

SEMICONDUCTOR GENERAL CATALOG

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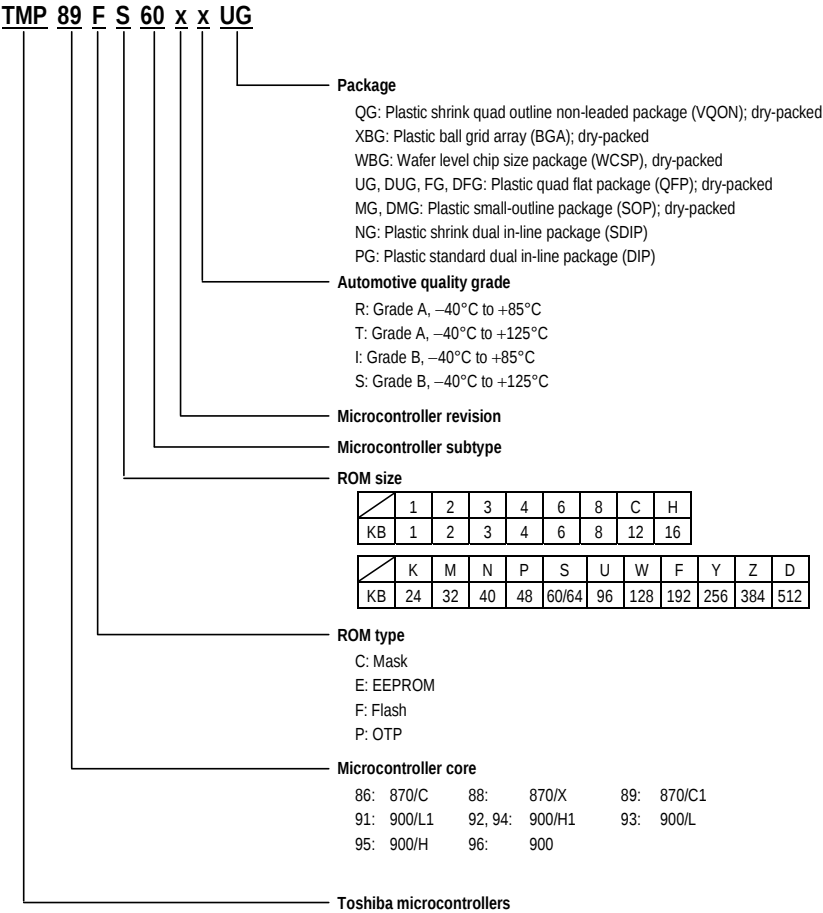
64-Bit Microprocessors

Development System Tools

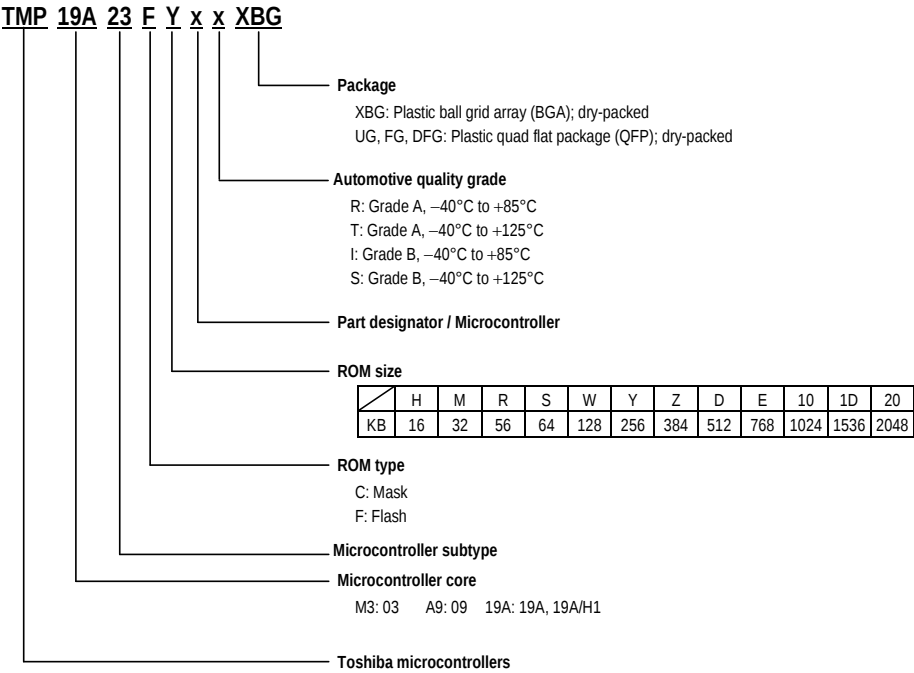
Datasheet.Live

Part Numbering Nomenclature

Example 1



Example 2



8-Bit Microcontrollers

TLCS-870 Family: TLCS-870/C Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SEI (ch)	SIO (ch)	UART (ch)	UART/SIO (ch) (Note 1)	UART/I ² C (ch) (Note 4)	I ² C (ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 5))	Clock Gear	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP86F409NG	4K	512	(1) 0.25 (2) 0.5 (3) 0.5	8			1		1				6			1		2			Yes	Yes				26	(1) 4.5 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -20 to 85	-	SDIP32	
TMP86F807MG	8K	256	(1) 0.25 (2) 0.5	8			1		1				6			1		2			Yes	Yes				22	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86C407MG TMP86C807MG	SOP28	
TMP86F807NG				8			1		1			6			1		2			Yes	Yes				22	TMP86C407NG TMP86C807NG			SDIP28		
TMP86F808DMG				8			1		1			6			1		2			Yes	Yes				24	TMP86C408DMG TMP86C808DMG			SSOP30		
TMP86FH09AMG	16K	512	(1) 0.25 (2) 0.5 (3) 0.5	8			1		1				6			1		2			Yes	Yes				26	(1) 4.5 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -20 to 85	-	SOP32	
TMP86FH09ANG				8			1		1			6			1		2			Yes	Yes				26	TMP86C809NG TMP86CH09NG		SDIP32			
TMP86FH12AMG				8			1		1			8			1	1	2			Yes	Yes				24	TMP86CH12MG		SSOP30			
TMP86FH46BNG			(1) 0.25 (2) 0.5	19			1		1			8			1	2			Yes	Yes				33	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86CH46ANG	SDIP42			
TMP86FH47BUG				19			1		1			8			1	2			Yes	Yes				35			-	LQFP44 (10×10 mm)			
TMP86FH92DMG				8			1		1		1		6			1	2			Yes	Yes		Yes	Yes	24	(1) 4.0 to 5.5 (2) 2.7 to 5.5	-20 to 85		SSOP30		
TMP86FH93NG			(2) 0.5	8			1		1		1	1	6			1	2			Yes	Yes		Yes	Yes	26				SDIP32		
TMP86FM29FG	32K	1536	(1) 0.5 (2) 1	4	32				1				8			1		4			Yes	Yes				39	(1) 2.7 to 3.6 (2) 1.8 to 3.6	-40 to 85	-	QFP64 (14×14 mm)	
TMP86FM29LUG				4	32				1			8			1	4			Yes	Yes				39	LQFP64 (10×10 mm)						
TMP86FM29UG			(1) 0.25 (2) 0.5	4	32				1			8			1	4			Yes	Yes				39	TMP86CM29UG	LQFP64 (10×10 mm)					
TMP86FM25FG		2048	(1) 0.25 (2) 0.5	4	(Note3) 60			1		1		8			1	4			Yes	Yes				42	(1) 2.7 to 3.6 (2) 1.8 to 3.6	-40 to 85			-	QFP100 (14×20 mm)	
TMP86FM48FG				11			1		1		1		16			2	2			Yes	Yes									54	QFP64 (14×14 mm)
TMP86FM48UG				11			1		1		1		16			2	2			Yes	Yes								54	LQFP64 (10×10 mm)	
TMP86FP24FG	48K			12	24				1		1		8			2	2			Yes	Yes				54	LQFP80 (12×12 mm)					
TMP86FS27FG	60K	1024	(1) 0.25 (2) 0.5 (3) 0.5	8	40				1		1		8			1	2		2		Yes	Yes				55	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 70	TMP86CM27FG TMP86CP27AFG	QFP80 (14×20 mm)	
TMP86FS23AUG		2048		5	32				1		1		8			1	4	Yes			Yes	Yes				51	(1) 3.5 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 5.5		(1) -40 to 85	TMP86CM23AUG TMP86CP23AUG	LQFP64 (10×10 mm)
TMP86FS28ADFG					40				1		1		8			2	4			Yes	Yes				62	(1) 4.0 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 5.5	(2) -40 to 85 (3) -40 to 85	TMP86CS28DFG	LQFP80 (12×12 mm)		
TMP86FS28AFG					40				1		1		8			2	4			Yes	Yes				62	(1) 4.0 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 5.5	TMP86CS28FG	QFP80 (14×20 mm)			
TMP86FS49BFG		(1) 0.25 (2) 0.5	13					2		2		1	16		2	4				Yes	Yes				56	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86CS49FG	QFP64 (14×14 mm)		
TMP86FS49BNG			13					2		2		1	16		2	4			Yes	Yes				56	-			SDIP64			
TMP86FS49BUG			13					2		2		1	16		2	4			Yes	Yes				56	TMP86CS49UG			LQFP64 (10×10 mm)			

Note 1) Configurable as UART or SIO.

Note 2) Minimum instruction execution times (1) to (3) correspond to (1) to (3) of both power supply voltage and operating temperature.

Note 3) Up to 960 LCD segments (60 seg. x 16 com.)

Note 4) Configurable as I²C or UART.

Note 5) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/X Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	LED Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I ² C (Ch)	PWM Generator (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Motor Controller (Ch)	Remote Control Preprocessor	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode)	Internal Oscillator	Oscillation Frequency Detector	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP88F846UG	8K	512	0.2	16		(Note 1) 1	(Note 1) 1				8	2	2	1			Yes		Yes		33	4.5 to 5.5	-40 to 85	-	LQFP44 (10×10 mm)
TMP88FH41UG	16K			16		(Note 1) 1	(Note 1) 1				8	2	2	1			Yes				33			TMP88CH41UG	
TMP88FW45AFG	120K	4096		24		1	2		2		16	2	4	2			Yes			Yes	71			-	QFP80 (14×20 mm)

Note 1) Cannot be used at the same time because their I/O pins are multiplexed.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/C1 Series

Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 3)	LED Driver (Ch)	LCD Driver (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/SIO (Ch) (Note 1)	I ² C/SIO (Ch) (Note 1)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	Clock Gear	Power-On Reset	Voltage Detecting Circuit	On-Chip Debug Unit (Note 2)	Internal Oscillator	I/O Port (Pins) (Note 6)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package	
TMP89FH40NG	16K	2048	(1) 0.1 (2) 0.238 (3) 0.5	6				1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	36	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5	-40 to 85	-	SDIP42		
TMP89FH42LUG			(1) 0.238 (2) 0.5	8				1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(Note 5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			LQFP44 (10×10 mm)		
TMP89FH42UG			(1) 0.1 (2) 0.238 (3) 0.5	8				1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5			TMP89CH42UG (Note 7)		
TMP89FH46DUG			(1) 0.238 (2) 0.5	8				1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	42	(Note 5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			TMP89CH46DUG	LQFP48 (7×7 mm)	
TMP89FM40NG	(1) 0.1 (2) 0.238 (3) 0.5		6					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	36	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5		-	SDIP42		
TMP89FM42AUG	(1) 0.1 (2) 0.19 (3) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(1) 2.7 to 3.6 (2) 2.2 to 3.6			LQFP44 (10×10 mm)		
TMP89FM42KUG	(1) 0.19 (2) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(1) 2.7 to 3.6 (2) 2.2 to 3.6					
TMP89FM42LUG	(1) 0.238 (2) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5				TMP89CM42UG (Note 7)	
TMP89FM42UG	(1) 0.1 (2) 0.238 (3) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	40	(1) 2.7 to 3.6 (2) 2.2 to 3.6					
TMP89FM43KQG	(1) 0.19 (2) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	38	(1) 2.7 to 3.6 (2) 2.2 to 3.6					
TMP89FM43LQG	(1) 0.238 (2) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	38	(Note 5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			VQON44 (5.3×5.3 mm)		
TMP89FM46ADUG	(1) 0.1 (2) 0.19 (3) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	42	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5					
TMP89FM46DUG	(1) 0.1 (2) 0.238 (3) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	42	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5			TMP89CM46DUG	LQFP48 (7×7 mm)	
TMP89FM46KDUG	(1) 0.19 (2) 0.5		8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	42	(Note 5) (1) 2.7 to 3.6 (2) 2.2 to 3.6					
TMP89FM82DUG	0.125		20					1			8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	39	4.5 to 5.5					
TMP89FS28LFG	60K		3072	(1) 0.167 (2) 0.25 (3) 0.5	80	2			1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	53	(1) 3.2 to 3.6 (2) 2.7 to 3.6 (3) 2.2 to 3.6	(1) -40 to 85 (2) -40 to 85 (3) -20 to 85	-	LQFP53 (20×20 mm)	
TMP89FS60FG		(1) 0.125 (2) 0.238 (3) 0.238		8				1	2	1	16			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	58	(1) 4.3 to 5.5 (2) 3.0 to 5.5 (3) 2.7 to 3.0	QFP64 (14×14 mm)				
TMP89FS60UG				8				1	2	1	16			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	58		LQFP64 (10×10 mm)				
TMP89FW20AUG		7		32			1	3	1	8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	52							
TMP89FW24ADFG	(1) 0.0625 (2) 0.125	11		40			1	3	1	8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	68	(1) 2.7 to 5.5 (2) 1.8 to 5.5	-40 to 85			QFP80 (14×20 mm)	
TMP89FW24AFG		11		40			1	3	1	8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	68					LQFP80 (12×12 mm)	

Note 1) Configurable as UART or SIO. Also, selectable from I²C and SIO.

One SIO channel can be used simultaneously. As for the TMP89FS60, up to two SIO channels can be used simultaneously.

Note 2) The on-chip debug unit is available with the flash versions, but not with the mask ROM versions.

Note 3) Minimum instruction execution times (1) to (3) correspond to (1) to (3) of both power supply voltage and operating temperature.

Note 4) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

Note 5) The erase/program power supply voltage is 3.0 to 3.6 V.

Note 6) Two ports are reserved for high-speed oscillator pins and cannot be used as I/O ports.

Note 7) The AD conversion accuracy differs between the flash and mask ROM versions. For details, see the datasheet.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/C Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 3)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/SIO (Ch) (Note 1)	UART/I ² C (Ch) (Note 4)	I ² C (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 5))	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package	
TMP86P203MG (Note 2)	2K	128	1.6	2									4						2			Yes			14	4.5 to 5.5		-	SOP20	
TMP86P203PG (Note 2)				2									4					2			Yes			14	DIP20					
TMP86C407MG	4K	256	(1) 0.25 (2) 0.5	8		1		1					6				1		2			Yes	Yes		22	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP86P807MG TMP86F807MG	SOP28	
TMP86C407NG				8		1		1			6			1		2			Yes	Yes		22	TMP86P807NG TMP86F807NG	SDIP28						
TMP86C408DMG				8		1		1			6			1		2			Yes	Yes		24	TMP86P808DMG TMP86F808DMG	SSOP30						
TMP86C420FG			(1) 0.25 (2) 0.5	4	32		1			8			1		2			Yes	Yes		39	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5			TMP86P820FG				QFP64 (14×14 mm)	
TMP86C420UG			(3) 0.95	4	32		1			8			1		2			Yes	Yes		39				TMP86P820UG				LQFP64 (10×10 mm)	
TMP86C807MG			8K	512	(1) 0.25 (2) 0.5	8		1		1					6			1		2			Yes	Yes					22	(1) 4.5 to 5.5 (2) 2.7 to 5.5
TMP86C807NG	8						1		1			6			1		2			Yes	Yes		22	TMP86P807NG TMP86F807NG	SDIP28					
TMP86C808DMG	8						1		1			6			1		2			Yes	Yes		24	TMP86P808DMG TMP86F808DMG	SSOP30					
TMP86C820FG	(1) 0.25 (2) 0.5				4	32		1			8			1		2			Yes	Yes		39	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5			TMP86P820FG	QFP64 (14×14 mm)			
TMP86C820UG	(3) 0.95				4	32		1			8			1		2			Yes	Yes		39				TMP86P820UG	LQFP64 (10×10 mm)			
TMP86C809NG	(1) 0.25 (2) 0.5	8				1		1			6			1		2			Yes	Yes		26	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5			TMP86FH09ANG	SDIP32			
TMP86C829BFG	(1) 0.25 (2) 0.5 (3) 0.95	4			32				1		8		1		4			Yes	Yes		39	TMP86PM29BFG				QFP64 (14×14 mm)				
TMP86C829BUG		4			32				1		8		1		4			Yes	Yes		39	TMP86PM29BUG				LQFP64 (10×10 mm)				
TMP86C847UG		19				1	1			8			1		2			Yes	Yes		35	TMP86PM47AUG TMP86PH47UG TMP86FH47BUG				LQFP44 (10×10 mm)				
TMP86CH06AUG	16K	512	(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95		8				1	1							1		2			Yes	Yes	Yes	35	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 2.0 to 5.5 (4) 1.8 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -40 to 85 (4) -20 to 85		TMP86PH06UG	
TMP86CH06NG			(1) 0.25 (2) 0.5 (3) 0.95		8					1	1						1		2			Yes	Yes	Yes	35				TMP86PH06NG	SDIP42
TMP86CH09NG			(1) 0.25 (2) 0.5		8		1		1			6			1		2			Yes	Yes		26	TMP86FH09ANG	SDIP32					
TMP86CH12MG			(3) 0.95	8				1	1			8			1	1	2			Yes	Yes		24	TMP86FH12AMG**	SSOP30					
TMP86CH21AUG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	4	32					1			8			1		4			Yes	Yes		39	TMP86PM29BUG			LQFP64 (10×10 mm)		
TMP86CH21FG			(1) 0.25 (2) 0.5 (3) 0.95	4	32					1			8			1		4			Yes	Yes		39	TMP86PM29BFG			QFP64 (14×14 mm)		
TMP86CH22UG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	3	23			1	1			4			1		2			Yes	Yes		33	TMP86PH22UG	LQFP44 (10×10 mm)					
TMP86CH46ANG				19				1	1			8			1		2			Yes	Yes		33	TMP86PH46NG TMP86PM46NG TMP86FH46BNG	SDIP42					
TMP86CH47AUG				19				1	1			8			1		2			Yes	Yes		35	TMP86PM47AUG TMP86PH47UG TMP86FH47BUG	LQFP44 (10×10 mm)					

Note 1) Configurable as UART or SIO.

Note 2) Contains an OTP memory.

Note 3) Minimum instruction execution times (1) to (4) correspond to (1) to (4) of both power supply voltage and operating temperature.

Note 4) Configurable as I²C or UART.

Note 5) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 3)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/SIO (Ch) (Note 1)	UART/I ² C (Ch) (Note 4)	I ² C (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 5))	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package
TMP86CH72FG	16K	1024	(1) 0.25 (2) 0.5			32		1	1			1	6				1		2		Yes	Yes	Yes		54	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP86PM72FG	QFP64 (14×14 mm)
TMP86CH29BFG		1536	(1) 0.25 (2) 0.5 (3) 0.95	4	32					1				8		1		4			Yes	Yes	Yes		39	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5	-40 to 85	TMP86PM29BFG	
TMP86CH29BUG				4	32					1				8		1		4			Yes	Yes	Yes		39			TMP86PM29BUG	LQFP64 (10×10 mm)
TMP86CK74AFG	24K	1024	(1) 0.25 (2) 0.5	2		37		1					8				2		2			Yes	Yes		70	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP86PM74AFG	QFP80 (14×20 mm)
TMP86CM27FG	(1) 0.25 (2) 0.5 (3) 0.95		8	40			1	1					8				1	2			Yes	Yes		55	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86PS27FG TMP86FS27FG		
TMP86CM47AUG			19				1	1					8			1		2			Yes	Yes		35	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5	-40 to 85	TMP86PM47AUG	LQFP44 (10×10 mm)	
TMP86CM72FG			(1) 0.25 (2) 0.5			32		1	1			1	6				1		2		Yes	Yes	Yes		54	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP86PM72FG	QFP64 (14×14 mm)
TMP86CM23AUG	32K		1536	(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	5	32			1	1					8		1		4	Yes		Yes	Yes		51	(1) 3.5 to 5.5 (2) 2.7 to 5.5 (3) 2.0 to 5.5 (4) 1.8 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -40 to 85 (4) -20 to 85	TMP86PM23UG TMP86FS23AUG	LQFP64 (10×10 mm)
TMP86CM29BFG				(1) 0.25 (2) 0.5 (3) 0.95	4	32				1				8		1		4			Yes	Yes		39	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5	-40 to 85	TMP86PM29BFG	QFP64 (14×14 mm)	
TMP86CM29BUG				4	32				1			8		1		4		Yes	Yes		Yes	Yes		39	(3) 1.8 to 5.5		TMP86PM29BUG	LQFP64 (10×10 mm)	
TMP86CM29LUG				4	32				1			8		1		4		Yes	Yes		Yes	Yes		39	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP86FM29UG		
TMP86CM25AFG		2048	(1) 0.25 (2) 0.5	4	(Note 2) 60			1	1				8			1		4			Yes	Yes		42				TMP86FM25FG	QFP100 (14×20 mm)
TMP86CM74AFG			2		37		1					8			2	2		2		Yes	Yes		70	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP86PM74AFG	QFP80 (14×20 mm)		
TMP86CP27AFG	48K	1024		8	40			1	1					8			1	2			Yes	Yes		55	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85		TMP86PS27FG TMP86FS27FG	
TMP86CP23AUG		2048	(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	5	32			1	1					8		1		4	Yes		Yes	Yes		51	(1) 3.5 to 5.5 (2) 2.7 to 5.5 (3) 2.0 to 5.5 (4) 1.8 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -40 to 85 (4) -20 to 85	TMP86PS23UG TMP86FS23AUG	LQFP64 (10×10 mm)	
TMP86CS44UG	60K	1024	(1) 0.25 (2) 0.5	19				1	1					8	1	2	2		2		Yes	Yes		35	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86PS44UG	LQFP44 (10×10 mm)	
TMP86CS25ADFG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	4	(Note 2) 60			1		1			8			1		4			Yes	Yes		42	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 2.0 to 5.5 (4) 1.8 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -40 to 85 (4) -20 to 85	-	LQFP100 (14×14 mm)	
TMP86CS25AFG		2048		4	(Note 2) 60			1		1			8			1		4			Yes	Yes		42			TMP86PS25FG	QFP100 (14×20 mm)	
TMP86CS28DFG			(1) 0.25 (2) 0.5		40				1	1				8		2	4		4		Yes	Yes		62	(1) 4.0 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86FS28ADFG	LQFP80 (12×12 mm)	
TMP86CS28FG					40				1	1				8		2	4		4		Yes	Yes		62			TMP86FS28AFG	QFP80 (14×20 mm)	
TMP86CS49FG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	13				2	2			1	16			2	4		4		Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 2.0 to 5.5 (4) 1.8 to 5.5	(1) -40 to 85 (2) -40 to 85 (3) -40 to 85 (4) -20 to 85	TMP86FS49BFG	QFP64 (14×14 mm)	
TMP86CS49UG				13				2	2			1	16			2	4		4		Yes	Yes		56			TMP86FS49BUG	LQFP64 (10×10 mm)	
TMP86CS64AFG			(1) 0.25 (2) 0.5	16				2	1					16			2	4		4		Yes	Yes		91	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86PS64FG	QFP100 (14×20 mm)

Note 1) Configurable as UART or SIO.

Note 2) Up to 960 LCD segments (60 seg. x 16 com.)

Note 3) Minimum instruction execution times (1) to (4) correspond to (1) to (4) of both power supply voltage and operating temperature.

Note 4) Configurable as I²C or UART.

Note 5) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/X Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 3)	LED Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I ² C (Ch) (Note 1)	PWM Generator (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Motor Controller (Ch)	Remote Control Preprocessor	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package
TMP88CH40MG	16K	512	0.2	14		(Note2) 1	(Note2) 1				4	1	2	1			Yes		19	4.5 to 5.5	-40 to 85	TMP88PH40MG	SOP28
TMP88CH40NG				14		(Note2) 1	(Note2) 1				4	1	2	1			Yes		19			TMP88PH40NG	SDIP28
TMP88CH41NG				16		(Note2) 1	(Note2) 1				8	2	2	1			Yes		33			TMP88PH41NG	SDIP42
TMP88CH41UG				16		(Note2) 1	(Note2) 1				8	2	2	1			Yes		33			TMP88PH41UG TMP88FH41UG	LQFP44 (10×10 mm)
TMP88CS43FG	64K	2048		24		1	1		2		16	2	4	2			Yes		71	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP88PS43FG	QFP80 (14×20 mm)
TMP88CS77FG				53	2			1		12		3	1				Yes	Yes	88			TMP88PU77FG	QFP100 (14×20 mm)
TMP88CU74FG	96K	3072	(1) 0.32 (2) 122	37	1			1		12		2	2				Yes	Yes	71			TMP88PU74FG	QFP80 (14×20 mm)
TMP88CU77FG				53	2			1		12		3	1				Yes	Yes	88			TMP88PU77FG	QFP100 (14×20 mm)

Note 1) Either I²C bus or SIO module can be selected via software.

Note 2) Cannot be used at the same time because their I/O pins are multiplexed.

Note 3) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

Note 4) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/C1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/SIO (Ch) (Note 1)	I ² C/SIO (Ch) (Note 1)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 3))	Clock Gear	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins) (Note 4)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package	
TMP89CH42UG	16K	2048	(1) 0.1 (2) 0.238 (3) 0.5	8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	40	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5	-40 to 85	TMP89FH42UG	LQFP44 (10×10 mm)		
TMP89CH46DUG				8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	42			TMP89FH46DUG	LQFP48 (7×7 mm)		
TMP89CM42UG	32K			8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	40			TMP89FM42UG	LQFP44 (10×10 mm)		
TMP89CM46DUG				8					1	1	1	8			2		4			Yes	Yes	Yes	Yes	Yes	42			TMP89FM46DUG	LQFP48 (7×7 mm)		

Note 1) Configurable as UART or SIO. Also, selectable from I²C and SIO.

One SIO channel can be used simultaneously.

Note 2) Minimum instruction execution times (1) to (3) correspond to power supply voltages (1) to (3).

Note 3) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

Note 4) Two ports are reserved for high-speed oscillator pins and cannot be used as I/O ports.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

16-Bit Microcontrollers

TLCS-900 Family: TLCS-900/L1 Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	LED Driver (Ch)	UART/SIO (Ch)	SIO (Ch)	I ² C/SIO (Ch)	I ² C (Ch)	DRAM Controller (Ch)	10-Bit AD Converter (Ch)	LCD Driver (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	Motor Controller (Ch)	32-kHz Timer (for SW RTC)	RTC (Ch)	8-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	Program Patch Logic(Bank)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP91FU62DFG	96K	4096	0.2	8	3			1		16		4	4	Yes					Yes	Yes	Yes	6	69	4.5 to 5.5	-40 to 85	-	QFP80 (14×20 mm)
TMP91FU62FG				8	3			1		16		4	4	Yes				Yes	Yes	Yes	6	LQFP80 (12×12 mm)					
TMP91FW40FG	128K	8192	(1) 0.148 (2) 0.25	4					4	(Note 2) 40	4	3			1			Yes	Yes		6	61	(1) 2.7 to 3.6 (2) 2.2 to 3.6	TMP91CW40FG		LQFP100 (14×14 mm)	
TMP91FW64DFG			(1) 0.16 (2) 0.25		3			2		16		6	5	Yes			4	Yes	Yes	Yes	6	83	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-		QFP100 (14×20 mm)	
TMP91FW64FG				3			2		16		6	5	Yes			4	Yes	Yes	Yes	6				-		LQFP100 (14×14 mm)	
TMP91FW27FG		12288	(1) 0.148 (2) 0.25		2		1			4		6	1	Yes			4	Yes	Yes	Yes		53	(1) 2.7 to 3.6 (2) 2.2 to 3.6	TMP91CU27FG		QFP64 (14×14 mm)	
TMP91FW27UG						2		1			4		6	1	Yes			4	Yes	Yes	Yes					-	LQFP64 (10×10 mm)
TMP91FY42FG		256K	16384	0.148		2		1			8		8	2	Yes			4	Yes	Yes	Yes		81	2.7 to 3.6		TMP91CY22FG TMP91CW12AFG	LQFP100 (14×14 mm)

Note 1) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

Note 2) For the 4-common and 40-segment LCD driver specification, see the technical datasheet.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLC9-900 Family: TLC9-900/L1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	LED Driver (Ch)	UART/SIO (Ch)	UART (Ch)	SIO (Ch)	I ² C/SIO (Ch)	I ² C (Ch)	DRAM Controller (Ch)	Memory Bank Controller	10-Bit AD Converter (Ch)	LCD Controller	LCD Driver (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for SAW RTC)	RTC (Ch)	8-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	Program Patch Logic (Bank)	Touch Screen Interface	Melody/Alarm Generator (MLD)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package
TMP91C016FG	NA	NA	(1) 0.148 (2) 0.4	1	1					1	Yes	Yes			4			1	4	Yes	Yes	Yes			Yes	31	(1) 2.7 to 3.6 (2) 1.8 to 3.6	-10 to 70	-	LQFP100 (14×14 mm)	
TMP91C219FG		2048	0.111	1								4			6	1			4	Yes		Yes				45	(Note 1) (1) 4.75 to 5.25 (2) 3.0 to 3.6	-20 to 70			
TMP91C630FG		6144		2								8			6	1			4	Yes		Yes				53	2.7 to 3.6	-40 to 85			
TMP91C820AFG	8K	8192	(1) 0.111 (2) 0.148	3			1			1	Yes	8	Yes		4	1		1	4	Yes	Yes	Yes			Yes	77	(1) 3.0 to 3.6 (2) 2.7 to 3.6	-20 to 70		LQFP144 (16×16 mm)	
TMP91CK27UG	24K	1024	(1) 0.148	2			1					4			6	1	Yes		4	Yes	Yes	Yes				53	(1) 2.7 to 3.6 (2) 1.8 to 3.6	-40 to 85	TMP91FW27UG	LQFP64 (10×10 mm)	
TMP91CP27UG	48K	4096	(2) 0.4	2			1					4			6	1	Yes		4	Yes	Yes	Yes				53	(2) 1.8 to 3.6		TMP91PW10FG	LQFP100 (14×14 mm)	
TMP91CU10FG	96K	3072	(1) 0.296 (2) 0.4	3							8			8	2				3	Yes	Yes	Yes				80	(1) 2.7 to 3.6 (2) 2.0 to 3.6		TMP91FW27FG	QFP64 (14×14 mm)	
TMP91CU27FG		10240	(1) 0.148 (2) 0.4	2			1				4			6	1	Yes			4	Yes	Yes	Yes				53	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP91FW27UG	LQFP64 (10×10 mm)	
TMP91CU27UG				2			1			4			6	1	Yes			4	Yes	Yes	Yes				53	(2) 1.8 to 3.6	TMP91PW11FG		LQFP100 (14×14 mm)		
TMP91CW11FG	128K	4096	(1) 0.16 (2) 0.32	6	2	1	2	1			8			2	2	Yes		2	3	Yes	Yes	Yes				79	(1) 4.5 to 5.5 (2) 2.7 to 5.5			TMP91FY42FG	
TMP91CW12AFG			(1) 0.148 (2) 0.4	2			1			8			8	2	Yes			4	Yes	Yes	Yes					81	(1) 2.7 to 3.6 (2) 1.8 to 3.6			TMP91PW12FG	
TMP91CW12FG			(1) 0.16 (2) 0.25	2			1			8			8	2	Yes			4	Yes	Yes	Yes					81	(1) 4.5 to 5.5 (2) 2.7 to 5.5			TMP91FW40FG	
TMP91CW40FG			(1) 0.148 (2) 0.25 (3) 0.4	4						4	(Note 3) 40	4	3	1		Yes	Yes		6	Yes	61	(1) 2.7 to 3.6 (2) 2.2 to 3.6 (3) 1.8 to 3.6				83	4.5 to 5.5		TMP91FW64DFG	QFP100 (14×20 mm)	
TMP91CW60DFG		8192	0.2	3				2			16			6	5	Yes			4	Yes	Yes	Yes	6			83			TMP91FW64FG	LQFP100 (14×14 mm)	
TMP91CW60FG				3				2			16			6	5	Yes			4	Yes	Yes	Yes	6			83		TMP91FY42FG			
TMP91CY22FG	256K	16384	(1) 0.148 (2) 0.4	2			1				8			8	2	Yes			4	Yes	Yes	Yes				81	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP91FY42FG		

Note 1) 3.0 V to 3.6 V internally; 4.75 V to 5.25 V for input/output interface

Note 2) Minimum instruction execution times (1) to (3) correspond to power supply voltages (1) to (3).

Note 3) For the 4-common and 40-segment LCD driver specification, see the technical datasheet.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-900 Family: TLCS-900/L Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	UART/SIO (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	LCD Driver (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for SW RTC)	Motor Pattern Generator (Ch)	8-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP93CW41DFG	NA	4096	(1) 0.2 (2) 0.32	2		8		2	2		2	2	3	Yes	Yes	Yes	61	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	-	LQFP100 (14×14 mm)
TMP93CS20FG	64K	2048		2	1	8	(Note3) 40	4	4	Yes				Yes	Yes	Yes	88			TMP93PW20AFG	LQFP144 (16×16 mm)
TMP93CS36UG				2		4		4	2				Yes		Yes	33	-			LQFP44 (10×10 mm)	
TMP93CW40DFG	128K	4096		2		8		2	2		2	2	3	Yes	Yes	Yes	79			TMP93PW40DFG	LQFP100 (14×14 mm)
TMP93CW44DFG (Note 1)				2	1	8		4	2					Yes	Yes	Yes	62			TMP93PW44ADFG (Note 1)	QFP80 (14×20 mm)

Note 1) Operating voltage of OTP-version TMP93PW44ADFG is 4.5 V to 5.5 V.

Note 2) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

Note 3) For the 4-common and 40-segment LCD driver specification, see the technical datasheet.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-900 Family: TLCS-900/H Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	UART/SIO (Ch)	DRAM Controller (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	Motor Pattern Generator (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP95C001FG	NA	NA	(1) 0.16 (2) 0.32								4			(1) 4.5 to 5.5 (2) 2.7 to 5.5	-20 to 70	-	QFP64 (14×14 mm)
TMP95C061BDFG			0.16	2	1	4		4	2	2	4	Yes	56	4.5 to 5.5			LQFP100 (14×14 mm)
TMP95C063DFG				2	2	8	2	8	2	2	4	Yes	91				LQFP144 (20×20 mm)
TMP95C265FG		2048	(1) 0.16	3		8	2	8	2		4	Yes	55	LQFP100 (14×14 mm)			
TMP95CW65FG		4096	(2) 0.4	3		8	2	8	2		4	Yes	55				
TMP95CS64FG		2048		3		8	2	8	2		4	Yes	81				4.5 to 5.5
TMP95CS66FG	64K		0.16	1				8	2		4	Yes	81		TMP95PW64FG		

Note 1) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-900 Family: TLCS-900 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	UART/SIO (Ch)	DRAM Controller (Ch)	6-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	Motor Pattern Generator (Ch)	8-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP96C041BFG	NA	NA	(1) 0.2	2			4	2	2	2	2	3	Yes	47	4.5 to 5.5	(1) -20 to 70	-	QFP80 (14×20 mm)
TMP96C141BFG		1024	(2) 0.25	2			4	2	2	2	2	3	Yes	47		(2) -40 to 85		

Note 1) Minimum instruction execution times (1) and (2) correspond to operating temperature (1) and (2).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

32-Bit Microcontrollers

TLCS-900 Family: TLCS-900/H1 Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	USB Host (Full Speed) (Ch)	USB Device (Full Speed) (Ch)	SPI (SD Card)	High-Speed SIO (Ch)	UART/SIO (Ch)	I ² C/SIO (Ch)	DMA Controller (Ch)	DRAM Controller (Ch)	NAND Flash Controller (Ch)	Memory Bank Controller	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	LCD Controller	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for S/W RTC)	RTC (Ch)	Motor Pattern Generator (Ch)	Multiply-Accumulate (MAC)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	Program Patch Logic (Bank)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP92FD23ADFG	512K	32768	0.05				1	3	2					12			6	2	Yes				4	Yes	Yes	Yes	8	84	3.0 to 3.6	-40 to 85	TMP92CY23DFG	QFP100 (14×20 mm)
TMP92FD23AFG							1	3	2					12			6	2	Yes				4	Yes	Yes	Yes	8	84			TMP92CD23ADFG	
TMP92FD28AFG				1		Yes	1	2	(Note1) 2								6	2		1			3	Yes	Yes	Yes	8	70			TMP92CY23FG TMP92CD23AFG	LQFP100 (14×14 mm)
																															TMP92CD28AFG	

Note 1) Only one channel can be configured as SIO.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-900 Family: TLCS-900/H1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	USB Host (Full Speed) (Ch)	USB Device (Full Speed) (Ch)	SPI (SD Card)	High-Speed SIO (Ch)	UART/SIO (Ch)	UART (Ch)	I ² C/SIO (Ch)	I ² C (Ch)	DMA Controller (Ch)	DRAM Controller (Ch)	NAND Flash Controller (Ch)	Memory Bank Controller	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	LCD Controller	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for SW RTC)	RTC (Ch)	Motor Pattern Generator (Ch)	Multiply-Accumulate (MAC)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	Program Patch Logic (Bank)	Touch Screen Interface	Melody/Alarm Generator (MLD)	I ² S (Inter-IC Sound) Interface (Ch)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package
TMP94C251ADFG ◇	NA	2048	0.05				2						2		8	2		4	4						6	Yes						64	4.5 to 5.5	-20 to 70	-	LQFP144 (20×20 mm)	
TMP92C820FG		8192					2	1	1			1	1	2	Yes	5	Yes	4	1	1			4	Yes	Yes	Yes			Yes	83	3.0 to 3.6	LQFP144 (16×16 mm)					
TMP92CA25FG		10240	(1) 0.05		Yes	1		1		1	1	2	Yes	4	Yes	4	1	1			4	Yes	Yes	Yes	Yes	Yes	1	84	(1) 3.0 to 3.6								
TMP92CH21FG		16384	(2) 0.074	1		2				1	2	Yes	4	Yes	4	1	1			4	Yes	Yes	Yes	Yes	Yes	1	82	(2) 2.7 to 3.6									
TMP92CM22FG		32768	0.05				2		1							8			4	2				4	Yes		Yes					50	3.0 to 3.6	-40 to 85		LQFP100 (14×14 mm)	
TMP92CM27FG							2	4	2		1			12	2		8	6		2		6	Yes		Yes						83	LQFP144 (16×16 mm)					
TMP92CF26AXBG		147456	(1) 0.0125 (2) 0.0167	1	Yes		1			1	6	1	2	Yes	6	Yes	8	2		1		Yes	4	Yes	Yes	Yes	Yes	Yes	2	136	(Note 1) (1) 3.0 to 3.6 (2) 1.4 to 1.6	(1) 0 to 50 (2) 0 to 70	FBGA228 (15×15 mm)				
TMP92CF29AFG				1	Yes	2		1	6	1	2	Yes	6	Yes	8	2		1		Yes	4	Yes	Yes	Yes	Yes	Yes	1	98	LQFP176 (20×20 mm)								
TMP92CF30FG				1	Yes	2		1	6	1	2	Yes	6			8	2		1		Yes	4	Yes	Yes	Yes	Yes	Yes	1	98								
TMP92CZ26AXBG		294912	(1) 0.0125 (2) 0.0167	1	Yes		1			1	6	1	2	Yes	6	Yes	8	2		1		Yes	4	Yes	Yes	Yes	Yes	Yes	2	136	3.0 to 3.6	-40 to 85	TMP92FD23ADFG	QFP100 (14×20 mm)			
TMP92CY23DFG	256K	16384				3		2							12			6	2	Yes			4	Yes	Yes	Yes	8						84	TMP92FD23AFG	LQFP100 (14×14 mm)		
TMP92CY23FG							3		2							12			6	2	Yes			4	Yes	Yes	Yes	8						84	TMP92FD23ADFG	QFP100 (14×20 mm)	
TMP92CD23ADFG	512K	32768				1	3	2							12			6	2	Yes			4	Yes	Yes	Yes	8						84	TMP92FD23AFG	LQFP100 (14×20 mm)		
TMP92CD23AFG						1	3	2								12			6	2	Yes			4	Yes	Yes	Yes	8						84			
TMP92CD28AFG			1	Yes	1	2	(Note3) 2										6	2		1		3	Yes	Yes	Yes	8				70							

◇: Contains a 900/H2 core that is functionally fully compatible with 900/H1 core.

Note 1) Dual power supplies: 1.4 V to 1.6 V for internal circuitry, 3.0 V to 3.6 V for input/output interface.

Note 2) Minimum instruction execution times (1) and (2) correspond to (1) and (2) of both power supply voltage and operating temperature.

Note 3) Only one channel can be configured as SIO.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX03 Family: TX03 Series

□Flash Versions

Part Number	ROM (Bytes)	SRAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	SSP(Ch)	UART/SIO (Ch)	Full UART(Ch)	I ² C (Ch)	I ² C/SIO(Ch)	CAN (ch)	USB Host (Full Speed) (Ch)	USB Device (Full Speed) (Ch)	Ether MAC (ch)	10-Bit AD Converter (Ch)	12-Bit AD Converter (Ch)	10-Bit DA Converter (Ch)	16-Bit Timer/Counter (Ch)	CEC (Ch)	Remote Control Preprocessor (Ch)	Motor Controller (Ch)	Multi-Purpose Timer (MPT) (Ch)	Incremental Encoder Input (Ch)	Op Amp (Ch)	Comparator (Ch)	External Interrupt Pins (Pins)	CS/WAIT Controller (Ch)	RTC (Ch)	Dual Clocks	Trace Function	Oscillation Frequency Detector	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMPM382FSFG **	64K	8K	40	2	1	3		1						10	8		1	(Note1) 1	1	1			8	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	48	4.0 to 5.5	-40 to 85	QFP64 (14×14 mm)	
TMPM372FWUG **	128K	6K	(1) 80 (2) 32			4								11	8			1	1		10				Yes	Yes	Yes	Yes	Yes	Yes	53	4.5 to 5.5	(1) -40 to 85 (2) -40 to 105	LQFP64 (10×10 mm)		
TMPM373FWDUG **			(1) 80 (2) 32			3								7	8			1	1		8				Yes	Yes	Yes	Yes	Yes	Yes	37			LQFP48 (7×7 mm)		
TMPM374FWUG **			(1) 80 (2) 32			3								6	8			1	1		7				Yes	Yes	Yes	Yes	Yes	Yes	33			LQFP44 (10×10 mm)		
TMPM330FWFG		8K	40			3		3						12		10	1	2					8	1	Yes	Yes						78	2.7 to 3.6	-20 to 85	LQFP100 (14×14 mm)	
TMPM332FWUG			40			2		2						8		10	1	1				5	1	Yes	Yes						44	LQFP64 (10×10 mm)				
TMPM333FWFG			40			3		3						12		10						8	1	Yes	Yes						78	LQFP100 (14×14 mm)				
TMPM390FWFG **			20		1	3		1	1					12		10	1	2					8	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	74	1.7 to 3.6	-40 to 85	LQFP100 (14×14 mm)	
TMPM395FWAXBG			20		4	3		1	1					12		10	1	2					11	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	91			FBGA120 (6×6 mm)	
TMPM380FWDFG		12K	40	2	2	5		2						18	8		1	(Note1) 2	3	2		16	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	84			QFP100 (14×20 mm)	
TMPM380FWFG			40	2	2	5		2						18	8		1	(Note1) 2	3	2		16	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	84	LQFP100 (14×14 mm)			
TMPM382FWFG **			40	2	1	3		1						10	8		1	(Note1) 1	1			8	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	48	QFP64 (14×14 mm)			
TMPM366FWFG **		32K	48	4	3	2	1	2			1			12	10								10	2		Yes					74	(Note 2) 2.7 to 3.6	-40 to 85	LQFP100 (14×14 mm)		
TMPM366FWXBG **			48	4	3	2	1	2			1			12	10								10	2		Yes					74			FBGA109 (9×9 mm)		
TMPM367FWFG **		50K	80	31	3	4	2	3			1			8	2	8		1	(Note1) 1	4	1		14	4	1	Yes	Yes	Yes	Yes	Yes	Yes			60	LQFP100 (14×14 mm)	
TMPM367FWXBG **			80	31	3	4	2	3			1			8	2	8		1	(Note1) 1	4	1		14	4	1	Yes	Yes	Yes	Yes	Yes	Yes			60	FBGA109 (9×9 mm)	

Note 1) The motor controller channel is multiplexed with the multi-purpose timer (MPT).

Note 2) 3.0 to 3.6 V when USB is used.

Note 3) 48 MHz when USB is used.

- All products on this page incorporate a watchdog timer, a clock gear and an on-chip debug unit.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

***: Under development

Part Number	ROM (Bytes)	SRAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	SSP(Ch)	UART/SIO (Ch)	Full UART(ch)	I ² C (Ch)	I ² C/SIO(Ch)	CAN (ch)	USB Host (Full Speed) (Ch)	USB Device (Full Speed) (Ch)	Ether MAC (ch)	10-Bit AD Converter (Ch)	12-Bit AD Converter (Ch)	10-Bit DA Converter (Ch)	16-Bit Timer/Counter (Ch)	CEC (Ch)	Remote Control Preprocessor (Ch)	Motor Controller (Ch)	Multi-Purpose Timer (MPT) (Ch)	Incremental Encoder Input (Ch)	Op. Amp (Ch)	Comparator (Ch)	External Interrupt Pins (Pins)	CS/WAIT Controller (Ch)	RTC (Ch)	Dual Clocks	Trace Function	Oscillation Frequency Detector	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package		
TMPM370FYDFG	256K	10K	80		4									22	8				2	2	4	4	16					Yes	Yes	Yes	Yes	76	4.5 to 5.5	-40 to 85	QFP100 (14×20 mm)			
TMPM370FYFG			80		4										22	8				2	2	4	4	16				Yes	Yes	Yes	Yes	76						
TMPM330FYFG		16K	40		3		3							12		10	1	2							8		1	Yes	Yes					78	2.7 to 3.6	-20 to 85	LQFP100 (14×14 mm)	
TMPM330FYWFG			40		3		3							12		10	1	2							8		1	Yes	Yes					78		-40 to 85		
TMPM333FYFG			40		3		3							12		10									8		1	Yes	Yes					78		-20 to 85		
TMPM377FYDFG **			80		3		1							11	8					2	2				5				Yes	Yes	Yes	Yes	63	4.5 to 5.5		LQFP80 (14×14 mm)		
TMPM377FYFG **			80		3		1							11	8					2	2				5				Yes	Yes	Yes	Yes	63			LQFP80 (12×12 mm)		
TMPM380FYDFG			40	2	2	5		2						18	8	1	(Note1) 2	3	2						16		1	Yes	Yes	Yes	Yes	Yes	84	4.0 to 5.5		QFP100 (14×20 mm)		
TMPM380FYFG			40	2	2	5		2						18	8	1	(Note1) 2	3	2						16		1	Yes	Yes	Yes	Yes	Yes	84			LQFP100 (14×14 mm)		
TMPM341FYXBG **			32K	54	4	1	5		2							15	2	12								12	2			Yes	Yes			86	1.65 to 3.6		FBGA113 (6×6 mm)	
TMPM366FYFG **		48K	48	4	3	2	1	2				1			12		10									10	2		Yes					74		-40 to 85	LQFP100 (14×14 mm)	
TMPM366FYXBG **			48	4	3	2	1	2				1			12		10									10	2		Yes					74			FBGA109 (9×9 mm)	
TMPM367FYFG **		66K	80	31	3	4	2	3		1					8	2	8		1	(Note1) 1	4	1				14	4	1		Yes	Yes	Yes	Yes	60	(Note 2) 2.7 to 3.6		LQFP100 (14×14 mm)	
TMPM367FYXBG **			80	31	3	4	2	3				1			8	2	8		1	(Note1) 1	4	1				14	4	1		Yes	Yes	Yes	Yes	60			FBGA109 (9×9 mm)	
TMPM369FYFG **			80	31	3	4	2		3	1	1	1	1		16	2	8		1	(Note1) 2	4	2				16	4	1		Yes	Yes	Yes	Yes	102			LQFP144 (20×20 mm)	
TMPM369FYXBG **			80	31	3	4	2		3	1	1	1	1		16	2	8		1	(Note1) 2	4	2				16	4	1		Yes	Yes	Yes	Yes	102			FBGA177 (11×11 mm)	
TMPM330FDFG	512K	32K	40		3		3							12		10	1	2							8		1	Yes	Yes					78		-20 to 85	LQFP100 (14×14 mm)	
TMPM330FDWFG			40		3		3								12		10	1	2						8		1	Yes	Yes					78		-40 to 85		
TMPM333FDFG			40		3		3								12		10								8		1	Yes	Yes					78		-20 to 85		
TMPM341FDXBG		64K	54	4	1	5		2							15	2	12									12	2			Yes	Yes			86	1.65 to 3.6		FBGA113 (6×6 mm)	
TMPM376FDDFG **			80		4		1								22		8				2	2				16				Yes	Yes	Yes	Yes	82	4.5 to 5.5		QFP100 (14×20 mm)	
TMPM376FDFG **			80		4		1								22		8				2	2				16				Yes	Yes	Yes	Yes	82			LQFP100 (14×14 mm)	
TMPM366FDFG **		128K	48	4	3	2	1	2				1			12		10									10	2			Yes				74		-40 to 85	FBGA109 (9×9 mm)	
TMPM366FDXBG **			48	4	3	2	1	2				1			12		10									10	2			Yes				74			LQFP100 (14×14 mm)	
TMPM367FDFG **			80	31	3	4	2		3				1			8	2	8		1	(Note1) 1	4	1				14	4	1		Yes	Yes	Yes	Yes	60	(Note 2) 2.7 to 3.6		FBGA109 (9×9 mm)
TMPM367FDXBG **			80	31	3	4	2		3				1			8	2	8		1	(Note1) 1	4	1				14	4	1		Yes	Yes	Yes	Yes	60			LQFP144 (20×20 mm)
TMPM369FDFG **			80	31	3	4	2		3	1	1	1	1		16	2	8		1	(Note1) 2	4	2				16	4	1		Yes	Yes	Yes	Yes	102			FBGA177 (11×11 mm)	
TMPM369FDXBG **			80	31	3	4	2		3	1	1	1	1		16	2	8		1	(Note1) 2	4	2				16	4	1		Yes	Yes	Yes	Yes	102				

Note 1) The motor controller channel is multiplexed with the multi-purpose timer (MPT).

***: Under development

Note 2) 3.0 to 3.6 V when USB is used.

Note 3) 48 MHz when USB is used.

- All products on this page incorporate a watchdog timer, a clock gear and an on-chip debug unit.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX03 Family: TX03 Series

□Flash Versions (Continued)

Part Number	ROM (Bytes)	SRAM (Bytes)	Maximum Operating Frequency (MHz)		DMA Controller (Ch)	SSP(Ch)	UART/SIO (Ch)	Full UART(ch)	I ² C (Ch)	I ² C/SIO(Ch)	CAN (ch)	USB Host (Full Speed) (Ch)	USB Device (Full Speed) (Ch)	Ether MAC(ch)	10-Bit AD Converter (Ch)	12-Bit AD Converter (Ch)	10-Bit DA Converter (Ch)	16-Bit Timer/Counter (Ch)	CEC (Ch)	Remote Control Preprocessor (Ch)	Motor Controller (Ch)	Multi-Purpose Timer (MPT) (Ch)	Incremental Encoder Input (Ch)	Op Amp (Ch)	Comparator (Ch)	External Interrupt Pins (Pins)	CS/WAIT Controller (Ch)	RTC (Ch)	Dual Clocks	Trace Function	Oscillation Frequency Detector	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package		
TMPM380FDFG **	512K	32K	40	2	2	5			2						18		8		1		(Note 1) 2	3	2			16		1	Yes	Yes	Yes	Yes	Yes	84	4.0 to 5.5		LQFP100 (14×14 mm)		
TMPM384FDFG **			40	2	2	5			2							22		8		1		(Note 1) 2	4	2			16		1	Yes	Yes	Yes	Yes	Yes			84	LQFP144 (20×20 mm)	
TMPM321F10FG	1024K	64K	48	2	1	5		1	3		1				8		8		1							8		1	Yes	Yes				74	(Note 2) 2.7 to 3.6	-40 to 85	LQFP100 (14×14 mm)		
TMPM322F10FG			48	2	1	12			5		1				16		16		2							14	4	1	Yes	Yes				118			LQFP144 (20×20 mm)		
TMPM323F10FG			48	2	1	5		1	3	1	1				8		8		1							8		1	Yes	Yes				74			LQFP100 (14×14 mm)		
TMPM324F10FG			48	2	1	12			5	1	1				16		16		2							14	4	1	Yes	Yes				118			LQFP144 (20×20 mm)		
TMPM361F10FG			64	2	1	5		1	3						8		16	1	1								10	4	1	Yes	Yes				76	2.7 to 3.6	-20 to 85	LQFP100 (14×14 mm)	
TMPM362F10FG			64	2	1	12			5						16		16	1	2								16	4	1	Yes	Yes				120			LQFP144 (20×20 mm)	
TMPM363F10FG				(Note 3) 64	2	1	5		1	3	1	1			8		16	1	1									8	4	1	Yes	Yes				74	(Note 2) 2.7 to 3.6	-40 to 85	LQFP100 (14×14 mm)
TMPM364F10FG				(Note 3) 64	2	1	12			5	1	1			16		16	1	2									14	4	1	Yes	Yes				118			LQFP144 (20×20 mm)

Note 1) The motor controller channel is multiplexed with the multi-purpose timer (MPT).

Note 2) 3.0 to 3.6 V when USB is used.

Note 3) 48 MHz when USB is used.

- All products on this page incorporate a watchdog timer, a clock gear and an on-chip debug unit.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

** : Under development

TX03 Family: TX03 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	SRAM (Bytes)	DRAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	USB Host (High Speed) (Ch)	SD Host Controller (Ch)	SSP(SPI/MicroWire) (Ch)	UART (Ch)	I ² C (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	External Interrupt Pins (Pins)	Watchdog Timer	Static Memory Controller (Ch)	On-Chip Debug Unit	Trace Function	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMPM320C1DFG	NA	320K	1024K	144	8	1	1	4	4	2	4	8	4	Yes	2	Yes	Yes	55	(Note1)	-40 to 85	LQFP144 (20×20 mm)

Note 1) The following three power supplies are available:

- (1) For general port, AD converter: 3.0 V to 3.6 V
- (2) For USB: 3.15 V to 3.45 V
- (3) For internal circuitry: 1.1 V to 1.3 V

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX09 Family:TX09 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Maximum Operating Frequency (MHz)	USB Device (High Speed) (Ch)	USB Host (Full Speed) (Ch)	SD Host Controller (Ch)	UART (Ch)	I ² C (Ch)	SSP (Ch)	DMA Controller (Ch)	Static Memory Controller (Ch)	DRAM Controller (SDR SDRAM / LVCMOS DDR SDRAM) (Ch)	NANDFC (Ch)	10-Bit AD Converter (Ch)	LCD Controller	LCD Data Process Accelerator	16-Bit Timer/Counter (Ch)	32-kHz Timer (for SW RTC)	Watchdog Timer	I ² S/Inter-IC Sound Interface (Ch)	Touch Screen Interface	CMOS Image Sensor Interface (Ch)	JTAG (Debug)	JTAG (PC Trace)	JTAG (Boundary-Scan)	Clock Gear	Oscillation Frequency Detector	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMPA913CHXBG	NA	16K	(1) 200 (2) 150	1			2	2	2	8	4	1	2	6			6	Yes	Yes	2	Yes		Yes		Yes	Yes		98	(Note1)	(1) 0 to 70 (2) -20 to 85	FBGA361 (16×16 mm)
TMPA900CMXBG		32K		1	1	1	3	2	2	8	2	1	2	8	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes	Yes	91			FBGA289 (15×15 mm)
TMPA901CMXBG				1	1		2	1	1	8	2	1	2	4	Yes	Yes	6	Yes	Yes	1	Yes		Yes		Yes	Yes	Yes	43			FBGA177 (13×13 mm)
TMPA912CMXBG				1			2	2	2	8	4	1	2	6	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes		98			FBGA361 (16×16 mm)
TMPA910CRAXBG		56K	200	1		2	2	2	2	8	4	1	2	6	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes		114		0 to 70	
TMPA910CRBXBG			150	1		2	2	2	2	8	4	1	2	6	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes		114		-20 to 85	
TMPA911CRXBG			(1) 200 (2) 150	1			2	2	2	2	8	4	1	2	6	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes			98	(1) 0 to 70 (2) -20 to 85

Note 1) The following five power supplies are available:

- (1) For circuitry in general, AD converter, USB host (Full-Speed): 3.0 V to 3.6 V
- (2) For USB device (High-Speed): 3.15 V to 3.45 V
- (3) For memory: 1.7 V to 1.9 V/3.0 V to 3.6 V
- (4) For CMOS image sensor, I²S, LCD: 1.8 V to 3.6 V
- (5) For internal circuitry: 1.4 V to 1.6 V

Note 2) The external data bus width is as follows:

- TMPA910CRAXBG, TMPA910CRBxBG, TMPA911CRXBG, TMPA900CMXBG: Up to 32 bits
- TMPA912CMXBG, TMPA913CHXBG, TMPA901CMXBG: Up to 16 bits

Note 3) Maximum operating frequencies (1) and (2) correspond to operating temperatures (1) and (2).

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX19 Family: TX19A Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	10-Bit DA Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-Bit Timer Output Compare (Ch)	32-Bit Timer Input Capture (Ch)	Motor Controller (Ch)	External Interrupt Pins (Pins)	Dual Clocks	Debug Support Unit	I/O Ports (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP19A71FYFG	256K	10K	56	8	2		2		19				4			2	10		Yes	75	(Note 1) 2.3 to 2.7	-40 to 85	TMP19A71CYFG	QFP100 (14×20 mm)
TMP19A71FYUG			56	8	2		2		19				4			2	10		Yes	75			TMP19A71CYUG	LQFP100 (14×14 mm)
TMP19A23FYFG		24K	54	4	3	1		2	12				12				16		Yes	111	(Note 1) 1.35 to 1.65	-20 to 85	-	LQFP144 (20×20 mm)
TMP19A23FYXBG			40	4	3	1		2	12				12				15		Yes	103				FBGA141 (9×9 mm)
TMP19A43FZXBG	384K	20K	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43CZXBG	FBGA193 (12×12 mm)
TMP19A43FDXBG	512K	24K	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43CDXBG	
TMP19A61F10XBG	1024K	48K	54	8	9	2		2	32				36	4	4		16		Yes	212			TMP19A61C10XBG	FBGA289 (11×11 mm)
																							TMP19A61CDXBG	
TMP19A64F20BXXBG	2048K	64K	54	8	7			1	24				11	10	4		20	Yes	Yes	209			TMP19A64C1DXBG	FBGA281 (13×13 mm)

Note 1) A separate I/O power supply is required.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX19 Family: TX19A/H1 Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	32-Bit Timer Output Compare (Ch)	32-Bit Timer Input Capture (Ch)	Motor Controller (Ch)	External Interrupt Pins (Pins)	RTC (Ch)	Dual Clocks	Debug Support Unit	I/O Ports (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP19A44FDXBG	512K	32K	80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160	2.7 to 3.6	-20 to 85	-	FBGA241 (12×12 mm)
TMP19A44FEXBG	768K	64K	80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160				
TMP19A44F10XBG	1024K		80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160				
TMP19A33F20NG	2048K	10K	64	8	5	3		3		2				11			Yes	49				SDIP64
TMP19A33F20NG-OTP (Note 1)			64	8	5	3		3		2				11			Yes	49				

Note 1) The on-chip ROM can be programmed only once and can not be reprogrammed.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX19 Family: TX19A Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	10-Bit DA Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-Bit Timer Output Compare (Ch)	32-Bit Timer Input Capture (Ch)	Motor Controller (Ch)	External Interrupt Pins (Pins)	Dual Clocks	Debug Support Unit	I/O Ports (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package
TMP19A71CYFG	256K	10K	56	8	2		2		19				4			2	10		Yes	75	(Note 1) 1.35 to 1.65	-40 to 85	TMP19A71FYFG	QFP100 (14×20 mm)
TMP19A71CYUG			56	8	2		2		19				4			2	10		Yes	75			TMP19A71FYUG	LQFP100 (14×14 mm)
TMP19A43CZXBG	384K	20K	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143		-20 to 85	TMP19A43FZXBG	FBGA193 (12×12 mm)
TMP19A43CDXBG	512K	24K	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43FDXBG	
TMP19A61CDXBG		40K	54	8	9	2		2	32				36	4	4		16		Yes	212			TMP19A61F10XBG	FBGA289 (11×11 mm)
TMP19A61C10XBG	1024K	48K	54	8	9	2		2	32				36	4	4		16		Yes	212				
TMP19A64C1DXBG	1536K	56K	54	8	7			1	24				11	10	4		20	Yes	Yes	209			TMP19A64F20BXBG	FBGA281 (13×13 mm)

Note 1) A separate I/O power supply is required.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX19 Family: TX19A/H1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	External Memory Interface	UART/SIO (Ch)	UART/HSIO (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	16-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	Multiply-Accumulate (MAC)	External Interrupt Pins (Pins)	Watchdog Timer	Clock Gear	32-kHz Timer (for SW RTC)	RTC (ch)	Dual Clocks	Debug Support Unit	I/O Ports (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP19A31CYFG	NA	256K	80	8	Yes	5	5	2	12	16		6	Yes	16	Yes	Yes		1	Yes	Yes	96	2.7 to 3.6	-20 to 85	-	LQFP176 (24×24 mm)

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

8-Bit Microcontrollers for Automotive

TLCS-870 Family: TLCS-870/C Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	LED Driver (Ch)	CAN (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/I ² C (Ch) (Note 3)	I ² C (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 2))	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP86FH92IDMG (Note 4)	16K	512	(1) 0.25 (2) 0.4	8		1		1	1			6		1	2	Yes	Yes	Yes	Yes	24	(1) 4.0 to 5.5 (2) 3.0 to 5.5	-40 to 85	TMP86CH92IDMG (Note 4) TMP86CH92SDMG ** (Note 4)	SSOP30

Note 1) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

**: Under development

Note 2) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

Note 3) Configurable as I²C or UART.

Note 4) Reliability testing includes AEC-Q100-Rev-F (July 18, 2003) in addition to Toshiba's standard tests (automotive grade).

- For further information about the V/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/C1 Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/SIO (Ch) (Note 1)	SEI/UART (Ch) (Note 3)	I ² C/SIO (Ch) (Note 2)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Multiply-Accumulate (MAC)	Motor Controller (Ch) (Note 5)	Program Patch Logic	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	Clock Gear	Power-On Reset	Voltage Detecting Circuit	On-Chip Debug Unit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP89FM82TDUG **	32K	2048	0.125	20						1	1		8			2		4		1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	39	4.5 to 5.5	-40 to 125	-	LQFP48 (7×7 mm)

Note 1) Configurable as SIO or UART.

**: Under development

Note 2) Configurable as I²C or SIO. Up to two SIO channels can be used simultaneously.

Note 3) Configurable as SEI or UART.

Note 4) Only peripheral units remain active in Low-Speed mode.

Note 5) Enabled only in High-Speed mode.

- For further information about the V/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/C Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	LED Driver (Ch)	CAN (Ch) (Note 2)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/I ² C (Ch) (Note 5)	I ² C (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	Power-On Reset	Voltage Detecting Circuit	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package
TMP86C408IDMG	4K	256	(1) 0.25 (2) 0.5	8		1		1			6		1	2	Yes	Yes			24	(1) 4.5 to 5.5	-40 to 85	TMP86P808DMG	SSOP30
TMP86C408SDMG				8		1		1			6		1	2	Yes	Yes			24		-40 to 125		
TMP86C808IDMG				8		1		1			6		1	2	Yes	Yes			24		-40 to 85		
TMP86C808SDMG				8		1		1			6		1	2	Yes	Yes			24		-40 to 125		
TMP86C847IUG	8K			19			1	1				8	1	2	Yes	Yes			35	(2) 2.7 to 5.5	-40 to 85	TMP86PM47AUG TMP86PH47UG TMP86FH47AUG	LQFP44 (10×10 mm)
TMP86C847SUG				19			1	1				8	1	2	Yes	Yes			35		-40 to 125		
TMP86CH47IUG				19			1	1				8	1	2	Yes	Yes			35		-40 to 85		
TMP86CH47SUG				19			1	1				8	1	2	Yes	Yes			35		-40 to 125		
TMP86CH92IDMG (Note 6)	16K		(1) 0.25	8		1		1	1			6	1	2	Yes	Yes	Yes	Yes	24	(1) 4.0 to 5.5	-40 to 85	TMP86FH92IDMG (Note 6)	SSOP30
TMP86CH92SDMG (Note 6) **			(2) 0.4	8		1		1	1			6	1	2	Yes	Yes	Yes	Yes	24	(2) 2.7 to 5.5	-40 to 125		
TMP86CH87RUG		1024	0.25	8	(Note 3) 1	1		1				14	1	2	Yes	Yes			35	4.5 to 5.5	-40 to 85	TMP86PM87RUG **	LQFP44 (10×10 mm)
TMP86CM87RUG				8	(Note 3) 1	1		1					14	1	2	Yes	Yes						

Note 1) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

**: Under development

Note 2) There are four channels of mailboxes.

Note 3) Either the SEI or UART module should be selected via software.

Note 4) The minimum instruction execution time in Low-Speed mode is 122 μs (at 32.768 kHz).

Note 5) Configurable as I²C or UART.

Note 6) Reliability testing includes AEC-Q100-Rev-F (July 18, 2003) in addition to Toshiba's standard tests (automotive grade).

- For further information about the I/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-870 Family: TLCS-870/X Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	LED Driver (Ch)	SIO (Ch)	UART (Ch)	10-Bit AD Converter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Motor Controller (Ch)	Watchdog Timer	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP88CH40IMG	16K	512	0.2	14	(Note 1) 1	(Note 1) 1	4	1	2	1	Yes	19	4.5 to 5.5	-40 to 85	TMP88PH40IMG	SOP28

Note 1) Cannot be used at the same time because their I/O pins are multiplexed.

- For further information about the I/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

16-Bit Microcontrollers for Automotive

TLCS-900 Family: TLCS-900/L1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for S/W RTC)	16-Bit PWM Generator (Ch)	CS/WAIT Controller (Ch)	PDC (Ch)	Watchdog Timer	Dual Clocks	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package
TMP91CU27RUG **	96K	10K	0.148			2	1	4	6	1	Yes		3		Yes	Yes	Yes	53	2.7 to 3.6	-40 to 85	TMP91FW27UG	LQFP64 (10×10 mm)
TMP91CY22IFG	256K	16K	(1) 0.148 (2) 0.4			2	1	8	8	2	Yes		4		Yes	Yes	Yes	81	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP91FY42FG	LQFP100 (14×14 mm)

Note 1) Minimum instruction execution times (1) and (2) correspond to power supply voltages (1) and (2).

** : Under development

- For further information about the I/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

32-Bit Microcontrollers for Automotive

TLCS-900 Family: TLCS-900/H1 Series

□Flash Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	RTC (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP92FD54AIFG (Note 1) **	512K	32K	0.05	1	1	2	3	12	8	2	1	1	Yes		68	4.5 to 5.25	-40 to 85	TMP92CD54IFG **	LQFP100 (14×14 mm)

Note 1) Contains voltage regulator.

** : Under development

- For further information about the I/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TLCS-900 Family: TLCS-900/H1 Series

□Mask ROM Versions

Part Number	ROM (Bytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I ² C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	RTC (Ch)	CS/WAIT Controller (Ch)	Watchdog Timer	Dual Clocks	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package
TMP92CD54IFG (Note 1) **	512K	32K	0.05	1	1	2	3	12	8	2	1	1	Yes		68	4.5 to 5.25	-40 to 85	TMP92FD54AIFG **	LQFP100 (14×14 mm)

Note 1) Contains voltage regulator.

** : Under development

- For further information about the I/R/S/T grade levels, please contact your nearest Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

TX03 Family: TX03 Series

□Flash Versions

Part Number	ROM (Bytes)	SRAM (Bytes)	Maximum Operating Frequency (MHz)	CAN (ch)	DMA Controller (Ch)	SEI (ch)	UART/SIO (ch)	12-Bit AD Converter (Ch)	Timer/Compare (32 bit)(ch)	Timer/Capture (32 bit)(ch)	PWM (24 bit)	Motor Controller (Ch)	Resolver Digital Converter (RDC)	External Interrupt Pins (Pins)	Watchdog Timer	On-Chip Debug Unit	Trace Function	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMPM350FDTFG **	512K	48K	88	2	32	1	2	20	7	1	6	1		(Note 1) 1	Yes	Yes	Yes	43	4.5 to 5.5	-40 to 105	LQFP100 (14×14 mm)
TMPM354F10TFG **	1024K	64K	80	3	64	2	3	21	5	2	4	1	1	(Note 1) 1	Yes	Yes	Yes	56		-40 to 125	LQFP144 (20×20 mm)

Note 1) The seven capture inputs of the timer can be programmed as external maskable interrupts.

** : Under development

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

32-Bit Microprocessors

TX39 Family

Part Number	Maximum Operating Frequency (MHz)	Internal Bus Width (Bits)	External Bus Width (Bits)	Instruction Cache (Kbytes)	Data Cache (Kbytes)	DMAC Channels (Ch)	I/O Ports (Pins)	Serial Interface (Ch)	Timer Channels (Ch)	External Interrupt Pins (Pins)	PCI Controller (MHz)	Debug Support Unit	Memory Controller	Others	Package
TMPR3912AUG-92 ☆	92	32	32	4	1		39	3	2	39			SDRAM, ROM, SRAM, Flash	LCD interface, PCMCIA, RTC	LQFP208
TMPR3912XB-92 ☆	92	32	32	4	1		39	3	2	39					FBGA217
TMPR3927CFE ☆	133	32	32	8	4	4	16	2	3	6	33	●	SDRAM, SRAM, ROM, Flash		QFP240

☆: Dry-packed

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

64-Bit Microprocessors

TX49 Family

Part Number	Maximum Operating Frequency (MHz)	Internal Bus Width (Bits)	External Bus Width (Bits)	Instruction Cache (Kbytes)	Data Cache (Kbytes)	DMAC Channels (Ch)	I/O Ports (Pins)	Serial Interface (Ch)	Timer Channels (Ch)	External Interrupt Pins (Pins)	PCI Controller (MHz)	Debug Support Unit	Memory Controller	Others	Package
TMPR4951BFG-200 ☆	200	64	32	16	8				1	4		●			LQFP100
TMPR4955BFG-200/300 ☆	200 /300	64	32	32	32				1	6		●		FPU	QFP160
TMPR4955CFG-400 ☆	400	64	32	32	32				1	6		●			QFP160
TMPR4956CXBG-400 ☆	400	64	64	32	32				1	6		●			PBGA217
TMPR4925XBG-200 ☆	200	64	32	16	16	4	32	2	3	8	33	●	NAND Flash, SDRAM, SRAM, ROM, NOR Flash	FPU, SPI, AC-Link, PCMCIA, RTC	PBGA256
TMPR4937XBG-300/333 ☆	300 /333	64	64	32	32	8	16	2	3	6	33/66	●	SDRAM, SRAM, ROM, NOR Flash	FPU, AC-Link	PBGA484
TMPR4938XBG-300/333 ☆	300 /333	64	64	32	32	8	16	2	3	6	33/66	●	NAND Flash, SDRAM, SRAM, ROM, NOR Flash	FPU, Ether MAC, SPI, AC-Link	PBGA484
TX4939XBG-400 ☆	400	64	32	32	32	8	101	4	6	7	33/66	●	NAND Flash, DDR-SDRAM, SRAM, ROM, NOR Flash	FPU, Ether MAC, ATA100, SPI, AC-Link/I ² S, I ² C, Video port, RTC, Crypt engine (AES, SHA1, etc.)	PBGA456
TX4961XBG-240 ☆	240	64	32	16	16	8	※	6	12	5		●	NAND Flash, DDR-SDRAM, SRAM, ROM, NOR Flash	Graphics controller, frame grabber, CAN controller, Media-LB interface, ADC, AC-Link controller	PBGA456
TX4964FG-120 ☆	120	64	16	8	8	4	※	4	6	7		●	SRAM, ROM, NOR Flash	Graphics controller, frame grabber, CAN controller, I ² S controller	LQFP176
TX4966XBG-280 ☆	280	64	32	16	16	8	※	7	22	10		●	SDRAM, SRAM, ROM, NOR Flash	Graphics controller × 2, frame grabber × 2, APIX, RSDS, CAN controller, I ² S controller	PBGA456

☆: Dry-packed

※: All I/O pins are configurable as general-purpose I/Os.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

64-Bit Microprocessor Peripherals (PCI companion chip)

Part Number	Functions	Package
TC86C001FG (GOKU-S) ★	PCI interface (32 bit, 33 MHz) ATA/ATAPI host controller, Ultra DMA transfer (mode 4), maximum transfer rate = 66 MB/s USB1.1 host controller: 2 ports (OpenHCI 1.0a compatible) USB device controller: 1 port I ² C/SIO Power supply voltage (I/O = 3.3 V, internal = 1.5 V)	LQFP144

★: Dry-packed

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Development System Tools

TLCS-870/C Series (1/4)

□ Software Products

Toshiba Integrated Development Environment	
C Compiler	Integrated Development Environment *1
SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C In-Circuit Emulation system.
- The TLCS-870/C Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller and In-Circuit Emulator comes with a single-seat download license for the Integrated Development Environment.

*2: The emulation chip is specifically designed for each target MCU. For availability status, contact your local Toshiba sales representative.

*3: One QFP adaptor and one pin protector are supplied with each QFP packaged product.

When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."

*4: These are ADLINKS's products.

*5: One IC socket is supplied with each target connection board. IC sockets are Yamaichi Electronics' products.

□ Hardware Products

Target MCU		RTE870/C model 15 In-Circuit Emulation System						RTE870/C In-Circuit Emulation System																																	
		Emulation Chip *2	model 15 In-Circuit Emulator				Accessory	Emulation Chip *2	In-Circuit Emulator	Accessory																															
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket			Probe Set *4	Bump Socket *4 (MCU Mount Adapter)																														
TMP86P203PG	DIP20	TMP86C908XB	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D020NA0A	—	TMP86C908XBG	HW86EG000AG	AP20D3W-2	—																														
TMP86P203MG	SOP20					BMP86D020MC0A	IC253-020-0004-B *5			AP20S3T-2	BM-20S3T																														
TMP86CH06AUG	LQFP44 (10 x 10)	TMP86C906XB				BMP86D044DE0A	PN210020A	TMP86C906XBG		AP44QP	BM-44Q10P																														
TMP86PH06UG						BMP86D042NB0A	—			AP42D0U-2	—																														
TMP86CH06NG	SDIP42	TMP86C908XB				BMP86A200010B	BMP86D028NB0A	—		TMP86C908XBG	HW86EG000AG	AP28D4U	—																												
TMP86PH06NG																																									
TMP86C407NG	SDIP28																																								
TMP86C807NG																																									
TMP86F807NG																																									
TMP86P807NG																																									
TMP86C407MG	SOP28													TMP86C908XB	BMP86A200010B	BMP86D028MC0A	IC253-028-0003-B *5	TMP86C908XBG	HW86EG000AG	AP28S9T	BM-28S9T																				
TMP86C807MG																																									
TMP86F807MG																																									
TMP86P807MG																																									
TMP86C408DMG	SSOP30																					TMP86C908XB	BMP86A200010B	BMP86D030MF1A	IC253-030-0002-B *5	TMP86C908XBG	HW86EG000AG	AP30S3N-2	BM-30S3N												
TMP86C408IDMG																																									
TMP86C408SDMG																																									
TMP86C808DMG																																									
TMP86C808IDMG																																									
TMP86C808SDMG																																									
TMP86F808DMG																																									
TMP86P808DMG																																									
TMP86C809NG	SDIP32				TMP86C909XB																									BMP86A200020A	BMP86D032NB0A	—	TMP86C909XBG	HW86EG000AG	AP32D4U	—					
TMP86CH09NG																																									
TMP86FH09AMG	SOP32		—	—	—				—																												—	—	—	—	
TMP86FH09ANG	SDIP32		TMP86C909XB	BM1040R0B-G	BMP86A100010B				BMP86A200020A																												BMP86D032NB0A	—	TMP86C912XBG	++	++
TMP86F409NG																																									
TMP86CH12MG	SSOP30		TMP86C912XB																																						
TMP86FH12AMG **		++				++	++	++		++	++																														

** : Under development

++ : Under planning

TLCS-870/C Series (2/4)

□ Software Products

Toshiba Integrated Development Environment	
C Compiler	Integrated Development Environment *1
SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C In-Circuit Emulation system.
- The TLCS-870/C Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller and In-Circuit Emulator comes with a single-seat download license for the Integrated Development Environment.

*2: The emulation chip is specifically designed for each target MCU. For availability status, contact your local Toshiba sales representative.

*3: One QFP adaptor and one pin protector are supplied with each QFP packaged product.

When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."

*4: These are ADLINKS's products.

□ Hardware Products

Target MCU		RTE870/C model 15 In-Circuit Emulation System						RTE870/C In-Circuit Emulation System											
		Emulation Chip *2	model 15 In-Circuit Emulator				Accessory	Emulation Chip *2	In-Circuit Emulator	Accessory									
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket			Probe Set *4	Bump Socket *4 (MCU Mount Adapter)								
TMP86C420UG	LQFP64 (10 x 10)	TMP86C929AXB	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	TMP86C929AXBG	HW86EG000AG	AP64QM	BM-64Q10M								
TMP86C820UG																			
TMP86P820UG																			
TMP86C420FG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026				AP64QP	BM-64Q14P							
TMP86C820FG																			
TMP86P820FG																			
TMP86CH21AUG	LQFP64 (10 x 10)									BMP86D064DG0A	PN210033		AP64QM	BM-64Q10M					
TMP86CH21FG	QFP64 (14 x 14)									BMP86D064DE0A	PN210026		AP64QP	BM-64Q14P					
TMP86CH22UG	LQFP44 (10 x 10)	TMP86C923XB				BMP86D044DE1A	PN210020A	TMP86C923XBG		AP44QP-2	BM-44Q10P								
TMP86PH22UG																			
TMP86CM23AUG					BMP86D064DG0A	PN210033			AP64QM	BM-64Q10M									
TMP86CP23AUG																			
TMP86FS23AUG **	LQFP64 (10 x 10)	++	++	++	++	++	++	++	++	++	++								
TMP86PM23UG		TMP86C923XB	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	TMP86C923XBG	HW86EG000AG	AP64QM	BM-64Q10M								
TMP86PS23UG																			
TMP86FP24FG		LQFP80 (12 x 12)			TMP86C948XB	BMP86A200030A	BMP86D080DG1A	PN210008	—	—	—	—							
TMP86CS25ADFG	LQFP100 (14 x 14)	TMP86C925XB			BM1040R0B-G	BMP86A100010B	BMP86A200020A	BMP86D100DG0A	PN210023	TMP86C925XBG	HW86EG000AG	AP100QM-2	BM-100Q14M						
TMP86CM25AFG																			
TMP86CS25AFG								QFP100 (14 x 20)	BMP86D100FF0A			PN210005A		AP100QN	BM-100Q142N				
TMP86FM25FG																			
TMP86PS25FG																			
TMP86CM27FG	QFP80 (14 x 20)						TMP86C927XB	BMP86A200010B	BMP86D080FE0A	PN210002		TMP86C927XBG	HW86EG000AG	AP80QP	BM-80Q142P				
TMP86CP27AFG																			
TMP86FS27FG																			
TMP86PS27FG																			
TMP86CS28DFG	LQFP80 (12 x 12)	TMP86C989XB								BMP86D080DG0A	PN210008	TMP86C989XBG			AP80QM	BM-80Q12M			
TMP86FS28ADFG **		++	++	++			++		++	++	++	++		++					
TMP86CS28FG	QFP80 (14 x 20)	TMP86C989XB	BM1040R0B-G	BMP86A100010B			BMP86A200010B	BMP86D080FE0A	PN210002	TMP86C989XBG	HW86EG000AG	AP80QP		BM-80Q142P					
TMP86FS28AFG **		++	++	++			++	++	++	++	++	++		++					

**: Under development

++: Under planning

TLCS-870/C Series (3/4)

□ Software Products

Toshiba Integrated Development Environment	
C Compiler	Integrated Development Environment *1
SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C In-Circuit Emulation system.
- The TLCS-870/C Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller and In-Circuit Emulator comes with a single-seat download license for the Integrated Development Environment.

*2: The emulation chip is specifically designed for each target MCU. For availability status, contact your local Toshiba sales representative.

*3: One QFP adaptor and one pin protector are supplied with each QFP packaged product.

When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."

*4: These are ADLINKS's products.

*5: These are top covers for IC packages. These are Tokyo Eletech's products.

□ Hardware Products

Target MCU		RTE870/C model 15 In-Circuit Emulation System						RTE870/C In-Circuit Emulation System							
		Emulation Chip *2	model 15 In-Circuit Emulator				Accessory	Emulation Chip *2	In-Circuit Emulator	Accessory					
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket			Probe Set *4	Bump Socket *4 (MCU Mount Adapter)				
TMP86C829BUG	LQFP64 (10 x 10)	TMP86C929AXB	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	TMP86C929AXBG	HW86EG000AG	AP64QM	BM-64Q10M				
TMP86CH29BUG															
TMP86CM29BUG															
TMP86CM29LUG															
TMP86FM29LUG															
TMP86FM29UG															
TMP86PM29BUG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026			AP64QP	BM-64Q14P				
TMP86C829BFG															
TMP86CH29BFG															
TMP86CM29BFG															
TMP86FM29FG															
TMP86PM29BFG															
TMP86CS44UG	LQFP44 (10 x 10)	TMP86C944XB				BMP86D044DE0A	PN210020A	TMP86C944XBG		AP44QP	BM-44Q10P				
TMP86PS44UG															
TMP86CH46ANG	SDIP42	TMP86C947XB										BMP86D042NB1A	—	AP42D0U-3	—
TMP86FH46BNG															
TMP86PH46NG															
TMP86PM46NG															
TMP86C847IUG	LQFP44 (10 x 10)					BMP86D044DE0A	PN210020A	AP44QP		BM-44Q10P					
TMP86C847SUG															
TMP86C847UG															
TMP86CH47AUG															
TMP86CH47IUG															
TMP86CH47SUG															
TMP86CM47AUG															
TMP86FH47BUG															
TMP86PH47UG															
TMP86PM47AUG															

TLCS-870/C Series (4/4)

□ Software Products

Toshiba Integrated Development Environment	
C Compiler	Integrated Development Environment *1
SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses

□ Hardware Products

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C In-Circuit Emulation system.
- The TLCS-870/C Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller and In-Circuit Emulator comes with a single-seat download license for the Integrated Development Environment.

*2: The emulation chip is specifically designed for each target MCU. For availability status, contact your local Toshiba sales representative.

*3: One QFP adaptor and one pin protector are supplied with each QFP packaged product.

When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."

*4: These are ADLINKS's products.

*5: One IC socket is supplied with each target connection board. IC sockets are Yamaichi Electronics' products.

Target MCU		RTE870/C model 15 In-Circuit Emulation System						RTE870/C In-Circuit Emulation System								
		Emulation Chip *2	model 15 In-Circuit Emulator				Accessory	Emulation Chip *2	In-Circuit Emulator	Accessory						
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket			Probe Set *4	Bump Socket *4 (MCU Mount Adapter)					
TMP86FM48UG	LQFP64 (10 x 10)	TMP86C948XB	BM1040R0B-G	BMP86A100010B	BMP86A200030A	BMP86D064DG0A	PN210033	TMP86C948XBG	HW86EG000AG	AP64QM	BM-64Q10M					
TMP86FM48FG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026			AP64QP	BM-64Q14P					
TMP86CS49UG	LQFP64 (10 x 10)	TMP86C949XB			BMP86A200010B	BMP86D064DG0A	PN210033	TMP86C949XBG		AP64QM	BM-64Q10M					
TMP86FS49BUG																
TMP86FS49BNG	SDIP64	—	—	—	—		AP64D0U-2			—						
TMP86PM49UG	LQFP64 (10 x 10)	TMP86C949XB	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033			TMP86C949XBG	AP64QM	BM-64Q10M				
TMP86CS49FG	QFP64 (14 x 14)					BMP86A200020A	BMP86D100FF0A	PN210005A			TMP86C964XBG	AP64QP	BM-64Q14P			
TMP86FS49BFG																
TMP86PM49FG																
TMP86CS64AFG	QFP100 (14 x 20)	TMP86C964XB												AP100QN	BM-100Q142N	
TMP86PS64FG																
TMP86CH72FG	QFP64 (14 x 14)	TMP86C972XB			BMP86A200010B	BMP86D064DE0A	PN210026	TMP86C972XBG		TMP86C974XBG	AP64QP	BM-64Q14P				
TMP86CM72FG																
TMP86PM72FG	QFP80 (14 x 20)	TMP86C974XB									BMP86D080FE0A	PN210002	TMP86C987XBG	TMP86C993XBG	AP80QP	BM-80Q142P
TMP86CK74AFG																
TMP86CM74AFG					LQFP44 (10 x 10)	TMP86C987XB	BMP86D044DE0A	PN210020A		TMP86C993XBG					AP44QP	BM-44Q10P
TMP86PM74AFG																
TMP86CH87RUG	SSOP30	TMP86C993XB									BMP86D030MF3A	IC253-030-0002-B *5	TMP86C993XBG	AP30S3N-4	BM-30S3N	
TMP86CM87RUG																
TMP86PM87RUG **																
TMP86CH92IDMG																
TMP86CH92SDMG **	SSOP30	TMP86C993XB			BMP86A200020A	BMP86D032NB1A	—	TMP86C993XBG		AP32D4U-2	—					
TMP86FH92IDMG																
TMP86FH92DMG																
TMP86FH93NG	SDIP32															

** : Under development

TLCS-870/X Series

□Software Products

Language Tool	Debugger
C Compiler & Assembler Set	
SW88YN0-ZCK: 1 license (Japanese edition)	SW88DN9-ZCK: 1 license (Japanese edition)
SW88YN0-ZCF: 1 license (English edition)	SW88DN9-ZCF: 1 license (English edition)
SW88YN3-ZCK: 10 licenses (Japanese edition)	SW88DN3-ZCK: 10 licenses (Japanese edition)
SW88YN3-ZCF: 10 licenses (English edition)	SW88DN3-ZCF: 10 licenses (English edition)

□Hardware Products

Target MCU		RTE870/X model 15/25 In-Circuit Emulation System												
		In-Circuit Emulator		Accessory										
Part Number	Package	Controller *2	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter /IC Socket /Top Cover for IC Package								
TMP88CH40NG	SDIP28	BM1040R0B-G /BM1055R0C	BM88CS43F0A-GM	PN100003	PN200004	—								
TMP88PH40NG					PN200008	IC253-028-0003-B *4								
TMP88CH40IMG	SOP28			TEC-044SA-PN1NQ *5			—	HQPACK044SA *5						
TMP88CH40MG					LQFP44 (10 x 10)	PN100002	PN200001	—						
TMP88PH40MG	SDIP42			TEC-064RZ-T1/SET *5			—	HQPACK064RZ *5						
TMP88CH41UG					QFP64 (14 x 20)	PN110005	—	—						
TMP88PH41UG	SDIP64			TEC-080RA-T1/SET *1*5			—	HQPACK080RA178 *5						
TMP88CH41NG					QFP80 (14 x 20)	BM88FW44F0A-GM	TEC-080RA-T1/SET *1*5	—	HQPACK080RA178 *5					
TMP88PH41NG	QFP80 (14 x 20)			BM88CS43F0A-GM				TEC-044SA-PN1NQ *5	—	HQPACK044SA *5				
TMP88PS42FG					LQFP44 (10 x 10)	BM88CU74F0A	PN120004 *1		—	PN210002				
TMP88PS42NG	QFP80 (14 x 20)			BM88CP77F0A				PN120005 *1	—	PN210005A				
TMP88CS43FG					QFP100 (14 x 20)	BM1055R0C	BM88CU74F0A		PN120004 *1	—	PN210002			
TMP88PS43FG	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A				PN120005 *1	—	PN210005A
TMP88FW45AFG														
TMP88F846UG			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
TMP88CU74FG	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
TMP88PU74FG		QFP100 (14 x 20)												BM1055R0C
TMP88CS77FG			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
TMP88CU77FG	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
TMP88PU77FG		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C
			QFP100 (14 x 20)		BM1055R0C	BM88CP77F0A	PN120005 *1		—	PN210005A				
	QFP100 (14 x 20)			BM1055R0C				BM88CP77F0A			PN120005 *1	—	PN210005A	
		QFP100 (14 x 20)												BM1055R0C

● The TLCS-870/X Series software products run on the Japanese or English Microsoft® Windows® 2000 and Microsoft® Windows® XP.

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

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

When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."

● For the supported Programming tools, see the section "Programming Tools".

● Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: These are spare parts. One spare part is supplied with each emulation pod.

*2: "BM1040R0B-G/BM1055R0C" indicates that either one of them should be selected, the BM1040R0B-G when the model 15 controller is used and the BM1055R0C when the model 25 controller is used.

● For connection with the host system via RS-232C:

the BM1055R0C requires a 9-pin cross cable;

the BM1055R0B and BM1055R0A (old version) require a 25-pin straight cable;

the BM1040R0B-G requires a 25-pin straight cable.

● For connection with the emulation pod, the BM1055R0A, the old version of the controller, requires the PN300001.

*3: One IC socket is supplied with each MCU probe. IC sockets are Yamaichi Electronics' product.

*4: One IC socket is supplied with the package converter. The IC socket is Yamaichi Electronics' product.

*5: These are Tokyo Eletech's products.

TLCS-870/C1 Series

□Software Products

Toshiba Integrated Development Environment	
C Compiler	Integrated Development Environment *1
SW89CN0-ZCC: 1 license SW89CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses

□Hardware Products

Target MCU		RTE870/C1 On-Chip Debug Emulation System		RTE870/C1 In-Circuit Emulation System					
		On-Chip Debug Emulator	Accessory	In-Circuit Emulator	Emulation Chip *3	Accessory *4			
Part Number	Package		Connector *2			Probe Set	Bump Socket (MCU Mount Adapter)		
TMP89FH00DUG	LQFP48 (7 x 7)	BMP89A400010A-G	FTSH-110-01-L-DV-K	—	—	—	—		
TMP89FH00WBG	WCSP39 (3.8 x 3.8)								
TMP89FW20AUG	LQFP64 (10 x 10)	**	**						
TMP89FW24ADFG	QFP80 (14 x 20)								
TMP89FW24AFG	LQFP80 (12 x 12)								
TMP89FS28LFG	QFP179 (20 x 20)	BMP89A400010A-G	FTSH-110-01-L-DV-K	BMP89A300010A-G	TMP89C900XBG	**	AP42D0U-4	—	
TMP89FM40NG	SDIP42								
TMP89FH40NG				LQFP44 (10 x 10)	AP44QP-3	BM-44Q10P			
TMP89FM42UG									
TMP89FM42LUG									
TMP89FM42AUG									
TMP89FM42KUG									
TMP89FH42UG									
TMP89FH42LUG									
TMP89CM42UG									
TMP89CH42UG	—			—					
TMP89FM43KQG	VQON44 (5.3 x 5.3)			BMP89A400010A-G	FTSH-110-01-L-DV-K	—	—	—	—
TMP89FM43LQG									
TMP89FM46DUG	LQFP48 (7 x 7)	BMP89A300010A-G	TMP89C900XBG			**	AP48QM-3	BM-48Q7M	
TMP89FM46ADUG									
TMP89FM46KDUG									
TMP89FH46DUG									
TMP89FH46LDUG									
TMP89CM46DUG									
TMP89CH46DUG									
TMP89FS60UG	LQFP64 (10 x 10)	BMP89A400010A-G	FTSH-110-01-L-DV-K	—	—	AP64QM-2	BM-64Q10M		
TMP89FS60FG	QFP64 (14 x 14)							AP64QP-2	BM-64Q14P
TMP89FM82DUG	LQFP48 (7 x 7)								
TMP89FM82TDUG		**	—	—	—	—			

● Choose either the On-Chip Debug Emulator or the In-Circuit Emulator.

**: Under development

● The TLCS-870/C1 Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®.

Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

● For the supported Programming tools, see the section "Programming Tools".

● Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The emulator comes with a single-seat download license for the Integrated Development Environment.

*2: One spare part is supplied with each On-Chip Debug Emulator. These are Samtec's products. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available.

For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

*3: The emulation chip is specifically designed for each target MCU. For availability status, contact your local Toshiba sales representative.

*4: These are ADLINKS's products.

TLCS-900 Family (1/4)

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 3.0)
C Compiler	Integrated Development Environment *1	
SW96CN0-ZCC: 1 license SW96CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU		RTE900 model 15/25 In-Circuit Emulation System					
		In-Circuit Emulator		Accessory			
Part Number	Package	Controller *2	Emulation Pod	MCU Probe/Probe Set	Package Converter	MCU Mount Adapter	
TMP91CU10FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91CU10F0B-M15 *4	PN120013 *3	—	PN210023	
TMP91PW10FG			LQFP100 (14 x 14)	BM91CW11F0B-M15	PN120013 *3	—	PN210023
TMP91CW11FG	BM1040R0B-G	BM91CW12AF0A-M15 *5		PN120013 *3	—	PN210023	
TMP91PW11FG		LQFP100 (14 x 14)		BM1040R0B-G /BM1055R0C	BM91CW12F0A-M15	PN120013 *3	—
TMP91CW12AFG	LQFP100 (14 x 14)		BM1040R0B-G	BM91C016F0A-M15 *5	PN120013 *3	—	PN210023
TMP91CW12FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91C219F0A-M15	PN120013 *3	—	PN210023	
TMP91PW12FG			BM91C016FG	PN120013 *3	—	PN210023	
TMP91C016FG	LQFP100 (14 x 14)	BM1040R0B-G	BM91C219FG	PN120013 *3	—	PN210023	
TMP91C219FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91CM20F0A-M15	PN120044 *3	—	PN210044 *3	
TMP91C820AFG	LQFP144 (16 x 16)		BM1040R0B-G	BM91CW12AF0A-M15 *5	PN120013 *3	—	PN210023
TMP91CY22FG	LQFP100 (14 x 14)	BM1040R0B-G	BM91CW12AF0A-M15 *5	TEC-064SA-T2/SET *6	—	HQPACK064SA *7	
TMP91CY22IFG				QFP64 (14 x 14)	PN120013 *3	PN120065-G	PN210033
TMP91CU27FG							
TMP91FW27FG							
TMP91CK27UG							
TMP91CP27UG							
TMP91CU27UG							
TMP91CU27RUG **	LQFP64 (10 x 10)						
TMP91FW27UG							
TMP91C630FG	LQFP100 (14 x 14)			BM1040R0B-G /BM1055R0C	BM91C630F0A-M15	PN120013 *3	—
TMP91CW40FG	LQFP100 (14 x 14)	BM91CW40F0A-M15	PN120013 *3		—	PN210023	
TMP91FW40FG		BM1040R0B-G	BM91CW12AF0A-M15	PN120013 *3	—	PN210023	
TMP91FY42FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91CW60F0A-M15	PN120013 *3	—	PN210023	
TMP91CW60FG	LQFP100 (14 x 14)			TEC-100RB-T1/SET *6	—	HQPACK100RB179 *7	
TMP91CW60DFG	QFP100 (14 x 20)			TEC-080SD-T2/SET *6	—	HQPACK080SD *7	
TMP91FU62FG	LQFP80 (12 x 12)			TEC-080RA-T2/SET *6	—	HQPACK080RA178 *7	
TMP91FU62DFG	QFP80 (14 x 20)			TEC-100SD-T1/SET *6	—	HQPACK100SD *7	
TMP91FW64FG	LQFP100 (14 x 14)			BM91FW64F0A-GM	TEC-100RB-T1/SET *6	—	HQPACK100RB179 *7
TMP91FW64DFG	QFP100 (14 x 20)				TEC-100RB-T1/SET *6	—	HQPACK100RB179 *7

- The TLCS-900 Family software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP, Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

** : Under development

- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12." When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller comes with a single-seat download license for the Integrated Development Environment.

*2: "BM1040R0B-G/BM1055R0C" indicates that either one of them should be selected, the BM1040R0B-G when the model 15 controller is used and the BM1055R0C when the model 25 controller is used.

- For connection with the host system via RS-232C:
the BM1055R0C requires a 9-pin cross cable;
the BM1055R0B and BM1055R0A (old version) require a 25-pin straight cable;
the BM1040R0B-G requires a 25-pin straight cable.
- The previous version of the controller requires a dedicated cable shown below. For details, contact your local Toshiba sales representative.
To perform a performance analysis and a coverage measurement using the BM1055R0B with an MCU whose name begins with "TMP92", the PN300007 is required.
BM1055R0A: The PN300001 is required. The BM1055R0A cannot be used for an MCU whose name begins with "TMP92".

*3: These are spare parts. One spare part is supplied with each emulation pod.

*4: To operate the TMP91CU10FG at 2 V on the target board, a 2-V conversion adaptor (PN410001) is required. For information about the 2-V conversion adaptor, contact your local Toshiba sales representative.

*5: 2-V operation is not supported.

*6: These are Tokyo Eletech's products.

*7: These are top covers for IC packages. These are Tokyo Eletech's products.

TLCS-900 Family (2/4)

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 3.0)
C Compiler	Integrated Development Environment *1	
SW96CN0-ZCC: 1 license SW96CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU		Emulation System				
		Emulator		Accessory		
Part Number	Package	Controller *2	Emulation Pod/Emulator	MCU Probe/Probe Set	MCU Mount Adapter / Top Cover for IC Package	Communication Cable: Connector
TMP92C820FG	LQFP144 (16 x 16)	BM1040R0B-G /BM1055R0C	BM92C820F0A-M15	PN120044 *3	PN210044 *3	—
TMP92CH21FG			BM92CH21F0A-M15	PN120044 *3	PN210044 *3	—
TMP92CM22FG	LQFP100 (14 x 14)		BM92CM22F0A-M15	PN120013 *3	PN210023	—
TMP92CY23FG	LQFP100 (14 x 14)		BM92CY23F0A-M15	PN120013 *3	PN210023	—
TMP92CY23DFG	QFP100 (14 x 20)			TEC-100RB-T1/SET *4	HQPACK100RB179 *4	—
TMP92CA25FG	LQFP144 (16 x 16)		BM92CA25F0A-M15	PN120044 *3	PN210044 *3	—
TMP92CZ26AXBG	FBGA228 (15 x15)	—	HW92DG000AG	—	—	FTSH-110-01-L-DV-K *5 *6
TMP92CF26AXBG		—	—	—	—	—
TMP92CM27FG	LQFP144 (16 x 16)	BM1040R0B-G /BM1055R0C	BM92CM27F0A-M15	PN120044 *3	PN210044 *3	—
TMP92CD28AFG	LQFP100 (14 x 14)		BM92CD28F0A-GM	PN120013 *3	PN210023	—
TMP92FD28AFG		—	—	—	—	—
TMP92CF29AFG	LQFP176 (20 x 20)	—	HW92DG000AG + BMC92CF29F0A-G *7	—	HQPACK176SE *4	—
TMP92CF30FG	LQFP176 (20 x 20)		—	—	—	—
TMP92CD54IFG **	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM92CY54F0A-M15	PN120013 *3	PN210023	—
TMP92FD54AIFG **						
TMP92CD23AFG	LQFP100 (14 x 14)	—	HW92ES230AG	TEC-100SD-T1/SET *4	HQPACK100SD *4	—
TMP92FD23AFG		—		—	—	—
TMP92CD23ADFG	QFP100 (14 x 20)	—	—	TEC-100RB-T1/SET *4	HQPACK100RB179 *4	—
TMP92FD23ADFG				—	—	—

- The TLCS-900 Family software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP, Microsoft® Windows Vista®. **: Under development
Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller comes with a single-seat download license for the Integrated Development Environment.

*2: "BM1040R0B-G/BM1055R0C" indicates that either one of them should be selected, the BM1040R0B-G when the model 15 controller is used and the BM1055R0C when the model 25 controller is used.

- For connection with the host system via RS-232C:
the BM1055R0C requires a 9-pin cross cable;
the BM1055R0B and BM1055R0A (old version) require a 25-pin straight cable;
the BM1040R0B-G requires a 25-pin straight cable.
- The previous version of the controller requires a dedicated cable shown below. For details, contact your local Toshiba sales representative.
To perform a performance analysis and a coverage measurement using the BM1055R0B with an MCU whose name begins with "TMP92", the PN300007 is required.
BM1055R0A: The PN300001 is required. The BM1055R0A cannot be used for an MCU whose name begins with "TMP92".

*3: These are spare parts. One spare part is supplied with each emulation pod.

*4: These are Tokyo Eletech's products.

*5: These are Samtec's products. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available.
For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

*6: One spare part is supplied with each emulator.

*7: The BMC92CF29F0A-G is an in-circuit adaptor and should be purchased together with the emulator.

TLCS-900 Family (3/4)

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 3.0)
C Compiler	Integrated Development Environment *1	
SW96CN0-ZCC: 1 license SW96CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU		RTE900 model 15/25 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller *2	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter
TMP93CS20FG	LQFP144 (16 x 16)	BM1040R0B-G /BM1055R0C	BM93CS20F0B-M15	PN120044 *3	—	PN210044 *3
TMP93PW20AFG						
TMP93CS36UG	LQFP44 (10 x 10)		BM93CS32F0B-M15	PN120039A *3	PN120063	PN210020A
TMP93CW40DFG	LQFP100 (14 x 14)		BM93CM40F0C-M15	PN120013 *3	—	PN210023
TMP93PW40DFG						
TMP93CW41DFG	LQFP100 (14 x 14)					
TMP93PS44FG	LQFP80 (12 x 12)		BM93CS44F0B-M15	PN120042 *3	—	PN210008
TMP93CW44DFG	QFP80 (14 x 20)			PN120009	—	PN210002
TMP93PW44ADFG						

- The TLCS-900 Family software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP, Microsoft® Windows Vista®.

Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
- When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The controller comes with a single-seat download license for the Integrated Development Environment.

*2: "BM1040R0B-G/BM1055R0C" indicates that either one of them should be selected, the BM1040R0B-G when the model 15 controller is used and the BM1055R0C when the model 25 controller is used.

- For connection with the host system via RS-232C:
 - the BM1055R0C requires a 9-pin cross cable;
 - the BM1055R0B and BM1055R0A (old version) require a 25-pin straight cable;
 - the BM1040R0B-G requires a 25-pin straight cable.
- The previous version of the controller requires a dedicated cable shown below. For details, contact your local Toshiba sales representative.

To perform a performance analysis and a coverage measurement using the BM1055R0B with an MCU whose name begins with "TMP92", the PN300007 is required.

BM1055R0A: The PN300001 is required. The BM1055R0A cannot be used for an MCU whose name begins with "TMP92".

These are spare parts. One spare part is supplied with each emulation pod.

*3: These are spare parts. One spare part is supplied with each emulation pod.

TLCS-900 Family (4/4)

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 3.0)
C Compiler	Integrated Development Environment *1	
SW96CN0-ZCC: 1 license SW96CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW96RN2-ZCC: Object code can be freely copied. SW96RNC-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU		RTE900 model 15/25 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller *2	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter
TMP94C251ADFG	LQFP144 (20 x 20)	BM1056R0B ##	BM94C251F0A	PN120050 *3	—	PN210036
TMP95C001FG	QFP64 (14 x 14)	BM1040R0B-G /BM1055R0C	BM95C001F0B-M15	PN120039A *3	—	PN210026
TMP95C061BDFG	LQFP100 (14 x 14)		BM95C061F0C-M15	PN120013 *3	—	PN210023
TMP95C061BFG	QFP100 (14 x 14)	BM10R0B-G /BM1055R0C	BM95C061F0C-M15	PN120013 *3	—	PN210023
TMP95C063DFG	LQFP144 (20 x 20)	BM1040R0B-G /BM1055R0C	BM95C063F0B-M15	PN120027 *3	—	PN210036
TMP95CS64FG	LQFP100 (14 x 14)		BM95CS64F0B-M15	PN120013 *3	—	PN210023
TMP95PW64FG						
TMP95C265FG	LQFP100 (14 x 14)					
TMP95CW65FG						
TMP95CS66FG						
TMP96C041BFG	QFP80 (14 x 20)	BM1040R0B-G /BM1055R0C	BM96C141F0D-M15	PN120009 *3	—	PN210002
TMP96C141BFG						

- The TLCS-900 Family software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP, Microsoft® Windows Vista®.

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- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- One QFP adapter and one pin protector are supplied with an MCU probe or a package converter whose name begins with "PN12."
- When you purchase additional QFP adaptors or pin protectors, check their part numbers in the section "Spare Parts from Toshiba."
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

##: Contact your local Toshiba sales representative before ordering products.

*1: The controller comes with a single-seat download license for the Integrated Development Environment (excluding the BM1056R0B).

*2: "BM1040R0B-G/BM1055R0C" indicates that either one of them should be selected, the BM1040R0B-G when the model 15 controller is used and the BM1055R0C when the model 25 controller is used.

- For connection with the host system via RS-232C:
 - the BM1055R0C requires a 9-pin cross cable;
 - the BM1055R0B and BM1055R0A (old version) require a 25-pin straight cable;
 - the BM1040R0B-G requires a 25-pin straight cable.
- The previous version of the controller requires a dedicated cable shown below. For details, contact your local Toshiba sales representative.
 - To perform a performance analysis and a coverage measurement using the BM1055R0B with an MCU whose name begins with "TMP92", the PN300007 is required.
 - BM1055R0A: The PN300001 is required. The BM1055R0A cannot be used for an MCU whose name begins with "TMP92".

*3: These are spare parts. One spare part is supplied with each emulation pod.

*4: To connect the BM96C031F0A to the controller (BM1055R0B), a dedicated adaptor is required. For details, please contact your local Toshiba sales representative.

TX19A Series

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 4.0)
C Compiler	Integrated Development Environment *1	
SW1ACN0-ZCC: 1 license SW1ACN3-ZCC: 10 license	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 license	SW1ARN5-ZCC: Object code can be freely copied. SW1ARNF-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU	RTE19A model 110 On-Chip Debug Emulation System		RTE19A model 120 On-Chip Debug Emulation System	
	On-Chip Debug Emulator	Accessory	On-Chip Debug Emulator	Accessory
		Communication Cable: Connector		Communication Cable: Connector
TMP19A23FYFG	BM1210R0A	FFSD-10-D-9.00-01-N: FTSH-110-01-F-D-K FFSD-17-D-8.00-01-N: FTSH-117-01-F-D-K *2	BM1211R0A	FFSD-10-D-9.00-01-N: FTSH-110-01-F-D-K FFSD-17-D-8.00-01-N: FTSH-117-01-F-D-K *2 FFSD-10-D-8.00-01-N: FTSH-110-01-F-D-K
TMP19A23FYXBG				
TMP19A43CDXBG				
TMP19A43CZXBG				
TMP19A43FZXBG				
TMP19A43FDXBG				
TMP19A61C10XBG				
TMP19A61CDXBG				
TMP19A61F10XBG				
TMP19A64C1DXBG				
TMP19A64F20BXBG				
TMP19A71CYUG				
TMP19A71CYFG				
TMP19A71FYFG				
TMP19A71FYUG				

- Choose either the RTE19A model 110 On-Chip Debug Emulation system RTE19A model 120 On-Chip Debug Emulation system.
- The TX19A Series software products run on the Japanese or English Microsoft® Windows® 2000, Microsoft® Windows® XP and Microsoft® Windows Vista®. Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- For the supported Programming tools, see the section "Programming Tools".
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The emulator comes with a single-seat download license for the Integrated Development Environment.

*2: These communication cables and connectors are provided by Samtec, Inc. Each emulator comes with a communication cable. If you need an additional communication cable, please contact Samtec directly.

A connector must be purchased separately. The part numbers listed here denote connectors with through-hole leads. Other options, such as surface-mount leads and ejectors, are also available.

For details, please visit Samtec's website.

FFSD-10-D-9.00-01-N: Communication cable for EJTAG (20 pin)

FTSH-110-01-F-D-K: EJTAG Connector (20 pin)

FFSD-17-D-8.00-01-N: Communication cable for TPC (34 pin)

FTSH-117-01-F-D-K: TPC Connector (34 pin)

FFSD-10-D-8.00-01-N: Communication cable for TPD (20 pin)

FTSH-110-01-F-D-K: TPD Connector (20 pin)

TX19A/H1 Series

□Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 4.0)
C Compiler	Integrated Development Environment *1	
SW1ACN0-ZCC: 1 license SW1ACN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW1ARN5-ZCC: Object code can be freely copied. SW1ARNF-ZCC: Object code can be freely copied and comes with source code.

□Hardware Products

Target MCU	RTE19A/H1 Light On-Chip Debug Emulation System			
	On-Chip Debug Emulator	Accessory		
		Communication Cable *2	Connector *2	
TMP19A31CYFG	HW19DG100AG	FFSD-10-D-07.00-01-N	FTSH-110-01-L-DV-K *3	
TMP19A33F20NG				
TMP19A33F20NG-OTP	HW19DG100AG *4			
TMP19A44FDAXBG	HW19DG100AG			
TMP19A44FEXBG				
TMP19A44F10XBG				

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- The real-time OS requires a license agreement. For details, please contact your local Toshiba sales representative.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: The emulator comes with a single-seat download license for the Integrated Development Environment.

*2: These communication cables and connectors are provided by Samtec, Inc. One communication cable and one connector are supplied with each emulator.

*3: One spare part is supplied with each emulator. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available.

For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

*4: The TMP19A33F20NG is required for debugging.

TX49 Family

□Hardware Products

Reference Board	Target MPU	Functions
	Part Number	
RBTX4951	TMPR4951BFG-200	These are reference boards for evaluating the TMPR4951 and TMPR 4955 respectively. Since both the TMPR4951 and TMPR 4955 have the SysAD Bus interface, the same board can be used for evaluation; the RBTX4951 and RBTX4955 simply come with different CPUs.
	RBHMA4601(CE)	
RBTX4955	TMPR4955CFG-400	These reference boards have a system controller (SysAD bridge), a NOR flash ROM, a DIMM DRAM, an SIO, an Ethernet controller, an I/O controller, and an EEPROM and an RTC connected to the SPI. Also, the reference boards provide an EJTAG connector, a ROM emulator connector and an expansion connector.
	RBHMA4605(CE)	
RBTX4925	TMPR4925XBG-200	This is a PCI-card-compliant reference board for evaluating the TMPR4925. This board has a CPU, a flash ROM, an SDRAM, a PCI controller, an Ethernet controller, an SIO interface, and PCMCIA and SmartMedia™ card slots. It also provides an expansion connector.
RBTX4937	RBHMA4300(CE)	This is a PCI-card-compliant reference board for evaluating the TMPR4937. This board has a CPU, a flash ROM, an SDRAM, an Ethernet controller and an SIO interface. It also provides a connector that can be connected to an external AC'97 board.
	TMPR4937XBG-300/333	
RBTX4938	TMPR4938XBG-300/333	This is a PCI-card-compliant reference board for evaluating the TMPR4938. This board has a CPU, a 128-MB SO-DIMM DRAM, a 16-MB NOR flash ROM, a detachable 32-MB NAND flash ROM and a PCI controller. On-chip features include an Ethernet controller, a debug Ethernet, an SIO, an ATA (IDE), an AC-Link interface, and an EEPROM and an RTC connected to the SPI. It also provides an expansion connector.
	RBHMA4500(CE)	
RBTX4939	TX4939XBG-400	This is an ATX-compliant reference board for evaluating the TX4939. It mainly consists of two modules: an independent CPU module having a DDR-SDRAM and an EJTAG interface, and a BASE board with a CPU module that allows the on-chip PCI, ATA, Ethernet MAC (RMII) and Video/Audio to be evaluated.
	RBHMS4700(CE)	
RBTC86C1	TC86C001FG(GOKU-S)	This is a reference board is compliant with the PCI card edge specification (3.3 V, 33-MHz, 32-bit) and is used to evaluate the TC86C001FG. It has a connector to which the ATA/ATAPI, two USB 1.1 host channels, a USB 1.1 device, I²C and SIO channels can be attached.
	RBHPE4300(CE)	
RBHBK4400	—	This is a backplane board that can be used for system evaluation in conjunction with a PCI-compliant referenced board. It consists of a PCI-card-type CPU board and four PCI bard slots. A commercially-available ATX-compliant power supply may be used.
	RBHBK4400(CE)	

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Programming Tools (1/3)

Target MCU			OTP Programming	Flash Programming	
Family/Series	Part Number	Package	OTP Programming Adapter	Off-Board Programming *2	On-Board Programming *3
				FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLCS-870/C Series	TMP86P203MG	SOP20	BM11704	—	—
	TMP86P203PG	DIP20	BM11203		
	TMP86PH06NG	SDIP42	BM11155		
	TMP86PH06UG	LQFP44 (10 x 10)	BM11656		
	TMP86F807MG	SOP28	—	PN410117	⊙
	TMP86F807NG	SDIP28		PN410119	⊙
	TMP86P807MG	SOP28	BM11684	—	—
	TMP86P807NG	SDIP28	BM11197-G		
	TMP86F808DMG	SSOP30	—	PN410118	⊙
	TMP86F808NG	SDIP30		PN410119	⊙
	TMP86P808DMG	SSOP30	BM11683	—	—
	TMP86P808NG	SDIP30	BM11210		
	TMP86F409NG	SDIP32	—	PN410119	⊙
	TMP86FH09AMG	SOP32		—	⊙
	TMP86FH09ANG	SDIP32		PN410119	⊙
	TMP86FH12AMG	SSOP30		++	++
	TMP86P820FG	QFP64 (14 x 14)	BM11663	—	—
	TMP86P820UG	LQFP64 (10 x 10)	BM11662-G		
	TMP86PH22UG	LQFP44 (10 x 10)	BM11713		
	TMP86FS23AUG	LQFP64 (10 x 10)	—	++	++
	TMP86PM23UG	LQFP64 (10 x 10)	BM11698	—	—
	TMP86PS23UG	LQFP64 (10 x 10)	BM11698		
	TMP86FP24FG	LQFP80 (12 x 12)	—	PN410107	⊙
	TMP86FM25FG	QFP100 (14 x 20)		PN410111	⊙
	TMP86PS25FG	QFP100 (14 x 20)	BM11672-G	—	—
	TMP86FS27FG	QFP80 (14 x 20)	—	PN410104	⊙
	TMP86PS27FG	QFP80 (14 x 20)	BM11701-G	—	—
	TMP86FS28ADFG	LQFP80 (12 x 12)	—	++	++
	TMP86FS28AFG	QFP80 (14 x 20)		++	++
	TMP86FM29FG	QFP64 (14 x 14)		PN410108	⊙
	TMP86FM29LUG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP86FM29UG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP86PM29BFG	QFP64 (14 x 14)	BM11663	—	—
	TMP86PM29BUG	LQFP64 (10 x 10)	BM11662-G		
	TMP86PS44UG	LQFP44 (10 x 10)	BM11687-G		
	TMP86FH46BNG	SDIP42	—	PN410110	⊙
	TMP86PH46NG	SDIP42	BM11188	—	—
	TMP86PM46NG	SDIP42	BM11188		
	TMP86FH47BUG	LQFP44 (10 x 10)	—	PN410109	⊙
	TMP86PH47UG	LQFP44 (10 x 10)	BM11687-G	—	—
	TMP86PM47AUG	LQFP44 (10 x 10)	BM11687-G		
	TMP86FM48FG	QFP64 (14 x 14)	—	PN410108	⊙
	TMP86FM48UG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP86FS49AIFG	QFP64 (14 x 14)		++	++
	TMP86FS49AIUG	LQFP64 (10 x 10)		++	++
	TMP86PM49FG	QFP64 (14 x 14)	BM11709	—	—
	TMP86PM49UG	LQFP64 (10 x 10)	BM11708		
	TMP86FS49BFG	QFP64 (14 x 14)	—	PN410108	⊙
	TMP86FS49BUG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP86FS49BNG	SDIP64		PN410116	⊙
	TMP86PS64FG	QFP100 (14 x 20)	BM11690	—	—
	TMP86PM72FG	QFP64 (14 x 14)	BM11707-G		
	TMP86PM74AFG	QFP80 (14 x 20)	BM11689		
	TMP86PM87RUG	LQFP44 (10 x 10)	BM11687-G		
	TMP86FH92DMG	SSOP30	—	PN410118	⊙
	TMP86FH92IDMG	SSOP30		PN410118	⊙
	TMP86FH93NG	SDIP32		PN410119	⊙

● Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

*1: As a guideline, the adapter should be replaced after 2,000 writes.

*2: Off-board Programming: Programs a Flash microcontroller before it is mounted on the target board.

*3: On-board Programming: Programs a Flash microcontroller while it is mounted on the target board.

*4: Comes with a download license for control software.

*5: These are Samtec's products. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available. For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

++: Under planning

⊙: Supported

Programming Tools (2/3)

Target MCU			OTP Programming	Flash Programming	
Family/Series	Part Number	Package	OTP Programming Adapter	Off-Board Programming *2	On-Board Programming *3
				FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLC8-870/X Series	TMP88PH40MG	SOP28	BM11695-G	—	—
	TMP88PH40NG	SDIP28	BM11196	—	—
	TMP88FH41UG	LQFP44 (10 x 10)	—	PN410109	⊙
	TMP88PH41NG	SDIP42	BM11205	—	—
	TMP88PH41UG	LQFP44 (10 x 10)	BM11706		
	TMP88PS42FG	QFP64 (14 x 20)	BM11200 *1		
	TMP88PS42NG	SDIP64	BM11199-G		
	TMP88PS43FG	QFP80 (14 x 20)	BM11680-G		
	TMP88FW45AFG	QFP80 (14 x 20)	—	PN410104	⊙
	TMP88F846UG	LQFP44 (10 x 10)	—	PN410109	⊙
	TMP88PU74FG	QFP80 (14 x 20)	BM11631	—	—
	TMP88PU77FG	QFP100 (14 x 20)	BM11650		
TLC8-870/C1 Series	TMP89FH00DUG	LQFP48 (7 x 7)	—	PN410115	⊙
	TMP89FH00WBG	WCSP39 (3.8 x 3.8)		—	⊙
	TMP89FW20AUG	LQFP64 (10 x 10)		++	++
	TMP89FW24ADFG	QFP80 (14 x 20)		++	++
	TMP89FW24AFG	LQFP80 (12 x 12)		++	++
	TMP89FS28LFG	QFP179 (20 x 20)		—	⊙
	TMP89FM40NG	SDIP42		PN410110	⊙
	TMP89FH40NG	SDIP42		PN410110	⊙
	TMP89FM42UG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FM42LUG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FM42AUG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FM42KUG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FH42UG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FH42LUG	LQFP44 (10 x 10)		PN410109	⊙
	TMP89FM43KQG	VQON44 (5.3 x 5.3)		PN410121-G	⊙
	TMP89FM43LQG	VQON44 (5.3 x 5.3)		PN410121-G	⊙
	TMP89FM46DUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FM46ADUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FM46KDUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FH46DUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FH46LDUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FS60UG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP89FS60FG	QFP64 (14 x 14)		PN410108	⊙
	TMP89FM82DUG	LQFP48 (7 x 7)		PN410115	⊙
	TMP89FM82TDUG	LQFP48 (7 x 7)		PN410115	⊙

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++: Under planning

*1: As a guideline, the adapter should be replaced after 2,000 writes.

⊙: Supported

*2: Off-board Programming: Programs a Flash microcontroller before it is mounted on the target board.

*3: On-board Programming: Programs a Flash microcontroller while it is mounted on the target board.

*4: Comes with a download license for control software.

*5: These are Samtec's products. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available.

For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

Programming Tools (3/3)

Target MCU			OTP Programming	Flash Programming	
Family/Series	Part Number	Package	OTP Programming Adapter	Off-Board Programming *2	On-Board Programming *3
				FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLCS-900 Family	TMP91PW10FG	LQFP100 (14 x 14)	BM11629	—	—
	TMP91PW11FG	LQFP100 (14 x 14)	BM11629		
	TMP91PW12FG	LQFP100 (14 x 14)	BM11649		
	TMP91PW18AFG	QFP80 (14 x 20)	BM11679		
	TMP91FW27FG	QFP64 (14 x 14)	—	PN410108	⊙
	TMP91FW27UG	LQFP64 (10 x 10)		PN410105A	⊙
	TMP91FW40FG	LQFP100 (14 x 14)		PN410106	⊙
	TMP91FY42FG	LQFP100 (14 x 14)		PN410106	⊙
	TMP91FU62DFG	QFP80 (14 x 20)		PN410104	⊙
	TMP91FU62FG	LQFP80 (12 x 12)		PN410107	⊙
	TMP91FW64DFG	LQFP100 (14 x 20)		PN410111	⊙
	TMP91FW64FG	LQFP100 (14 x 14)		PN410106	⊙
	TMP92FD23ADFG	QFP100 (14 x 20)		PN410111	⊙
	TMP92FD23AFG	LQFP100 (14 x 14)		PN410106	⊙
	TMP92FD28AFG	LQFP100 (14 x 14)		PN410106	⊙
	TMP92FD54AIFG	LQFP100 (14 x 14)		—	—
	TMP93PW20AFG	LQFP144 (16 x 16)	BM11641	—	—
	TMP93PW40DFG	LQFP100 (14 x 14)	BM11629		
	TMP93PS44FG	LQFP80 (12 x 12)	BM11628		
	TMP93PW44ADFG	QFP80 (14 x 20)	BM11652		
	TMP95PW64FG	LQFP100 (14 x 14)	BM11629		
TX19 Family	TMP19A23FYFG	LQFP144 (20 x 20)	—	PN410120-G	⊙

● Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

⊙: Supported

*1: As a guideline, the adapter should be replaced after 2,000 writes.

*2: Off-board Programming: Programs a Flash microcontroller before it is mounted on the target board.

*3: On-board Programming: Programs a Flash microcontroller while it is mounted on the target board.

*4: Comes with a download license for control software.

*5: These are Samtec's products. The part number shown here denotes surface mount type with keying shroud (recommended). Other mount types, such as through-hole, and other mating options are also available.

For the specifications and purchase inquiries about this product, please contact the supplier Samtec, Inc. The recommended connector can also be purchased from it-sim corporation, Sophia Systems Co., Ltd. and UNIDUX INC.

Accessory Tools

Expendable and optional hardware items for the development system are collectively referred to as accessory tools.

- MCU probe
 - Probe set
 - QFP adaptor
 - Pin protector
 - Package converter
 - MCU mount adaptors
 - Communication cable
 - Connector
- ◆ To provide versatility, the footprint pattern of the QFP adaptor leads is slightly different from that of an MCU. If there is a need to install both the QFP adaptor and the MCU with an identical footprint, the board must be designed to be compatible with both of them.
 - ◆ Before beginning a board design or purchasing these accessory tools, be sure to check the latest product specification, recommended footprints, etc. with each manufacturer.
 - ◆ Other than those listed below, accessory tools that can be used together with the Toshiba products are available from Tokyo Eletech Corporation. Please visit Tokyo Eletech Corporation's website for more details.

Adlinks Corp.

Emulation Technology Inc.

Samtec Inc.

Tokyo Eletech Corp.

Tyco Electronics Corp.

Yamaichi Electronics Co., Ltd.

<http://www.adlinks.co.jp>

<http://www.emulation.com>

<http://www.samtec.com>

<http://www.tetc.co.jp/e-index.htm>

<http://www.tycoelectronics.com>

http://www.yamaichi.co.jp/index_e.shtml

Spare Parts from Toshiba

The TLC-870/C model 15 target connection boards, MCU probes and package converters whose part numbers begin with "PN12" come with a QFP adaptor and a pin protector. When you purchase additional QFP adaptors or pin protectors, check their part numbers in the following Spare Parts table. For information about spare parts for third-party accessory tools, please contact the manufacturer or distributor of each product.

- ◆ Note that if you are using a package converter, use spare parts for package converters, not those for MCU probes.
- ◆ QFP adaptors and pin protectors are available from Tokyo Eletech and Toshiba.

Target Connection Board Spare Parts

Part Number	Target MCU Package	Spare Part			
		QFP Adaptor *1		Pin Protector *2	
		Toshiba *3	Tokyo Eletech (QFP Socket)	Toshiba	Tokyo Eletech (Emulator Connector)
BMP86D044DE0A	LQFP44 (10 x 10)	PN210019	TQPACK044SA	PN210021	TQSOCKET044SAG
BMP86D044DE1A					
BMP86D064DE0A	QFP64 (14 x 14)	PN210025	TQPACK064SA	PN210027	TQSOCKET064SAG
BMP86D064DG0A	LQFP64 (10 x 10)	PN210031	TQPACK064SD	PN210032	TQSOCKET064SDG
BMP86D080DG0A	LQFP80 (12 x 12)	PN210007	TQPACK080SD	PN210009	TQSOCKET080SDG
BMP86D080DG1A					
BMP86D080FE0A	QFP80 (14 x 20)	PN210001	TQPACK080RA	PN210003	TQSOCKET080RAG
BMP86D100DG0A	LQFP100 (14 x 14)	PN210022	TQPACK100SD	PN210024	TQSOCKET100SDG
BMP86D100FF0A	QFP100 (14 x 20)	PN210004	TQPACK100RB	PN210006	TQSOCKET100RBG

*1: QFP adaptors and QFP Sockets connectors are soldered onto the pc board of the target system. Once soldered, they should not be unsoldered from the pc board and resoldered.

*2: Pin protectors are sockets used to protect the target connection boards for QFPs and the pins of QFP adaptors and QFP Sockets. Be sure to use a pin protector to protect the portion where the target connection board is connected. It is recommended to replace the pin protector or the emulator Connectors after 100 attachments and detachments.

*3: For the recommended footprints pattern, please visit Tokyo Eletech Corporation's website.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

MCU Probe Spare Parts

Part Number	Target MCU Package	Spare Part			
		QFP Adaptor *1		Pin Protector *2	
		Toshiba *3	Tokyo Eletech (QFP Socket)	Toshiba	Tokyo Eletech (Emulator Connector)
PN120004	QFP80 (14 x 20)	PN210001	TQPACK080RA	PN210003	TQSOCKET080RAG
PN120005	QFP100 (14 x 20)	PN210004	TQPACK100RB	PN210006	TQSOCKET100RBG
PN120006A	LQFP80 (12 x 12)	PN210007	TQPACK080SD	PN210009	TQSOCKET080SDG
PN120009	QFP80 (14 x 20)	PN210001	TQPACK080RA	PN210003	TQSOCKET080RAG
PN120011	QFP44 (10 x 10)	PN210019	TQPACK044SA	PN210021	TQSOCKET044SAG
PN120013	LQFP100 (14 x 14)	PN210022	TQPACK100SD	PN210024	TQSOCKET100SDG
PN120014	QFP64 (14 x 20)	PN210010	TQPACK064RZ	PN210012	TQSOCKET064RZG
PN120022	LQFP64 (10 x 10)	PN210031	TQPACK064SD	PN210032	TQSOCKET064SDG
PN120023B	QFP100 (14 x 20)	PN210004	TQPACK100RB	PN210006	TQSOCKET100RBG
PN120027	LQFP144 (20 x 20)	PN210034	TQPACK144SD	PN210035	TQSOCKET144SDG
PN120039A	QFP64 (14 x 14)	PN210025	TQPACK064SA	PN210027	TQSOCKET064SAG
PN120040A	QFP160 (28 x 28)	PN210028	TQPACK160SB	PN210029	TQSOCKET160SBG
PN120042	LQFP80 (12 x 12)	PN210007	TQPACK080SD	PN210009	TQSOCKET080SDG
PN120044	LQFP144 (16 x 16)	PN210043	NQPACK144SE	PN210045	YQPACK144SE
PN120050	LQFP144 (20 x 20)	PN210034	TQPACK144SD	PN210035	TQSOCKET144SDG
PN120052	QFP64 (14 x 14)	PN210025	TQPACK064SA	PN210027	TQSOCKET064SAG
PN120057	TQFP128 (14 x 14)	PN210053	NQPACK128SE	PN210055	YQPACK128SE

*1: QFP adaptors and QFP Sockets connectors are soldered onto the pc board of the target system. Once soldered, they should not be unsoldered from the pc board and resoldered.

*2: Pin protectors are sockets used to protect the MCU probes for QFPs and the pins of QFP adaptors and QFP sockets. Be sure to use a pin protector to protect the portion where the MCU probe is connected. It is recommended to replace the pin protector or the emulator connectors after 100 attachments and detachments.

*3: For the recommended footprints pattern, please visit Tokyo Eletech Corporation's website.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Package Converter Spare Parts

Part Number	Target MCU Package	Spare Part			
		QFP Adaptor *1		Pin Protector *2	
		Toshiba *3	Tokyo Eletech (QFP Socket)	Toshiba	Tokyo Eletech (Emulator Connector)
PN120007	QFP64 (14 x 20)	PN210010	TQPACK064RZ	PN210012	TQSOCKET064RZG
PN120035	LQFP64 (10 x 10)	PN210031	TQPACK064SD	PN210032	TQSOCKET064SDG
PN120063	LQFP44 (10 x 10)	PN210019	TQPACK044SA	PN210021	TQSOCKET044SAG
PN120065-G	LQFP64 (10 x 10)	PN210031	TQPACK064SD	PN210032	TQSOCKET064SDG

*1: QFP adaptors and QFP Sockets connectors are soldered onto the pc board of the target system. Once soldered, they should not be unsoldered from the pc board and resoldered.

*2: Pin protectors are sockets used to protect the package converters for QFPs and the pins of QFP adaptors and QFP sockets. Be sure to use a pin protector to protect the portion where the package converter is connected. It is recommended to replace the pin protector or the emulator connectors after 100 attachments and detachments.

*3: For the recommended footprints pattern, please visit Tokyo Eletech Corporation's website.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

MCU Mount Adaptor Spare Parts

Part Number	Target MCU Package	Spare Part			
		QFP Adaptor *1		Pin Protector *2	
		Toshiba *3	Tokyo Eletech (QFP Socket)	Toshiba	Tokyo Eletech (Emulator Connector)
PN210002	QFP80 (14 x 20)	PN210001	TQPACK080RA	PN210003	TQSOCKET080RAG
PN210005A	QFP100 (14 x 20)	PN210004	TQPACK100RB	PN210006	TQSOCKET100RBG
PN210008	LQFP80 (12 x 12)	PN210007	TQPACK080SD	PN210009	TQSOCKET080SDG
PN210011A	QFP64 (14 x 20)	PN210010	TQPACK064RZ	PN210012	TQSOCKET064RZG
PN210020A	QFP44 (10 x 10)	PN210019	TQPACK044SA	PN210021	TQSOCKET044SAG
PN210023	LQFP100 (14 x 14)	PN210022	TQPACK100SD	PN210024	TQSOCKET100SDG
PN210026	QFP64 (14 x 14)	PN210025	TQPACK064SA	PN210027	TQSOCKET064SAG
PN210030	QFP160 (28 x 28)	PN210028	TQPACK160SB	PN210029	TQSOCKET160SBG
PN210033	LQFP64 (10 x 10)	PN210031	TQPACK064SD	PN210032	TQSOCKET064SDG
PN210036	LQFP144 (20 x 20)	PN210034	TQPACK144SD	PN210035	TQSOCKET144SDG
PN210044	LQFP144 (16 x 16)	PN210043	NQPACK144SE	—	—
PN210054	TQFP128 (14 x 14)	PN210053	NQPACK128SE	—	—

*1: QFP adaptors and QFP Sockets connectors are soldered onto the pc board of the target system. Once soldered, they should not be unsoldered from the pc board and resoldered.

*2: Pin protectors are sockets used to protect the MCU mount adaptors for QFPs and the pins of QFP adaptors and QFP sockets. Be sure to use a pin protector to protect the portion where the MCU mount adaptor is connected. It is recommended to replace the pin protector or the emulator connectors after 100 attachments and detachments.

*3: For the recommended footprints pattern, please visit Tokyo Eletech Corporation's website.

- QFP adaptors and the pin protector are not attached to the MCU mount adaptor.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

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