)
	TMP87CM74AF	0.50/122 122	16	37	1	1	12						2	2									71	4.5 to 5.5 (2.7 to 5.5)	-30 to 70	TMP87PM74F	QFP80 (14 x 20 mm)			
	TMP87CM75F		16	51	1	1	16						2	2													TMP87PM75F	QFP100 (14 x 20 mm)		
	TMP87CM78F			40	2			8					2	2														TMP87PM78F	QFP100 (14 x 20 mm)	
	TMPA8700CMN/F		0.50	4				2		6				2	2											33	4.5 to 5.5	TMPA8700PSN/F	SDIP42/ QFP44 (14 x 14 mm)	
	1.5K	TMP87CM71F	0.50/122 0.95/122			16	1		1			6	2	2									73	4.5 to 5.5 2.7 to 5.5	-10 to 70	TMP87PP71F	QFP80 (14 x 20 mm)			
	2K	TMP87CM24AF		1	40	2			8				2	2									69	4.5 to 5.5 2.2 to 5.5		TMP87PP24AF	LOFP100 (14 x 14 mm)			
		TMP87CM28F		80	2			4				2	2										49	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87PM28F	QFP144 (20 x 20 mm)			
	40K	1.5K	TMP87CN71F	0.50/122 0.95/122			16	1		1		6	2	2										73	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87PP71F	QFP80 (14 x 20 mm)		
		TMP87CP71F					16	1		1		6	2	2															TMP87PP21F/DF	QFP80 (14 x 20 mm)/ LOFP80 (12 x 12 mm)
			TMP87CP21CF/CDF		1	32	2			8			2	2									52	4.5 to 5.5 2.7 to 5.5	-30 to 70	TMP87PP21F/DF	QFP80 (14 x 20 mm)/ LOFP80 (12 x 12 mm)			
			TMP87CP23F		1	40	2			8			2	2									70					TMP87PP23F	QFP100 (14 x 20 mm)	
			TMP87CP24AF		1	40	2			8			2	2									69	4.5 to 5.5 2.2 to 5.5	-10 to 70	TMP87PP24AF	LOFP100 (14 x 14 mm)			
	2K	TMP87CP38N/F	0.50	4				2	6			2	2									33	4.5 to 5.5	-30 to 70	TMP87PS38N/F	SDIP42/ QFP44 (14 x 14 mm)				
		TMP87CP39N/F	0.50/122 122	4				2	8			2	2									55	4.5 to 5.5		TMP87PS39N/F	SDIP64/ QFP64 (14 x 20 mm)				
		TMP87CP64F	0.50/122 0.95/122	16		3		16				2	3									90	2.7 to 5.5		TMP87PS64F	QFP100 (14 x 20 mm)				
		TMPA8700CPN/F	0.50	4				2	6			2	2									33	4.5 to 5.5		TMPA8700PSN/F	SDIP42/ QFP44 (14 x 14 mm)				
		TMP87CS38N/F		4				2	6	6		2	2									33	4.5 to 5.5		TMP87PS38N/F	SDIP64/ QFP64 (14 x 20 mm)				
		TMP87CS39N/F	0.50/122 122	4				2	8			2	2									55				TMP87PS39N/F	SDIP64/ QFP64 (14 x 20 mm)			
		TMP87CS64F	0.50/122	16		3		16				2	3									90	4.5 to 5.5		TMP87PS64F	QFP100 (14 x 20 mm)				
		TMP87CS68DF	0.95/122	7		1	1		8			2	2									72	2.7 to 5.5		TMP87PS68DF	LOFP80 (12 x 12 mm)				
		TMP87CS71F	0.50/122			16	1		1		6	2	2										73	-30 to 70	TMP87PS71AF	QFP80 (14 x 20 mm)				
		TMP87CS71BF	122			16	1		1		6	2	2													TMPA8700PSN/F	SDIP42/ QFP44 (14 x 14 mm)			
		TMPA8700CSN/F	0.50	4				2	6			2	2										33	4.5 to 5.5						

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)
F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: I²C bus circuit can be switched between I²C bus circuit and SIO circuit in software.

TLCS-870/C Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs) (Note 6)	Driver										AD Con- verter	Timer/ Counter			Motor Control	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD	VFT (fluor. tube)	CAN	SEI	SIO Channels	SIOMART Channels (Note 3)	PC Bus Channels (Note 2)	Sync. Processor	PWM Channels		8-bit channels	10-bit channels	18-bit channels									
4K	256	TMP86C420U/F	A 0.25/122 B 0.50/122 C 0.95/122	4	32						1					8	1	2	●	●		39	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	-40 to 85	TMP86P820U/F	LQFP64 (10×10mm)/ QFP64 (14×14 mm)
		** TMP86C407M/N	A 0.25/122 B 0.50/122	8				1	Note 4 1			6		1	2		●	●				22	A 4.5to 5.5 B 2.7 to 5.5		TMP86P807M/N	SOP28/SDIP28
		TMP86C408DM		8				1	Note 4 1			6		1	2		●	●				24	TMP86P808DM		SSOP30	
		** TMP86C807M/N		8				1	Note 4 1			6		1	2		●	●				22	TMP86P807M/N		SOP28/SDIP28	
		TMP86C808DM		8				1	Note 4 1			6		1	2		●	●				24	TMP86P808DM		SSOP30	
8K	512	TMP86C845U	0.50/122	19					1			8		2		●	●				35	2.7 to 5.5	TMP86PM47U	QFP44 (10×10 mm)		
		TMP86C820U/F	A 0.25/122 B 0.50/122 C 0.95/122	4	32				1			8	1	2	4	●	●					39	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	TMP86P820U/F	LQFP64 (10×10 mm)/ QFP64 (14×14 mm)	
		TMP86C829BU/BF		4	32				1			8	1	2	4	●	●					33	** TMP86PM46N	SDIP42		
		TMP86C846N		19				1	Note 4 1			8	1	2		●	●					35	TMP86PM47U	QFP44 (10×10 mm)		
		TMP86C847U		19				1	Note 4 1			8	1	2		●	●					35	TMP86PH06N/U	SDIP42/ QFP44 (10×10 mm)		
		TMP86CH06N/U		8					2	Note 5 2			8	1	2		●	●	●				33	** TMP86PM46N	SDIP42	
		TMP86CH46N		19				1	Note 4 1			8	1	2		●	●					35	TMP86PM47U	QFP44 (10×10 mm)		
		TMP86CH47U		19				1	Note 4 1			8	1	2		●	●					35	TMP86PM29AU/AF	LQFP64 (10×10 mm)/ QFP64 (14×14 mm)		
		TMP86CH21U/F		4	32				1				8	1	4		●	●					39	** TMP86PM87U	QFP44 (10×10 mm)	
		** TMP86CH87U		A 0.25/122 B 0.50/122	8			1	1	Note 4 1			14	1	2		●	●					35	A 4.5to 5.5 B 2.7 to 5.5	TMP86PM74AF	QFP80 (14×20 mm)
1.5K	TMP86CH29BU/BF	A 0.25/122 B 0.50/122 C 0.95/122	4	32				1			8	1	4		●	●					39	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	TMP86PM29AU/AF	LQFP64 (10×10 mm)/ QFP64 (14×14 mm)		
24K	1K	TMP86CK74AF	A 0.25/122 B 0.50/122	2	37				1						8		2	2	●			70	A 4.5to 5.5 B 2.7 to 5.5	-30 to 70	TMP86PM74AF	QFP80 (14×20 mm)

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP) **: Under development
 F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: PC bus circuit can be switched between PC bus circuit and SIO circuit in software.

Note 3: SIO circuit or UART can be selected in software.

Note 4: UART only

Note 5: Either of the two UART channels can be selected in software as the SIO channel.

Note 6: Minimum instruction execution times A to C correspond to power supply voltages A to C.

TLCS-870/C Series (continued)

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs) (Note 7)	Driver				SIO Channels	SIO/UART Channels (Note 3)	I ² C Bus Channels (Note 2)	Sync. Processor	PWM Channels	AD Converter		Timer/Counter		Motor Control	Multiply and accumulation	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD	VFT (fluor. tube)	CAN						SEI	8-bit channels	10-bit channels	8-Bit DA Converter Channels										
32K	1.5K	** TMP86CM23U	A 0.25/122 B 0.50/122 C 0.95/122	5	32			1	Note 4 1				8	1	4		•	•	•			48	A 3.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	-40 to 85	** TMP86PM23U	LOFP64 (10 × 10 mm)
		TMP86CM29BU/BF	A 0.25/122 b 0.50/122 C 0.95/122	4	32				1				8	1	4			•	•			39	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5		TMP86PM29AU/AF	LOFP64 (10 × 10 mm)/ QFP64 (14 × 14 mm)
	1K	TMP86CM41F	0.25/122	8				1	Note 4 1				16	2	4		•	•				55	4.5 to 5.5	-40 to 85	TMP86FS41F	QFP64 (14 × 14 mm)
		** TMP86CM46N	A 0.25/122 B 0.50/122 C 0.95/122	19				1	Note 4 1				8	1	2		•	•				33	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5		** TMP86PM46N	SDIP42
		TMP86CM47U	A 0.25/122 B 0.50/122 C 0.95/122	19				1	Note 4 1				8	1	2		•	•				35	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5		TMP86PM47U	QFP44 (10 × 10 mm)
	2K	** TMP86CM87U	A 0.25/122 B 0.50/122	8		1	1	Note 4 1					14	1	2		•	•				35	A 4.5to 5.5 B 2.7 to 5.5	-30 to 70	** TMP86PM87U	QFP44 (10 × 10 mm)
		TMP86CM74AF	A 0.25/122 B 0.50/122	2	37			1					8	2	2		•					70	A 4.5to 5.5 B 2.7 to 5.5		TMP86PM74AF	QFP80 (14 × 20 mm)
			TMP86CM25F	A 0.25/122 B 0.50/122 C 0.95/122	4	Note 4 60			1	1			8	1	4		•	•				42	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	-40 to 85	TMP86PS25F	QFP100 (14 × 20 mm)
	48K	512	TMP86CP11AN	0.33				1	Note 4 3	•	8	3			2		•					35	4.5 to 5.5	-30 to 70	TMP86PP11AN	SDIP42
	60K	1K	TMP86CS44U	A 0.25/122 B 0.50/122	19				1	Note 4 1			8	1	2	2		•	•				35	A 4.5to 5.5 B 2.7 to 5.5	-40 to 85	TMP86PS44U
2K		TMP86CS25F	A 0.25/122 B 0.50/122 C 0.95/122	4	Note 4 60			1	1			8	1	4		•	•					42	A 4.5to 5.5 B 2.7 to 5.5 C 1.8to 5.5	TMP86PS25F		QFP100 (14 × 20 mm)
		TMP86CS41F	A 0.25/122 B 0.50/122	8				1	Note 4 1				16	2	4		•	•				55	A 4.5to 5.5 B 2.7 to 5.5	TMP86FS41F		QFP64 (14 × 14 mm)
		TMP86CS43F	A 0.25/122 B 0.50/122	24				2	Note 4 1				16	2	4	3	•	•				71	A 4.5to 5.5 B 2.7 to 5.5	TMP86PS43F		QFP80 (14 × 20 mm)
		TMP86CS64F	A 0.25/122 B 0.50/122	16				2	Note 4 1				16	2	4		•	•				91	A 4.5to 5.5 B 2.7 to 5.5	TMP86PS64F		QFP100 (14 × 20 mm)

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)
F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: I²C bus circuit or SIO circuit can be selected in software.

Note 3: SIO circuit or UART can be selected in software.

Note 4: Maximum of 960 LCD segments (60 seg. × 16 com.)

Note 5: One channel supporting two slaves devices.

Note 6: UART only

Note 7: Minimum instruction execution times A to C correspond to power supply voltages A to C.

** : Under development

TLCS-870/X Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs)	Driver										AD Con- verter	Timer/ Counter	External Memory Interface	Remote Control Pulse Detector	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package		
				LED	LCD	VFT (fluo. tube)	SIO Channels	UART Channels	PC Bus Channels (Note 2)	PWM Channels	8-bit channels	10-bit channels	16-bit channels													8-bit channels	
NA		TMP88C060F	0.32/122 0.95/122	8					1	1				8	2	4		●	●	●	●	42	4.5 to 5.5 2.7 to 5.5	-40 to 85	-	LQFP80 (12 × 12 mm)	
16K	512	**TMP88CH40N/M	0.2	14					1	1				4	1	2	1		●			19	4.5 to 5.5		-40 to 85	TMP88PH40N/M	SDIP28/SOP28
		TMP88CH47N/F	0.25	8					1	1				8	2	1	1		●			34		-40 to 85		TMP88PH47N/F	SDIP42/ QFP44 (14 × 14 mm)
24K	1K	TMP88CK48N/F		8						1	1	1		16	2	2	1		●							56	-40 to 85
		TMP88CK49N/F	8						1	1	2		16	2	3	2		●				56		-40 to 85	TMP88PS49N/F		
		TMP88CM48N/F	8						1	1	1		16	2	2	1		●									33
		TMP88CM49N/F	8						1	1	2		16	2	3	2		●				33		-40 to 85	TMP88PS38N/F		
	1.5K	TMP88CM38AN/AF	4						2	10	6		2	2				●								33	-40 to 85
		TMP88CM38BN/BF	4						2	10	6		2	2				●				33		-40 to 85	TMP88PS38N/F		
48K	1K	TMP88CP76F	0.32/122		40	1			1		12		3	1				●	●							68	4.5 to 5.5
			TMP88CP77F	122		53	2			1		12		3	1				●	●				88	2.7 to 5.5	TMP88PS76F	QFP80 (14 × 20 mm)
	1.5K	TMP88CP38AN/AF	0.25	4					2	10	6		2	2				●				33	-30 to 70	TMP88PS38N/F	SDIP42/ QFP44 (14 × 14 mm)		
		TMP88CP38BN/BF		4						2	10	6		2	2				●							33	-30 to 70
		**TMP88CP34N/F	1						2	4	6		2	2				●				33	-30 to 70	**TMP88PS34N/F	SDIP42/ QFP44 (14 × 14 mm)		
		**TMP88CS34N/F	1						2	4	6		2	2				●						33		-30 to 70	**TMP88PS34N/F
		TMP88CS38N/F	0.20	4					2	10	6		2	2				●				71	-40 to 85		TMP88PS38N/F		SDIP64/ QFP64 (14 × 20 mm)
		TMP88CS38BN/BF		4						2	10	6		2	2				●						71	-40 to 85	
	2K	TMP88CS43F	0.20	24					1	1	2		16	2	4	2		●				71	-40 to 85	TMP88PS43F			QFP80 (14 × 20 mm)
		TMP88CS48AN/AF	0.25	8					1	1	2		16	2	3	1		●				56		-40 to 85	TMP88PS49N/F	SDIP64/ QFP64 (14 × 20 mm)	
		**TMP88CS42N/F	0.20	24					1	1	2		16	2	4	2		●				55	-40 to 85		**TMP88PS42N/F	QFP64 (14 × 20 mm)	
		TMP88CS76F	0.32/122		40	1			1		12		3	1				●	●			68		4.5 to 5.5	-30 to 70	TMP88PS76F	QFP80 (14 × 20 mm)
		TMP88CS77F		122		53	2			1		12		3	1				●	●			88			4.5 to 5.5	-30 to 70
		TMP88CU74F	122		37	1			1		12		2	2				●	●			71	2.7 to 5.5	-30 to 70	TMP88PU74F		
96K	3K	TMP88CU77F				53	2			1		12		3	1				●	●					88	2.7 to 5.5	-30 to 70

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)
F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: PC bus circuit or SIO circuit can be selected in software.

Note 3: Cannot be used at the same time because they share the input/output.

** : Under development

TLCS-900 Family (CMOS) 900/H Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)		CAN	SEI	SIO/UART	Synchronous SIO	I ² C Bus/SIO	DRAW Controller	AD Converter		LCD Driver	VFT (floor-tube) Driver	Timer/Counter	Clock Timer	Timebase Counter	Pattern Generator	Stepping Motor Controller	PWM Timer			VCR Servo Controller	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package				
			5V±10%	3V±10%							6-bit channels	8-bit channels								10-bit channels	8-bit channels	12-bit channels									14-bit channels			
NA	NA	TMP95C001F	160	320																		4				0	-20 to 70	-	QFP64 (14 × 14 mm)					
		TMP95C061BF		-		2		1	4		4	2		2									4	●					56	QFP100 (14 × 14 mm)				
		TMP95C063F		-		2		2	8	2	8	2		2									4	●					91	QFP144 (20 × 20 mm)				
	2K	TMP95C265F	400		3			8	2	8	2											4	●			55								
	4K	TMP95CW65F	400		3			8	2	8	2											4	●											
64K	2K	TMP95CS54F (Note 2)	167	-	1	1	2			8		8	2										●				-40 to 85	TMP95PS54F (Note 2)	LQFP100 (14 × 14 mm)					
		TMP95CS64F	160	400		3			8	2	8	2										4	●				-20 to 70	TMP95PW64F						
		TMP95CS66F	160	-		1					8	2	8	2								4	●											
128K	4K	TMP95CU54AF	167	-	1	1	2			8		8	2										●				81	-40 to 85	TMP95FW54AF	LQFP100 (14 × 14 mm)/ QFP100 (14 × 14 mm)				
		TMP95CW54AF			1	1	2			8		8	2											●										
		TMP95FW54AF			1	1	2			8		8	2												●									
256K	8K	TMP95CW64F	160	400		3			8	2	8	2										4	●				-20 to 70	TMP95PW64F	LQFP100 (14 × 14 mm)					
		TMP95FY64F	160	-		3			8	2	8	2										4	●								QFP100 (14 × 14 mm)			

Note 1: The suffix F in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

Note 2: Operating voltage is 4.7 V to 5.3 V.

32-Bit Microcontrollers

TLCS-900 Family (CMOS) 900/H1 Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)			CAN	SEI	SIO/JART	Synchronous SIO	I ² C Bus/SIO	DRAM Controller	Memory Bank Control	AD Converter			LCD Driver	LCD Controller	VFT (flour. tube) Driver	Timer/Counter		RTC	Timebase Counter	PWM Timer		CS/Wait Controller	VCR Servo Controller	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package
			5V±10%	3V±10%	2V±10%								6-bit channels	8-bit channels	10-bit channels				8-bit channels	16-bit channels			8-bit channels	14-bit channels									
NA	8K	** TMP92C820FG	-	(Note 2) 50	-			3		1	●	●	5		●		4	1	●				4	●	●	●	●	61	-20 to 70	-	LQFP144 (16 × 16 mm)		
	16K	** TMP92CH21FG		(Note 2) 50		2		●	●	4		●		4	1	●								4	●	●	●	●			61	LQFP100 (14 × 14 mm)	
	32K	** TMP92CM22F		(Note 2) 50		2	1			8					4	2									4	●	●	●	58	-40 to 85			

Note 1: The suffix F in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

** : Under development

Note 2: Operating voltage is 3.0 V to 3.6 V.

TLCS-900 Family (CMOS) 900/H2 Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)		CAN	SEI	SIO/JART	Synchronous SIO	I ² C Bus/SIO	DRAM Controller	AD Converter			LCD Driver	VFT (flour. tube) Driver	Timer/Counter		Timebase Counter	PWM Timer		CS/Wait Controller	VCR Servo Controller	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package
			5V±10%	3V±10%							6-bit channels	8-bit channels	10-bit channels			8-bit channels	16-bit channels		8-bit channels	14-bit channels									
NA	2K	TMP94C241CF	50	-			2			2		8	2		4	4				6	●					64	-20 to 70	-	QFP160 (28 × 28 mm)
		TMP94C251AF			2	2	8	2	4	4	6	●																	

Note 1: The suffix F in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

16-Bit Microcontrollers for Automotive

TLCS-900 Family (CMOS) 900/L1 Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)			CAN (16 Mail box)	CAN (8 Mail box)	SEI	SIO/UART	Synchronous SIO	PC Bus/SIO	DRAM Controller	Memory Bank Control	AD Converter			LCD Driver	LCD Controller	VFT (fluor. tube) Driver	Timer/Counter		Clock Timer	RTC	Timebase Counter	PWM Timer			CS/Walt Controller	PDC	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package	
			5V±10%	3V±10%	2V±10%									6-bit channels	8-bit channels	10-bit channels				8-bit channels	16-bit channels				8-bit channels	14-bit channels	16-bit channels										
32K	1K	** TMP91CM801F	200	-	-	1	1							8					4	2						2	1				61	-40 to 85	** TMP91PP801F	LQFP80 (12 × 12 mm)			
		** TMP91CM805F				1	1					8										4	2						2	1						-40 to 125	** TMP91PP805F
	⊙ TMP91CM811U	1				2											12					4	1						2					45	-40 to 85	⊙ TMP91PM811U	LQFP64 (10 × 10 mm)
	⊙ TMP91CM815U	1				2											12					4	1						2							-40 to 125	
48K	2K	TMP91CP82RF				1	1	2						12					4	2						4	1						80	-40 to 85	TMP91PP82RF	LQFP100 (14 × 14 mm)	
		TMP91CP82TF				1	2								12					4	2						4	1									-40 to 125

Note 1: The suffix F or U in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer.

** : Under development

⊙ : Planned

32-Bit Microcontrollers for Automotive

TLCS-900 Family (CMOS) 900/H1 Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)			CAN (16 Mail box)	SEI	SIO/UART	Synchronous SIO	PC Bus/SIO	DRAM Controller	Memory Bank Control	AD Converter			LCD Driver	LCD Controller	VFT (fluor. tube) Driver	Timer/Counter		Clock Timer	RTC	Timebase Counter	PWM Timer			VCR Servo Controller	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package	
			5V±10%	3V±10%	2V±10%								6-bit channels	8-bit channels	10-bit channels				8-bit channels	16-bit channels				8-bit channels	14-bit channels	16-bit channels									
96K	6K	TMP92CU531F	-	(Note 2) 50	-	1	2	2	2	2				12					8	2						1	●				70	-40 to 85	** TMP94FD531F	LQFP100 (14 × 14 mm)	
128K	6K	TMP92CW531F	-	(Note 2) 50	-	1	2	2	2					12					8	2						1	●					70	-40 to 85	** TMP94FD531F	LQFP100 (14 × 14 mm)

Note 1: The suffix F in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

Note 2: 3.3 V ± 0.3 V internally; 5 V ± 10% for input/output interface

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer.

** : Under development

TLCS-900 Family (CMOS) 900/H2 Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (ns)		CAN (16 Mail box)	SEI	SIO/UART	Synchronous SIO	PC Bus/SIO	DRAM Controller	AD Converter			LCD Driver	VFT (fluor. tube) Driver	Timer/Counter		Clock Timer	Timebase Counter	PWM Timer			VCR Servo Controller	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Operating Temperature (°C)	Version with OTP/Flash	Package				
			5V±10%	3V±10%							6-bit channels	8-bit channels	10-bit channels			8-bit channels	16-bit channels			8-bit channels	14-bit channels	16-bit channels												
512K	16K	** TMP94FD531F	-	(Note 2) 50	1	2	2	2					12						8	2						1	●				70	-40 to 85	-	LQFP100 (14 × 14 mm)

Note 1: The suffix F in a product number denotes a plastic quad flat package (QFP), Dry-packed product.

Note 2: 3.3 V ± 0.3 V internally; 5 V ± 10% for input / output interface

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer.

** : Under development

8-Bit Microcontrollers for Automotive

TLCS-870 (CMOS) Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs) (Note 5)	Driver		SIO Channels	UART Channels	PC Bus Channels (Note 2)	High-Speed Serial Output	8-bit channels	10-bit channels	AD Converter	Timer/Counter	Remote Control Pulse Detector	Watchdog Timer	OSD	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD																		
4K	256	TMP87C408SM/SN	0.50	6		1				6			2		●				22	A 4.5 to 5.5 B 2.7 to 5.5	-40 to 125	TMP87P808M/N	SOP28/SDIP28
8K		TMP87C808SM/SN	0.95	6		1				6			2		●				22				
16K	512	TMP87CH48IU	0.50/122	8			1	1		16			2	2	●		●		56	A 4.5 to 5.5 B 2.7 to 5.5	-40 to 125	TMP87PM48U/DF	LQFP64(10 × 10 mm)
		TMP87CH48SU	0.95/122	8			1	1		16			2	2	●		●		56				

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)
M: Plastic small-outline package (SOP), Dry-packed product
F or U: Plastic quad flat package (QFP), Dry-packed product

Note 2: PC bus circuit or SIO circuit can be selected in software.

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer.

TLCS-870/C Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs) (Note 5)	Driver		SIO Channels	UART Channels	PC Bus Channels (Note 2)	Sync. Processor	PMM Channels	8-bit channels	10-bit channels	16-bit channels	AD Converter	Timer/Counter	Motor Control	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD																			
4K	256	** TMP86C407IM/IN	A 0.25/122 B 0.50/122	8			1	1			6		1	2		●	●			22	A 4.5 to 5.5 B 2.7 to 5.5	-40 to 125	** TMP86P807M/N	SOP28/SDIP28
		** TMP86C407SM/SN		8			1	1			6		1	2		●	●			22				
		TMP86C408IDM		8			1	1			6		1	2		●	●			24				
		TMP86C408SDM		8			1	1			6		1	2		●	●			24				
8K	256	** TMP86C807IM/IN	A 0.25/122 B 0.50/122	8			1	1			6		1	2		●	●			22	A 4.5 to 5.5 B 2.7 to 5.5	-40 to 125	** TMP86P807M/N	SOP28/SDIP28
		** TMP86C807SM/SN		8			1	1			6		1	2		●	●			22				
		TMP86C808IDM		8			1	1			6		1	2		●	●			24				
		TMP86C808SDM		8			1	1			6		1	2		●	●			24				
16K	512	** TMP86C847SU	A 0.25/122 B 0.50/122 C 0.95/122	19			1	1			8		1	2		●	●				A 4.5 to 5.5 B 2.7 to 5.5 C 1.8 to 5.5	-40 to 125	TMP86PM47U	QFP44 (10 × 10 mm)
		** TMP86CH47SU		19			1	1			8		1	2		●	●							
32K	1K	** TMP86CH87RU	A 0.25/122 B 0.50/122	8		(Note 7)	1	1			14		1	2		●	●			35	A 4.5 to 5.5 B 2.7 to 5.5	-40 to 85	** TMP86PM87RU	QFP44 (10 × 10 mm)
		** TMP86CM47SU		19			1	1			8		1	2		●	●							
		** TMP86CM87RU		8		(Note 7)	1	1			14		1	2		●	●							

Note 1: Product number suffixes N: Plastic shrink dual in-line package (SDIP)
F or U: Plastic quad flat package (QFP), Dry-packed product

** : Under development

Note 2: PC bus circuit or SIO circuit can be selected in software.

Note 3: Either of the two UART channels can be selected in software as the SIO channel.

Note 4: UART only

Note 5: Minimum instruction execution times A to C correspond to power supply voltages A to C.

Note 6: There are four channels of mailboxes.

Note 7: When using CAN, select either SEI or UART.

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer.

TLCS-870/X Series

ROM (bytes)	RAM (bytes)	Product No.	Minimum Instruction Execution Time (μs) (Note 3)	Driver			SIO Channels	UART Channels	PC Bus Channels (Note 2)	PWM Channels	AD Converter		Timer/Counter	Motor Control	External Memory Interface	Remote Control Pulse Detector	Watchdog Timer	Dual Clock	Clock Gear	Number of I/O Ports	Power Supply Voltage (V)	Operating Temperature (°C)	Version with OTP	Package
				LED	LCD	VFT (fluor. tube)					8-bit channels	10-bit channels												
16K	512	** TMP88CH40SN/SM	0.2	14			1	1			4	1	2	1			●			19	4.5 to 5.5	-40 to 125	TMP88PH40N/M	SDIP28/SOP28

Note 1: Product number suffixes F or U: Plastic quad flat package (QFP), Dry-packed product

** : Under development

Note 2: PC bus circuit or SIO circuit can be selected in software.

Note 3: Cannot be used at the same time because they share the input/output.

◆ For further information about the I/R/S/T versions, please contact your nearest Toshiba office or authorized Toshiba dealer

Development System Tools

TLCS-900 Family (TLCS-900, 900/L, 900/H, 900/H2)

Software Products

Toshiba Integrated Development Environment (TIDE)		Real-Time OS	
C Compiler	Debugger & Simulator Set	Real-Time OS	Real-Time OS Task Scheduler (%1)
SW96WN0-ZCC: 1 license SW96WN3-ZCC: 10 licenses	SW96NN0-ZCC: 1 license SW96NN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied. With source code.	SW96KN2-ZCC: Object code can be freely copied.

Hardware Products

Product name	Target MCU		Test Tool		Accessory					
	OTP/Flash MCU	Package	Controller	Emulation pod (#3)	MCU probe (#1, #2)	Package Converter (#1, #2)	QFP adapter (#1)			
TMP96C031ZF	—	QFP64 (14×20)	BM1055R0B	BM96C031F0A	(PN110007)	(PN120007)	(PN210010)			
TMP96CM40F	TMP96PM40F	QFP80 (14×20)	BM1040R0V BM1055R0B	BM96C141F0D-M15	(PN120009)	—	(PN210001)			
TMP96C041BF	—									
TMP96C141BF	—									
TMP95C001F	—	QFP64 (14×14)		BM95C001F0B-M15	(PN120039A)		(PN210025)			
TMP95CS54F	TMP95PS54F	LQFP100 (14×14)		BM95CS54F0A-M15	(PN120013)		(PN210022)			
TMP95C061BF	—	QFP100 (14×14)		BM95C061F0C-M15						
TMP95C063F	—	QFP144 (20×20)		BM95C063F0B-M15				(PN120027)	(PN210034)	
TMP95CS64F	TMP95PW64F	LQFP100 (14×14)		BM95CS64F0B-M15	(PN120013)		(PN210022)			
TMP95CW64F		—								
TMP95FY64F	—	QFP100 (14×14)								
TMP95C265F	—	LQFP100 (14×14)								
TMP95CW65F	—									
TMP95CS66F	TMP95PW64F	—								
TMP95FW54AF	—	QFP100 (14×14)						BM95FW54F0A-M15	(PN120013)	(PN210022)
TMP95CU54AF	TMP95FW54AF	LQFP100 (14×14)								
TMP95CW54AF		QFP100 (14×14)								
TMP94C241CF	—	QFP160 (28×28)	BM1056R0B			BM94C241F0A		(PN120040A)	(PN210028)	
TMP94C251AF	—	QFP144 (20×20)	—	BM94C251F0A	(PN120050)	(PN210034)				
TMP93CS20F	TMP93PW20AF	LQFP144 (16×16)	BM1040R0V BM1055R0B	BM93CS20F0B-M15	(PN120044)	(PN210043)				
TMP93CS32F	TMP93PW32F	QFP64 (14×14)		BM93CS32F0B-M15	(PN120039A)	(PN210025)				
** TMP93CS36U	—	LQFP44 (10×10)		—	PN120063	PN210019				
TMP93CS40DF	TMP93PS40DF	LQFP100 (14×14)		BM1040R0V BM1055R0B	BM93CM40F0C-M15	(PN120013)	(PN210022)			
TMP93CW40DF	TMP93PW40DF									
TMP93CM40F	TMP93PS40F	QFP100 (14×14)								
TMP93CS40F		—						LQFP100 (14×14)		
TMP93CS41DF		—						QFP100 (14×14)		
TMP93CW41DF	—	QFP100 (14×14)								
TMP93CS41F	—									
TMP93CS42AF	TMP93PS42AF	—								
TMP93CU44DF	TMP93PW44ADF	QFP80 (14×20)						—	PN120009	PN210001
TMP93CW44DF	—	LQFP80 (12×12)						BM93CS44F0B-M15	(PN120042)	(PN210007)
TMP93CS44F	TMP93PS44F									
TMP93CS45F	—	LQFP100 (14×14)						BM93CW46F0B-M15	(PN120013)	(PN210022)
TMP93CW46AF	TMP93PW46AF	—	BM93C071F0B-M15					(PN120032)	—	
TMP93C071F	—	QFP120 (28×28)	BM93CW76F0A-M15					(PN120023B)	(PN210004)	
TMP93CF76F	TMP93PF76F	QFP100 (14×20)								
TMP93CF77F				—						
TMP93CW76F	TMP93PW76F									
TMP93CU76F				—						
TMP93CT76F				—						

RTOS products require a license agreement. For details, please contact your local Toshiba sales representative.

%1: The Real-Time OS Task Scheduler does not support the TLCS-900 series (TMP96xx).

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.

#2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."

#3: The model 25 and model 15 pods can use the same accessories.

CASE Tool
CaseWorks
SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license)
SW00ENB-ZCC: Source code analysis (1 license)
SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

OTP/MCU mount adaptor (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210011A	(PN210012)	—	The BM96C031F0A requires a dedicated adaptor for connection to the controller (BM1055R0B).
PN210002	(PN210003)	BM1139A	
		—	
PN210026	(PN210027)	—	
PN210023	(PN210024)	BM11129	
		—	
PN210036	(PN210035)	—	
PN210023	(PN210024)	BM11129	
		—	
		BM11129	
		—	
PN210030	(PN210029)	—	
PN210036	(PN210035)	—	
(PN210044)	(PN210045)	BM11141	
PN210026	(PN210027)	BM11132	
PN210020A	PN210021	—	
PN210023	(PN210024)	BM11129	
		BM11109	
		—	
		BM11109	
PN210002	PN210003	BM11152	
PN210008	(PN210009)	BM11128	
		—	
PN210023	(PN210024)	BM11129	
(IC149-120K13207-0B)	—	—	One IC socket (IC149-120K13207-0B) is supplied with the PN120032. The IC socket is provided by Yamaichi Electronics, Co., Ltd.
PN210005A	(PN210006)	BM11146A	—

TLCS-900 Family (TLCS-900/L1, 900/H1)

Software Products

Toshiba Integrated Development Environment (TIDE)		Real-Time OS	
C Compiler	Debugger & Simulator Set	Real-Time OS	Real-Time OS Task Scheduler (%1)
SW96WN0-ZCC: 1 license SW96WN3-ZCC: 10 licenses	SW96NN0-ZCC: 1 license SW96NN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied. With source code.	SW96KN2-ZCC: Object code can be freely copied.

Hardware Products

Product name	Target MCU		Test Tool		MCU probe (#1, #2)	Package Converter (#1, #2)	QFP adapter (#1)
	OTP/Flash MCU	Package	Controller	Emulation pod (#3)			
** TMP92CM22F	—	LQFP100(14×14)	BM1040R0W BM1055R0B	** BM92CM22F0A-M15	(PN120013)	—	(PN210022)
** TMP92C820FG		LQFP144 (16×16)		** BM92C820F0A-M15	(PN120044)		(PN210043)
** TMP92CH21FG		LQFP100 (14×14)		—	** BM92CH21F0A-M15		(PN120013)
TMP91CU10F	TMP91PW10F		BM91CU10F0B-M15				
TMP91CW11F	TMP91PW11F		BM91CW11F0B-M15				
TMP91CW12F	TMP91PW12F		BM91CW12F0A-M15				
TMP91CW12AF	TMP91FY12AF		BM91CW12AF0A-M15				
TMP91C815F	—		TQFP128 (14×14)		BM1040R0A	BM91C815F0A-M15	
TMP91C016F	—	LQFP100 (14×14)	BM1040R0W BM1055R0B	BM91C016F0A-M15	(PN120013)	(PN210022)	
TMP91CW18AF	TMP91PW18AF	QFP80 (14×20)		BM91CW18F0A-M15	(PN120009)	(PN210001)	
TMP91C219F	—	LQFP100 (14×14)		BM91C219F0A-M15	(PN120013)	(PN210022)	
TMP91C820AF	—	LQFP144 (16×16)	BM1040R0A	BM91CM20F0A-M15	(PN120044)	(PN210043)	
TMP91CY22F	TMP91FY22F	LQFP100 (14×14)		BM91CW12AF0A-M15	(PN120013)	(PN210022)	
** TMP91CY23F	TMP91FY23F	QFP80 (14×20)	BM1040R0W BM1055R0B	** BM91CY23F0A-M15	(PN120009)	(PN210001)	
TMP91C824F	—	LQFP100 (14×14)		BM91C824F0A-M15	(PN120013)	(PN210022)	
TMP91C025F	—	FBGA144(11×11)		BM91C025F0A-M15	(PN120044)	** PN120067	** PN210056
** TMP91CP27U	** TMP91FY27U	LQFP64 (10×10)	BM1040R0A	BM91CW12AF0A-M15	(PN120013)	PN120065	PN210031
TMP91C829F	—	LQFP100 (14×14)	BM1040R0W BM1055R0B	BM91C829F0A-M15		(PN210022)	
** TMP91C630F	TMP91PP80F	LQFP80 (12×12)		** BM91C 630F0A-M15	PN120042	PN210007	
** TMP91CP82F	** TMP91PP82F	LQFP100 (14×14)		** BM91C P82F0B-M15	(PN120013)	(PN210022)	

CASE Tool
CaseWorks
SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license)
SW00ENB-ZCC: Source code analysis (1 license)
SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

RTOS products require a license agreement. For details, please contact your local Toshiba sales representative.

%1: The real-time task scheduler does not support the TLCS-900 series (TMP96xx).

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.

#2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."

#3: The model 25 and model 15 pods can use the same accessories.

** : Under development

OTP/MCU mount adapter (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210023	(PN210024)	—	—
(PN210044)	(PN210045)		
PN210023	(PN210024)	BM11129	The 2V conversion adapter (PN410001) is required to operate the TMP91CU10F off a 2V power supply on the target board.
		BM11149	—
PN210054	(PN210055)	—	The BM91CW12AF0A-M15 does not support 2V operation.
PN210023	(PN210024)		The BM91C815F0A-M15 does not support 2V operation.
PN210002	(PN210003)	BM11179	—
PN210023	(PN210024)		
(PN210044)	(PN210045)	—	The BM91CW12AF0A-M15 does not support 2V operation.
PN210023	(PN210024)		
PN210002	(PN210003)		
PN210023	(PN210024)		
—	—	—	The BM91CW12AF0A-M15 does not support 2V operation.
PN210033	PN210032		
PN210023	(PN210024)	BM11178	—
PN210008	PN210009		
PN210023	(PN210024)		

TLCS-870 Series (1/4)

Software Products

Language Tool	Test Tool	CASE Tool
C/C-Like Compiler & Assembler Set	Debugger	CaseWorks
SW87YN0-ZCE: 1 license SW87YN3-ZCE: 10 licenses	SW87DN9-ZFE: 1 license SW87DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool		Accessory					
Product name	OTP/Flash MCU	Package	Controller	Emulation pod	MCU probe (#1, #2)	Package converter (#2)	QFP Adapter (#1)			
TMP87C800DF	TMP87PH00DF	QFP64 (14×14)	BM1022R0B	BM87CH00N0B	(PN110005)	PN120015	PN210025			
TMP87CH00DF					PN120014	—	PN210010			
TMP87C800F	TMP87PH00F	QFP64 (14×20)			(PN110005)	PN120015	—	—		
TMP87CH00F										
TMP87CH00LF	TMP87PH00LF	QFP64 (14×14)			BM87C408M0A	(PN100003 + AS-DIP.6-028-SO08-1)	—	—		
TMP87C800N	TMP87PH00N	SDIP64								
TMP87CH00N	TMP87P808M	SOP28			BM87CH47U0B	(PN120011)	—	(PN210019)		
TMP87C405AM					TMP87PH47U	QFP44 (10×10)				
TMP87C807U	TMP87P808M/ TMP87P808N	SSOP30		BM1022R0B	BM87C408M0A	(PN100003)	PN200007	—		
TMP87C408DM						TMP87P808LM	SOP28		(PN100003 + AS-DIP.6-028-SO08-1)	—
TMP87C408LM										
TMP87C408LN						TMP87P808LN	SDIP28		(PN100003)	PN200004
TMP87C808LN										
TMP87C408M						TMP87P808M	SOP28		(PN100003 + AS-DIP.6-028-SO08-1)	—
TMP87C808M										
TMP87C408N			TMP87P808N			SDIP28	(PN100003)		PN200004	
TMP87C808N										
TMP87C408SM			TMP87P808M			SOP28	(PN100003 + AS-DIP.6-028-SO08-1)		—	
TMP87C808SM										
TMP87C408SN			TMP87P808N			SDIP28	(PN100003)		PN200004	
TMP87C808SN										
TMP87C409BM			TMP87P809M			SOP28	BM87C809N0A		(PN100003 + PN200004)	AS-DIP.6-028-SO08-1
TMP87C809BM										
TMP87C409BN	TMP87P809N	SDIP28	BM87CM14N0A	(PN110008)	PN120007	PN210010				
TMP87C809BN										
TMP87C814F	TMP87PM14F	QFP64 (14×20)	BM87CM14N0A	(PN110008)	PN120007	PN210010				
TMP87CH14F										
TMP87CK14F										
TMP87CM14F										
TMP87C814N										
TMP87CH14N							TMP87PM14N	SDIP64	BM87CH20F0B	PN120004
TMP87CH14N										
TMP87CK14N										
TMP87CM14N										
TMP87CK20AF	TMP87PM20F	QFP80 (14×20)	BM87CH20F0B	PN120004	—	PN210001				
TMP87CM20AF										
TMP87CC20F	TMP87PH20F	LOFP80 (12×12)	BM87CP23F0B	PN120006A	—	PN210007				
TMP87CH20F										
TMP87CH21CDF	TMP87PP21DF	QFP80 (14×20)	BM87CP23F0B	PN120004	—	PN210001				
TMP87CP21CDF										
TMP87CH21CF	TMP87PP21F	QFP80 (14×20)	BM87CP23F0B	PN120004	—	PN210001				
TMP87CP21CF										

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.
 #2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
 **: Under development

OTP/MCU mount adaptor (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210026	PN210027	BM1173	—
PN210011A	PN210012	BM1137	
PN210026	PN210027	BM1173	
—	—	BM1136	
		BM1116	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET).
PN210020A	(PN210021)	BM1194C	—
IC253-030-0002-B	—	TMP87P808M: BM11116 TMP87P808N: BM11122	One IC socket (IC253-030-0002-B) is supplied with the PN200007. The IC socket is provided by Yamaichi Electronics, Co. Ltd. The TMP87C408DM is packaged in a 30-pin SSOP. However, the OTP version is not available in the same package. If necessary, use the 28-pin TMP87P808M (SOP) or TMP87P808N (SDIP) with on-chip OTP.
—		BM11116	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET).
		BM11122	—
		BM11116	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET).
		BM11122	—
		BM11116	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET).
		BM11122	—
		BM11116	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET).
		BM11122	—
PN210011A	PN210012	BM1199	—
—	—	BM1198	
PN210002	PN210003	BM1138	To connect the supplied probe (which has two 40-pin flat cables with the HIF3BA-40D-2.54R sockets) to the target system, the target system must have the pin header HIF3BA-40PA-2.54DSA or its equivalent. The socket (HIF3BA-40D-2.54R) and the pin header (HIF3BA-40PA-2.54DSA) are available from Hirose Electric, Co., Ltd.
PN210008	PN210009	BM11105	—
PN210002	PN210003	BM11104	

TLCS-870 Series (2/4)

Software Products

Language Tool	Test Tool	CASE Tool
C/C-Like Compiler & Assembler Set	Debugger	CaseWorks
SW87YN0-ZCE: 1 license SW87YN3-ZCE: 10 licenses	SW87DN9-ZFE: 1 license SW87DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool			Accessory					
Product name	OTP/Flash MCU	Package	Controller	Emulation pod	MCU probe (#1, #2)	Package converter (#2)	QFP Adapter (#1)				
TMP87CM21CDF	TMP87PP21DF	LOFP80 (12×12)	BM1022R0B	BM87CP23F0B	PN120006A	—	PN210007				
TMP87CM21CF	TMP87PP21F	QFP80 (14×20)			PN120004		PN210001				
TMP87CM23AF	TMP87PP23F	QFP100 (14×20)			(PN120005)		(PN210004)				
TMP87CP23F											
TMP87CM24AF	TMP87PP24AF	LOFP100 (14×14)		BM87CP24F0A	(PN120013)	(PN210022)					
TMP87CP24AF											
TMP87CM28F	TMP87PM28F	QFP144 (20×20)		BM87CM28F0A	(PN120027)	(PN210034)					
TMP87CH29N	TMP87PM29N	SDIP64		BM87CM29U0B	PN110005	—					
TMP87CK29N											
TMP87CM29N											
TMP87CH29U	TMP87PM29U	LOFP64 (10×10)		BM87CM29U0B	(PN120022)	(PN210031)					
TMP87CK29U											
TMP87CM29U											
TMP87CC31N					TMP87PM36N	SDIP42	BM87CM37N0A	(PN110005 + PN200006)	—		
TMP87CH31N											
TMP87CH34BN	TMP87PM34AN	SDIP42		BM87CM34N0A			(PN110009)				
TMP87CK34BN											
TMP87CM34BN	TMP87PM36N	SDIP42		BM87CM37N0A	(PN110005 + PN200006)	—					
TMP87CH36N											
TMP87CK36N											
TMP87CM36N	TMP87PS38F	QFP44 (14×14)		BM87CS38N0A	(PN100002 + PN200001)	AS-SDIP-QF52S-47C800F	—				
TMP87CH38F											
TMP87CK38F											
TMP87CM38F											
TMP87CP38F											
TMP87CS38F											
TMP87CH38N	TMP87PS38N	SDIP42		BM87CS38N0A	(PN100002 + PN200001)	—	—				
TMP87CK38N											
TMP87CM38N											
TMP87CP38N											
TMP87CS38N											
TMP87CM39F	TMP87PS39F	QFP64 (14×20)		BM87CS39N0A	(PN110005)	PN120007	PN210010				
TMP87CS39F											
TMP87CP39F											
TMP87CM39N	TMP87PS39N	SDIP64		BM87CS39N0A	(PN110005)	—	—				
TMP87CP39N											
TMP87CS39N											
TMP87CK40AF	TMP87PM40AF	QFP64 (14×20)		BM87CK40N0B	PN120014	—	PN210010				
TMP87CM40AF											
TMP87CK40AN	TMP87PM40AN	SDIP64		BM87CK40N0B	(PN110005)	—	—				
TMP87CM40AN											

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.
 #2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
 **: Under development

OTP/MCU mount adapter (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210008	PN210009	BM11105	—
PN210002	PN210003	BM11104	
PN210005A	(PN210006)	BM1185A	
PN210023	(PN210024)	BM11127	
PN210036	(PN210035)	BM11181 or BM11185	The BM11181 is parallel adapter for off-board OTP programming, and the BM11185 is a serial adapter for on-board OTP programming.
—	—	BM11143	—
PN210033	(PN210032)	BM11117A	
—	—	BM1183A	
—	—	BM11136	The shape-conversion adapter (AS-SDIP-QF52S-47C800F) is made by Emulation Technology, Inc. (ET)
—	—	BM11112	—
PN210011A	PN210012	BM11138	
—	—	BM11118	
PN210011A	PN210012	BM11137	
—	—	BM11136	

TLCS-870 Series (3/4)

Software Products

Language Tool	Test Tool	CASE Tool
C/C-Like Compiler & Assembler Set	Debugger	CaseWorks
SW87YN0-ZCE: 1 license SW87YN3-ZCE: 10 licenses	SW87DN9-ZFE: 1 license SW87DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool			Accessory				
Product name	OTP/Flash MCU	Package	Controller	Emulation pod	MCU probe (#1, #2)	Package converter (#2)	QFP Adapter (#1)			
TMP87C840F	TMP87PH40AF	QFP64 (14×20)	BM1022R0B	BM87CK40N0B	PN120014	—	PN210010			
TMP87CC40F										
TMP87CH40F										
TMP87C840N	TMP87PH40AN	SDIP64		—	(PN110005)	—	—			
TMP87CC40N										
TMP87CH40N										
TMP87C841F	TMP87PM41F	QFP64 (14×20)		BM1022R0B	—	PN120014	—	PN210010		
TMP87CC41F										
TMP87CH41F										
TMP87CM41F	TMP87PM41N	SDIP64			—	(PN110005)	—	—		
TMP87C841N										
TMP87CC41N										
TMP87CH41N	TMP87PM41U	LOFP64 (10×10)	BM1022R0B		—	PN120035	PN210031	—		
TMP87CK41N										
TMP87CM41N										
TMP87C841U	TMP87PM43N	SDIP42			BM1022R0B	—	(PN100002 + PN200001)	—	—	
TMP87CC41U										
TMP87CH41U										
TMP87CK41U	TMP87P844N	SDIP64		BM1022R0B		—	(PN110005)	—	—	
TMP87CM41U										
TMP87CK43N										
TMP87CM43N	TMP87PH46N	SDIP42				BM1022R0B	—	(PN100002 + PN200001)	—	—
TMP87C444N										
TMP87C844N										
TMP87CM45N	TMP87PH47LU	QFP44 (10×10)	BM1022R0B				—	(PN100002 + PN200001)	—	—
TMP87C446N										
TMP87C846N										
TMP87C847LU	TMP87PH47U	QFP44 (10×10)			BM1022R0B		—	PN120011	—	(PN210019)
TMP87CH47LU										
TMP87C447U										
TMP87C847U	TMP87PH48DF	QFP64 (14×14)		BM1022R0B			—	PN120052	—	PN210025
TMP87CH48DF										
TMP87CM48DF										
TMP87CH48U	TMP87PM48J	LOFP64 (10×10)				BM1022R0B	—	(PN120022)	—	(PN210031)
TMP87CM48U										
TMP87PM48J										
TMP87CM53F	TMP87PM53F	QFP80 (14×20)	BM1022R0B				—	(PN120004)	—	(PN210001)
TMP87CM64F										
TMP87CP64F										
TMP87CS64F	TMP87PS64F	QFP100 (14×20)			BM1022R0B		—	(PN120005)	—	(PN210004)
TMP87CS64F										

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.
 #2: One QFP adaptor and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
 **: Under development

OTP/MCU mount adaptor (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210011A	PN210012	BM1137	
—	—	BM1136	
PN210011A	PN210012	BM1137	
—	—	BM1136	
PN210033	PN210032	BM11121	
—	—	BM1163	
		BM11108	
		BM11118	
		BM11193	
PN210020A	(PN210021)	BM11194C	
PN210026	PN210027	BM11147	
PN210033	(PN210032)	BM11117A	
PN210002	(PN210003)	BM11104	
PN210005A	(PN210006)	BM11185A	

TLCS-870 Series (4/4)

Software Products

Language Tool	Test Tool	CASE Tool
C/C-Like Compiler & Assembler Set	Debugger	CaseWorks
SW87YN0-ZCE: 1 license SW87YN3-ZCE: 10 licenses	SW87DN9-ZFE: 1 license SW87DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool			Accessory							
Product name	OTP/Flash MCU	Package	Controller	Emulation pod	MCU probe (#1, #2)	Package converter (#2)	QFP Adapter (#1)						
TMP87CS68DF	TMP87PS68DF	LOFP80 (12×12)	BM1022R0B	BM87CS68DF0A	(PN120006A)	—	(PN210007)						
TMP87CH70BF	TMP87PM70F	QFP80 (14×20)		BM87CK70F0B	PN120004		—	PN210001					
TMP87CM70BF													
TMP87CM71F													
TMP87CN71F													
TMP87CP71F													
TMP87CS71F													
TMP87CS71BF	TMP87PS71AF												
TMP87CH74AF													
TMP87CM74AF	TMP87PM74F												
TMP87CH75F	TMP87PM75F								QFP100 (14×20)	BM87CM75F0A	(PN120005)	—	(PN210004)
TMP87CM75F													
TMP87CC78F													
TMP87CH78F													
TMP87CK78F													
TMP87CM78F	TMP87PM78F												
TMPA8700CHF													
TMPA8700CKF	TMPA8700PSF	QFP44 (14×14)		—	—		AS-SDIP-QF52S-47C800F	—					
TMPA8700CMF													
TMPA8700CPF													
TMPA8700CSF													
TMPA8700CHN													
TMPA8700CKN	TMPA8700PSN	SDIP42	BMA8700CSN0A	—	—	—							
TMPA8700CMN													
TMPA8700CPN													
TMPA8700CSN													
TMPA8701CHF													
TMPA8701CKF	TMPA8700PSF	QFP44 (14×14)	—	—	AS-SDIP-QF52S-47C800F	—							
TMPA8701CMF													
TMPA8701CHN	TMPA8700PSN	SDIP42	—	—	—	—							
TMPA8701CKN													
TMPA8701CMN													

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.
 #2: One QFP adaptor and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
 **: Under development

OTP/MCU mount adaptor (#1)	Pin protector (#1)	OTP programming adaptor	Note
PN210008	(PN210009)	BM11105	—
PN210002	PN210003	BM1150B	To connect the supplied probe (which has two 40-pin flat cables with the HIF3BA-40D-2.54R sockets) to the target system, the target system must have the pin header HIF3BA-40PA-2.54DSA or its equivalent. The socket (HIF3BA-40D-2.54R) and the pin header (HIF3BA-40PA-2.54DSA) are available from Hirose Electric, Co., Ltd.
		BM11107	
		BM11120	
PN210005A	(PN210006)	BM11124	—
		BM1188	
—	—	BMA1102	The package converter (AS-SDIP-QF52S-47C800F) is made by Emulation Technology, Inc. (ET)
		BMA1101	—
		BMA1102	The package converter (AS-SDIP-QF52S-47C800F) is made by Emulation Technology, Inc. (ET)
		BMA1101	—

TLCS-870/C Series

Software Products

Language Tool	Test Tool	CASE Tool
C Compiler & Assembler Set	Debugger	CaseWorks
SW86YN0-ZCE: 1 license SW86YN3-ZCE: 10 licenses	SW86DN9-ZFE: 1 license SW86DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool								
Product name	OTP/Flash MCU	Package	Controller	Interface module	Emulation module	Emulation chip (#2)	Target connect board				
TMP86CH06N	TMP86PH06N	SDIP42	BM1040R0A	BMP86A100010A	BMP86A200010B	** TMP86C906XB	BMP86D042NB0A				
TMP86CH06U	TMP86PH06U	QFP44 (10×10)				BMP86D044DE0A					
TMP86C408DM	TMP86P808DM	SSOP30				BMP86D030MF1A					
TMP86C808DM											
** TMP86C407M	TMP86P807M	SOP28				** TMP86C908XB	BMP86D028MC0A				
** TMP86C807M						BMP86D028NB0A					
** TMP86C407N						TMP86P807N	SDIP28	BMP86D042NB0A			
** TMP86C807N											
TMP86CP11AN	TMP86PP11AN	SDIP42				** TMP86C911XB	BMP86D042NB0A				
TMP86C420F	TMP86P820F	QFP64 (14×14)				** TMP86C929AXB	BMP86A200020A	** TMP86C925XB	BMP86D100FF0A		
TMP86C820F											
TMP86CH21F	TMP86PM29AF	LQFP64 (10×10)								BMP86A200010B	** TMP86C929AXB
TMP86C420U	TMP86P820U										
TMP86C820U	TMP86PM29AU										
TMP86CH21U	TMP86PM23U										
** TMP86CM23U	** TMP86PM23U										
TMP86CM25F	TMP86PS25F				QFP100 (14×20)						
TMP86CS25F	TMP86PM29AF	QFP64 (14×14)			** TMP86C929AXB		BMP86D064DE0A				
TMP86C829BF											
TMP86CH29BF											
TMP86CM29BF	TMP86PM29AU	LQFP64 (10×10)			** TMP86C941XB		BMP86D064DE0A				
TMP86C829BU											
TMP86CH29BU											
TMP86CM29BU	TMP86FS41F	QFP64 (14×14)			** TMP86C943XB	BMP86D080FE0A					
TMP86CM41F											
TMP86CS41F											
TMP86CS43F	TMP86PS43F	QFP80 (14×20)			** TMP86C944XB	BMP86D044DE0A					
TMP86CS44U	TMP86PS44U	QFP44(10×10)									
TMP86C846N	** TMP86PM46N	SDIP42			** TMP86C947XB	BMP86D042NB1A					
TMP86CH46N											
** TMP86CM46N											
TMP86C845U	TMP86PM47U	QFP44 (10×10)					BMP86A200020A	** TMP86C964XB	BMP86D100FF0A		
TMP86C847U											
TMP86CH47U											
TMP86CM47U											
TMP86CS64F	TMP86PS64F	QFP100 (14×20)			** TMP86C974XB	BMP86D080FE0A					
TMP86CK74AF	TMP86PM74AF	QFP80 (14×20)									
TMP86CM74AF											
** TMP86CH87U	** TMP86PM87U	QFP44 (10×10)			** TMP86C987XB	BMP86D044DE0A					
** TMP86CM87U											

#1: Those enclosed within parentheses are spare parts. One each is supplied with a target connect board.

#2: The emulation chip is specifically designed for each development tool.

** : Under development

Accessory				Note
QFP adapter (#1)	OTP/MCU mount adapter (#1)	Pin protector (#1)	OTP programming adapter	
—	—	—	BM11155	—
(PN210019)	PN210020A	(PN210021)	BM11156	
—	(IC253-030-0002-B)	—	BM11183	One IC socket (IC253-030-0002-B) is supplied with the target connection board. The IC socket is provided by Yamaichi Electronics, Co., Ltd.
	(IC253-028-0003-B)		BM11184	One IC socket (IC253-028-0003-B) is supplied with the target connection board. The IC socket is provided by Yamaichi Electronics, Co., Ltd.
	—		BM11197	
			BM11173	
(PN210025)	PN210026	(PN210027)	BM11163	—
(PN210031)	PN210033	(PN210032)	BM11162	
			BM11198	
(PN210004)	PN210005A	(PN210006)	BM11172	
(PN210025)	PN210026	(PN210027)	BM11163	
(PN210031)	PN210033	(PN210032)	BM11162	
(PN210025)	PN210026	(PN210027)	—	
(PN210001)	PN210002	(PN210003)	BM11182	
(PN210019)	PN210020A	(PN210021)	BM11187	
—	—	—	BM11188	
(PN210019)	PN210020A	(PN210021)	BM11187	
(PN210004)	PN210005A	(PN210006)	BM11190	
(PN210001)	PN210002	(PN210003)	BM11189	
(PN210019)	PN210020A	(PN210021)	BM11187	

TLCS-870/X Series

Software Products

Language Tool	Test Tool	CASE Tool
C/C-Like Compiler & Assembler Set	Debugger	CaseWorks
SW88YN0-ZFE	SW88DN9-ZFE: 1 license SW88DN3-ZFF: 10 licenses	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Sourcecode analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool		MCU probe (#1, #2)	Package converter (#2)	
Product name	OTP/Flash MCU	Package	Controller	Emulation pod			
** TMP88CP34F	** TMP88PS34F	QFP44 (14x14)	BM1040R0W BM1055R0B	** BM88CS34N0A-M15	**PN120066		
** TMP88CS34F							
** TMP88CP34N	** TMP88PS34N	SDIP42					(**PN110016)
** TMP88CS34N							
TMP88CM38AF	TMP88PS38F	QFP44 (14x14)			BM88CS38N0A-M15		PN120058
TMP88CM38BF	TMP88PS38BF						**PN120064
TMP88CP38AF	TMP88PS38F						PN120058
TMP88CP38BF	TMP88PS38BF						**PN120064
TMP88CS38F	TMP88PS38F						PN120058
TMP88CS38BF	TMP88PS38BF						**PN120064
TMP88CM38AN	TMP88PS38N	SDIP42					(PN110013)
TMP88CM38BN	TMP88PS38BN						**PN110015
TMP88CP38AN	TMP88PS38N						(PN110013)
TMP88CP38BN	TMP88PS38BN						**PN110015
TMP88CS38N	TMP88PS38N						(PN110013)
TMP88CS38BN	TMP88PS38BN						**PN110015
** TMP88CH40M	TMP88PH40M	SOP28			BM88CS43F0A-M15		PN100003 + PN200008
** TMP88CH40N	TMP88PH40N	SDIP28					PN100003 + PN200004
** TMP88CS42F	** TMP88PS42F	QFP64(14x20)					PN120014
** TMP88CS42N	** TMP88PS42N	SDIP64					PN110005
TMP88CS43F	TMP88PS43F	QFP80 (14x20)					(PN120004)
TMP88CH47F	TMP88PH47F	QFP44 (14x14)			BM88CM49N0B-M15		PN120019
TMP88CH47N	TMP88PH47N	SDIP42					PN100002 + PN200001
TMP88CS48AF	TMP88PS49F	QFP64 (14x20)					PN120014
TMP88CS48AN	TMP88PS49N	SDIP64					(PN110005)
TMP88CK48F	TMP88PS49F	QFP64 (14x20)					PN120014
TMP88CM48F							
TMP88CK48N	TMP88PS49N	SDIP64					(PN110005)
TMP88CM48N							
TMP88CK49F	TMP88PS49F	QFP64 (14x20)					PN120014
TMP88CM49F							
TMP88CK49N	TMP88PS49N	SDIP64					(PN110005)
TMP88CM49N							
TMP88C060F	—	LQFP80 (12x12)	BM1055R0B	BM88C060F0A	(PN120006A)		
TMP88CU74F	TMP88PU74F	QFP80 (14x20)		BM88CU74F0A	(PN120004)		
TMP88CP76F	TMP88PS76F	QFP80 (14x20)		BM88CP77F0A	PN120004		
TMP88CS76F							
TMP88CP77F	TMP88PU77F	QFP100 (14x20)			(PN120005)		
TMP88CS77F							
TMP88CU77F							

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.
 #2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
 **: Under development

Accessory				Note	
QFP adapter (#1)	OTP/MCU mount adapter (#1)	Pin protector (#1)	OTP programming adapter		
—	IC149-044-039-S5	—	** BM11175A	One IC socket (IC149-044-039-S5) is supplied with the PN120066. The IC socket is provided by Yamaichi Electronics, Co., Ltd.	
	—		BM11174A		
	IC149-044-039-S5		BM11175	One IC socket (IC149-044-039-S5) is supplied with the PN120058 or PN120064. The IC socket is provided by Yamaichi Electronics, Co., Ltd.	
			** BM11175A		
			** BM11175A		
			BM11175		
			** BM11175A		
	IC253-028-0003-B		BM11174A	—	
			—		
	—		—	—	BM11195
—	—	—	BM11196	—	
PN210010	PN210011A	PN210012	BM11200		
—	—	—	BM11199		
(PN210001)	PN210002	(PN210003)	BM11180A	—	
—	IC149-044-039-S5	—	BM11168		One IC socket (IC149-044-039-S5) is supplied with the PN120019. The IC socket is provided by Yamaichi Electronics, Co., Ltd.
	—		BM11167		
PN210010	PN210011A	PN210012	BM11111A		
—	—	—	BM11110A		
PN210010	PN210011A	PN210012	BM11111A		
—	—	—	BM11110A		
PN210010	PN210011A	PN210012	BM11111A		
—	—	—	BM11110A		
(PN210007)	PN210008	(PN210009)	—		
(PN210001)	PN210002	(PN210003)	BM11131		
PN210001		PN210003	BM11157		
(PN210004)		PN210005A	(PN210006)	BM11150	

TLCS-47 Family

Software Products

Language Tool		Test Tool
Assembler	C-Like Compiler	Debugger
SW471E0-ZZE	SW476E0-ZZE	SW477E0-ZZE: Controller: BM1020A (for the RTE emulation system) SW477E1-ZZE: Controller: BM1022R0B (for the model 10 emulation system)

Hardware Products

Product name	Target MCU		Test Tool		MCU probe (#1, #2)	Package converter (#2)
	OTP/Flash MCU	Package	Controller	Emulator/Emulation pod		
TMP47C800F	TMP47P800F	QFP44 (14x14)	BM1020A	BM47C800A	(PN100002 + PN200001)	AS-SDIP-QF52S-47C800F
TMP47C800N	TMP47P800N	SDIP42		BM1022R0B		BM47C415N0A
TMP47C215N	TMP47P415VN		QFP44 (14x14)		BM1022R0B	
TMP47C415N	TMP47P416VF	QFP64 (14x20)		BM1020A		BM47C860A
TMP47C216F	TMP47P860VF		SDIP64		BM1020A	
TMP47C416F	TMP47P860VN	SOP16		BM1020A		BM4721A
TMP47C660AF	—		DIP16		BM1020A	
TMP47C860AF	TMP47P201VP	SOP20		BM1020A		BM47C203N0A
TMP47C660AN	TMP47P202VM		DIP20		BM1020A	
TMP47C860AN	TMP47P202VP	SOP28		BM1020A		BM47C203N0A
TMP47C101M	TMP47P403VM		SDIP28		BM1020A	
TMP47C201M	—	QFP44 (14x14)		BM1022R0B		BM47C206M0A
TMP47C101P	TMP47P206VP		SDIP42		BM1022R0B	
TMP47C201P	TMP47P422VF	QFP44 (10x10)		BM1022R0B		BM47C422N0B
TMP47C102M	TMP47P422VU		QFP44 (14x14)		BM1022R0B	
TMP47C202M	—	SSOP30		BM1022R0B		BM47C443N0B
TMP47C102P	TMP47P443VDM		SOP28		BM1022R0B	
TMP47C202P	TMP47P443VM	SDIP28		BM1022R0B		BM47C443N0B
TMP47C103M	TMP47P443VN		SOP16		BM1020A	
TMP47C203M	—	QFP44 (14x14)		BM1020A		BM47E486M0A
TMP47C103N	TMP47P187M		SDIP42		BM1020A	
TMP47C203N	TMP47P187M	QFP44 (14x14)		BM1020A		BM47E486M0A
TMP47C206M	TMP47P440VF		SDIP42		BM1020A	
TMP47C206P	TMP47P440VN	SDIP42		BM1020A		BM47214A
TMP47C222F	—		SSOP30		BM1022R0B	
TMP47C422F	TMP47P443VDM	SOP28		BM1022R0B		BM47214A
TMP47C222N	TMP47P443VM		SDIP28		BM1022R0B	
TMP47C422N	TMP47P443VN	SOP16		BM1022R0B		BM47214A
TMP47C222U	—		QFP44 (14x14)		BM1020A	
TMP47C422U	TMP47P443VDM	SDIP42		BM1020A		BM47214A
TMP47C241M	TMP47P241VM		SSOP30		BM1022R0B	
TMP47C241N	TMP47P241VN	SOP28		BM1022R0B		BM47214A
TMP47C243DM	TMP47P443VDM		SOP28		BM1022R0B	
TMP47C443DM	TMP47P443VM	SDIP28		BM1022R0B		BM47214A
TMP47C243M	TMP47P443VN		SOP16		BM1022R0B	
TMP47C443M	—	QFP44 (14x14)		BM1020A		BM47214A
TMP47C243N	TMP47P187M		SDIP42		BM1020A	
TMP47C443N	TMP47P187M	SDIP42		BM1020A		BM47214A
TMP47E186M	TMP47P440VF		SDIP42		BM1020A	
TMP47E187M	TMP47P440VN	SDIP42		BM1020A		BM47214A
TMP47C440BF	—		SSOP30		BM1022R0B	
TMP47C440BN	TMP47P440VN	SDIP42		BM1022R0B		BM47214A

The TLCS-47 family software runs under MS-DOS, or in MS-DOS compatibility mode on Windows 95 and Windows NT [4.0] platforms.

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.

#2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."

Accessory				Note			
QFP adapter (#1)	OTP/MCU mount adapter (#1)	Pin protector (#1)	OTP programming adapter				
—	—	—	BM1111	The package converter (AS-SDIP-QF52S-47C800F) is made by Emulation Technology, Inc. (ET)			
			BM1108	—			
			BM1191	—			
	IC149-044-039-S5		BM1192	One IC socket (IC149-044-039-S5) is supplied with the PN120019. The IC socket is provided by Yamaichi Electronics, Co. Ltd.			
PN210010	PN210011A	PN210012	BM1132	—			
—	—	—	BM1130	—			
			—	The package converter (AS-DIP.3-016-SO03-1) is made by Emulation Technology, Inc. (ET)			
			BM1187	—			
			BM11113	The package converter (AS-DIP.3-020-SO03-1) is made by Emulation Technology, Inc. (ET)			
			BM1187	—			
			BM1141	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET)			
			BM1140	—			
			BM11126	The package converter (AS-DIP.3-020-SO03-1) is made by Emulation Technology, Inc. (ET)			
			BM11125	—			
			IC149-044-039-S5	BM11103	One IC socket (IC149-044-039-S5) is supplied with the PN120019. The IC socket is provided by Yamaichi Electronics, Co. Ltd.		
			—	BM11102	—		
			IC149-044-052-B5	BM11170	One IC socket (IC149-044-052-B5) is supplied with the PN200030. The IC socket is provided by Yamaichi Electronics, Co. Ltd.		
			—	BM11157	The package converter (AS-SDP.4-028-SO05-2) is made by Emulation Technology, Inc. (ET)		
			—	BM11156	—		
			IC253-030-0002-B	BM11115	The IC socket (IC253-030-0002-B) is supplied with the PN200007. The IC socket (IC253-030-0002-B) is available from Yamaichi Electronics, Co. Ltd.		
			—	—	—	BM11101	The package converter (AS-DIP.6-028-SO08-1) is made by Emulation Technology, Inc. (ET)
						BM11100	—
BM11114	The package converter (AS-DIP.3-016-SO03-1) is made by Emulation Technology, Inc. (ET)						
BM1125	The package converter (AS-SDIP-QF52S-47C800F) is made by Emulation Technology, Inc. (ET)						
—	—	—	BM1118	—			

TX19 Family

- **Full ICE**

Software Products

Language Tool	Test Tool	Real-Time OS	CASE Tool
C Compiler	Debugger & Simulator Set	Real-Time OS	CaseWorks
SW19YN0-ZCF: 1 license SW19YN3-ZCF: 10 licenses	SW19DN9-ZCF: 1 license SW19DN3-ZCF: 10 licenses	SW19RN2-ZCC: Object code can be freely copied. SW19RN3-ZCC: Green Hills Software, Inc (GHS) compiler supported: Object code can be freely copied SW19RNC-ZCC: Object code can be freely copied. With source code. SW19RND-ZCC: Green Hills Software, Inc (GHS) compiler supported: Object code can be freely copied. With source code.	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU			Test Tool	
Product name	OTP/Flash	Package	controller	Emulation pod
TMP1940CYAF	TMP1940FDBF	QFP100	BM1055R0B /BM1040R0A	BMR1940CYF0A-M15
TMP1941AF				BMR1942C DU0A-M15
TMP1942CYU	TMP1942FDU	LOFP144		** BMR1942C DU0A-M15
TMP1942CZU				
TMP1942CZXB	TMP1942FDXB	FBGA177		

- **DSU PROBE**

Software Products

Language Tool	Test Tool	CASE Tool
C Compiler	Debugger	CaseWorks
SW19YN0-ZCF: 1 license SW19YN3-ZCF: 10 licenses	%2	SW00ENA-ZCC: ASM code generation / Reengineering of code to design (1 license) SW00ENB-ZCC: Source code analysis (1 license) SW00ENC-ZCC: C code generation / Reengineering of code to design (1 license)

Hardware Products

Target MCU	Test Tool
Product name	DSU PROBE for N-WIRE
TMP1940FDBF	BM1200R0A
TMP1941AF	
TMP1942FDU	
TMP1942FDXB	

RTOS products require a license agreement. For details, please contact your local Toshiba sales representative.

%1: For software upgrades, please contact your local Toshiba sales representative.

%2: [TX19 DSU DEBUGGER] is supplied with [DSU PROBE for N-WIRE].

#1: Those enclosed within parentheses are spare parts. One each is supplied with an emulation pod.

#2: One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."

** : Under development

Accessory			
MCU probe (#1, #2)	QFP adapter (#1)	OTP / MCU mount adapter (#1)	Pin protector
(PN120013)	(PN210022)	(PN210023)	PN210024
(PN120044)	(PN210043)	(PN210044)	PN210045
**	**	**	**

64-Bit RISC Processors

RISC Processors

Processor Type	Product No.	Package	Functions/Features	Technical Data	Product Status
64-Bit super scalar RISC	◇** TMPR7901XB		64-bit super scalar RISC type processors Architecture based MIPS Technologies Data path which can be dynamically configured as either 128 bits or 64 bits × 2 channels Built-in 32-Kbyte instruction cache and 32-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 128-bit multimedia instructions Incorporates peripherals such as PCI controller, SDRAM controller, DMA controller and 10/100Mbps Ethernet Media Access Controller Supply voltage (I/O 3.3V, internal 1.5V) Operates internally at 200MHz	2001 Databook (Only on Web)	ES: NOW MP: 02/12
64-Bit RISC	◇ TMPR4955AFG-200B	QFP 160	Architecture based on MIPS Technologies, Inc. R4000 Built-in 32-Kbyte instruction cache and 32-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 Built-in 32-bit system interface (SysAD bus) Supply voltage: 3.3 V (I/O), 1.5 V (internal) Operates internally at 167/200 MHz; operates externally at 83/100 MHz	2001 Databook	MP: NOW
	◇ TMPR4927ATB-200	TBGA420	Architecture based on MIPS Technologies, Inc. R4000 Built-in 32-Kbyte instruction cache and 32-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 Incorporates peripherals such as PCI controller, DMA controller, memory controller, timer, serial I/F and AC-Link. Supply voltage: 3.3 V (I/O), 1.5 V (internal) Operates internally at 200 MHz	2002 Databook	MP: NOW
	◇** TMPR4955BFG-300		Architecture based on MIPS Technologies, Inc. R4000 Built-in 32-Kbyte instruction cache and 32-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 Built-in 32-bit SysAD bus interface Supply voltage (I/O 3.3V, internal 1.5V) Operates internally at 300MHz	2002 Databook	ES: NOW MP: 02/9
	◇** TMPR4925XB-200		Built-in 16-Kbyte instruction cache and 16-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 Incorporates peripherals such as NAND Flash controller, PCI controller, DMA controller, memory controller, timer, serial and AC-Link Supply voltage (I/O 3.3V, internal 1.5V) Operates internally at 200MHz	2002 Databook	ES: NOW MP: 02/10
	◇** TMPR4937XB-300		Built-in 32-Kbyte instruction cache and 32-Kbyte data cache Single- or double-precision FPU in compliance with IEEE 754 Incorporates peripherals such as PCI controller, memory controller, DMA controller, timer, serial and AC-Link Supply voltage (I/O 3.3V, internal 1.5V) Operates internally at 300MHz	Under Writing	ES: 02/9 MP: 02/12

◇: Dry-packed product

R4000 and R4300 are trademarks of MIPS Technologies, Inc.

** : Under development

32-Bit RISC Processors

Built-in RISC Processors

Processor Type	Product No.	Package	Functions/Features	Technical Data	Product Status
32-Bit RISC	◇ TMP1940CYAF	LQFP 100	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE Built-in 256-Kbyte mask ROM and 10-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, timer and serial I/F. Supply voltage: 3.3 V Operates internally at 32 MHz.	2002 Databook	MP: NOW
	◇ TMP1940FDBF	LQFP 100	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE Built-in 512-Kbyte Flash E2PROM and 16-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, timer and serial I/F. Supply voltage: 3.3 V Operates internally at 32 MHz.	2002 Databook	MP: NOW
	◇ TMP1941AF	LQFP 100	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE No built-in ROM. Built-in 10-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, timer and serial I/F. Supply voltage: 3.3 V Operates internally at 40 MHz.	2002 Databook	MP: NOW
	◇ TMP1942CYU	LQFP144	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE Built-in 256-Kbyte mask ROM and 16-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, D/A converter, timer, PWM and serial I/F. Supply voltage: 3.3 V Operates internally at 32 MHz.	2002 Databook	MP: NOW
	◇ TMP1942CZU ◇ TMP1940CZXB	LQFP144/ FBGA177	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE Built-in 384-Kbyte mask ROM and 16-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, D/A converter, timer, PWM and serial I/F. Supply voltage: 3.3 V Operates internally at 32 MHz.	2002 Databook	MP: NOW
	◇ TMP1942FDU ◇ TMP1942FDXB	LQFP144/ FBGA177	Architecture based on MIPS Technologies, Inc. R3000A + MIPS16ASE Built-in 512-Kbyte Flash E2PROM and 20-Kbyte RAM. Incorporates general-purpose peripherals such as interrupt controller, DMA controller, A/D converter, D/A converter, timer, PWM and serial I/F. Supply voltage: 3.3 V Operates internally at 32 MHz.	2002 Databook	MP: NOW
	◇ Tmpr3911BU/BXB	LQFP 176/ FBGA 177	Built-in 4-Kbyte instruction cache and 1-Kbyte data cache Built-in TLB Incorporates peripherals for portable information equipment such as memory controller, LCD controller and serial I/Fs (e.g. UART and IrDA). Supply voltage: (I/O: 3.3 V, internal voltage: 2.6 V) Operates internally at 55.6 MHz.	2001 Databook	MP
	◇ Tmpr3912AU-92/XB-92	LQFP 208/ FBGA 217	Designed specially for Windows CE. Built-in 4-Kbyte instruction cache and 1-Kbyte data cache Built-in TLB Incorporates peripherals for portable information equipment such as memory controller, LCD controller and serial I/Fs (e.g. UART and IrDA). Supply voltage: 3.3 V Operates internally at 92 MHz.	2001 Databook	MP
	◇ Tmpr3927CF	QFP 240	Built-in 8-Kbyte instruction cache and 4-Kbyte data cache Built-in TLB Incorporates general-purpose peripherals such as PCI controller, DMA controller, memory controller, interrupt controller, timer and serial I/F. Supply voltage: (I/O: 3.3 V, internal voltage: 2.5 V) Operates internally at 133 MHz.	2002-09 Databook	MP

◇: Dry-packed product

Microsoft Windows® is a trademark of Microsoft Corporation.

R3000A is a trademark of MIPS Technologies, Inc.

RISC Engines for Car Navigation Systems

Processor Type	Product No.	Product No.	Functions/Features	Technical Data	Product Status
32-Bit RISC	◇** Tmpr3916F (Capricorn)	QFP 208	TX39/H core and peripheral circuits integrated onto a single chip. Built-in graphic control functions: <ul style="list-style-type: none"> • 4-sheet overlay using hardware • Sync. signal (HSYNC, VSYNC, CSYNC) generation • Built-in color pallet and video DAC Comes with graphic drawing capability and software library. Full CAN controller. Supply voltage: 3.3 V Operates internally at 60 MHz.	NOW	MP: 02/8

◇: Dry-packed product

** : Under development

PCI connecting Companion Chip

Processor Type	Product No.	Product No.	Functions/Features	Technical Data	Product Status
Companion Chip	◇** TC86C001F (GOKU-S)	QFP 144	PCI interface (32bit, 33MHz) ATA/ATAPI host controller Ultra DMA transfer (mode 4) maximum transfer rate 66Mbyte/sec USB 1.1 host controller 2 ports (supports OpenHCI 1.0a) USB device controller 1 port I2Cbus/SIO Supply voltage: 3.3V(I/O), 1.5V (internal)	NOW	ES: NOW MP: 03/1Q

◇: Dry-packed product

** : Under development



Purchase of TOSHIBA PC components conveys a license under the Philips PC Patent Rights to use these components in an PC system, provided that the system conforms to the PC Standard Specification as defined by Philips.

LL Microcontrollers and Peripheral LSIs

4-Bit LL Microcontrollers

Hardware Series	Product No.	Applications	Built-in Memory	Supply Voltage (V)	Ports			Built-in LCD Driver Column × Row	Built-in Peripheral Circuits	Min Instruction Execution Time (μs)	Current Consumption (μA) max	Package
					I	O	I/O					
T4X Series	T41	Calculators, watches, LCD games, remote controllers	ROM: 16 K words RAM: 2 Kbits (working) 6 Kbits (data)	1.2 to 1.8 or 2.4 to 3.6	8	1	8	60 × 8 / 58 × 10 (with voltage regulator + voltage doubler)	Timer/Counter, buzzer output (beep tone)	1 (at 3 V)	7 (at 1.5 V) 11 (at 3.0 V)	Chip
	T42	Calculators, watches, LCD games, remote controllers	ROM: 16 K words RAM: 2 Kbits (working)	1.2 to 1.8 or 2.4 to 3.6	4	1	12	52 × 16 (with voltage regulator + voltage doubler)	Timer/Counter, buzzer output (beep tone)	1 (at 3 V)	7 (at 1.5 V) 11 (at 3.0 V)	Chip
	T44	Calculators, watches, LCD games, remote controllers	ROM: 32 K words RAM: 4 Kbits (working) 4 Kbits (data)	2.4 to 3.6	4	2	12	64 × 16 (with voltage regulator + voltage doubler)	Timer/Counter, melody generator, 8-bit synchronous SIO, remote carrier output	1 (at 3 V)	11 (at 3.0 V)	Chip
	T47	** JTMP04060 -XXXS	Calculators, watches, LCD games, remote controllers	ROM: 4 K words RAM: 1.5 Kbits (working)	1.2 to 1.8 or 2.4 to 3.6	4	2	12	27 × 4 (with voltage doubler)	Timer/Counter, remote carrier output (buzzer output)	1 (at 3 V)	2 (at 1.5 V) 10 (at 3.0 V)

** : Under development

Automobile Clock LSIs

Product No.	Function	Features	Package
TC9538N/↔U	VFD-display digital car clock	Hours/minutes (VFD display), built-in power-on reset, variable dimming function (1/128 to 3/8), 12H/24H selection	SDIP 42/μQFP 44

↔: Dry-packed product

Microcontrollers with Built-in CAN

TLCS-900/L1 Series (CMOS)

ROM (bytes)	RAM (bytes)	Product No.	Minimum instruction execution time (ns) (5 V ± 10%)	CAN	SEI	SIO/UART	AD Converter (10 bits)	Timer/Counter		PDC (phase detection counter)	PWM (16-bit pulse width modulation)	Clock gear	I/O ports	Operating Temperature (°C)	Version with Built-in OTP	Package
								8 bits	16 bits							
32K	1K	◇ TMP91CM80SF	200	1 (8 mailboxes)	–	1	8	4	2	1	2	● 61	–	–40~125	TMP91PP80SF	LOFP80
48K	2K	◇ TMP91CP82TF	200	1 (16 mailboxes)	1	2	12	4	2	1	4	● 80	–	–40~125	TMP91PP82TF	LOFP100
48K	2K	◇ TMP91PP80SF	200	1 (8 mailboxes)	–	1	8	4	2	1	2	● 61	–	–40~125	–	LOFP80
48K	2K	◇ TMP91PP82TF	200	1 (16 mailboxes)	1	2	12	4	2	1	4	● 80	–	–40~125	–	LOFP100

◇: Dry-packed product