

## TXZ™ Family M3H Group

TOKYO—Toshiba Electronic Devices & Storage Corporation (“Toshiba”) has added the “M3H Group” to its “TXZ™ Family” of Arm® Cortex®-M-based microcontrollers for consumer and industrial equipment. The new microcontrollers are now in mass production.

The M3H Group has two groups based on their functional level. “M3H Group (1)” offers standard functions, while “M3H Group (2)” offers an expanded package line-up and memory size and supports high-speed processing (80MHz). Together, they offer a rich line-up with 13 packages (32 pins to 144 pins) and flash memory ranging from 32KB to 512KB.



Toshiba plans to release groups of microcontrollers for communications control for high-speed data processing, and devices equipped with high-precision analog circuits for control of low- to medium-speed motors. The Company continues to expand the TXZ family to meet the needs of the motor control and global sensing market.

### Features

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- High-performance ARM Cortex-M3 core, operating at up to 80MHz
- A comprehensive line-up of memory and package variations
- General-purpose microcontrollers for diverse applications

### Applications

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- Air-conditioners, washing machines, refrigerators, office automation equipment, housing and facility equipment, audio-visual equipment, motor control applications (consumer and industrial applications).

## Product Specifications

Product series		TXZ3 Series	
Product group		M3H Group (1)	M3H Group (2)
CPU core		Arm Cortex-M3	
Maximum operating frequency		40MHz	80MHz
Internal oscillator		10MHz( $\pm 1\%$ )*1	*1:Factory default setting
Built-in memory	Flash (code)	32K to 128KB	256K to 512KB
	Flash (data)	8K to 32KB	32KB
	RAM	8K to 18KB	66KB with parity
I/O port		24 to 87	56 to 134
CRC calculation circuit (CRC)		None	1 channel
Communication function	UART	2 to 3 channels	5 to 6 channels
	TSPI	1 to 2 channels	1 to 5 channels
	I <sup>2</sup> C	1 to 3 channels	2 to 4 channels
12-bit AD converter (ADC)	Channel input	4 to 16 channels	19 to 21 channels
	Conversion time	1.5 $\mu$ s	
8-bit DA converter (DAC)		0 to 2 channels	2 channels
Programmable motor driver (PMD+)		1 channel	None
Advanced programmable motor driver (A-PMD)		None	1 channel
Advanced encoder input circuit (A-ENC)		1 channel	
Remote control signal processor (RMC)		0 to 1 channel	1 channel
Timer		Used as 32-bit timer : 6 channels Used as 16-bit timer $\times$ 2 channels: 12 channels	Used as 32-bit timer: 8 channels Used as 16-bit timer $\times$ 2 channels: 16 channels
Real time clock (RTC)		0 to 1 channel	1 channel
Watchdog timer (WDT)		1 channel	1 channel
DMA controller (DMAC)		32 channels / 1 unit	64 channels / 2 units
Operating temperature range		-40~+85 $^{\circ}$ C	
Supply voltage		2.7 to 5.5V	
Number of pins		32 to 100 pins	64 to 144 pins

## M3H Group (1) Lineup

Product Name	Memory				Package
	Code Flash (KB)	Data Flash (KB)	RAM (KB)	Backup RAM (KB)	
TMPM3H6FWFG	128	32	16	2	LQFP100 (14mm x 14mm, 0.5mm pitch)
TMPM3H6FUFG	96	32	12		
TMPM3H6FSFG	64	16	8		
TMPM3H6FWDFG	128	32	16	2	QFP100 (14mm x 20mm, 0.65mm pitch)
TMPM3H6FUDFG	96	32	12		
TMPM3H6FSDFG	64	16	8		
TMPM3H5FWFG	128	32	16	2	LQFP80 (12mm x 12mm, 0.5mm pitch)
TMPM3H5FUFG	96	32	12		
TMPM3H5FSFG	64	16	8		
TMPM3H5FWDFG	128	32	16	2	LQFP80 (14mm x 14mm, 0.65mm pitch)
TMPM3H5FUDFG	96	32	12		
TMPM3H5FSDFG	64	16	8		
TMPM3H4FWUG	128	32	16	2	LQFP64 (10mm x 10mm, 0.5mm pitch)
TMPM3H4FUUG	96	32	12		
TMPM3H4FSUG	64	16	8		
TMPM3H4FWFG	128	32	16	2	LQFP64 (10mm x 10mm, 0.5mm pitch)
TMPM3H4FUFG	96	32	12		
TMPM3H4FSFG	64	16	8		
TMPM3H3FWUG	128	32	16	2	LQFP52 (10mm x 10mm, 0.65mm pitch)
TMPM3H3FUUG	96	32	12		
TMPM3H3FSUG	64	16	8		
TMPM3H2FWDUG	128	32	16	2	LQFP48 (7mm x 7mm, 0.5mm pitch)
TMPM3H2FUDUG	96	32	12		
TMPM3H2FSDUG	64	16	8		
TMPM3H2FWQG	128	32	16	2	VQFN48 (6mm x 6mm, 0.4mm pitch)
TMPM3H2FUQG	96	32	12		
TMPM3H2FSQG	64	16	8		
TMPM3H1FWUG	128	32	16	2	LQFP44 (10mm x 10mm, 0.8mm pitch)
TMPM3H1FUUG	96	32	12		
TMPM3H1FSUG	64	16	8		
TMPM3H1FPUG	48	8	6		
TMPM3H0FSDUG	64	16	8	2	LQFP32 (7mm x 7mm, 0.8mm pitch)
TMPM3H0FMDUG	32	8	6		

## M3H Group (2) Lineup

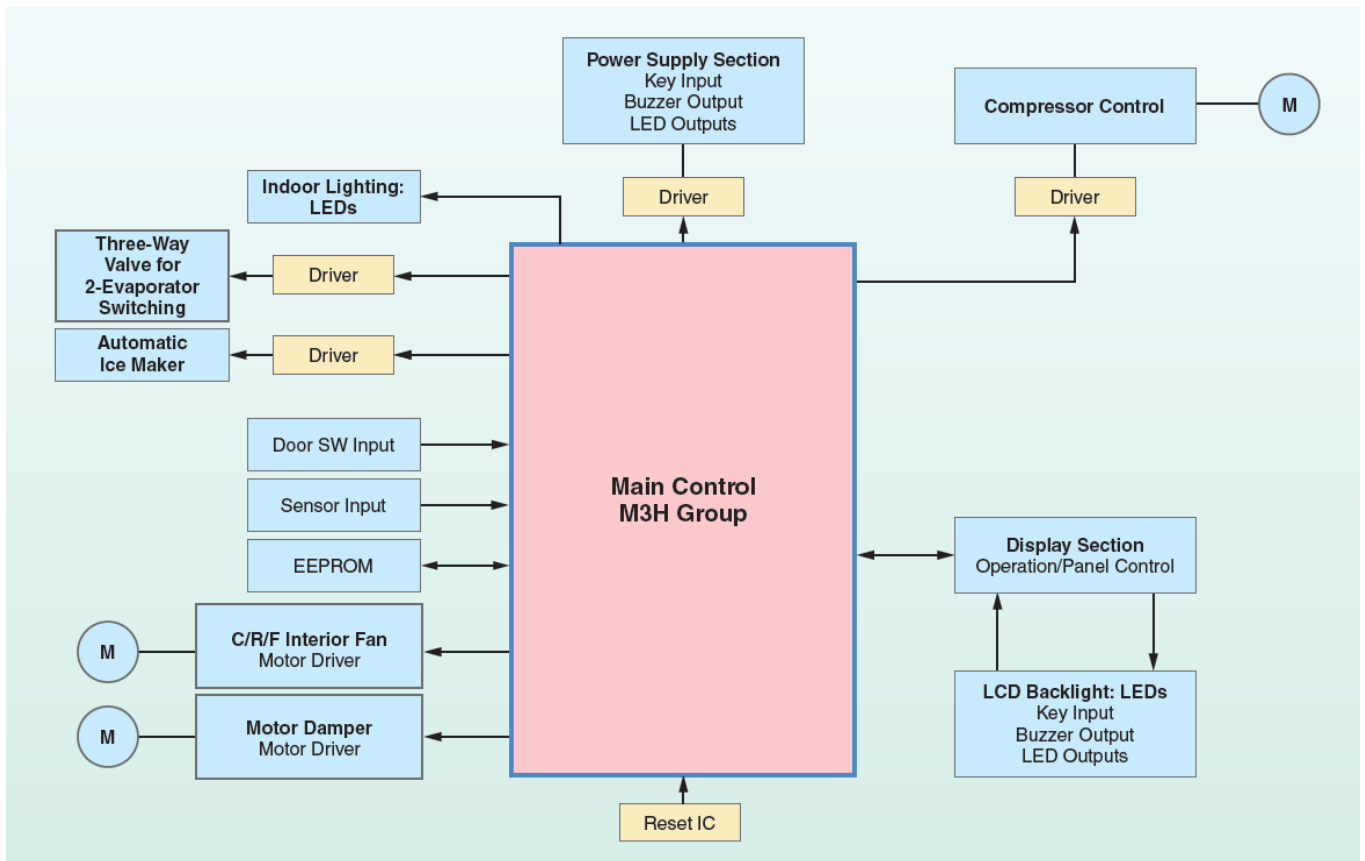
Product Name	Memory				Package
	Code Flash (KB)	Data Flash (KB)	RAM (KB)	Backup RAM (KB)	
TMPM3HQFDFG	512	32	64	2	LQFP144 (20mm x 20mm, 0.5mm pitch)
TMPM3HQFZFG	384	32	64		
TMPM3HQFYFG	256	32	64		
TMPM3HPFDFG	512	32	64	2	LQFP128 (14mm x 14mm, 0.4mm pitch)
TMPM3HPFZFG	384	32	64		
TMPM3HPFYFG	256	32	64		
TMPM3HNFDFG	512	32	64	2	LQFP100 (14mm x 14mm, 0.5mm pitch)
TMPM3HNFZFG	384	32	64		
TMPM3HNFYFG	256	32	64		
TMPM3HNFDDFG	512	32	64	2	QFP100 (14mm x 20mm, 0.65mm pitch)
TMPM3HNFZDFG	384	32	64		
TMPM3HNFYDFG	256	32	64		
TMPM3HMFDFG	512	32	64	2	LQFP80 (12mm x 12mm, 0.5mm pitch)
TMPM3HMFZFG	384	32	64		
TMPM3HMFYFG	256	32	64		
TMPM3HLFDUG	512	32	64	2	LQFP64 (10mm x 10mm, 0.5mm pitch)
TMPM3HLFZUG	384	32	64		
TMPM3HLFYUG	256	32	64		

# Pin Assignment

Pin	Function	Pin	Function
75	PJ4/INT04/UT1RTS_N/UT1CTS_N/T32A03INB0/WO	50	RESET_N
74	PJ3/UT1CTS_N/UT1RTS_N/T32A03OUTB/Y00	49	PH1/X2
73	PJ2/UT1RXD/UT1TXDA/T32A03INA1/T32A03INC1/Y00	48	PH0/X1/EHCLKIN
72	PJ1/UT1TXDA/UT1RXD/T32A03INA0/T32A03INC0/X00	47	DVSSA
71	PJ0/UT1TXDB/T32A03OUTA/T32A03OUTC/U00	46	REGOUT1
70	PN0/T32A05OUTA/T32A05OUTC	45	REGOUT2
69	PN1/T32A05INA0/T32A05INC0	44	DVDD5A
68	PN2/T32A05INA1/T32A05INC1	43	PP2/TSP11RXD/T32A01INA1/T32A01INC1
67	PN3/INT10/T32A05OUTB/TRG1N2	42	PP1/TSP11TXD/T32A01INA0/T32A01INC0
66	PN4/T32A05INB0	41	PPO/TSP11SCK/T32A01OUTA/T32A01OUTC
65	PN5/T32A05INB1	40	PL6/TSP11CS0/TSP11CS1N
64	PR3	39	PL5/TSP11CS1
63	PR2/T32A02INA1/T32A02INC1	38	PL4/INT12
62	PR1/T32A02INA0/T32A02INC0	37	PL3/INT08/UT2RTS_N/UT2CTS_N
61	PR0/T32A02OUTA/T32A02OUTC	36	PL2/UT2CTS_N/UT2RTS_N
60	PC6	35	PL1/UT2RXD/UT2TXDA/12C2SDA
59	PC5/T32A02INB1	34	PLO/UT2TXDA/UT2RXD/12C2SCL
58	PC4/T32A02INB0	33	PB7
57	PC3/T32A02OUTB	32	PB6/TSP11CS1
56	PC2/INT02/T32A02INA1/T32A02INC1/RT1COUT	31	PB5/UT2RTS_N/UT2CTS_N/TSP11CS0/T32A01INB1/TSP11CS1N
55	PC1/INT01/12C0SDA/T32A02INA0/T32A02INC0	30	PB4/UT2CTS_N/UT2RTS_N/TSP11RXD/T32A01INB0
54	PC0/INT00/12C0SCL/T32A02OUTA/T32A02OUTC	29	PB3/UT2RXD/UT2TXDA/TSP11TXD/T32A01OUTB
53	MODE	28	PB2/UT2TXDA/UT2RXD/TSP11SCK/T32A01INA1/T32A01INC1
52	PH3/XT2/INT06	27	PB1/INT03/RX1NO/T32A01INA0/T32A01INC0/TRG1NO
51	PH2/XT1	26	PB0/BOOT_N/T32A01OUTA/T32A01OUTC/SCOUT
76	Z00/T32A03INB1/PJ5		
77	EMGO_N/UT1TXDB/PK0		
78	OVVO_N/UT1RXD/UT1TXDA/INT05/PK1		
79	TMS/SWDIO/T32A04OUTC/T32A04OUTA/UT1TXDA/UT1RXD/PK2		
80	TCK/SWCLK/T32A04INC0/T32A04INA0/UT1RTS_N/UT1CTS_N/PK3		
81	TDO/SWV/T32A04INC1/T32A04INA1/UT1CTS_N/UT1RTS_N/PK4		
82	TDI/T32A04OUTB/PK5		
83	TRST_N/T32A04INB0/PK6		
84	T32A04INB1/INT13/PK7		
85	INT14/PP3		
86	BSC		
87	DVDD5B		
88	DVSSB		
89	A1NA15/PF4		
90	A1NA14/PF3		
91	A1NA13/PF2		
92	A1NA12/PF1		
93	A1NA11/PF0		
94	A1NA10/PE6		
95	A1NA09/PE5		
96	A1NA08/PE4		
97	A1NA07/PE3		
98	A1NA06/PE2		
99	A1NA05/PE1		
100	A1NA04/PE0		
1	A1NA03/PD3		
2	A1NA02/PD2		
3	A1NA01/PD1		
4	A1NA00/PD0		
5	AVDD5		
6	AVSS		
7	DA00/PD0		
8	DA01/PD1		
9	DVSSC		
10	DVDD5C		
11	INT11/PA7		
12	INT07/PA6		
13	T32A00INB1/12C1SDA/PA5		
14	T32A00INB0/TSP10CS1/12C1SCL/PA4		
15	TRG1N1/T32A00OUTB/TSP10CS0/TSP10CS1N/PA3		
16	ENC02/T32A00INC1/T32A00INA1/TSP10RXD/UT0TXDA/UT0RXD/PA2		
17	ENC08/T32A00INC0/T32A00INA0/TSP10TXD/UT0RXD/UT0TXDA/PA1		
18	ENC0A/T32A00OUTC/T32A00OUTA/TSP10SCK/UT0TXDB/PA0		
19	INT15/PMB		
20	T32A00INB1/PMB		
21	TRACEDATA3/T32A00INB0/TSP10CS1/UT0CTS_N/UT0RTS_N/PM4		
22	TRACEDATA2/TSP10CS1N/T32A00OUTB/TSP10CS0/UT0RTS_N/UT0CTS_N/PM3		
23	TRACEDATA1/T32A00INC1/T32A00INA1/TSP10RXD/UT0TXDA/UT0RXD/INT09/PM2		
24	TRACEDATA0/T32A00INC0/T32A00INA0/TSP10TXD/UT0RXD/UT0TXDA/PM1		
25	TRACEDATA0/T32A00INC0/T32A00OUTA/TSP10SCK/UT0TXDB/PM0		

e.g. LQFP100

# Application Circuit Example (Refrigerators)



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