Hercules™ TMS570 Microcontrollers

Texas Instruments

Flash options from 256 KB to 4 MB and performance from 80 MHz to 300 MHz

The Hercules TMS570 MCU family enables customers to easily develop safety-critical products for transportation and automotive applications. TMS570 devices are part of SafeTI™ design packages and are developed to meet the requirements of the ISO 26262 ASIL-D and IEC 61508 SIL-3 safety standards and qualified to the AEC-Q100 automotive specification. The TMS570 ARM® Cortex®-R based family offers several options of performance, memory, peripherals for motor control and a variety of communication interfaces. The TMS570 family includes options with ARM Cortex-R4 and ARM Cortex-R5 cores. Lockstep CPU architecture, hardware BIST, MPU, ECC and on-chip clock and voltage monitoring are some of the key functional safety features available to meet the needs of automotive, railway and aerospace applications.

For additional information, please visit **www.ti.com/tms570** or **www.ti.com/safeti**

Device	Speed (Mhz)	Flash	RAM (kB)	Data Flash (kB)	EMAC	FlexRay™	CAN	MibSPI (cs)	SPI (cs)	I²C	UART (LIN)	HET (ch)	PWM (ch)	CAP/QEP	MibADC 12 bit (ch)	EMIF (16 bit)	Total GIO (Interrupt)	TRACE (ETM/RTP/DMM)	Package	Temperature Range (°C)
TMS570LC43x series																				
TMS570LC4357ZWTQQ1	300	4MB	512	128	10/100	2 ch	4	5(32)	–	2	4(2)	2(64)	14	6/2	2(41)	Yes	145(16)	Yes	337 BGA	–40 to 125
TMS570LS04x/03x series																				
TMS5700332PZQQ1	80	256KB	32	16	–	–	2	1(4)	2(8)	–	1(1)	19	–	–/2	1(16)	–	45(8)	–	100 QFP	–40 to 125
TMS5700432PZQQ1	80	384KB	32	16	–	–	2	1(4)	2(8)	–	1(1)	19	–	–/2	1(16)	–	45(8)	–	100 QFP	–40 to 125
TMS570LS12x/11x series																				
TMS5701114PGEQQ1	160	1MB	128	64	–	–	3	3(12)	1(1)	1	2(1)	2(40)	14	6/2	2(24)	–	64(10)	–	144 QFP	–40 to 125
TMS5701114ZWTQQ1	180	1MB	128	64			3	3(16)	2(3)	1	2(1)	2(44)	14	6/2	2(24)	Yes	101(16)	–	337 BGA	–40 to 125
TMS5701115PGEQQ1	160	1MB	128	64	–	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	14	6/2	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5701115ZWTQQ1	180	1MB	128	64		2 ch	3	3(16)	2(3)	1	2(1)	2(44)	14	6/2	2(24)	Yes	101(16)	–	337 BGA	–40 to 125
TMS5701224PGEQQ1	160	1.25MB	192	64	–	–	3	3(12)	1(1)	1	2(1)	2(40)	14	6/2	2(24)	–	64(10)	–	144 QFP	–40 to 125
TMS5701224ZWTQQ1	180	1.25MB	192	64			3	3(16)	2(3)	1	2(1)	2(44)	14	6/2	2(24)	Yes	101(16)	–	337 BGA	–40 to 125
TMS5701225PGEQQ1	160	1.25MB	192	64	–	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	14	6/2	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5701225ZWTQQ1	180	1.25MB	192	64		2 ch	3	3(16)	2(3)	1	2(1)	2(44)	14	6/2	2(24)	Yes	101(16)	–	337 BGA	–40 to 125
TMS5701227PGEQQ1	160	1.25MB	192	64	10/100	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	14	6/2	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5701227ZWTQQ1	180	1.25MB	192	64	10/100	2 ch	3	3(16)	2(3)	1	2(1)	2(44)	14	6/2	2(24)	Yes	101(16)	–	337 BGA	–40 to 125
TMS570LS31x/21x series																				
TMS5702124APGEQQ1	160	2MB	192	64	–	–	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	64(10)	–	144 QFP	–40 to 125
TMS5702124AZWTQQ1	180	2MB	192	64			3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5702125APGEQQ1	160	2MB	192	64	–	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5702125AZWTQQ1	180	2MB	192	64		2 ch	3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5702134APGEQQ1	160	2MB	256	64	–	–	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	64(10)	–	144 QFP	–40 to 125
TMS5702134AZWTQQ1	180	2MB	256	64			3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5702135APGEQQ1	160	2MB	256	64	–	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5702135AZWTQQ1	180	2MB	256	64		2 ch	3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5703134APGEQQ1	160	3MB	256	64	–	–	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	64(10)	–	144 QFP	–40 to 125
TMS5703134AZWTQQ1	180	3MB	256	64			3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5703135APGEQQ1	160	3MB	256	64	–	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5703135AZWTQQ1	180	3MB	256	64		2 ch	3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125
TMS5703137APGEQQ1	160	3MB	256	64	10/100	2 ch	3	3(12)	1(1)	1	2(1)	2(40)	–	–	2(24)	–	58(4)	–	144 QFP	–40 to 125
TMS5703137AZWTQQ1	180	3MB	256	64	10/100	2 ch	3	3(16)	2(3)	1	2(1)	2(44)	–	–	2(24)	Yes	120(16)	Yes	337 BGA	–40 to 125

Note: Above reflects max configuration of each module – some functions are multiplexed.

Development hardware

Evaluation and development

TMDX570LS31USB – TMS570LS31x/21x USB Stick Kit
TMDX570LS31HDK – TMS570LS31x/21x Development Kit
TMDX570LS12HDK – TMS570LS12x/11x Development Kit
TMDX570LS04HDK – TMS570LS04x/03x Development Kit
TMDX570LC43HDK – TMS570LC43x Development Kit

Motor control

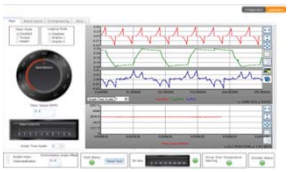
DRV8301-LS31-KIT – TMS570LS31x/21x Motor Control Kit
DRV8301-LS12-KIT – TMS570LS12x/11x Motor Control Kit
TMDX570LS31CNCD – TMS570LS31x/21x Control Card
TMDX570LS12CNCD – TMS570LS12x/11x Control Card

Development software

Integrated development environment

Compilers and debuggers:
- TI Code Composer Studio™ IDE
- Green Hills MULTI®
- IAR Workbench®
- KEIL™ µVision®

TI MotorWare™ software for TMS570



- Field oriented / vector control (FOC)
- Sensorless InstaSPIN™-BLDC
- Speed and torque control loops
- TI MotorWare and HALCoGen conventions
- Leverages ARM® CMSIS Math Library

Safety-certifiable RTOS and AutoSAR

Real-time operating system support:
- SAFERTOS®: High Integrity Systems
- µC/OS II/III™: Micrium
- SCIOPTA RTOS: SCIOPTA

AutoSAR RTE and MCAL support:
- Vector MICROSAR Safe
- Safe AutoSAR from TTTech/Vector
- AutoSAR: ElektroBit tresos
- MCAL 4.0 from TI

GUI-based code generation tools

HALCoGen
- GUI to configure peripherals, interrupts, clocks, and other µC parameters
- Generates device init and peripheral drivers
- Import into CCStudio, IAR and KEIL IDEs

HET IDE
- Graphical programming environment
- Output simulation tool
- Generates CCStudio-ready software
- Includes functional examples from TI

Development support

TI E2E™ Community
www.ti.com/hercules-support

SafeTI™ Design Packages for Functional Safety
www.ti.com/safeti

www.ti.com/herculestraining

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