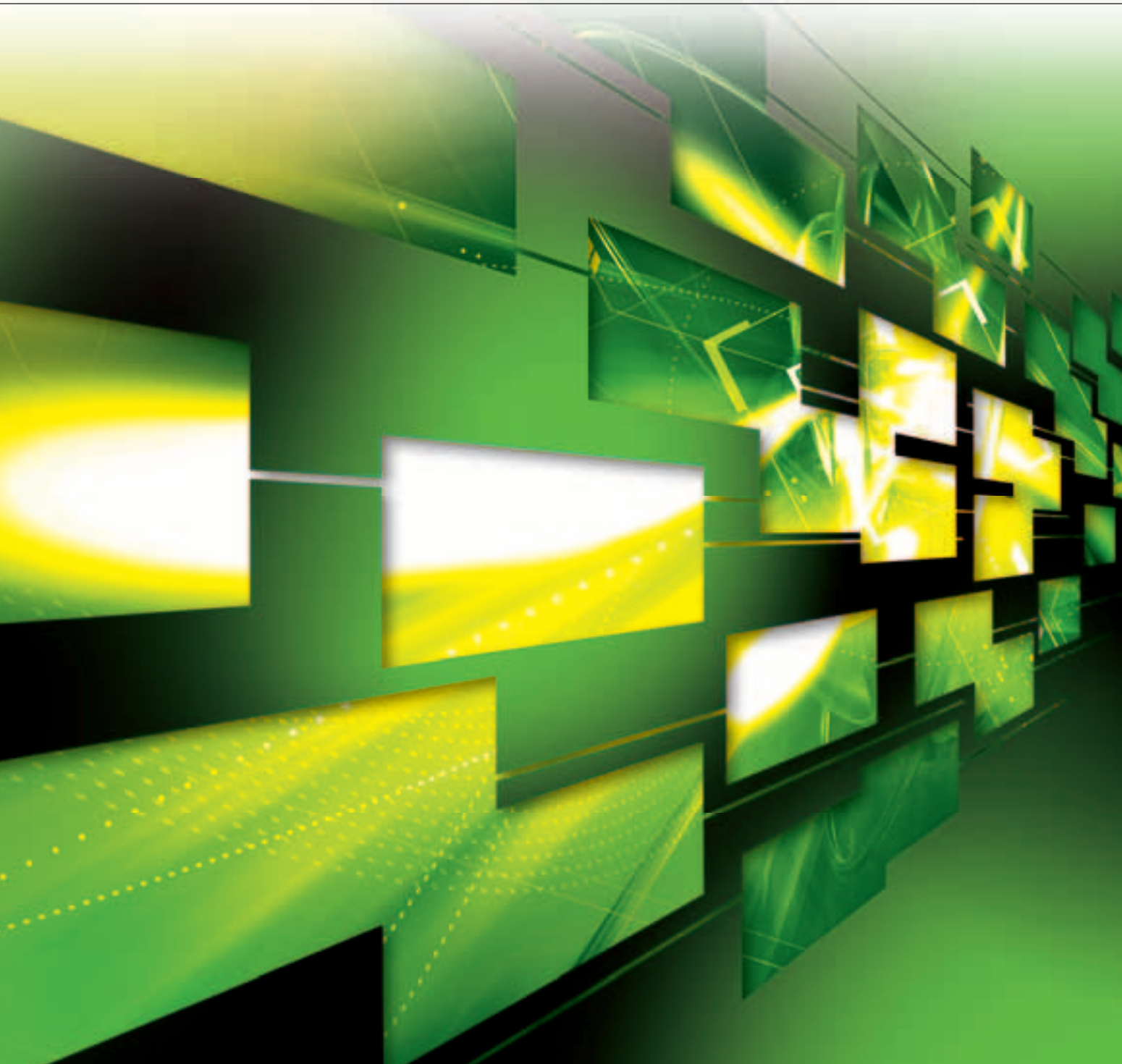
TOSHIBA
Leading Innovation

2010-7

PART NUMBER LIST

Microcomputers / Microcomputer Development Systems



SEMICONDUCTOR

http://www.semicon.toshiba.co.jp/eng

PART NUMBER LIST

Microcomputers / Microcomputer Development Systems

Part Numbering Nomenclature

Example 1

TMP 89 F S 60 x x UG

Package

QG: Plastic shrink quad outline non-leaded package (VQON); dry-packed
XBG: Plastic ball grid array (BGA); dry-packed
WBG: Wafer level chip size package (WCSP), dry-packed
UG, DUG, FG, DFG: Plastic quad flat package (QFP); dry-packed
MG, DMG: Plastic small-outline package (SOP); dry-packed
NG: Plastic shrink dual in-line package (SDIP)
PG: Plastic standard dual in-line package (DIP)

Automotive quality grade

R: Grade A, −40°C to +85°C
T: Grade A, −40°C to +125°C
I: Grade B, −40°C to +85°C
S: Grade B, −40°C to +125°C

Microcontroller revision

Microcontroller subtype

ROM size

	1	2	3	4	6	8	C	H
KB	1	2	3	4	6	8	12	16

	K	M	N	P	S	U	W	F	Y	Z	D
KB	24	32	40	48	60/64	96	128	192	256	384	512

ROM type

C: Mask
E: EEPROM
F: Flash
P: OTP

Microcontroller core

47:	47E	89:	870/C1	95:	900/H
86:	870/C	91:	900/L1	96:	900
87:	870	92, 94:	900/H1		
88:	870/X	93:	900/L		

Toshiba microcontrollers

Example 2

TMP 19A 23 F Y x XBG

Package

XBG: Plastic ball grid array (BGA); dry-packed
UG, FG: Plastic quad flat package (QFP); dry-packed

Part designator / Microcontroller revision

ROM size

	H	M	R	S	W	Y	Z	D	E	10	1D	20
KB	16	32	56	64	128	256	384	512	768	1024	1536	2048

ROM type

C: Mask
F: Flash

Microcontroller subtype

Microcontroller core

19	M3: 03
19A:	19A, 19A/H1
A9:	09

Toshiba microcontrollers

Microcomputer Selection Guide

Microcontrollers

4-Bit Microcontrollers

TLCS-47 Family: TLCS-47E Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	RAM (Nibbles)	Minimum Instruction Execution Time (μs) (Note 2)	LED Driver (Ch)	LCD Driver (Ch)	SIO (Ch)	AD Converter (Ch)	Pulse Generator (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	Standby Mode	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version	Package
TMP47C101MG	1	64	(1) 1.3 (2) 1.9	4							Yes	11	(Note1) (1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	—	SOP16
TMP47C101PG				4							Yes	11			TMP47P201VPG	DIP16
TMP47C102MG				4					Yes		Yes	15			TMP47P202VMG	SOP20
TMP47C102PG				4					Yes		Yes	15			TMP47P202VPG	DIP20
TMP47C103MG				8		1			Yes		Yes	23			TMP47P403VMG	SOP28
TMP47C103NG				8		1			Yes		Yes	23			TMP47P403VNG	SDIP28
TMP47C201MG	2	128		4							Yes	11			—	SOP16
TMP47C201PG				4							Yes	11			TMP47P201VPG	DIP16
TMP47C202MG				4					Yes		Yes	15			TMP47P202VMG	SOP20
TMP47C202PG				4					Yes		Yes	15			TMP47P202VPG	DIP20
TMP47C203MG				8		1			Yes		Yes	23			TMP47P403VMG	SOP28
TMP47C203NG				8		1			Yes		Yes	23			TMP47P403VNG	SDIP28
TMP47C206MG			(1) 1 (2) 1.9	5				1	Yes		Yes	15	(1) 4.0 to 5.7 (2) 4.0 to 5.7	-40 to 85	TMP47P206VMG	SOP20
TMP47C206PG				5				1	Yes		Yes	15			TMP47P206VPG	DIP20
TMP47C241MG			(1) 1.3 (2) 1.9	5		1	4		Yes		Yes	21	(1) 4.5 to 6.0 (2) 2.7 to 6.0	-30 to 70	TMP47P241VMG	SOP28
TMP47C241NG				5		1	4		Yes		Yes	21			TMP47P241VNG	SDIP28
TMP47C243DMG (Note3)			(1) 1 (2) 1.9	8		1	8	1	Yes		Yes	23	(1) 2.7 to 5.5 (2) 2.2 to 5.5		TMP47P443VDMG	SSOP30
TMP47C243MG (Note3)				8		1	8	1	Yes		Yes	23			TMP47P443VMG	SOP28
TMP47C243NG (Note3)				8		1	8	1	Yes		Yes	23			TMP47P443VNG	SDIP28
TMP47C222FG (Note3)		192			20	1	4	1	Yes	Yes	Yes	22			TMP47P422VFG	QFP44 (14×14 mm)
TMP47C222NG (Note3)					20	1	4	1	Yes	Yes	Yes	20			TMP47P422VNG	SDIP42
TMP47C222UG (Note3)					20	1	4	1	Yes	Yes	Yes	22			TMP47P422VUG	LQFP44 (10×10 mm)
TMP47C422FG (Note3)	4	256			20	1	4	1	Yes	Yes	Yes	22			TMP47P422VFG	QFP44 (14×14 mm)
TMP47C422NG (Note3)					20	1	4	1	Yes	Yes	Yes	20			TMP47P422VNG	SDIP42
TMP47C422UG (Note3)					20	1	4	1	Yes	Yes	Yes	22			TMP47P422VUG	LQFP44 (10×10 mm)
TMP47C443DMG (Note3)				8		1	8	1	Yes		Yes	23			TMP47P443VDMG	SSOP30
TMP47C443MG (Note3)				8		1	8	1	Yes		Yes	23			TMP47P443VMG	SOP28
TMP47C443NG (Note3)				8		1	8	1	Yes		Yes	23			TMP47P443VNG	SDIP28

Note 1) When CR oscillation is used (2.2 V to 5.5 V at 2.5 MHz)

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

Note 3) Contains the CPU core for the 470 Series.

Note 4) The minimum instruction execution time in Low-Speed mode is 244 μs (at 32.768 kHz).

- Not recommended for automotive applications.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

8-Bit Microcontrollers

TLCS-870 Family: TLCS-870/C Series

☐Flash Versions

Part Number	ROM (Kbytes)	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/I²C (Ch) (Note 4)	I²C (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	8-Bit DA Converter (Ch)	8-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	Undervoltage Detection	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP86F409NG	4	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	8	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
TMP86F808NG				8			1		1				5				1		2			Yes	Yes				24			TMP86C808NG	SDIP30
TMP86F809NG		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	TMP86C809NG	SDIP32
TMP86FH09ANG	16			8			1		1					6			1		2			Yes	Yes				26			TMP86C809NG TMP86CH09NG	
TMP86FH12MG				8				1	1					8			1	1	2			Yes	Yes				24			TMP86CH12MG	SSOP30
TMP86FH46ANG				19				1	1					8			1		2			Yes	Yes				33			TMP86C846NG TMP86CH46ANG	SDIP42
TMP86FH47ADUG				19				1	1					8			1		2			Yes	Yes				35			—	LQFP48 (7×7 mm)
TMP86FH47AUG				19				1	1					8			1		2			Yes	Yes				35			TMP86C845UG TMP86C847UG TMP86CH47AUG	LQFP44 (10×10 mm)
TMP86FH92DMG			(1) 0.25 (2) 0.5	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				8			1		1		1	1		6			1		2			Yes	Yes		Yes	Yes	26				SDIP32
TMP86FM29FG	32	1536		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)
TMP86FM29UG				4	32					1				8		1			4			Yes	Yes				39			TMP86CM29LUG	LQFP64 (10×10 mm)
TMP86FM25FG		2048		4	(Note3) 60			1		1			8			1			4			Yes	Yes				42			TMP86CM25AFG	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	48			12	24			1		1				8			2		2		Yes	Yes	Yes				54				LQFP80 (12×12 mm)
TMP86FS27FG	60	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 70	TMP86CM27FG TMP86CP27AFG	QFP80 (14×20 mm)
TMP86FS23UG		2048	(1) 0.25 (2) 0.5 (3) 0.5	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 (2) -40 to 85 (3) -20 to 85	TMP86CM23AUG TMP86CP23AUG	LQFP64 (10×10 mm)
TMP86FS28DFG					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		TMP86CS28DFG	LQFP80 (12×12 mm)
TMP86FS28FG					40				1	1				8			2		4			Yes	Yes				62			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	TMP86CH49FG TMP86CM49FG TMP86CS49FG	QFP64 (14×14 mm)
TMP86FS49BUG				13				2	2			1		16			2		4			Yes	Yes				56			TMP86CM49UG TMP86CS49UG	LQFP64 (10×10 mm)

Note 1) Configurable as UART or SIO.

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

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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	LED Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I²C (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	8	512	0.2	16		(Note1) 1	(Note1) 1				8	2	2	1			Yes		Yes		33	4.5 to 5.5	-40 to 85	—	LQFP44 (10×10 mm)
TMP88FH41UG	16			16		(Note1) 1	(Note1) 1				8	2	2	1			Yes				33			TMP88CH41UG	
TMP88FW45AFG	120	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 (Kbytes)	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)	I²C/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	Undervoltage Detection	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	16	2048	(1) 0.1 (2) 0.238 (3) 0.5	6				1	1	1		8			2		4			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		40	(Note5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			LQFP44 (10x10 mm)
TMP89FH42UG			(1) 0.1	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		40	(1) 4.3 to 5.5		TMP89CH42UG (Note 7)	
TMP89FH46DUG			(2) 0.238 (3) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		42	(2) 2.7 to 5.5 (3) 2.2 to 5.5		TMP89CH46DUG	LQFP48 (7x7 mm)
TMP89FH46LDUG			(1) 0.238 (2) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		42	(Note5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			
TMP89FM40NG	32		(1) 0.1 (2) 0.238 (3) 0.5	6				1	1	1		8			2		4			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				LQFP44 (10x10 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		40				
TMP89FM42UG			(1) 0.1 (2) 0.238 (3) 0.5	8				1	1	1		8			2		4			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)	
TMP89FM43LQG			(1) 0.238 (2) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		38	(Note5) (1) 2.7 to 3.6 (2) 2.2 to 3.6		—	VQON44 (5.3x5.3 mm)
TMP89FM46ADUG			(1) 0.1 (2) 0.19 (3) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		42	(1) 4.3 to 5.5 (2) 2.7 to 5.5 (3) 2.2 to 5.5			LQFP48 (7x7 mm)
TMP89FM46DUG			(1) 0.1 (2) 0.238 (3) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes		42			TMP89CM46DUG	
TMP89FM46KDUG			(1) 0.19 (2) 0.5	8				1	1	1		8			2		4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	42	(Note5) (1) 2.7 to 3.6 (2) 2.2 to 3.6			
TMP89FM82DUG			0.125	16					1			8			2		4		Yes	Yes	Yes	Yes	Yes	Yes	Yes		39	4.5 to 5.5			
TMP89FS60FG	60	3072	(1) 0.125 (2) 0.238	8				1	2	1		16			2		4			Yes	Yes	Yes	Yes	Yes	Yes		58	(1) 4.3 to 5.5 (2) 3.0 to 5.5	(1) -40 to 85 (2) -40 to 85	—	QFP64 (14x14 mm)
TMP89FS60UG			(3) 0.238	8				1	2	1		16			2		4			Yes	Yes	Yes	Yes	Yes	Yes		58	(3) 2.7 to 3.0	(3) -20 to 85		LQFP64 (10x10 mm)
TMP89FW20UG	124		(1) 0.0625 (2) 0.125	8	32		1	3		1		8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	52	(1) 2.7 to 5.5 (2) 1.8 to 5.5	-40 to 85		
TMP89FW24DFG				12	40		1	3		1		8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	68				QFP80 (14x20 mm)
TMP89FW24FG				12	40		1	3		1		8			2	1	4			Yes	Yes	Yes	Yes	Yes	Yes	Yes	68				LQFP80 (12x12 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) and (3) correspond to power supply voltages (1) and (3).

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 (Kbytes)	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/I²C (Ch) (Note 4)	I²C (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
TMP86P202MG (Note2)	2	128	0.5	2									4						2			Yes			14	3.3 to 5.5	-40 to 85	—	SOP20
TMP86P202PG (Note2)				2									4						2			Yes			14				DIP20
TMP86P203MG(Note2)			1.6	2									4						2			Yes			14	4.5 to 5.5			SOP20
TMP86P203PG(Note2)				2									4						2			Yes			14				DIP20
TMP86C407MG	4	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
TMP86C408NG				8			1		1				6				1		2			Yes	Yes		24			TMP86P808NG TMP86F808NG	SDIP30
TMP86C420FG			(1) 0.25 (2) 0.5 (3) 0.95	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				4	32			1					8			1			2			Yes	Yes		39			TMP86P820UG	LQFP64 (10×10 mm)
TMP86C807MG	8		(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
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
TMP86C808NG				8			1		1				6				1		2			Yes	Yes		24			TMP86P808NG TMP86F808NG	SDIP30
TMP86C820FG			(1) 0.25 (2) 0.5 (3) 0.95	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				4	32			1					8			1			2			Yes	Yes		39			TMP86P820UG	LQFP64 (10×10 mm)
TMP86C845UG			0.5	19				1						8					2			Yes	Yes		35	2.7 to 5.5		TMP86PM47AUG TMP86PH47UG TMP86FH47AUG	LQFP44 (10×10 mm)
TMP86C809NG		512	(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		TMP86F809NG TMP86FH09ANG	SDIP32
TMP86C822UG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	3	23			1	1				4			1			2			Yes	Yes		33	(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	TMP86PH22UG	LQFP44 (10×10 mm)
TMP86C829BFG			(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)
TMP86C829BUG				4	32					1				8		1			4			Yes	Yes		39			TMP86PM29BUG	LQFP64 (10×10 mm)
TMP86C846NG				19				1	1					8			1		2			Yes	Yes		33			TMP86PH46NG TMP86PM46NG TMP86FH46ANG	SDIP42
TMP86C847UG				19				1	1					8			1		2			Yes	Yes		35			TMP86PM47AUG TMP86PH47UG TMP86FH47AUG	LQFP44 (10×10 mm)
TMP86CH06AUG	16		(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	8					1	1							1		2			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	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5	-40 to 85	TMP86PH06NG	SDIP42
TMP86CH09NG			(1) 0.25	8			1		1					6			1		2			Yes	Yes		26	(1) 4.5 to 5.5		TMP86FH09ANG	SDIP32
TMP86CH12MG			(2) 0.5	8				1	1					8			1	1	2			Yes	Yes		24	(2) 2.7 to 5.5		TMP86FH12MG	SSOP30

Note 1) Configurable as UART or SIO.

Note 2) Contains an OTP memory.

Note 3) Minimum instruction execution times (1) to (4) correspond to power supply voltages (1) to (4).

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 (Kbytes)	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/I²C (Ch) (Note 4)	I²C (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
TMP86CH21AUG	16	512	(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	4	32					1			8			1			4			Yes	Yes		39	(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	TMP86PM29BUG	LQFP64 (10×10 mm)
TMP86CH21FG			(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)
TMP86CH22UG			(1) 0.25 (2) 0.5 (3) 0.95 (4) 0.95	3	23			1	1				4			1			2			Yes	Yes		33	(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	TMP86PH22UG	LQFP44 (10×10 mm)
TMP86CH46ANG				19				1	1				8			1			2			Yes	Yes		33			TMP86PH46NG TMP86PM46NG TMP86FH46ANG	SDIP42
TMP86CH47AUG				19				1	1				8			1			2			Yes	Yes		35			TMP86PM47AUG TMP86PH47UG TMP86FH47AUG	LQFP44 (10×10 mm)
TMP86CH49FG			(1) 0.25 (2) 0.5 (3) 0.95	13				2	2			1	16			2			4			Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5	-40 to 85	TMP86PM49FG TMP86FS49BFG	QFP64 (14×14 mm)
TMP86CH72FG		1024	(1) 0.25 (2) 0.5			16		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	
TMP86CH29BFG		1536	(1) 0.25	4	32					1			8			1			4			Yes	Yes		39	(1) 4.5 to 5.5	-40 to 85	TMP86PM29BFG	
TMP86CH29BUG			(2) 0.5 (3) 0.95	4	32					1			8			1			4			Yes	Yes		39	(2) 2.7 to 5.5 (3) 1.8 to 5.5		TMP86PM29BUG	LQFP64 (10×10 mm)
TMP86CK74AFG	24	1024	(1) 0.25	2		16		1					8				2		2			Yes	Yes		70	(1) 4.5 to 5.5	-30 to 70	TMP86PM74AFG	QFP80 (14×20 mm)
TMP86CM27FG	32		(2) 0.5	8	40			1	1				8					1	2			Yes	Yes		55	(2) 2.7 to 5.5	-40 to 85	TMP86PS27FG TMP86FS27FG	
TMP86CM46ANG			(1) 0.25 (2) 0.5 (3) 0.95	19				1	1				8			1			2			Yes	Yes		33	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5		TMP86PM46NG	SDIP42
TMP86CM47AUG				19				1	1				8			1			2			Yes	Yes		35			TMP86PM47AUG	LQFP44 (10×10 mm)
TMP86CM49FG				13				2	2			1	16			2			4			Yes	Yes		56			TMP86PM49FG TMP86FS49BFG	QFP64 (14×14 mm)
TMP86CM49UG				13				2	2			1	16			2			4			Yes	Yes		56			TMP86PM49UG TMP86FS49BUG	LQFP64 (10×10 mm)
TMP86CM72FG			(1) 0.25 (2) 0.5			16		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		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 TMP86FS23UG	LQFP64 (10×10 mm)
TMP86CM29BFG			(1) 0.25 (2) 0.5	4	32					1			8			1			4			Yes	Yes		39	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86PM29BFG	QFP64 (14×14 mm)
TMP86CM29BUG			(3) 0.95	4	32					1			8			1			4			Yes	Yes		39	(3) 1.8 to 5.5		TMP86PM29BUG	LQFP64 (10×10 mm)
TMP86CM29LUG				4	32					1			8			1			4			Yes	Yes		39			TMP86FM29UG	
TMP86CM25AFG		2048	(1) 0.25 (2) 0.5	4	(Note2) 60			1		1			8			1			4			Yes	Yes		42	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP86FM25FG	QFP100 (14×20 mm)
TMP86CM25FG			(1) 0.25 (2) 0.5 (3) 0.95	4	(Note2) 60			1		1			8			1			4			Yes	Yes		42	(1) 4.5 to 5.5 (2) 2.7 to 5.5 (3) 1.8 to 5.5		TMP86PS25FG	
TMP86CM74AFG			(1) 0.25 (2) 0.5	2		16		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)

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 power supply voltages (1) to (4).

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/C Series

☐Mask ROM Versions (Continued)

Part Number	ROM (Kbytes)	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)	UART/I²C (Ch) (Note 4)	I²C (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
TMP86CP27AFG	48	1024	(1) 0.25 (2) 0.5	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	QFP80 (14×20 mm)
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 TMP86FS23UG	LQFP64 (10×10 mm)
TMP86CS44UG	60	1024	(1) 0.25 (2) 0.5	19			1	1					8	1		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		2048	(1) 0.25 (2) 0.5	4	(Note2) 60		1		1			8			1			4			Yes	Yes		42	(1) 4.5 to 5.5 (2) 2.7 to 5.5	(1) -40 to 85 (2) -40 to 85	—	QFP100 (14×14 mm)
TMP86CS25AFG			(3) 0.95 (4) 0.95	4	(Note2) 60		1		1			8			1			4			Yes	Yes		42	(3) 2.0 to 5.5 (4) 1.8 to 5.5	(3) -40 to 85 (4) -20 to 85	TMP86PS25FG	QFP100 (14×20 mm)
TMP86CS28DFG			(1) 0.25		40			1	1				8			2		4			Yes	Yes		62	(1) 4.0 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86FS28DFG	LQFP80 (12×12 mm)
TMP86CS28FG			(2) 0.5		40			1	1				8			2		4			Yes	Yes		62			TMP86FS28FG	QFP80 (14×20 mm)
TMP86CS49FG			(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	(1) -40 to 85 (2) -40 to 85	TMP86FS49BFG	QFP64 (14×14 mm)
TMP86CS49UG			(3) 0.95 (4) 0.95	13			2	2			1		16			2		4			Yes	Yes		56	(3) 2.0 to 5.5 (4) 1.8 to 5.5	(3) -40 to 85 (4) -20 to 85	TMP86FS49BUG	LQFP64 (10×10 mm)
TMP86CS64AFG			(1) 0.25 (2) 0.5	16			2	1					16			2		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 power supply voltages (1) to (4).

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 Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 3)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I²C (Ch) (Note 1)	High-Speed Serial Output (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	6-Bit Comparator (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 4))	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP87C405AMG	4	256	(1) 0.5 (2) 0.95	6											2		Yes		Yes	22	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP87P808MG	SOP28
TMP87C408DMG (Note2)				6			1				6				2		Yes		Yes	22			—	SSOP30
TMP87C408LMG			0.95	6			1				6				2		Yes		Yes	22	1.8 to 4.0		TMP87P808LMG	SOP28
TMP87C408LNG				6			1				6				2		Yes		Yes	22			TMP87P808LNG	SDIP28
TMP87C408MG			(1) 0.5 (2) 0.95	6			1				6				2		Yes		Yes	22	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87P808MG	SOP28
TMP87C408NG				6			1				6				2		Yes		Yes	22			TMP87P808NG	SDIP28
TMP87C409BMG				6					1			8			1	2	Yes			22	(1) 4.5 to 5.5 (2) 2.2 to 5.5		TMP87P809MG	SOP28
TMP87C409BNG				6					1			8			1	2	Yes			22			TMP87P809NG	SDIP28
TMP87C446NG		512		8			1			1	8				2	2	Yes	Yes		35	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PH46NG	SDIP42
TMP87C447UG				8			1			1	8				2	2	Yes	Yes		37			TMP87PH47UG	LQFP44 (10×10 mm)
TMP87C807UG	8	256		8			1			1					2	2	Yes	Yes		37				
TMP87C808LMG			0.95	6			1				6				2		Yes		Yes	22	1.8 to 4.0		TMP87P808LMG	SOP28
TMP87C808LNG				6			1				6				2		Yes		Yes	22			TMP87P808LNG	SDIP28
TMP87C808MG			(1) 0.5 (2) 0.95	6			1				6				2		Yes		Yes	22	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87P808MG	SOP28
TMP87C808NG				6			1				6				2		Yes		Yes	22			TMP87P808NG	SDIP28
TMP87C809BMG				6					1			8			1	2	Yes			22	(1) 4.5 to 5.5 (2) 2.2 to 5.5		TMP87P809MG	SOP28
TMP87C809BNG				6					1			8			1	2	Yes			22			TMP87P809NG	SDIP28
TMP87C840FG				8			2				8				2	2	Yes	Yes		56	(1) 4.5 to 6.0 (2) 2.7 to 6.0		TMP87PH40AFG	QFP64 (14×20 mm)
TMP87C840NG				8			2				8				2	2	Yes	Yes		56			TMP87PH40ANG	SDIP64
TMP87C841FG				8			2					16			2	2	Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP87PM41FG	QFP64 (14×20 mm)
TMP87C841NG				8			2					16			2	2	Yes	Yes		56			TMP87PM41NG	SDIP64
TMP87C841UG				8			2					16			2	2	Yes	Yes		56			TMP87PM41UG	LQFP64 (10×10 mm)
TMP87C814FG		512	0.5			16	1				8				2	2	Yes	Yes		55	4.5 to 5.5	-30 to 70	TMP87PM14FG	QFP64 (14×20 mm)
TMP87C814NG						16	1				8				2	2	Yes	Yes		55			TMP87PM14NG	SDIP64
TMP87C846NG			(1) 0.5 (2) 0.95	8			1			1	8				2	2	Yes	Yes		35	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PH46NG	SDIP42
TMP87C847LUG			0.95	8			1			1	8				2	2	Yes	Yes		37	1.8 to 4.0		TMP87PH47LUG	LQFP44 (10×10 mm)
TMP87C847UG			(1) 0.5 (2) 0.95	8			1			1	8				2	2	Yes	Yes		37	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PH47UG	
TMP87CC40FG	12			8			2				8				2	2	Yes	Yes		56	(1) 4.5 to 6.0 (2) 2.7 to 6.0		TMP87PH40AFG	QFP64 (14×20 mm)
TMP87CC40NG				8			2				8				2	2	Yes	Yes		56			TMP87PH40ANG	SDIP64
TMP87CC41FG				8			2					16			2	2	Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP87PM41FG	QFP64 (14×20 mm)
TMP87CC41NG				8			2					16			2	2	Yes	Yes		56			TMP87PM41NG	SDIP64
TMP87CC41UG				8			2					16			2	2	Yes	Yes		56			TMP87PM41UG	LQFP64 (10×10 mm)
TMP87CH14FG	16		0.5			16	1				8				2	2	Yes	Yes		55	4.5 to 5.5	-30 to 70	TMP87PM14FG	QFP64 (14×20 mm)
TMP87CH14NG						16	1				8				2	2	Yes	Yes		55			TMP87PM14NG	SDIP64
TMP87CH40FG			(1) 0.5 (2) 0.95	8			2				8				2	2	Yes	Yes		56	(1) 4.5 to 6.0 (2) 2.7 to 6.0		TMP87PH40AFG	QFP64 (14×20 mm)
TMP87CH40NG				8			2				8				2	2	Yes	Yes		56			TMP87PH40ANG	SDIP64

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

Note 2) A 125°C version is available for the TMP87C408DM. For further information, please contact your nearest Toshiba sales representative.

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 Series

☐Mask ROM Versions (Continued)

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 2)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I²C (Ch) (Note 1)	High-Speed Serial Output (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	6-Bit Comparator (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 3))	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP87CH41FG	16	512	(1) 0.5 (2) 0.95	8			2					16			2	2	Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP87PM41FG	QFP64 (14×20 mm)
TMP87CH41NG				8			2					16			2	2	Yes	Yes		56			TMP87PM41NG	SDIP64
TMP87CH41UG				8			2					16			2	2	Yes	Yes		56			TMP87PM41UG	LQFP64 (10×10 mm)
TMP87CH46NG				8			1			1	8				2	2	Yes	Yes		35		-30 to 70	TMP87PH46NG	SDIP42
TMP87CH47LUG			0.95	8			1			1	8				2	2	Yes	Yes		37	1.8 to 4.0		TMP87PH47LUG	LQFP44 (10×10 mm)
TMP87CH47UG			(1) 0.5 (2) 0.95	8			1			1	8				2	2	Yes	Yes		37	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PH47UG	
TMP87CH48DFG				8				1	1			16			2	2	Yes	Yes		56		-40 to 85	TMP87PH48DFG	QFP64 (14×14 mm)
TMP87CH48UG				8				1	1			16			2	2	Yes	Yes		56			TMP87PH48UG	LQFP64 (10×10 mm)
TMP87CH74AFG			0.5	16		16	1		1		12				2	2	Yes	Yes		71	4.5 to 5.5	-30 to 70	TMP87PM74FG	QFP80 (14×20 mm)
TMP87CH75FG				16		16	1		1		16				2	2	Yes	Yes		89			TMP87PM75FG	QFP100 (14×20 mm)
TMP87CH21CDFG		1024	(1) 0.5 (2) 0.95	1	32		2				8				2	2	Yes	Yes		52	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PP21DFG	LQFP80 (12×12 mm)
TMP87CH21CFG				1	32		2				8				2	2	Yes	Yes		52			TMP87PP21FG	QFP80 (14×20 mm)
TMP87CH29NG				3	24			1			5			1		4	Yes	Yes		43			TMP87PM29NG	SDIP64
TMP87CH29UG				3	24			1			5			1		4	Yes	Yes		43			TMP87PM29UG	LQFP64 (10×10 mm)
TMP87CK14FG	24		0.5			16	1				8				2	2	Yes	Yes		55	4.5 to 5.5		TMP87PM14FG	QFP64 (14×20 mm)
TMP87CK14NG						16	1				8				2	2	Yes	Yes		55			TMP87PM14NG	SDIP64
TMP87CK29NG			(1) 0.5 (2) 0.95	3	24			1			5			1		4	Yes	Yes		43	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PM29NG	
TMP87CK29UG				3	24			1			5			1		4	Yes	Yes		43			TMP87PM29UG	LQFP64 (10×10 mm)
TMP87CK40AFG				8			2				8				2	2	Yes	Yes		56			TMP87PM40AFG	QFP64 (14×20 mm)
TMP87CK40ANG				8			2				8				2	2	Yes	Yes		56			TMP87PM40ANG	SDIP64
TMP87CK41FG				8			2					16			2	2	Yes	Yes		56		-40 to 85	TMP87PM41FG	QFP64 (14×20 mm)
TMP87CK41NG				8			2					16			2	2	Yes	Yes		56			TMP87PM41NG	SDIP64
TMP87CK41UG				8			2					16			2	2	Yes	Yes		56			TMP87PM41UG	LQFP64 (10×10 mm)
TMP87CM70BFG	32	512				16	1			1			6		2	2	Yes	Yes		73		-30 to 70	TMP87PM70FG	QFP80 (14×20 mm)
TMP87CM14FG		1024	0.5			16	1				8				2	2	Yes	Yes		55	4.5 to 5.5		TMP87PM14FG	QFP64 (14×20 mm)
TMP87CM14NG						16	1				8				2	2	Yes	Yes		55			TMP87PM14NG	SDIP64
TMP87CM21CDFG			(1) 0.5 (2) 0.95	1	32		2				8				2	2	Yes	Yes		52	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PP21DFG	LQFP80 (12×12 mm)
TMP87CM21CFG				1	32		2				8				2	2	Yes	Yes		52			TMP87PP21FG	QFP80 (14×20 mm)
TMP87CM23AFG				1	40		2				8				2	2	Yes	Yes		70			TMP87PP23FG	QFP100 (14×20 mm)
TMP87CM29NG				3	24			1			5			1		4	Yes	Yes		43			TMP87PM29NG	SDIP64
TMP87CM29UG				3	24			1			5			1		4	Yes	Yes		43			TMP87PM29UG	LQFP64 (10×10 mm)

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

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

Note 3) 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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 2)	LED Driver (Ch)	LCD Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I²C (Ch) (Note 1)	High-Speed Serial Output (Ch)	8-Bit AD Converter (Ch)	10-Bit AD Converter (Ch)	6-Bit Comparator (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Dual Clocks (Low-Speed Mode (Note 3))	Clock Gear	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP Version (See the datasheet for operating conditions.)	Package
TMP87CM40AFG	32	1024	(1) 0.5 (2) 0.95	8			2				8				2	2	Yes	Yes		56	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP87PM40AFG	QFP64 (14×20 mm)
TMP87CM40ANG				8			2				8				2	2	Yes	Yes		56			TMP87PM40ANG	SDIP64
TMP87CM41FG				8			2					16			2	2	Yes	Yes		56		-40 to 85	TMP87PM41FG	QFP64 (14×20 mm)
TMP87CM41NG				8			2					16			2	2	Yes	Yes		56			TMP87PM41NG	SDIP64
TMP87CM41UG				8			2					16			2	2	Yes	Yes		56			TMP87PM41UG	LQFP64 (10×10 mm)
TMP87CM48DFG				8				1	1			16			2	2	Yes	Yes		56			TMP87PM48DFG	QFP64 (14×14 mm)
TMP87CM48UG				8				1	1			16			2	2	Yes	Yes		56			TMP87PM48UG	LQFP64 (10×10 mm)
TMP87CM53FG				7			1	1			8				2	2	Yes	Yes	Yes	72	(1) 4.5 to 5.5 (2) 2.2 to 5.5	-30 to 60	TMP87PM53FG	QFP80 (14×20 mm)
TMP87CM74AFG			0.5	16		16	1		1		12				2	2	Yes	Yes		71	4.5 to 5.5	-30 to 70	TMP87PM74FG	
TMP87CM75FG				16		16	1		1		16				2	2	Yes	Yes		89			TMP87PM75FG	QFP100 (14×20 mm)
TMP87CP21CDFG	48	2048	(1) 0.5 (2) 0.95	1	32		2				8				2	2	Yes	Yes		52	(1) 4.5 to 5.5 (2) 2.7 to 5.5		TMP87PP21DFG	LQFP80 (12×12 mm)
TMP87CP21CFG				1	32		2				8				2	2	Yes	Yes		52			TMP87PP21FG	QFP80 (14×20 mm)
TMP87CP23FG				1	40		2				8				2	2	Yes	Yes		70			TMP87PP23FG	QFP100 (14×20 mm)
TMP87CS68DFG	60			7			1	1			8				2	2	Yes	Yes	Yes	72			TMP87PS68DFG	LQFP80 (12×12 mm)
TMP87CS71BFG						16	1			1			6		2	2	Yes	Yes		73			TMP87PS71AFG	QFP80 (14×20 mm)

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

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

Note 3) 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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 3)	LED Driver (Ch)	VFT Driver (Ch)	SIO (Ch)	UART (Ch)	I²C (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	16	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 (10x10 mm)
TMP88CS42FG	64	2048		24		1	1		2		16	2	4	2			Yes		55			TMP88PS42FG	QFP64 (14x20 mm)
TMP88CS42NG				24		1	1		2		16	2	4	2			Yes		55			TMP88PS42NG	SDIP64
TMP88CS43FG				24		1	1		2		16	2	4	2			Yes		71			TMP88PS43FG	QFP80 (14x20 mm)
TMP88CS77FG			(1) 0.32 (2) 122		18	2		1		12		3	1				Yes	Yes	88	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-30 to 70	TMP88PU77FG	QFP100 (14x20 mm)
TMP88CU74FG	96				16	1		1		12		2	2				Yes	Yes	71			TMP88PU74FG	QFP80 (14x20 mm)
TMP88CU77FG		3072			18	2		1		12		3	1				Yes	Yes	88			TMP88PU77FG	QFP100 (14x20 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 (Kbytes)	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)	I²C/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	Undervoltage Detection	I/O Port (Pins) (Note 4)	Power Supply Voltage (V)	Operating Temperature (°C)	Flash Version (See the datasheet for operating conditions.)	Package
TMP89CH42UG	16	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	32			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) and (3) correspond to power supply voltages (1) and (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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	LED Driver (Ch)	UART/SIO (Ch)	SIO (Ch)	I²C/SIO (Ch)	I²C (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)	Motor Controller (Ch)	32-kHz Timer (for S/W 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	96	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	69				LQFP80 (12×12 mm)
TMP91FW40FG	128		(1) 0.148 (2) 0.25		4						4		(Note2) 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		8192	(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	83			—	LQFP100 (14×14 mm)
TMP91FW27FG		12288	(1) 0.148 (2) 0.25		2		1				4			6	1		Yes			3	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			3	Yes	Yes	Yes		53			TMP91CK27UG TMP91CP27UG TMP91CU27UG	LQFP64 (10×10 mm)
TMP91FY42FG	256	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.

TLCS-900 Family: TLCS-900/L1 Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 2)	LED Driver (Ch)	UART/SIO (Ch)	UART (Ch)	SIO (Ch)	I²C/SIO (Ch)	I²C (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 S/W 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				31	(1) 2.7 to 3.6 (2) 1.8 to 3.6	-10 to 70	—	LQFP100 (14×14 mm)
TMP91C025FG			(1) 0.111 (2) 0.148 (3) 0.25		2						Yes	4	Yes		4			1		4	Yes	Yes	Yes		Yes	Yes	38	(1) 3.0 to 3.6 (2) 2.7 to 3.6 (3) 2.4 to 3.6	-40 to 85		
TMP91C219FG		2048	0.111		1							4			6	1				4	Yes		Yes				45	(Note1) (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		
TMP91C815FG		8192	(1) 0.148 (2) 0.4		2			1			Yes	8	Yes		4			1		4	Yes	Yes	Yes			Yes	61	(1) 2.7 to 3.6 (2) 1.8 to 3.6			TQFP128 (14×14 mm)
TMP91C824FG			(1) 0.122 (2) 0.4		2			1			Yes	8			4			1		4	Yes	Yes	Yes			Yes	35				LQFP100 (14×14 mm)
TMP91C829FG			0.111		2							8			6	1				4	Yes		Yes				45	(Note1) (1) 4.75 to 5.25 (2) 3.0 to 3.6	-20 to 70		
TMP91C820AFG	8		(1) 0.111 (2) 0.148		2	1		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			LQFP144 (16×16 mm)
TMP91CK27UG	24	1024	(1) 0.148		2			1				4			6	1	Yes			3	Yes	Yes	Yes				53	(1) 2.7 to 3.6	-40 to 85	TMP91FW27UG	LQFP64 (10×10 mm)
TMP91CP27UG	48	4096	(2) 0.4		2			1				4			6	1	Yes			3	Yes	Yes	Yes				53	(2) 1.8 to 3.6			
TMP91CU10FG	96	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		TMP91PW10FG	LQFP100 (14×14 mm)
TMP91CU27FG		10240	(1) 0.148 (2) 0.4		2			1				4			6	1	Yes			3	Yes	Yes	Yes				53	(1) 2.7 to 3.6 (2) 1.8 to 3.6		TMP91FW27FG	QFP64 (14×14 mm)
TMP91CU27UG					2			1				4			6	1	Yes			3	Yes	Yes	Yes				53			TMP91FW27UG	LQFP64 (10×10 mm)
TMP91CW11FG	128	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		TMP91PW11FG	LQFP100 (14×14 mm)
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		TMP91FY42FG	
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		TMP91PW12FG	
TMP91CW40FG			(1) 0.148 (2) 0.25 (3) 0.4		4							4		(Note3) 40	4	3		1			Yes	Yes		6			61	(1) 2.7 to 3.6 (2) 2.2 to 3.6 (3) 1.8 to 3.6		TMP91FW40FG	
TMP91CW60DFG		8192	0.2		3				2			16			6	5	Yes			4	Yes	Yes	Yes	6			83	4.5 to 5.5		TMP91FW64DFG	QFP100 (14×20 mm)
TMP91CW60FG					3				2			16			6	5	Yes			4	Yes	Yes	Yes	6			83			TMP91FW64FG	LQFP100 (14×14 mm)
TMP91CY22FG	256	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) and (3) correspond to power supply voltages (1) and (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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 2)	UART/SIO (Ch)	I²C/SIO (Ch)	10-Bit AD Converter (Ch)	LCD Driver (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	32-kHz Timer (for S/W 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
TMP93CS41DFG	NA	2048	(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)
TMP93CS45FG				2	1	8		4	2					Yes	Yes	Yes	44				LQFP80 (12×12 mm)
TMP93CW41DFG		4096		2		8		2	2		2	2	3	Yes	Yes	Yes	61				LQFP100 (14×14 mm)
TMP93CS20FG	64	2048		2	1	8	(Note3) 40	4	4	Yes				Yes	Yes	Yes	88			TMP93PW20AFG	LQFP144 (16×16 mm)
TMP93CS32FG				2		6		4	2					Yes		Yes	49			TMP93PW32FG	QFP64 (14×14 mm)
TMP93CS36UG				2		4		4	2					Yes		Yes	33			—	LQFP44 (10×10 mm)
TMP93CS40DFG				2		8		2	2		2	2	3	Yes	Yes	Yes	79			TMP93PS40DFG	LQFP100 (14×14 mm)
TMP93CS44FG				2	1	8		4	2					Yes	Yes	Yes	62			TMP93PS44FG	LQFP80 (12×12 mm)
TMP93CU44DFG (Note1)	96	3072		2	1	8		4	2					Yes	Yes	Yes	62			TMP93PW44ADFG (Note1)	QFP80 (14×20 mm)
TMP93CW40DFG	128	4096		2		8		2	2		2	2	3	Yes	Yes	Yes	79			TMP93PW40DFG	LQFP100 (14×14 mm)
TMP93CW44DFG (Note1)				2	1	8		4	2					Yes	Yes	Yes	62			TMP93PW44ADFG (Note1)	QFP80 (14×20 mm)
TMP93CW46AFG				5		8		2	2			2	3	Yes	Yes	Yes	79			TMP93PW46AFG	LQFP100 (14×14 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 (Kbytes)	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 (2) 0.4	3		8	2	8	2		4	Yes	55	(1) 4.5 to 5.5 (2) 2.7 to 5.5			LQFP100 (14×14 mm)
TMP95CW65FG		4096		3		8	2	8	2		4	Yes	55				
TMP95CS64FG	64	2048		3		8	2	8	2		4	Yes	81			TMP95PW64FG	
TMP95CS66FG			0.16	1				8	2		4	Yes	81	4.5 to 5.5			
TMP95CW64FG	128	4096	(1) 0.16 (2) 0.4	3		8	2	8	2		4	Yes	81	(1) 4.5 to 5.5 (2) 2.7 to 5.5			

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 (Kbytes)	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
TMP96C031ZFG	NA	NA	0.2	2	1	4		4	1	2		4	Yes	37	4.5 to 5.5	-20 to 70	—	QFP64 (14×20 mm)
TMP96C041BFG		1024	(1) 0.2 (2) 0.25	2			4	2	2	2	2	3	Yes	47		(1) -20 to 70 (2) -40 to 85		QFP80 (14×20 mm)
TMP96C141BFG				2			4	2	2	2	2	3	Yes	47				
TMP96CM40FG	32			2			4	2	2	2	2	3	Yes	65			TMP96PM40FG	

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.

32-Bit Microcontrollers

TLCS-900 Family: TLCS-900/H1 Series

☐Flash Versions

Part Number	ROM (Kbytes)	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)	UART/SIO/HSIO (Ch)	I²C/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	512	32768	0.05					2	1	2					12			6	2	Yes				4	Yes	Yes	Yes	8	84	3.0 to 3.6	-40 to 85	TMP92CY23DFG TMP92CD23ADFG	QFP100 (14x20 mm)
TMP92FD23AFG								2	1	2					12			6	2	Yes				4	Yes	Yes	Yes	8	84			TMP92CY23FG TMP92CD23AFG	LQFP100 (14x14 mm)
TMP92FD28AFG				1		Yes	1	2		(Note1) 2								6	2		1			3	Yes	Yes	Yes	8	70			TMP92CD28AFG	LQFP100 (14x14 mm)

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 (Kbytes)	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)	UART/SIO/HSIO (Ch)	I²C/SIO (Ch)	I²C (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)	Touch Screen Interface	Melody/Alarm Generator (MLD)	I²S(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
TMP94C241CFG◇	NA	2048	0.05					2						2			8	2		4	4					6	Yes							64	4.5 to 5.5	-20 to 70	—	QFP160 (28x28 mm)
TMP94C251ADFG◇								2						2			8	2		4	4					6	Yes							64				LQFP144 (20x20 mm)
TMP92C820FG		8192					2	1		1				1		Yes	5		Yes	4	1		1			4	Yes	Yes	Yes			Yes		83	3.0 to 3.6			LQFP144 (16x16 mm)
TMP92CA25FG		10240	(1) 0.05			Yes		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					58	3.0 to 3.6	-40 to 85		LQFP100 (14x14 mm)
TMP92CM27FG							2	4			2			1			12	2		8	6			2		6	Yes		Yes					83				LQFP144 (16x16 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	(Note1) 3.0 to 3.6 1.4 to 1.6	(1) 0 to 50 (2) 0 to 70		FBGA228 (15x15 mm)
TMP92CF29AFG			0.0125		1	Yes		2				1	6	1	2	Yes	6		Yes	8	2		1		Yes	4	Yes	Yes	Yes		Yes	Yes	1	98		0 to 70		LQFP176 (20x20 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		(1) 0 to 50 (2) 0 to 70		FBGA228 (15x15 mm)
TMP92CY23DFG	256	16384	0.05					3			2						12			6	2	Yes				4	Yes	Yes	Yes	8				84	3.0 to 3.6	-40 to 85	TMP92FD23ADFG	QFP100 (14x20 mm)
TMP92CY23FG								3			2						12			6	2	Yes				4	Yes	Yes	Yes	8				84			TMP92FD23AFG	LQFP100 (14x14 mm)
TMP92CD23ADFG	512	32768						2		1	2						12			6	2	Yes				4	Yes	Yes	Yes	8				84			TMP92FD23ADFG	QFP100 (14x20 mm)
TMP92CD23AFG								2		1	2						12			6	2	Yes				4	Yes	Yes	Yes	8				84			TMP92FD23AFG	LQFP100 (14x14 mm)
TMP92CD28AFG				1		Yes	1	2			(Note3) 2									6	2		1			3	Yes	Yes	Yes	8				70			TMP92FD28AFG	

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

Note 1) 1.4 V to 1.6 V internally; 3.0 V to 3.6 V for input/output interface.

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

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.

Automotive Microcontrollers

8-Bit Microcontrollers for Automotive

TLCS-870 Family: TLCS-870/C Series

☐Flash Versions

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 1)	LED Driver (Ch)	CAN (Ch)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/I²C (Ch) (Note 3)	I²C (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	Undervoltage Detection	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Mask ROM Version (See the datasheet for operating conditions.)	Package
TMP86FH92IDMG (Note4)	16	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 (Note4) TMP86CH92SDMG (Note4)	SSOP30

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

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 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/C1 Series

☐Flash Versions

Part Number	ROM (Kbytes)	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)	I²C/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	Undervoltage Detection	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 **	32	2048	0.125	16						1	1			8			2		4		1	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) The minimum instruction execution time in Low-Speed mode is 122 µs (at 32.768 kHz).

Note 5) The motor controller can only be used when an 8-MHz oscillator is used with the clock gear set to 1x.

- 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/C Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (µs) (Note 1)	LED Driver (Ch)	CAN (Ch) (Note 2)	SEI (Ch)	SIO (Ch)	UART (Ch)	UART/I²C (Ch) (Note 5)	I²C (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	Undervoltage Detection	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	OTP/Flash Version (See the datasheet for operating conditions.)	Package
TMP86C408IDMG	4	256	(1) 0.25 (2) 0.5	8		1		1			6		1	2	Yes	Yes			24	(1) 4.5 to 5.5 (2) 2.7 to 5.5	-40 to 85	TMP86P808DMG	SSOP30
TMP86C408SDMG				8		1		1			6		1	2	Yes	Yes			24		-40 to 125		
TMP86C808IDMG	8			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		512		19			1	1				8	1	2	Yes	Yes			35		-40 to 85	TMP86PM47AUG TMP86PH47UG TMP86FH47AUG	LQFP44 (10×10 mm)
TMP86C847SUG				19			1	1				8	1	2	Yes	Yes			35		-40 to 125		
TMP86CH47IUG	16			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 (Note6)			(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 (Note6)	SSOP30
TMP86CH92SDMG (Note6)			(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	(Note3) 1	1		1				14	1	2	Yes	Yes			35	4.5 to 5.5	-40 to 85	TMP86PM87RUG	LQFP44 (10×10 mm)
TMP86CM87RUG	32			8	(Note3) 1	1		1				14	1	2	Yes	Yes			35				

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

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 (Kbytes)	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	16	512	0.2	14	(Note1) 1	(Note1) 1	4	1	2	1	Yes	19	4.5 to 5.5	-40 to 85	TMP88PH40MG	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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs) (Note 1)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I²C/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 **	96	10240	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	256	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	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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I²C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	H/W 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 (Note1) **	512	32768	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 (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Time (μs)	CAN (16 Mailboxes) (Ch)	SEI (Ch)	UART/SIO (Ch)	I²C/SIO (Ch)	10-Bit AD Converter (Ch)	8-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	H/W 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 (Note1)**	512	32768	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.

ARM Core-Based Microcontrollers

32-Bit Microcontrollers

TX03 Family: TX03 Series

☐Flash Versions

Part Number	ROM (Kbytes)	SRAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	SSP(Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	I²C (Ch)	I²C/SIO(Ch)	10-Bit AD Converter (Ch)	12-Bit AD Converter (Ch)	10-Bit DA Converter (Ch)	16-Bit Timer/Counter (Ch)	USB Host (Full Speed) (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)	Watchdog Timer	Clock Gear	RTC (Ch)	Dual Clocks	On-Chip Debug Unit	Trace Function	Oscillation Frequency Detector	Power-On Reset	Undervoltage Detection	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMPM382FSFG **	64		40	2	1	3			1		10		8			1	(Note3) 1	1				8		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	48	4.0 to 5.5	-40 to 85	QFP64 (14x14 mm)
TMPM330FWFG	128	8	40			3			3	12			10		1	2						8		Yes	Yes	1	Yes	Yes	Yes				78	2.7 to 3.6	-20 to 85	LQFP100 (14x14 mm)
TMPM332FWUG			40			2			2	8			10		1	1						5		Yes	Yes	1	Yes	Yes	Yes				44			LQFP64 (10x10 mm)
TMPM333FWFG			40			3			3	12			10									8		Yes	Yes	1	Yes	Yes	Yes				78			LQFP100 (14x14 mm)
TMPM390FWFG **			20		1	3		1	1	12			10		1	1						7		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	76	1.7 to 3.6	-40 to 85	
TMPM395FWXBG			20		4	3		1	1	12			10		1	1						11		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	91			FBGA120 (6x6 mm)
TMPM380FWDFG **		12	40	2	2	5			2		18		8			1	(Note3) 2	3	2			16		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	84	4.0 to 5.5		QFP100 (14x20 mm)
TMPM380FWFG **			40	2	2	5			2		18		8			1	(Note3) 2	3	2			16		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	84			LQFP100 (14x14 mm)
TMPM382FWFG **			40	2	1	3			1		10		8			1	(Note3) 1	1				8		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	48			QFP64 (14x14 mm)
TMPM370FYDFG	256	10	80			4					22		8				2		2	4	4	16		Yes	Yes			Yes	Yes	Yes	Yes	Yes	76	4.5 to 5.5		QFP100 (14x20 mm)
TMPM370FYFG			80			4					22		8				2		2	4	4	16		Yes	Yes			Yes	Yes	Yes	Yes	Yes	76			
TMPM330FYFG		16	40			3			3	12			10		1	2						8		Yes	Yes	1	Yes	Yes	Yes				78	2.7 to 3.6	-20 to 85	LQFP100 (14x14 mm)
TMPM330FYWFG**			40			3			3	12			10		1	2						8		Yes	Yes	1	Yes	Yes	Yes				78		-40 to 85	
TMPM333FYFG			40			3			3	12			10									8		Yes	Yes	1	Yes	Yes	Yes				78		-20 to 85	
TMPM380FYDFG **			40	2	2	5			2		18		8			1	(Note3) 2	3	2			16		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	84	4.0 to 5.5	-40 to 85	QFP100 (14x20 mm)
TMPM380FYFG **			40	2	2	5			2		18		8			1	(Note3) 2	3	2			16		Yes	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	84			
TMPM330FDFG	512	32	40			3			3	12			10		1	2						8		Yes	Yes	1	Yes	Yes	Yes				78	2.7 to 3.6	-20 to 85	LQFP100 (14x14 mm)
TMPM330FDWFG			40			3			3	12			10		1	2						8		Yes	Yes	1	Yes	Yes	Yes				78		-40 to 85	
TMPM333FDFG			40			3			3	12			10									8		Yes	Yes	1	Yes	Yes	Yes				78		-20 to 85	
TMPM341FDXBG **			54	4	1	5			2		16	2	12									12	2	Yes	Yes			Yes	Yes	Yes			87		-40 to 85	FBGA113 (6x6 mm)
TMPM361F10FG	1024	64	64	2	1	5		1	3	8			16		1	1						10	4	Yes	Yes	1	Yes	Yes	Yes				76		-20 to 85	LQFP100 (14x14 mm)
TMPM362F10FG			64	2	1	12			5	16			16		1	2						16	4	Yes	Yes	1	Yes	Yes	Yes				120			LQFP144 (20x20 mm)
TMPM363F10FG			(Note1) 64	2	1	5		1	3	8			16	1	1	1						8	4	Yes	Yes	1	Yes	Yes	Yes				74	(Note2) 2.7 to 3.6		LQFP100 (14x14 mm)
TMPM364F10FG **			(Note1) 64	2	1	12			5	16			16	1	1	2						14	4	Yes	Yes	1	Yes	Yes	Yes				118			LQFP144 (20x20 mm)
TMPM360F20FG **	2048	128	64		1	12			5	16			16		1	2						17	4	Yes	Yes	1	Yes	Yes	Yes				120	2.7 to 3.6		

Note 1) 48 MHz when USB is used.

**: Under development

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

Note 3) The motor controller channel is multiplexed with the multi-purpose timer (MPT).

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

TX03 Family: TX03 Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	SRAM (Kbytes)	eDRAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	USB Host (High Speed) (Ch)	SD Host Controller (Ch)	SSP(SPI/MicroWire) (Ch)	UART (Ch)	I²C (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	320	1024	144	8	1	1	4	4	2	4	8	4	Yes	2	Yes	Yes	55	(Note1) 1.1 to 1.3	-40 to 85	LQFP144 (20x20 mm)

Note 1) The following three power supplies are available:

(1) For external circuitry in general, USB, external AD converter, internal eDRAM: 3.0 V to 3.6 V

(2) For external USB device : 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 (Kbytes)	RAM (Kbytes)	Minimum Instruction Execution Time (µs)	USB Device (High Speed) (Ch)	USB Host (Full Speed) (Ch)	SD Host Controller (Ch)	UART (Ch)	I²C (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 S/W RTC)	Watchdog Timer	I²S(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	16	(1) 0.005 (2) 0.0067	1			2	2	2	8	4	1	2	6			6	Yes	Yes	2	Yes		Yes		Yes	Yes		98	(Note1) 1.4 to 1.6	(1) 0 to 70 (2) -20 to 85	FBGA361 (16x16 mm)
TMPA900CMXBG		32		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 (15x15 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 (13x13 mm)
TMPA912CMXBG				1			2	2	2	8	4	1	2	6	Yes	Yes	6	Yes	Yes	2	Yes	1	Yes		Yes	Yes		98			FBGA361 (16x16 mm)
TMPA910CRAXBG		56	0.005	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			0.0067	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) 0.005 (2) 0.0067	1			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 external circuitry in general, external AD converter, external USB host (Full-Speed): 3.0 V to 3.6 V

(2) For external USB device (High-Speed): 3.15 V to 3.45 V

(3) For external memory: 1.7 V to 1.9 V/3.0 V to 3.6 V

(4) For external CMOS image sensor, external I²S, external 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

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

TX System RISC Microcontrollers / Microprocessors

32-Bit Microcontrollers

TX19 Family: TX19 Series

☐Flash Versions

Part Number	ROM (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I²C/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
TMP1940FDBFG	512	16	32	4	2		2	1	8			4	4				11	Yes	Yes	77	2.7 to 3.6	-40 to 85	TMP1940CYAFG	LQFP100 (14×14 mm)
TMP1942FDU		20	32	4	5			1	16		3	12	14				29	Yes	Yes	108			TMP1942CYUE TMP1942CZUE	LQFP144 (16×16 mm)
TMP1942FDXBG **			32	4	5			1	16		3	12	14				29	Yes	Yes	108			TMP1942CZXBG	FBGA177 (13×13 mm)
TMP1962F10AXBG	1024	40	40.5	8	7			1	24			12	4	8	8		25		Yes	202	(Note1) 2.2 to 2.7	-20 to 85	TMP1962C10BXBG	FBGA281 (13×13 mm)

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

**: Under development

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

TX19 Family: TX19A Series

☐Flash Versions

Part Number	ROM (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I²C/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	256	10	56	8	2		2		19				4			2	10		Yes	75	(Note1) 2.25 to 2.75	-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		24	54	4	3	1		2	12				12				16		Yes	111	3.0 to 3.6	-20 to 85	—	LQFP144 (20×20 mm)
TMP19A23FYXBG			40	4	3	1		2	12				12				15		Yes	103	(Note1) 1.35 to 1.65			FBGA141 (9×9 mm)
TMP19A43FZXBG	384	20	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43CZXBG	FBGA193 (12×12 mm)
TMP19A43FDXBG	512	24	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43CDXBG	
TMP19A61F10XBG	1024	48	54	8	9	2		2	32				36	4	4		16		Yes	212			TMP19A61C10BG TMP19A61CDXBG	FBGA289 (11×11 mm)
TMP19A64F20XBG	2048	64	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 (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I²C/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
TMP19A44FDAXBG	512	32	80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160	2.7 to 3.6	-20 to 85	—	FBGA241 (12x12 mm)
TMP19A44FEXBG	768	64	80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160				
TMP19A44F10XBG	1024		80	8	3	3		1	16	18	8	4		64	1	Yes	Yes	160				
TMP19A33F20NG	2048	10	64	8	5	3		3		2				11			Yes	49				SDIP64
TMP19A33F20NG-OTP(Note1)			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: TX19 Series

☐Mask ROM Versions

Part Number	ROM (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I²C/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
TMP1941AFG	NA	10	40	4	2		2	1	8			4	4				11	Yes	Yes	46	2.7 to 3.6	-40 to 85	—	LQFP100 (14×14 mm)
TMP1940CYAFG	256		32	4	2		2	1	8			4	4				11	Yes	Yes	77			TMP1940FDBFG	
TMP1942CYUE		16	32	4	5			1	16		3	12	14				29	Yes	Yes	108			TMP1942FDU	LQFP144 (16×16 mm)
TMP1942CZUE	384		32	4	5			1	16		3	12	14				29	Yes	Yes	108				
TMP1942CZXBG			32	4	5			1	16		3	12	14				29	Yes	Yes	108			TMP1942FDXBG **	FBGA177 (13×13 mm)
TMP1962C10BXBG	1024	40	40.5	8	7			1	24			12	4	8	8		25		Yes	202	(Note1) 1.35 to 1.65	-20 to 85	TMP1962F10AXBG	FBGA281 (13×13 mm)

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

**: Under development

- 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 (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	DMA Controller (Ch)	UART/SIO (Ch)	UART/HSIO (Ch)	UART (Ch)	I²C/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	256	10	56	8	2		2		19				4			2	10		Yes	75	(Note1) 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	384	20	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143		-20 to 85	TMP19A43FZXBG	FBGA193 (12×12 mm)
TMP19A43CDXBG	512	24	40	8	3	3		1	16	2			16	8	4		48	Yes	Yes	143			TMP19A43FDXBG	
TMP19A61CDXBG		40	54	8	9	2		2	32				36	4	4		16		Yes	212			TMP19A61F10XBG	FBGA289 (11×11 mm)
TMP19A61C10XBG	1024	48	54	8	9	2		2	32				36	4	4		16		Yes	212				
TMP19A64C1DXBG	1536	56	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 (Kbytes)	RAM (Kbytes)	Maximum Operating Frequency (MHz)	External SRAM Interface	DMA Controller (Ch)	Remote Memory Interface	UART/SIO (Ch)	UART/HSIO (Ch)	I²C/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 S/W RTC)	RTC (Ch)	Dual Clocks	On-chip Debug Function	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	256	80	Yes	8	Yes	5	5	2	12	16	16	6	Yes	16	Yes	Yes		1	Yes	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.

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

- 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		●			PFBGA217
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/I²S, I²C, 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, I²S 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, I²S controller	PBGA456

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

**: Under development

- 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^2C/SIO Power supply voltage (I/O = 3.3 V, internal = 1.5 V)	LQFP144

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

Mixed-Signal Controllers

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Times (µs)	SIO (Ch)	I^2C (Ch)	10-Bit AD Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Clock Gear	Power-On Reset	Sensor Sampling Circuit	Offset Voltage Adjustment Circuit	On-chip Debug Function	Internal Oscillator (High-Speed)	Internal Oscillator (Low-Speed)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMP89FH00DUG	16	1024	0.2	1	1	4		1			Yes	Yes	Yes	(Note1) Yes	Yes	Yes	Yes	Yes	15	2.2 to 3.6	−40 to 85	LQFP48 (7×7 mm)
TMP89FH00WBG	16	1024	0.2	1	1	4		1			Yes	Yes	Yes	(Note1) Yes	Yes	Yes	Yes	Yes	15	2.2 to 3.6	−40 to 85	WCSP39 (3.8×3.8 mm)

Note1) Supports 1- to 4-axes resistive-bridge-type acceleration sensors.

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

Microcomputer Development System Selection Guide

TLCS-47 Family Development System

☐Software Products

Language Tool		Debugger
Assembler	C-Like Compiler	
SW471E0-ZZJ: Japanese edition SW471E0-ZZE: English edition	SW476E0-ZZJ: Japanese edition SW476E0-ZZE: English edition	SW477E0-ZZJ ## : Controller: BM1020A (for the RTE emulation system), Japanese edition SW477E0-ZZE ## : Controller: BM1020A (for the RTE emulation system), English edition SW477E1-ZZJ: Controller: BM1022R0B (for the model 10 emulation system), Japanese edition SW477E1-ZZE: Controller: BM1022R0B (for the model 10 emulation system), English edition

☐Hardware Products

Target MCU		In-Circuit Emulation System				
		Emulator		Accessory		
Part Number	Package	Controller *5	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter /IC Socket
TMP47C101PG TMP47C201PG TMP47P201VPG	DIP16	BM1020A ##	BM4721A ##	PN100002 + PN200001 *4	BM1160 ##	
TMP47C101MG TMP47C201MG	SOP16				BM1160 + AS-DIP.3-016-SO03-1 ## *3	
TMP47C102PG TMP47C202PG TMP47P202VPG	DIP20	BM1020A ##	BM47C203N0A ##	PN100004 *4	—	—
TMP47C102MG TMP47C202MG TMP47P202VMG	SOP20				AS-DIP.3-020-SO03-1 *3	
TMP47C103NG TMP47C203NG TMP47P403VNG	SDIP28			PN100003 *4	PN200004 *4	
TMP47C103MG TMP47C203MG TMP47P403VMG	SOP28				AS-DIP.6-028-SO08-1 *3	
TMP47C206PG TMP47P206VPG	DIP20	BM1022R0B ##	BM47C206M0A ##	PN100004 *4	—	
TMP47C206MG TMP47P206VMG	SOP20				AS-DIP.3-020-SO03-1 *3, *4	
TMP47C222UG TMP47C422UG TMP47P422VUG	LQFP44 (10 x 10)	BM1022R0B ##	BM47C422N0B ##	PN120030	—	IC149-044-052-B5 *1
TMP47C222FG TMP47C422FG TMP47P422VFG	QFP44 (14 x 14)			PN120019		IC149-044-039-B5 *1
TMP47C222NG TMP47C422NG TMP47P422VNG	SDIP42			PN100002 *4	PN200001 *4	—
TMP47C241NG TMP47P241VNG	SDIP28	BM1020A ##	BM47214A ##	PN110003 ##	BM1152 ##	
TMP47C241MG TMP47P241VMG	SOP28				BM1152 + AS-SDP.4-028-SO05-2 ## *3	
TMP47C243NG TMP47C443NG TMP47P443VNG	SDIP28	BM1022R0B ##	BM47C443N0B ##	PN100003 *4	PN200004 *4	
TMP47C243MG TMP47C443MG TMP47P443VMG	SOP28				AS-DIP.6-028-SO08-1 *3	
TMP47C243DMG TMP47C443DMG TMP47P443VDMG	SSOP30				PN200007	IC253-030-0002-B *2

- The TLCS-47 Family software products run on the Japanese or English Microsoft® Windows® 95, Microsoft® Windows NT®4.0, DOS-compatible box and Microsoft® MS-DOS®.
  Microsoft, Windows, Windows NT and MS-DOS 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.

##: Contact your local Toshiba sales representative before ordering products.
*1: One IC socket is supplied with each MCU probe. IC sockets are Yamaichi Electronics' products.
*2: One IC socket is supplied with each package converter. IC sockets are Yamaichi Electronics' products.
*3: The package converters whose part numbers begin with AS are Emulation Technology's products.
AS-DIP.3-016-SO03-1: DIP16 → SOP16 AS-DIP.6-028-SO08-1: DIP28 → SOP28
AS-DIP.3-020-SO03-1: DIP20 → SOP20 AS-SDP.4-028-SO05-2: SDIP28 → SOP28
*4: These are spare parts. One spare part is supplied with each emulator or emulation pod.
*5: BM1020A: RTE controller, BM1022R0B: model 10 controller

TLCS-870/C Series (1/4)

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C Light 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 Light 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.

☐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		Emulation Chip *2	RTE870/C model 15 In-Circuit Emulation System					RTE870/C Light In-Circuit Emulation System		
			model 15 In-Circuit Emulator				Accessory	Light In-Circuit Emulator	Accessory	
Part Number	Part Number		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket		Probe Set *4	Bump Socket *4 (MCU Mount Adapter)
TMP86P202PG	DIP20	TMP86C908XBG	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D020NA0A	—	BMP86A300010A	AP20D3W-2	—
TMP86P202MG	SOP20					BMP86D020MC0A	IC253-020-0004-B *5		AP20S3T-2	BM-20S3T
TMP86P203PG	DIP20					BMP86D020NA0A	—		AP20D3W-2	—
TMP86P203MG	SOP20					BMP86D020MC0A	IC253-020-0004-B *5		AP20S3T-2	BM-20S3T
TMP86CH06AUG	LQFP44 (10 x 10)	TMP86C906XBG				BMP86D044DE0A	PN210020A		AP44QP	BM-44Q10P
TMP86PH06UG										
TMP86CH06NG	SDIP42					BMP86D042NB0A	—		AP42D0U-2	—
TMP86PH06NG										
TMP86C407NG	SDIP28	TMP86C908XBG				BMP86D028NB0A	—		AP28D4U	—
TMP86C807NG										
TMP86F807NG										
TMP86P807NG										
TMP86C407MG	SOP28					BMP86D028MC0A	IC253-028-0003-B *5		AP28S9T	BM-28S9T
TMP86C807MG										
TMP86F807MG										
TMP86P807MG										
TMP86C408DMG	SSOP30					BMP86D030MF1A	IC253-030-0002-B *5		AP30S3N-2	BM-30S3N
TMP86C408IDMG										
TMP86C408SDMG										
TMP86C808DMG										
TMP86C808IDMG										
TMP86C808SDMG										
TMP86F808DMG										
TMP86P808DMG										
TMP86C408NG	SDIP30					BMP86D030NB0A	—		AP30D4U-2	—
TMP86C808NG										
TMP86F808NG										
TMP86P808NG										
TMP86C809NG	SDIP32	TMP86C909XBG			BMP86A200020A	BMP86D032NB0A	—	BMP86A300020A	AP32D4U	—
TMP86CH09NG										
TMP86FH09ANG										
TMP86F409NG										
TMP86F809NG										
TMP86CH12MG	SSOP30	TMP86C912XBG				BMP86D030MF0A	IC253-030-0002-B *5		AP30S3N	BM-30S3N
TMP86FH12MG										

TLCS-870/C Series (2/4)

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C Light 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 Light 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.

☐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		Emulation Chip *2	RTE870/C model 15 In-Circuit Emulation System					RTE870/C Light In-Circuit Emulation System		
			model 15 In-Circuit Emulator				Accessory		Accessory	
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket	Light In-Circuit Emulator	Probe Set *4	Bump Socket *4 (MCU Mount Adapter)
TMP86C420UG	LQFP64 (10 x 10)	TMP86C929AXBG	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	BMP86A300010A	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
TMP86C822UG	LQFP44 (10 x 10)	TMP86C923XBG				BMP86D044DE1A	PN210020A		AP44QP-2	BM-44Q10P
TMP86CH22UG										
TMP86PH22UG										
TMP86CM23AUG	LQFP64 (10 x 10)					BMP86D064DG0A	PN210033		AP64QM	BM-64Q10M
TMP86CP23AUG										
TMP86FS23UG										
TMP86PM23UG										
TMP86PS23UG										
TMP86FP24FG	LQFP80 (12 x 12)	TMP86C948XBG			BMP86A200030A	BMP86D080DG1A	PN210008	—	—	—
TMP86CS25ADFG	LQFP100 (14 x 14)	TMP86C925XBG			BMP86A200020A	BMP86D100DG0A	PN210023	BMP86A300020A	AP100QM-2	BM-100Q14M
TMP86CM25AFG	QFP100 (14 x 20)					BMP86D100FF0A	PN210005A		AP100QN	BM-100Q142N
TMP86CM25FG										
TMP86CS25AFG										
TMP86FM25FG										
TMP86PS25FG										
TMP86CM27FG	QFP80 (14 x 20)	TMP86C927XBG			BMP86A200010B	BMP86D080FE0A	PN210002	BMP86A300010A	AP80QP	BM-80Q142P
TMP86CP27AFG										
TMP86FS27FG										
TMP86PS27FG	QFP80 (14 x 20)									
TMP86CS28DFG	LQFP80 (12 x 12)	TMP86C989XBG				BMP86D080DG0A	PN210008		AP80QM	BM-80Q12M
TMP86FS28DFG										
TMP86CS28FG	QFP80 (14 x 20)					BMP86D080FE0A	PN210002		AP80QP	BM-80Q142P
TMP86FS28FG										

TLCS-870/C Series (3/4)

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C Light 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 Light 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.

☐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		Emulation Chip *2	RTE870/C model 15 In-Circuit Emulation System					RTE870/C Light In-Circuit Emulation System		
			model 15 In-Circuit Emulator				Accessory		Accessory	
Part Number	Package		Controller	Interface Module	Emulation Module	Target Connection Board *3	MCU Mount Adapter /IC Socket	Light In-Circuit Emulator	Probe Set *4	Bump Socket *4 (MCU Mount Adapter)
TMP86C829BUG	LQFP64 (10 x 10)	TMP86C929AXBG	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	BMP86A300010A	AP64QM	BM-64Q10M
TMP86CH29BUG										
TMP86CM29BUG										
TMP86CM29LUG										
TMP86FM29UG										
TMP86PM29BUG										
TMP86C829BFG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026		AP64QP	BM-64Q14P
TMP86CH29BFG										
TMP86CM29BFG										
TMP86FM29FG										
TMP86PM29BFG										
TMP86CS44UG	LQFP44 (10 x 10)	TMP86C944XBG				BMP86D044DE0A	PN210020A		AP44QP	BM-44Q10P
TMP86PS44UG										
TMP86C845UG		TMP86C947XBG								
TMP86C846NG	SDIP42					BMP86D042NB1A	—		AP42D0U-3	—
TMP86CH46ANG										
TMP86CM46ANG										
TMP86FH46ANG										
TMP86PH46NG										
TMP86PM46NG										
TMP86C847IUG	LQFP44 (10 x 10)					BMP86D044DE0A	PN210020A		AP44QP	BM-44Q10P
TMP86C847SUG										
TMP86C847UG										
TMP86CH47AUG										
TMP86CH47IUG										
TMP86CH47SUG										
TMP86CM47AUG										
TMP86FH47AUG										
TMP86PH47UG										
TMP86PM47AUG										
TMP86FH47ADUG	LQFP48 (7 x 7)					BMP86D048DG0A	HQPACK048SD *5		AP48QM-2	BM-48Q7M
TMP86FM48UG	LQFP64 (10 x 10)	TMP86C948XBG			BMP86A200030A	BMP86D064DG0A	PN210033	BMP86A300030A	AP64QM	BM-64Q10M
TMP86FM48FG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026		AP64QP	BM-64Q14P

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

- Choose either the RTE870/C model 15 In-Circuit Emulation system or the RTE870/C Light 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 Light 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		Emulation Chip *2	RTE870/C model 15 In-Circuit Emulation System					RTE870/C Light In-Circuit Emulation System		
			model 15 In-Circuit Emulator				Accessory	Light 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)
TMP86CM49UG	LQFP64 (10 x 10)	TMP86C949XBG	BM1040R0B-G	BMP86A100010B	BMP86A200010B	BMP86D064DG0A	PN210033	BMP86A300010A	AP64QM	BM-64Q10M
TMP86CS49UG										
TMP86FS49BUG										
TMP86PM49UG										
TMP86CH49FG	QFP64 (14 x 14)					BMP86D064DE0A	PN210026		AP64QP	BM-64Q14P
TMP86CM49FG										
TMP86CS49FG										
TMP86FS49BFG										
TMP86PM49FG										
TMP86CS64AFG	QFP100 (14 x 20)	TMP86C964XBG			BMP86A200020A	BMP86D100FF0A	PN210005A	BMP86A300020A	AP100QN	BM-100Q142N
TMP86PS64FG										
TMP86CH72FG	QFP64 (14 x 14)	TMP86C972XBG			BMP86A200010B	BMP86D064DE0A	PN210026	BMP86A300010A	AP64QP	BM-64Q14P
TMP86CM72FG										
TMP86PM72FG										
TMP86CK74AFG	QFP80 (14 x 20)	TMP86C974XBG				BMP86D080FE0A	PN210002		AP80QP	BM-80Q142P
TMP86CM74AFG										
TMP86PM74AFG										
TMP86CH87RUG	LQFP44 (10 x 10)	TMP86C987XBG			BMP86A200020A	BMP86D044DE0A	PN210020A	BMP86A300020A	AP44QP	BM-44Q10P
TMP86CM87RUG										
TMP86PM87RUG										
TMP86CH92IDMG	SSOP30	TMP86C993XBG				BMP86D030MF3A	IC253-030-0002-B *5		AP30S3N-4	BM-30S3N
TMP86CH92SDMG										
TMP86FH92IDMG										
TMP86FH92DMG										
TMP86FH93NG	SDIP32					BMP86D032NB1A	—		AP32D4U-2	—

TLCS-870 Series (1/3)

☐Software Products

Language Tool C/C-Like Compiler & Assembler Set	Debugger
SW87YN0-ZCJ: 1 license (Japanese edition) SW87YN0-ZCE: 1 license (English edition) SW87YN3-ZCJ: 10 licenses (Japanese edition) SW87YN3-ZCE: 10 licenses (English edition)	SW87DN9-ZCK: 1 license (Japanese edition) SW87DN9-ZCF: 1 license (English edition) SW87DN3-ZCK: 10 licenses (Japanese edition) SW87DN3-ZCF: 10 licenses (English edition)

☐Hardware Products

Target MCU		RTE870 model 10 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter /IC Socket
TMP87C405AMG	SOP28	BM1022R0B ##	BM87C408M0A ##	PN100003 *1	AS-DIP.6-028-SO08-1 *1, *2	—
TMP87C807UG	QFP44 (10 x 10)		BM87CH47U0B ##	PN120011 *1	—	PN210020A
TMP87C408LNG	SDIP28		BM87C408M0A ##	PN100003 *1	PN200004	—
TMP87C408NG						
TMP87C808LNG						
TMP87C808NG						
TMP87P808LNG						
TMP87P808NG						
TMP87C408LMG	SOP28				AS-DIP.6-028-SO08-1 *1, *2	
TMP87C408MG						
TMP87C808LMG						
TMP87C808MG						
TMP87P808LMG						
TMP87P808MG						
TMP87C408DMG	SSOP30				PN200007	IC253-030-0002-B *3
TMP87C409BNG	SDIP28		BM87C809N0A ##	PN100003 *1	PN200004 *1	—
TMP87C809BNG						
TMP87P809NG						
TMP87C409BMG	SOP28				AS-DIP.6-028-SO08-1 *2	
TMP87C809BMG						
TMP87P809MG						
TMP87C814FG	QFP64 (14 x 20)		BM87CM14N0A ##	PN110008 *1	PN120007	PN210011A
TMP87CH14FG						
TMP87CK14FG						
TMP87CM14FG						
TMP87PM14FG						
TMP87C814NG	SDIP64				—	—
TMP87CH14NG						
TMP87CK14NG						
TMP87CM14NG						
TMP87PM14NG						
TMP87CH21CDFG	LQFP80 (12 x 12)		BM87CP23F0B ##	PN120006A	—	PN210008
TMP87CM21CDFG						
TMP87CP21CDFG						
TMP87PP21DFG						
TMP87CH21CFG	QFP80 (14 x 20)			PN120004		PN210002
TMP87CM21CFG						
TMP87CP21CFG						
TMP87PP21FG						
TMP87CM23AFG	QFP100 (14 x 20)			PN120005 *1		PN210005A
TMP87CP23FG						
TMP87PP23FG						
TMP87CH29UG	LQFP64 (10 x 10)		BM87CM29U0B ##	PN120022 *1	—	PN210033
TMP87CK29UG						
TMP87CM29UG						

- The TLCS-870 Series software products run in the following environments:
  C/C-Like Compiler & Assembler Set: Japanese or English Microsoft® Windows® 98 and Microsoft® Windows NT®4.0.
  Debugger: Japanese or English Microsoft® Windows® 2000 and Microsoft® Windows® XP.
  Microsoft, Windows and Windows NT 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.

##: Contact your local Toshiba sales representative before ordering products.
*1: These are spare parts. One spare part is supplied with each emulation pod.
*2: The package converters (DIP28 → SOP28) whose part numbers begin with AS are Emulation Technology's products.
*3: One IC socket is supplied with the package converter. The IC socket is Yamaichi Electronics' product.

TLCS-870 Series (2/3)

☐Software Products

Language Tool C/C-Like Compiler & Assembler Set	Debugger
SW87YN0-ZCJ: 1 license (Japanese edition) SW87YN0-ZCE: 1 license (English edition) SW87YN3-ZCJ: 10 licenses (Japanese edition) SW87YN3-ZCE: 10 licenses (English edition)	SW87DN9-ZCK: 1 license (Japanese edition) SW87DN9-ZCF: 1 license (English edition) SW87DN3-ZCK: 10 licenses (Japanese edition) SW87DN3-ZCF: 10 licenses (English edition)

☐Hardware Products

Target MCU		RTE870 model 10 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter
TMP87PM29UG	LQFP64 (10 x 10)	BM1022R0B ##	BM87CM29U0B ##	PN120022 *1	—	PN210033
TMP87CH29NG TMP87CK29NG TMP87CM29NG TMP87PM29NG	SDIP64			PN110005		—
TMP87C840FG TMP87CC40FG TMP87CH40FG TMP87CK40AFG TMP87CM40AFG TMP87PH40AFG TMP87PM40AFG	QFP64 (14 x 20)		BM87CK40N0B ##	PN120014	—	PN210011A
TMP87C840NG TMP87CC40NG TMP87CH40NG TMP87CK40ANG TMP87CM40ANG TMP87PH40ANG TMP87PM40ANG	SDIP64			PN110005 *1		—
TMP87C841UG TMP87CC41UG TMP87CH41UG TMP87CK41UG TMP87CM41UG TMP87PM41UG	LQFP64 (10 x 10)		BM87CM41N0A ##	PN110005 *1	PN120035	PN210033
TMP87C841FG TMP87CC41FG TMP87CH41FG TMP87CK41FG TMP87CM41FG TMP87PM41FG	QFP64 (14 x 20)			PN120014	—	PN210011A
TMP87C841NG TMP87CC41NG TMP87CH41NG TMP87CK41NG TMP87CM41NG TMP87PM41NG	SDIP64			PN110005 *1		—
TMP87C446NG TMP87C846NG TMP87CH46NG TMP87PH46NG	SDIP42		BM87CH47U0B ##	PN100002 *1	PN200001 *1	—
TMP87C447UG TMP87C847LUG TMP87C847UG TMP87CH47LUG	LQFP44 (10 x 10)			PN120011 *1	—	PN210020A

- The TLCS-870 Series software products run in the following environments:
  C/C-Like Compiler & Assembler Set: Japanese or English Microsoft® Windows® 98 and Microsoft® Windows NT®4.0.
  Debugger: Japanese or English Microsoft® Windows® 2000 and Microsoft® Windows® XP.
  Microsoft, Windows and Windows NT 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.

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

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

TLCS-870 Series (3/3)

☐Software Products

Language Tool C/C-Like Compiler & Assembler Set	Debugger
SW87YN0-ZCJ: 1 license (Japanese edition)	SW87DN9-ZCK: 1 license (Japanese edition)
SW87YN0-ZCE: 1 license (English edition)	SW87DN9-ZCF: 1 license (English edition)
SW87YN3-ZCJ: 10 licenses (Japanese edition)	SW87DN3-ZCK: 10 licenses (Japanese edition)
SW87YN3-ZCE: 10 licenses (English edition)	SW87DN3-ZCF: 10 licenses (English edition)

☐Hardware Products

Target MCU		RTE870 model 10 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter
TMP87CH47UG	LQFP44 (10 x 10)	BM1022R0B ##	BM87CH47U0B ##	PN120011 *1	—	PN210020A
TMP87PH47LUG						
TMP87PH47UG						
TMP87CH48UG	LQFP64 (10 x 10)		BM87CH48U0A ##	PN120022 *1		PN210033
TMP87CM48UG						
TMP87PH48UG						
TMP87PM48UG						
TMP87CH48DFG	QFP64 (14 x 14)			PN120052		PN210026
TMP87CM48DFG						
TMP87PH48DFG						
TMP87PM48DFG						
TMP87CM53FG	QFP80 (14 x 20)		BM87CM53F0A ##	PN120004 *1		PN210002
TMP87PM53FG						
TMP87CS68DFG	LQFP80 (12 x 12)		BM87CS68DF0A ##	PN120006A *1		PN210008
TMP87PS68DFG						
TMP87CM70BFG	QFP80 (14 x 20)		BM87CK70F0B ##	PN120004		PN210002
TMP87PM70FG						
TMP87CS71BFG	QFP80 (14 x 20)					
TMP87PS71AFG						
TMP87CH74AFG	QFP80 (14 x 20)		BM87CM75F0A ##	PN120004		PN210002
TMP87CM74AFG						
TMP87PM74FG						
TMP87CH75FG	QFP100 (14 x 20)			PN120005 *1		PN210005A
TMP87CM75FG						
TMP87PM75FG						

- The TLCS-870 Series software products run in the following environments:
  C/C-Like Compiler & Assembler Set: Japanese or English Microsoft® Windows® 98 and Microsoft® Windows NT®4.0.
  Debugger: Japanese or English Microsoft® Windows® 2000 and Microsoft® Windows® XP.
  Microsoft, Windows and Windows NT 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.

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

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

☐Software Products

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

☐Hardware Products

Target MCU		RTE870/X model 10 In-Circuit Emulation System				
		In-Circuit Emulator		Accessory		
Part Number	Package	Controller *2	Emulation Pod	MCU Probe	Package Converter	MCU Mount Adapter /IC Socket
TMP88CH40NG	SDIP28	BM1040R0B-G /BM1055R0C	BM88CS43F0A-M15	PN100003	PN200004	—
TMP88PH40NG						
TMP88CH40IMG	SOP28				PN200008	IC253-028-0003-B *4
TMP88CH40MG						
TMP88PH40MG						
TMP88CH41UG	LQFP44 (10 x 10)			PN120011	—	PN210020A
TMP88PH41UG						
TMP88FH41UG						
TMP88CH41NG	SDIP42			PN100002	PN200001	—
TMP88PH41NG						
TMP88CS42FG	QFP64 (14 x 20)			PN120014	—	PN210011A
TMP88PS42FG						
TMP88CS42NG	SDIP64			PN110005		—
TMP88PS42NG						
TMP88CS43FG	QFP80 (14 x 20)			PN120004 *1		PN210002
TMP88PS43FG						
TMP88FW45AFG	QFP80 (14 x 20)		BM88FW44F0A-M15	PN120004 *1	—	PN210002
TMP88F846UG	LQFP44 (10 x 10)		BM88CS43F0A-M15	PN120011	—	PN210020A
TMP88CU74FG	QFP80 (14 x 20)	BM1055R0C	BM88CU74F0A	PN120004 *1	—	PN210002
TMP88PU74FG						
TMP88CS77FG	QFP100 (14 x 20)		BM88CP77F0A	PN120005 *1	—	PN210005A
TMP88CU77FG						
TMP88PU77FG						

- 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: model 15 controller, BM1055R0C: model 25 controller
- 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.

☐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)						
TMP89FW20UG	LQFP64 (10 x 10)						
TMP89FW24DFG	QFP80 (14 x 20)						
TMP89FW24FG	LQFP80 (12 x 12)						
TMP89FM40NG	SDIP42	BMP89A400010A-G	FTSH-110-01-L-DV-K	BMP89A300010A-G	TMP89C900XBG **	AP42D0U-4	—
TMP89FH40NG							
TMP89FM42UG	LQFP44 (10 x 10)					AP44QP-3	BM-44Q10P
TMP89FM42LUG							
TMP89FM42AUG							
TMP89FM42KUG							
TMP89FH42UG							
TMP89FH42LUG							
TMP89CM42UG		—	—				
TMP89CH42UG							
TMP89FM43LQG	VQON44 (5.3 x 5.3)	BMP89A400010A-G	FTSH-110-01-L-DV-K	—	—	—	—
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 **	LQFP48 (7 x 7)						

**: Under development

- Choose either the On-Chip Debug Emulator or the In-Circuit Emulator.
- 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						
TMP91CW11FG			BM91CW11F0B-M15	PN120013 *3		PN210023
TMP91PW11FG						
TMP91CW12AFG		BM1040R0B-G	BM91CW12AF0A-M15 *5	PN120013 *3		PN210023
TMP91CW12FG		BM1040R0B-G /BM1055R0C	BM91CW12F0A-M15	PN120013 *3		PN210023
TMP91PW12FG						
TMP91C815FG	TQFP128 (14 x 14)	BM1040R0B-G	BM91C815F0A-M15 *5	PN120057 *3		PN210054
TMP91C016FG	LQFP100 (14 x 14)		BM91C016F0A-M15 *5	PN120013 *3		PN210023
TMP91C219FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91C219F0A-M15	PN120013 *3		PN210023
TMP91C820AFG	LQFP144 (16 x 16)		BM91CM20F0A-M15	PN120044 *3		PN210044 *3
TMP91CY22FG	LQFP100 (14 x 14)	BM1040R0B-G	BM91CW12AF0A-M15 *5	PN120013 *3		PN210023
TMP91CY22IFG						
TMP91C824FG		BM1040R0B-G /BM1055R0C	BM91C824F0A-M15 *5	PN120013 *3		PN210023
TMP91C025FG			BM91C025F0A-M15	PN120013 *3		PN210023
TMP91CU27FG	QFP64 (14 x 14)	BM1040R0B-G	BM91CW12AF0A-M15 *5	TEC-064SA-T2/SET *6		HQPACK064SA *7
TMP91FW27FG						
TMP91CK27UG	LQFP64 (10 x 10)			PN120013 *3	PN120065-G	PN210033
TMP91CP27UG						
TMP91CU27UG						
TMP91CU27RUG **						
TMP91FW27UG						
TMP91C829FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91C829F0A-M15	PN120013 *3	—	PN210023
TMP91C630FG			BM91C630F0A-M15	PN120013 *3		PN210023
TMP91CW40FG			BM91CW40F0A-M15	PN120013 *3		PN210023
TMP91FW40FG						
TMP91FY42FG		BM1040R0B-G	BM91CW12AF0A-M15	PN120013 *3		PN210023
TMP91CW60FG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM91CW60F0A-M15	PN120013 *3		PN210023
TMP91CW60DFG	QFP100 (14 x 20)			TEC-100RB-T1/SET *6		HQPACK100RB179 *7
TMP91FU62FG	LQFP80 (12 x 12)			TEC-080SD-T2/SET *6		HQPACK080SD *7
TMP91FU62DFG	QFP80 (14 x 20)			TEC-080RA-T2/SET *6		HQPACK080RA178 *7
TMP91FW64FG	LQFP100 (14 x 14)		BM91FW64F0A-GM	TEC-100SD-T1/SET *6		HQPACK100SD *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®. **: 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: model 15 controller, BM1055R0C: model 25 controller
- 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 areTokyo 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						
TMP92CD54IFG **	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM92CY54F0A-M15	PN120013 *3	PN210023	
TMP92FD54AIFG **						

- Choose either the RTE900 model 15 / model 25 In-Circuit Emulation system or the RTE900 In-Circuit Emulation system.
  Both system can use the same accessories.

Target MCU		Emulation System			Accessory	
		RTE900 model 15 / model25 In-Circuit Emulation System		RTE900 In-Circuit Emulation System	MCU Probe/Probe Set	MCU Mount Adapter / Top Cover for IC Package
		Controller	Emulation Pod	In-Circuit Emulator		
TMP92CD23AFG	LQFP100 (14 x 14)	BM1040R0B-G /BM1055R0C	BM92FD23AF0A-M15	HW92ES230AG	PN120013 / TEC-100SD-T1/SET *8	PN210023 / HQPACK100SD *8
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: model 15 controller, BM1055R0C: model 25 controller
- 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 areTokyo 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.

*8: Appropriate accessories vary with the emulation system to be used.
RTE900 model 15 / model 25 system:
Use the MCU probe (PN120013) that comes with the BM92FD23AF0A-M15 and MCU mount adapter (PN210023).
RTE900 system:
Use the probe set (TEC-100SD-T1/SET) and top cover for IC package (HQPACK100SD) from Tokyo Eletech.

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						
TMP93CS32FG	QFP64 (14 x 14)		BM93CS32F0B-M15	PN120039A *3		PN210026
TMP93PW32FG						
TMP93CS36UG	LQFP44 (10 x 10)				PN120063	PN210020A
TMP93CS40DFG	LQFP100 (14 x 14)		BM93CM40F0C-M15	PN120013 *3		PN210023
TMP93CW40DFG						
TMP93PS40DFG						
TMP93PW40DFG						
TMP93CS41DFG						
TMP93CW41DFG						
TMP93CS44FG	LQFP80 (12 x 12)		BM93CS44F0B-M15	PN120042 *3	—	PN210008
TMP93PS44FG						
TMP93CU44DFG	QFP80 (14 x 20)			PN120009		PN210002
TMP93CW44DFG						
TMP93PW44ADFG						
TMP93CS45FG	LQFP80 (12 x 12)			PN120042 *3		PN210008
TMP93CW46AFG	LQFP100 (14 x 14)		BM93CW46F0B-M15	PN120013 *3		PN210023
TMP93PW46AFG						

- 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: model 15 controller, BM1055R0C: model 25 controller

- 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
TMP94C241CFG	QFP160 (28 x 28)	BM1056R0B ##	BM94C241F0A	PN120040A *3	—	PN210030
TMP94C251ADFG	LQFP144 (20 x 20)		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
TMP95C063DFG	LQFP144 (20 x 20)		BM95C063F0B-M15	PN120027 *3		PN210036
TMP95CS64FG TMP95CW64FG TMP95PW64FG TMP95C265FG TMP95CW65FG TMP95CS66FG	LQFP100 (14 x 14)		BM95CS64F0B-M15	PN120013 *3		PN210023
TMP96C031ZFG	QFP64 (14 x 20)	BM1055R0B ##	BM96C031F0A *4	PN110007 *3	PN120007 *3	PN210011A
TMP96CM40FG TMP96PM40FG TMP96C041BFG TMP96C141BFG	QFP80 (14 x 20)	BM1040R0B-G /BM1055R0C	BM96C141F0D-M15	PN120009 *3	—	PN210002

- 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.

##: 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: model 15 controller, BM1055R0C: model 25 controller, BM1056R0B: model 25/2 controller

- 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.

☐Software Products

Toshiba Integrated Development Environment		Real-Time OS (μITRON 3.0)
C Compiler	Integrated Development Environment *1	
SW19CN0-ZCC: 1 license SW19CN3-ZCC: 10 licenses	SW00MN0-ZCC: 1 license SW00MN3-ZCC: 10 licenses	SW19RN2-ZCC: Object code can be freely copied. SW19RN3-ZCC: The Green Hills Software (GHS) compiler is supported. Object code can be freely copied. SW19RNC-ZCC: Object code can be freely copied and comes with source code. SW19RND-ZCC: The Green Hills Software (GHS) compiler is supported. Object code can be freely copied and comes with source code.

☐Hardware Products

Target MCU	RTE19 for N-WIRE On-Chip Debug Emulation System	
	On-Chip Debug Emulator	Accessory
	DSU PROBE for N-WIRE	Connector
TMP1940CYAFG	BM1200R0A	104068-1 *2 / FTSH-110-01-F-D-K *3
TMP1940FDBFG		
TMP1941AFG	BM1200R0A ##	
TMP1942CYUE	BM1200R0A	
TMP1942CZUE		
TMP1942CZXBG		
TMP1942FDU		
TMP1942FDXBG **		
TMP1962C10BXBG		
TMP1962F10AXBG		

- The TX19 series software products run in the following environments: **: Under development
  Toshiba Integrated Development Environment: Japanese or English Microsoft® Windows® 2000 and Microsoft® Windows® XP.
  TX19 Series Real-Time OS (μITORON 3.0): Japanese or English Microsoft® Windows® 98, Microsoft® Windows NT® 4.0 and Microsoft® Windows® 2000.
  Microsoft, Windows and Windows NT 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.
- 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 emulator comes with a single-seat download license for the Integrated Development Environment.

*2: These are Available from Tyco Electronics's products.

*3: These are Samtec's products.
These connectors have through-hole leads. Other options, such as surface mount leads and ejectors are also available. Please visit Samtec, Inc.'s website for more details.

☐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 Communication Cable: Connector	On-Chip Debug Emulator	Accessory Communication Cable: Connector
TMP19A23FYFG TMP19A23FYXBG TMP19A43CDXBG TMP19A43CZXBG TMP19A43FZXBG TMP19A43FDXBG TMP19A61C10XBG TMP19A61CDXBG TMP19A61F10XBG TMP19A64C1DXBG TMP19A64F20BXBG TMP19A71CYUG TMP19A71CYFG TMP19A71FYFG TMP19A71FYUG	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

- 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)

☐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			
TMP19A44FDAXBG			
TMP19A44FEXBG			
TMP19A44F10XBG			

- The TX19A/H1 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.
- 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.

☐Hardware Products

Reference Board	Target MPU Part Number	Functions
RBTX4951	TMPR4951BFG-200 RBHMA4601(CE)	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. 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.
RBTX4955	TMPR4955CFG-400 RBHMA4605(CE)	
RBTX4925	TMPR4925XBG-200 RBHMA4300(CE)	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	TMPR4937XBG-300/333 RBHMA4400(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.
RBTX4938	TMPR4938XBG-300/333 RBHMA4500(CE)	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.
RBTX4939	TX4939XBG-400 RBHMS4700(CE)	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.
RBTC86C1	TC86C001FG(GOKU-S) RBHPE4300(CE)	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.
RBHBK4400	— RBHBK4400(CE)	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.

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

Programming Tools (1/4)

Target MCU			OTP Programming	Flash Programming	
				Off-Board Programming *2	On-Board Programming *3
Family/Series	Part Number	Package	OTP Programming Adapter	FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLCS-47 Family	TMP47P201VPG	DIP16	BM1187	—	—
	TMP47P202VMG	SOP20	BM11613		
	TMP47P202VPG	DIP20	BM1187		
	TMP47P403VMG	SOP28	BM11541		
	TMP47P403VNG	SDIP28	BM1140		
	TMP47P206VMG	SOP20	BM11626		
	TMP47P206VPG	DIP20	BM11125 ##		
	TMP47P422VFG	QFP44 (14 x 14)	BM11603		
	TMP47P422VNG	SDIP42	BM11102		
	TMP47P422VUG	LQFP44 (10 x 10)	BM11670		
	TMP47P241VMG	SOP28	BM11557		
	TMP47P241VNG	SDIP28	BM1156		
	TMP47P443VDMG	SSOP30	BM11115 *1		
	TMP47P443VMG	SOP28	BM11601		
	TMP47P443VNG	SDIP28	BM11100		
TLCS-870/C Series	TMP86P202MG	SOP20	BM11704	—	—
	TMP86P202PG	DIP20	BM11203		
	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	◎
	TMP86F809NG	SDIP32		PN410119	◎
	TMP86FH09ANG	SDIP32		PN410119	◎
	TMP86FH12MG	SSOP30		PN410118	◎
	TMP86P820FG	QFP64 (14 x 14)	BM11663	—	—
	TMP86P820UG	LQFP64 (10 x 10)	BM11662-G		
	TMP86PH22UG	LQFP44 (10 x 10)	BM11713		
	TMP86FS23UG	LQFP64 (10 x 10)	—	PN410105A	◎
	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	—	—
	TMP86FS28DFG	LQFP80 (12 x 12)	—	PN410107	◎
	TMP86FS28FG	QFP80 (14 x 20)		PN410104	◎
	TMP86FM29FG	QFP64 (14 x 14)		PN410108	◎
	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		
	TMP86FH46ANG	SDIP42	—	PN410110	◎
	TMP86PH46NG	SDIP42	BM11188	—	—
	TMP86PM46NG	SDIP42	BM11188		
	TMP86FH47ADUG	LQFP48 (7 x 7)	—	PN410115	◎

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

◎: Supported

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

*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.

Programming Tools (2/4)

Target MCU			OTP Programming	Flash Programming	
				Off-Board Programming *2	On-Board Programming *3
Family/Series	Part Number	Package	OTP Programming Adapter	FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLCS-870/C Series	TMP86FH47AUG	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	◎
	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	◎
TLCS-870 Series	TMP87PM14FG	QFP64 (14 x 20)	BM1199 *1	—	—
	TMP87PM14NG	SDIP64	BM1198		
	TMP87PP21DFG	LQFP80 (12 x 12)	BM11605		
	TMP87PP21FG	QFP80 (14 x 20)	BM11604		
	TMP87PP23FG	QFP100 (14 x 20)	BM11585		
	TMP87PM29NG	SDIP64	BM11143		
	TMP87PM29UG	LQFP64 (10 x 10)	BM11617		
	TMP87PH40AFG	QFP64 (14 x 20)	BM1137-G *1		
	TMP87PH40ANG	SDIP64	BM1136-G		
	TMP87PM40AFG	QFP64 (14 x 20)	BM1137-G *1		
	TMP87PM40ANG	SDIP64	BM11714		
	TMP87PM41FG	QFP64 (14 x 20)	BM1137-G *1		
	TMP87PM41NG	SDIP64	BM1136-G		
	TMP87PM41UG	LQFP64 (10 x 10)	BM11621		
	TMP87PH46NG	SDIP42	BM1193-G		
	TMP87PH47LUG	LQFP44 (10 x 10)	BM11594-G		
	TMP87PH47UG	LQFP44 (10 x 10)	BM11594-G		
	TMP87PH48DFG	QFP64 (14 x 14)	BM11647		
	TMP87PH48UG	LQFP64 (10 x 10)	BM11617		
	TMP87PM48DFG	QFP64 (14 x 14)	BM11647		
	TMP87PM48UG	LQFP64 (10 x 10)	BM11617		
	TMP87PM53FG	QFP80 (14 x 20)	BM11604		
	TMP87PS68DFG	LQFP80 (12 x 12)	BM11605		
	TMP87PM70FG	QFP80 (14 x 20)	BM11550		
	TMP87PS71AFG	QFP80 (14 x 20)	BM11607		
	TMP87PM74FG	QFP80 (14 x 20)	BM11620		
	TMP87PM75FG	QFP100 (14 x 20)	BM11624		
	TMP87P808LMG	SOP28	BM11616		
	TMP87P808LNG	SDIP28	BM11122-G		
	TMP87P808MG	SOP28	BM11616		
	TMP87P808NG	SDIP28	BM11122-G		
	TMP87P809MG	SOP28	BM11616		
	TMP87P809NG	SDIP28	BM11122-G		

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

++: Being planned

◎: 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.

Programming Tools (3/4)

Target MCU			OTP Programming	Flash Programming	
				Off-Board Programming *2	On-Board Programming *3
Family/Series	Part Number	Package	OTP Programming Adapter	FLASH Adapter *4	FLASH Writer: BM1401W0A-G *4 Connector: FTSH-110-01-L-DV-K *5
TLCS-870/X Series	TMP88PH40MG	SOP28	BM11695	—	—
	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		
	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		
TLCS-870/C1 Series	TMP89FH00DUG	LQFP48(7 x 7)	—	PN410115	◎
	TMP89FH00WBG	WCSP39 (3.8 x 3.8)		—	◎
	TMP89FW20UG	LQFP64 (10 x 10)		PN410105A	◎
	TMP89FW24DFG	QFP80 (14 x 20)		PN410104	◎
	TMP89FW24FG	LQFP80 (12 x 12)		PN410107	◎
	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	◎
	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	◎

● 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.

Programming Tools (4/4)

Target MCU			OTP Programming	Flash Programming	
				Off-Board Programming *2	On-Board Programming *3
Family/Series	Part Number	Package	OTP Programming Adapter	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	—	—
	TMP93PW32FG	QFP64 (14 x 14)	BM11632		
	TMP93PS40DFG	LQFP100 (14 x 14)	BM11629		
	TMP93PW40DFG	LQFP100 (14 x 14)	BM11629		
	TMP93PS44FG	LQFP80 (12 x 12)	BM11628		
	TMP93PW44ADFG	QFP80 (14 x 20)	BM11652		
	TMP93PW46AFG	LQFP100 (14 x 14)	BM11629		
	TMP95PW64FG	LQFP100 (14 x 14)	BM11629		
	TMP96PM40FG	QFP80 (14 x 20)	BM11539		
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.	http://www.adlinks.co.jp
Emulation Technology Inc.	http://www.emulation.com
Samtec Inc.	http://www.samtec.com
Tokyo Eletech Corp.	http://www.tetc.co.jp/e-index.htm
Tyco Electronics Corp.	http://www.tycoelectronics.com
Yamaichi Electronics Co., Ltd.	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.

OVERSEAS SUBSIDIARIES AND AFFILIATES

(As of June 01, 2010)

Toshiba America Electronic Components, Inc.
- Irvine, Headquarters
  Tel: (949)623-2900 Fax: (949)474-1330
- Buffalo Grove (Chicago)
  Tel: (847)484-2400 Fax: (847)541-7287
- Duluth/Atlanta
  Tel: (770)931-3363 Fax: (770)931-7602
- El Paso
  Tel: (915)771-8156
- Houston
  Tel: (713)466-6277
- Marlborough
  Tel: (508)481-0034 Fax: (508)481-8828
- Parsippany
  Tel: (973)541-4715 Fax: (973)541-4716
- San Jose
  Tel: (408)526-2400 Fax: (408)526-2410
- Wixom (Detroit)
  Tel: (248)347-2607 Fax: (248)347-2602

Toshiba Electronics do Brasil Ltda.
Tel: (011)2539-6681 Fax: (011)2539-6675

Toshiba India Private Ltd.
Tel: (011)2331-8422 Fax: (011)2371-4603

Toshiba Electronics Europe GmbH
- Düsseldorf Head Office
  Tel: (0211)5296-0 Fax: (0211)5296-400
- France Branch
  Tel: (1)47282828 Fax: (1)42046491
- Italy Branch
  Tel: (039)68701 Fax: (039)6870205
- Spain Branch
  Tel: (91)660-6798 Fax: (91)660-6799
- U.K. Branch
  Tel: (1252)5300 Fax: (1252)53-0250
- Sweden Branch
  Tel: (8)704-0900 Fax: (8)80-8459

Toshiba Electronics Asia (Singapore) Pte. Ltd.
Tel: (6278)5252 Fax: (6271)5155

Toshiba Electronics Service (Thailand) Co., Ltd.
Tel: (02)501-1635 Fax: (02)501-1638

Toshiba Electronics Trading (Malaysia) Sdn. Bhd.
- Kuala Lumpur Head Office
  Tel: (03)5631-6311 Fax: (03)5631-6307
- Penang Office
  Tel: (04)226-8523 Fax: (04)226-8515

Toshiba Electronics Asia, Ltd.
- Hong Kong Head Office
  Tel: 2375-6111 Fax: 2375-0969
- Beijing Office
  Tel: (010)6590-8796 Fax: (010)6590-8791
- Chengdu Office
  Tel: (028)8675-1773 Fax: (028)8675-1065
- Qingdao Office
  Tel: (532)8579-3328 Fax: (532)8579-3329

Toshiba Electronics Shenzhen Co., Ltd.
Tel: (0755)2399-6897 Fax: (0755)2399-5573

Toshiba Electronics (Shanghai) Co., Ltd.
- Shanghai Head Office
  Tel: (021)6841-0666 Fax: (021)6841-5002
- Hangzhou Office
  Tel: (0571)8717-5004 Fax: (0571)8717-5013
- Nanjing Office
  Tel: (025)8689-0070 Fax: (025)8689-0125

Toshiba Electronics (Dalian) Co., Ltd.
Tel: (0411)8368-6882 Fax: (0411)8369-0822

Tsurong Xiamen Xiangyu Trading Co., Ltd.
Tel: (0592)226-1398 Fax: (0592)226-1399

Toshiba Electronics Korea Corporation
- Seoul Head Office
  Tel: (02)3484-4334 Fax: (02)3484-4302
- Daegu Office
  Tel: (053)428-7610 Fax: (053)428-7617

Toshiba Electronics Taiwan Corporation
- Taipei Head Office
  Tel: (02)2508-9988 Fax: (02)2508-9999

Microcomputers / Microcomputer Development Systems

TOSHIBA

TOSHIBA CORPORATION
Semiconductor Company
Website: http://www.semicon.toshiba.co.jp/eng

Previous edition: BCE0023H
2010-7(3k)SO-DQ