
TEXAS INSTRUMENTS
HAS ACQUIRED
LUMINARY MICRO®
See How Far You Can Go Now

TI Embedded Processing Portfolio

Microcontrollers — ARM-Based — DSP

16-bit	32-bit Real-time	32-bit ARM	ARM+	ARM + DSP	DSP
MSP430	**C2000™**	**Stellaris M3**	**ARM9 Cortex A-8**	**C64x+ plus ARM9/Cortex A-8**	**C647x, C64x+, C55x**
Ultra-Low Power	Fixed & Floating Point	Industry Std Low Power	Industry-Std Core, High-Perf GPP	Industry-Std Core + DSP for Signal Proc.	Leadership DSP Performance
Up to 25 MHz	Up to 150 MHz	Up to 100 MHz	Accelerators	4800 MMACs/ 1.07 DMIPS/MHz	24,000 MMACS
Flash 1 KB to 256 KB	Flash 32 KB to 512 KB	Flash 8kB to 256kB	MMU	MMU, Cache	Up to 3 MB L2 Cache
Analog I/O, ADC LCD, USB, RF	PWM, ADC, CAN, SPI, I²C	USB (H/D/OTG), ENET(PHY, 1588), ADC, PWM, QVGA	USB, LCD, MMC, EMAC	VPSS, USB, EMAC, MMC	1G EMAC, SRIO, DDR2, PCI-66
Measurement, Sensing, General Purpose	Motor Control, Digital Power, Lighting	Host Control	Linux/WinCE User Apps	Linux/Win + Video, Imaging, Multimedia	Comm, WiMAX, Industrial/ Medical Imaging
$0.49 to $9.00	$1.50 to $20.00	$2.00 to $8.00	$8.00 to $35.00	$12.00 to $65.00	$4.00 to $99.00+
					

Software & Dev. Tools

Texas Instruments Developer Network

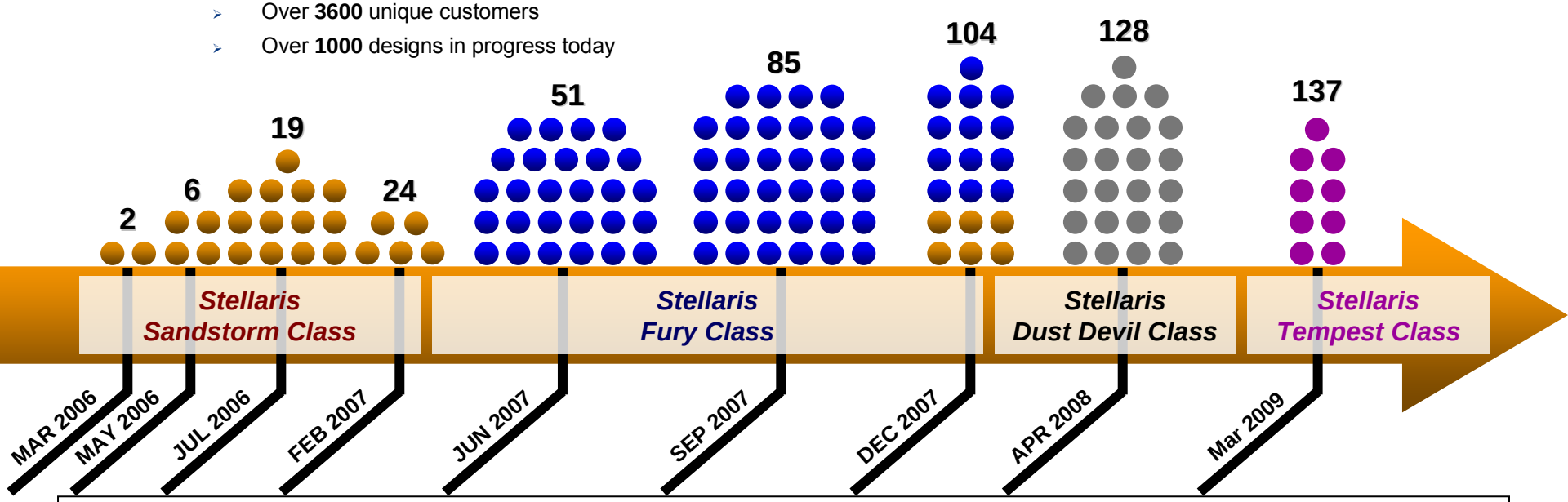
Texas Instruments eXpressDSP™

Texas Instruments


EETIMES PRODUCTCENTER
ULTIMATE PRODUCTS
3.1 Winner
StellarisWare™
EETIMES'
Ultimate Products
4.2
Winner
best electronic design
2006
jaguar
LUMINARY MICRO
JUST ADD MOTOR
eg3
Editors Tech Choice
EDN
HOT products 100
ARM POWERED
Cortex
Intelligent Processors by ARM
FRC
FIRST Robotics Competition
CROWN SUPPLIER
Embedded COMPUTING DESIGN
Editor's Choice products
CERTIFIED USB

Stellaris Family of Industrial-Grade 32-bit MCUs

- … the first 32-bit ARM® microcontroller offered for $1.00
- … the first available ARM Cortex™-M3-based microcontrollers in production
- … the first to bring serious motion control capability to the ARM architecture
- … the only to integrate 10/100 Ethernet MAC and PHY in an ARM architecture
- … the largest ARM portfolio in the world – over 140 compatible family members
- … a *complete* and *fully functional* StellarisWare™ software library
- … extensive world-class third-party tools support
- … shipping to **64 countries/territories** worldwide:
  - Over **13,000** evaluation kits in 24 months
  - Over **12,000** modules in 8 months
  - Over **3600** unique customers
  - Over **1000** designs in progress today



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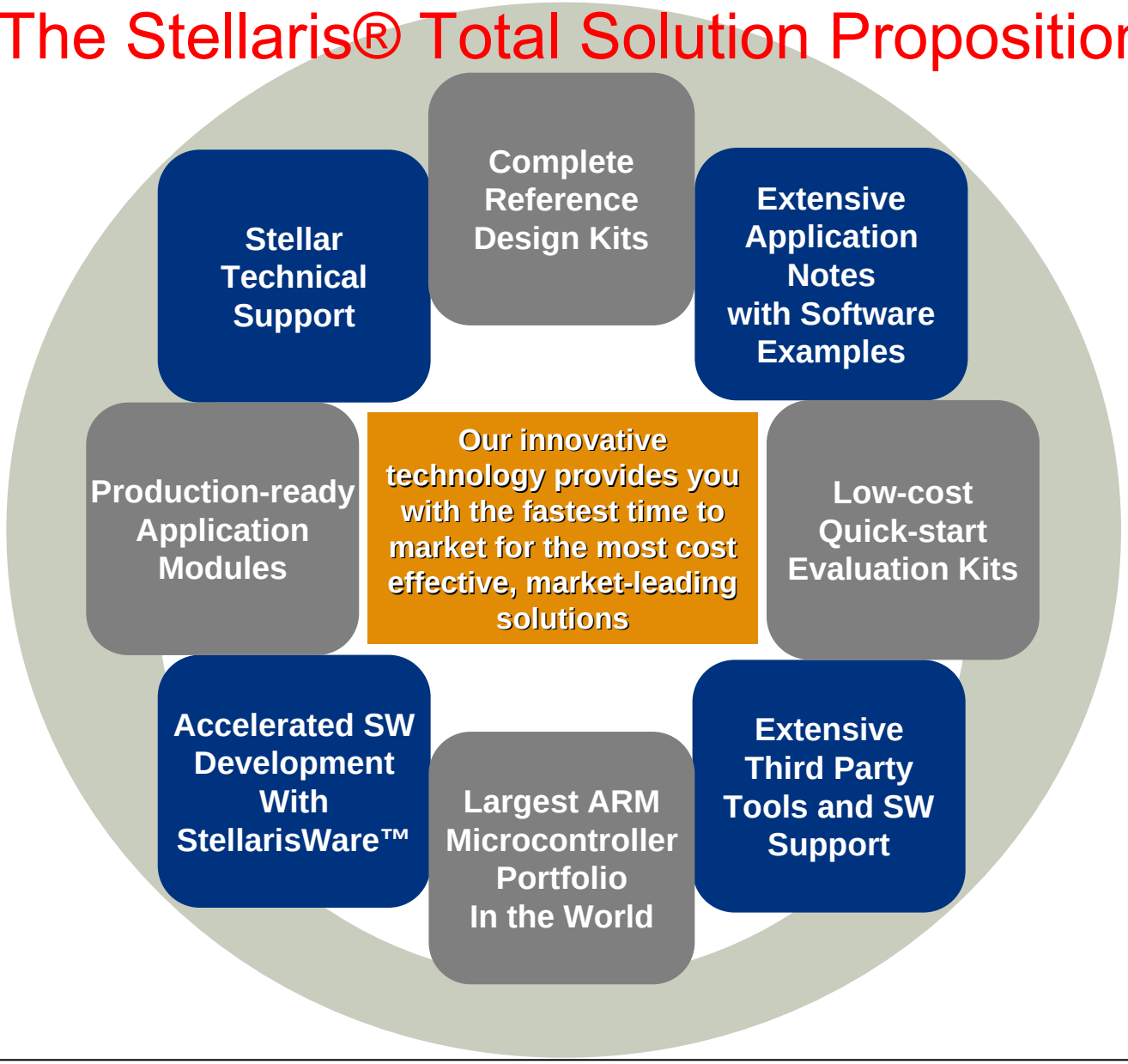
The Stellaris® Total Solution Proposition



Stellaris Roadmap

Sandstorm class
- 64K flash
- 8K SRAM
- Motion control
- 1Msps ADC

Fury class
- 256K flash
- 64K SRAM
- Motion control
- Ethernet MAC+PHY
- CAN 2.0
- Ethernet+CAN

DustDevil class
- 128K flash
- 64K SRAM
- Motion control enhancements
- USB 2.0 Host/Device & OTG
- 32ch DMA

Tempest class
- Higher performance
- Low power
- Ethernet+CAN+USB
- External bus capability

Future
- Advanced analog
- Wireless communications
- Larger memory
- Display support

Blizzard class
- Small form factor
- Low pin count

2006 2007 2008 2009 2010

Stellaris Evaluation Kits: “Zero-to-32bits” in 10 minutes

- Each feature-rich evaluation kit includes:
  - everything a developer needs to get up and running in 10 minutes or less, for a superb "out-of-the-box" experience.
  - evaluation board(s), all required cables, a choice of evaluation tools suites for popular development tools, documentation, the Stellaris Driver Library, and applications notes
- Each kit spans the design spectrum from evaluation to prototyping to application-specific design by functioning both as an evaluation platform and as a serial in-circuit debug interface for any Stellaris microcontroller-based target board.

EK-LM3S811
Low pin count
49 USD

EK-LM3S1968
High pin count
59 USD

EK-LM3S2965
CAN Functionality
79 USD

EK-LM3S3748
USB Host/Device
109 USD

EK-LM3S6965
Ethernet MAC+PHY
69 USD

EK-LM3S8962
Ethernet+CAN
89 USD

EK-LM3S9B90
Ethernet+USB OTG
99 USD

EK-LM3S9B92
Ethernet+OTG+MC
99 USD

Four versions of each kit:

- EKK-LM3Sx
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3Sx
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3Sx
  - CodeSourcerySourcery G++ GNU with 30-day evaluation license
- EKT-LM3Sx
  - Code Red Technologies Red Suite with full evaluation license locked to board

Stellaris Complete, Open-Tool Motor Reference Kits

RDK-ACIM
$379

AC Induction Motor Controller Design

Example applications:

- White goods
- Residential and light commercial HVAC
- 3-ph Industrial Motor Drives

RDK-STEPPER
$199

Stepper Motor Controller Design

Example applications:

- 2 and 3 axis CNC equipment
- Sorting and grading equipment
- Specialized printers and scanners

RDK-BLDC
$219

Brushless DC Motor Controller with CAN/Ethernet

Example applications:

- Small appliances
- Electric wheelchairs and mobility devices
- Pumping and ventilation systems

RDK-BDC
$219

Brush DC Motor Controller with CAN

Example applications:

- Small appliances
- Electric wheelchairs and mobility devices
- Pumping and ventilation systems

Official FIRST KoP Speed Controller – FRC 2009

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Stellaris Complete, Open-Tool Reference Design Kits

RDK-IDM
$219

Touch-screen Intelligent Display Module with PoE

Example applications:

- Security Systems & Building Access Controllers
- White Goods and other Home Appliances
- Factory Automation (System Status and Configuration)

RDK-IDM-L35
$219

Landscape-oriented Touch-screen Intelligent Display Module

Example applications:

- Security Systems & Building Access Controllers
- White Goods and other Home Appliances
- Factory Automation (System Status and Configuration)

RDK-IDM-SBC
$299

Stellaris 3.5” Landscape IDM Single Board Computer

Example applications:

- Security Systems & Building Access Controllers
- White Goods and other Home Appliances
- Factory Automation (System Status and Configuration)

RDK-S2E
$139

Tiny Footprint Serial-to-Ethernet Module

Example applications:

- SCADA Remote Terminal Units (RTUs)
- Electronic Flow Meters (EFMs)
- CCTV RS-232 Recorders

Stellaris® Means:

- World class support

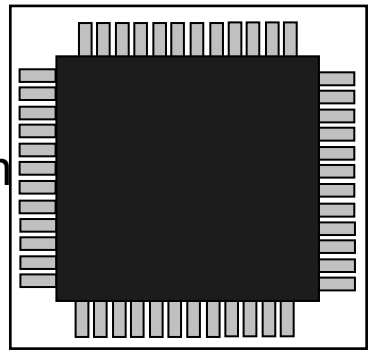
Compilers, Debuggers	KEIL An ARM® Company; IAR SYSTEMS; Rowley Associates; hitex DEVELOPMENT TOOLS; code_red; CodeSourcery; iSYSTEM
RTOS	KEIL An ARM® Company; IAR SYSTEMS; Micriμm; μTasker; CMX SYSTEMS; PUMPKIN INCORPORATED; freeRTOS™; expresslogic; SEGGER; SCIOPTA; Quadros Systems Inc.
Stacks, Specialty	SEGGER; PCB MATRIX; IXXAT; Willert Software Tools — Pioneers in Embedded Software Engineering; Quadros Systems Inc.; interniche technologies, inc.; WhizNets; SEVENSTAX EMBEDDED TECHNOLOGIES; Micriμm; port; expresslogic; NATIONAL INSTRUMENTS; Micromint USA; RoweBots; CMX SYSTEMS
Training Partners	FEASER; hitex; DOULOS; mbest ARM工具关键合作伙伴
Programmers	BPM MICROSYSTEMS; SYSTEM GENERAL; XELTEK; ZHIYUAN ELECTRONICS

Stellaris Family: Unique Value Proposition

The only ARM MCU with 10/100 Ethernet MAC / PHY

- Enables network connectivity and embedded web servers
- Lower external power budget requirements than solutions using an external PHY
- Savings in board space and system cost

The Stellaris MCU in a BGA package is just slightly larger than a standard Ethernet PHY in a 48 pin TQFP package



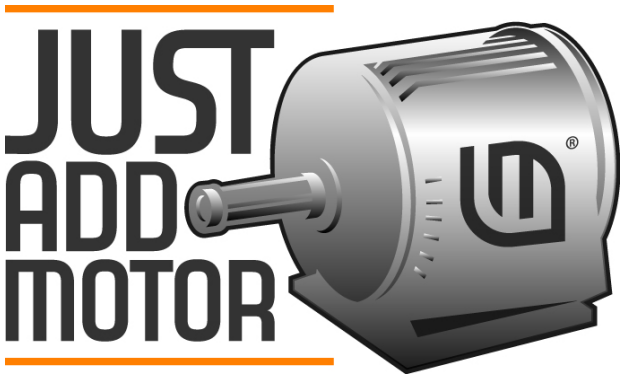
MCU + PHY + More Stellaris Features in an area the size of an Industry standard PHY!

And now even more value in the same small package:

- Hardware support for Precision Time Protocol (IEEE 1588 PTP)

Stellaris Family: Unique Value Proposition

Stellaris Motion Control Advantage!



- Most competitors do not even have motion-control Pulse Width Modulators (PWMs)! (e.g. NXP)
- Stellaris supports up to 8 general-purpose PWMs **and** up to 8 channels of motion control PWMs.
- General-purpose PWMs
  - Stellaris 16-bit timer simple PWM mode with programmable output negation.
- Motion-control PWM Module
  - Can generate simple PWM signals for a simple charge pump.
  - Can generate paired PWM signals with dead-band delays for a half-H bridge driver.
  - Can generate the full six channels of gate controls for a 3-Phase inverter bridge.
  - Dead-band generator providing shoot-through protection.
  - Synchronization of timers enables precise alignment of ***all*** edges.
- **Stellaris Exclusive!** Up to 4 fault-condition handling inputs in hardware quickly provide low-latency shutdown.
- **Stellaris Exclusive!** Up to 2 Quadrature Encoder Inputs provide accurate positioning for closed-feedback control.

Stellaris Family: Unique Value Proposition

Stellaris features single-cycle Flash memory up to 50MHz!

- Some competitors claim faster core speeds with ARM7 and Cortex-M3, but the flash is not single-cycle!
- Some competitors claim single-cycle, but the max core speed is very limited

Vendor	MCU Line	Flash Access Time 20MHz CPU	Flash Access Time 25MHz CPU	Flash Access Time 50MHz CPU	Unit of Measure
Luminary Micro	Stellaris				**Cycle**
ST Micro	STM32	1	**2**	**3**	Cycles
Atmel	AVR8	1	**n/a**	**n/a**	Cycles

Flash access specifications from published datasheets

Stellaris Family: Unique Value Proposition

StellarisWare™

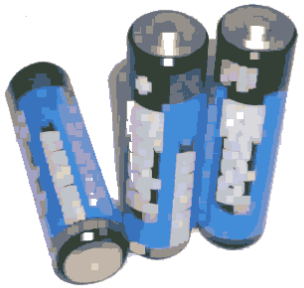
Free license and royalty-free source code:

- Peripheral Driver Library
- Graphics Library
- USB Library
- Boot Loader
- IEC 60730 Library

Enabling our customers with the ability to rapidly develop and deploy their products at competitive costs yielding a higher overall value for the Stellaris solution!

Stellaris—Optimized for Battery-backed 32-bit Applications

- Battery-backed Hibernation Module (Standby current as low as 10µA*)
  - 32-bit real-time counter (RTC)
    - Programmable 32.768-kHz external oscillator or a 4.194304-MHz crystal
    - RTC software trim for making fine adjustments to the clock rate
  - 256 bytes (sixty-four 32-bit words) of non-volatile battery-backed memory
  - Power-switching logic to discrete external regulator (switch to battery)
  - Low-battery detection, signaling, and interrupt generation
  - Wake on RTC match and / or external pin
- On-chip Low Drop-Out (LDO) voltage regulator
- Low-power options on controller: Sleep and Deep-sleep modes
- Low-power options for peripherals: software controls shutdown of individual peripherals
- 3.3-V supply brownout detection and reporting via interrupt or reset



Operating Mode	Sandstorm Class	Fury Class	Dust Devil Class	Tempest Class*
Run	< 120 mA	160 mA (w/ETH)	120 mA	60 mA (w/o ETH) 80 mA (w/ETH)
Sleep	20 mA	20 mA (w/ETH)	20 mA	8 mA
Deep Sleep	700 µA	5 mA (w/ETH)	350uA	600 µA
Hibernate	—	10 to 18 µA	10 to 18 µA	10 to 18 µA

* Preliminary

Stellaris Family of MCUs

	MCUs in Series	Memory and Speed				Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital		Hibernate	Package Options
													PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Ext. Peripheral Interface	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S100s	*2*	8	2	-	-	20	-	2	4	1	2	□	-	-	-	-	-	-	-	1	1	1	-	-	-	-	□	2	-	18	-	28-SOIC
LM3S300s	*8*	16	4	-	-	25	-	3	6	1	6	□	6	1	-	-	-	-	-	2	1	1	-	8	500	□	□	3	-	36	-	48-LQFP
LM3S600s	*11*	32	8	-	-	50	-	3	6	1	6	□	6	1	1	-	-	-	-	2	1	1	-	8	1000	□	□	3	-	36	-	48-LQFP
LM3S800s	*9*	64	8	-	-	50	-	3	6	1	6	□	6	1	1	-	-	-	-	2	1	1	-	8	1000	□	□	3	-	36	-	48-LQFP
LM3S1000s	*29*	256	64	□	-	50	-	4	8	1	8	□	8	3	2	-	-	-	-	3	2	2	-	8	1000	□	□	3	-	60	□	64-LQFP 100-LQFP 108-BGA
LM3S2000s	*26*	256	96	□	□	80	□	4	8	2	8	□	8	4	2	-	-	2	-	3	2	2	□	16	1000	□	□	3	7	60	□	64-LQFP 100-LQFP 108-BGA
LM3S3000s	*4*	128	64	□	-	50	-	4	8	1	8	□	8	4	1	-	-	-	O/H/D	3	2	2	-	8	1000	□	□	3	-	61	□	64-LQFP 100-LQFP
LM3S5000s	*12*	256	96	□	□	80	□	4	8	2	8	□	8	4	2	-	-	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	71	□	64-LQFP 100-LQFP
LM3S6000s	*19*	256	64	-	-	50	-	4	8	1	6	□	6	1	2	□	□	-	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S8000s	*12*	256	64	-	-	50	-	4	8	1	6	□	6	1	2	□	□	3	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S9000s	*6*	256	96	□	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

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Stellaris: **Four Generations** of ARM Cortex-M3

- **1st Generation of Stellaris = Sandstorm Class**
  - LM3S100 Series, LM3S300 Series, LM3S600 Series, LM3S800 Series
  - First ARM Cortex-M3 microcontrollers available anywhere
  - Feature sets start at $1
  - Up to 50MHz operation, Single-cycle memory up to 64K flash / 8K SRAM
  - Meticulous motion-control IP integration
- **2nd Generation of Stellaris = Fury Class**
  - LM3S1000 Series, LM3S2000 Series, LM3S6000 Series, and LM3S8000 Series
  - Extending Sandstorm Class with integrated Ethernet MAC+PHY and CAN
  - Increasing single-cycle memory up to 256K flash / 64K SRAM
  - Further optimized for battery-backed applications
  - Added peripherals, such as additional UART, I2C, SSI, and QEI
- **3rd Generation of Stellaris = Dust Devil Class**
  - LM3S1000 Series, LM3S3000 Series, and LM3S5000 Series
  - Improving Stellaris offering with integration of USB OTG, Host, and Device options
  - Added DMA, improved GPIO drive strength, and additional PWM outputs
  - Additional fault protection inputs for advanced motion control
  - Bootloader and StellarisWare™ peripheral driver library in preloaded in ROM
  - Providing new small package options (64 pin LQFP)
- **4th Generation of Stellaris = Tempest Class**
  - LM3S2000 Series, LM3S5000 Series, and LM3S9000 Series
  - Higher performance with lower operating power (80 MHz and 100 MHz, 1.2v internal supplies)
  - Powerful external interface for high-speed chip-to-chip interconnect
  - Enhanced subsystems including dual ADCs, extended in-ROM software, precision oscillator, and I2S interface
  - Expanded networking and connectivity with Ethernet, CAN and USB options and combinations

Stellaris® Family Technology

ARM® Cortex™-M3 v7-M Processor Core
- Up to 100 MHz
- Up to 125 MIPS (at 100 MHz)

On-chip Memory
- 256 KB Flash; 96 KB SRAM
- ROM loaded with Stellaris DriverLib, BootLoader, AES tables, and CRC

External Peripheral Interface (EPI)
- 32-bit dedicated parallel bus for external peripherals
- Supports SDRAM, SRAM/Flash, M2M

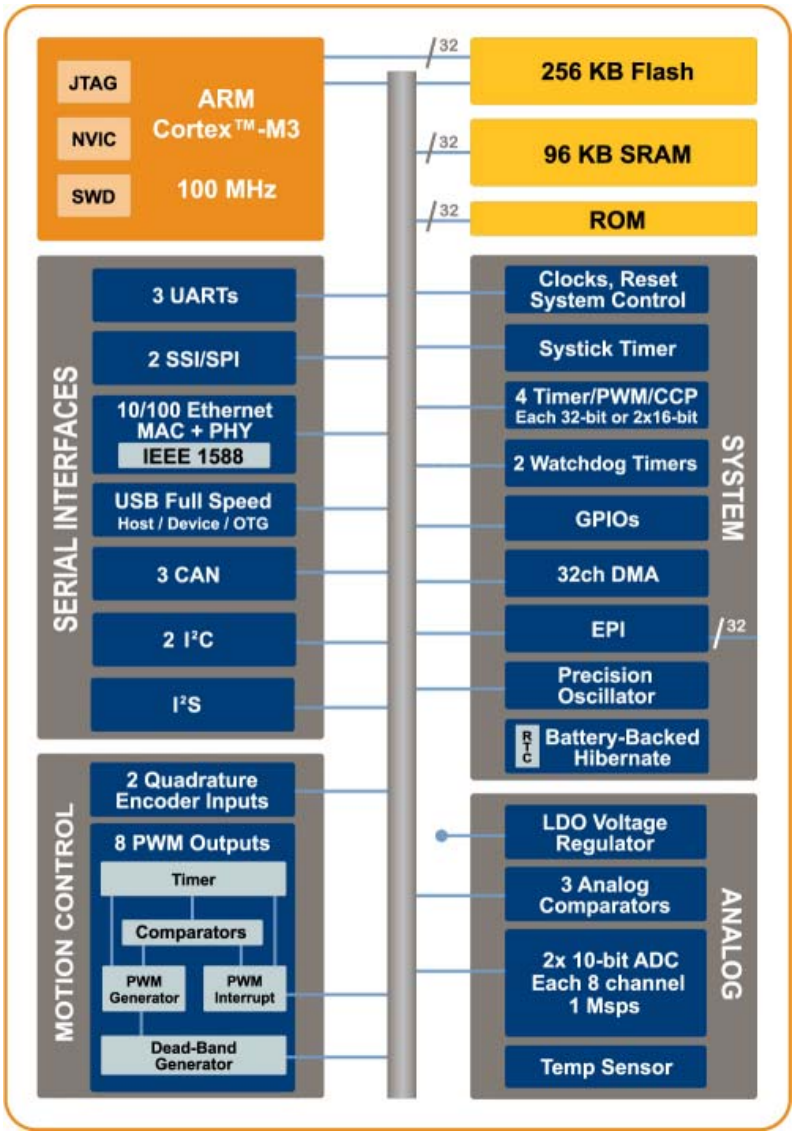
Advanced Serial Integration
- 10/100 Ethernet MAC and PHY
- 3 CAN 2.0 A/B Controllers
- USB (full speed) OTG / Host / Device
- 3 UARTs with IrDA and ISO 7816 support*
- 2 I^2Cs
- 2 Synchronous Serial Interfaces (SSI)
- Integrated Interchip Sound (I^2S)

System Integration
- 32-channel DMA Controller
- Internal Precision 16MHz Oscillator
- Two watchdog timers with separate clock domains
- ARM Cortex Systick Timer
- 4 32-bit timers (up to 8 16-bit) with RTC capability
- Lower-power battery-backed hibernation module
- Flexible pin-muxing capability

Advanced Motion Control
- 8 advanced PWM outputs for motion and energy applications
- 2 Quadrature Encoder Inputs (QEI)

Analog
- 2x 8-ch 10-bit ADC (for a total of 16 channels)
- 3 analog comparators
- On-chip voltage regulator (1.2V internal operation)

*** One UART features full modem controls**



RoHS COMPLIANT

External Peripheral Interface (EPI)

- **Multiple device types supported**
  - *SDRAM: Supports x16 (Single Data Rate) at up to 50MHz*
    - Supports low-cost SDRAMS up to 64 MB
    - Includes automatic refresh and access to all banks/rows.
    - Includes a sleep/standby mode to keep contents alive with minimal power draw.
  - *Host-Bus Interface: Traditional x8 MCU bus interface capabilities*
    - Similar device compatibility options as PIC, ATmega, 8051, and others
    - Access to SRAM, NOR Flash, and other devices, with up to 24MB of addressing
    - Support of both muxed and de-muxed address and data
    - Access to a range of devices supporting the non-address FIFO x8 interface variant, with support for TXempty and RXfull
    - Speed controlled, with read and write data wait-state counters
    - Manual chip-enable (or use extra address pins)
  - *Machine-to-Machine: Wide parallel interfaces for fast communications*
    - For instance, CPLDs and FPGAs
    - Data widths up to 32-bits, data rates up to 150 Mbytes/second
    - Optional “address” sizes from 4-bits to 16-bits
    - Optional clock output, read/write strobes, framing (with counter-based size), and clock-enable input
- **Other features**
  - General parallel GPIO, FIFOed with speed control – for custom peripherals or digital controls
  - Blocking and non-blocking reads
  - FIFOed writes separate the processor from timing details
  - Direct memory access (DMA)

Low Pin Count Real-Time MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital		Hibernate	Package Options
												PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S100s	2	8	2	-	20	-	2	4	1	2	□	-	-	-	-	-	-	-	1	1	1	-	-	-	-	□	2	-	18	-	28-SOIC
LM3S300s	8	16	4	-	25	-	3	6	1	6	□	6	1	-	-	-	-	-	2	1	1	-	8	500	□	□	3	-	36	-	48-LQFP
LM3S600s	11	32	8	-	50	-	3	6	1	6	□	6	1	1	-	-	-	-	2	1	1	-	8	1000	□	□	3	-	36	-	48-LQFP
LM3S800s	9	64	8	-	50	-	3	6	1	6	□	6	1	1	-	-	-	-	2	1	1	-	8	1000	□	□	3	-	36	-	48-LQFP

- LM3S811 evaluation platform
  - 50 MHz LM3S811, OLED, potentiometer, 2 pushbuttons, 2 LEDs, access to MCU pins
- Integrated serial JTAG debugger
- Can be used as a serial debugger for target applications platform

Four versions, each only $49:

- EKK-LM3S811: ARM RealView MDK with 32KB address Limit
- EKI-LM3S811: IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S811: CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S811: Code Red Technologies Red Suite with 32KB program size limit

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High Pin Count Real-Time MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog						Digital		Hibernate	Package Options
												PWM												ADC (10-bit)									
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S1000s	*29*	256	64	□	50	-	4	8	1	8	□	8	3	2	-	-	-	-	3	2	2	-	8	1000	□	□	3	-	60	□	64-LQFP 100-LQFP 108-BGA

Stellaris LM3S1968 Evaluation Kit:

- LM3S1968 Evaluation Board
  - Stellaris LM3S1968 MCU with 256K flash, 64K SRAM, 8 ADCs, and up to 52 GPIOs
  - OLED graphics display with 128 x 64 pixel resolution
  - User LED, navigation switches, and select pushbuttons
  - Magnetic speaker
  - LM3S1968 I/O available on labeled break-out pads
  - Standard ARM® 20-pin JTAG debug connector with input and output modes
- USB and JTAG cables
- CD containing evaluation software tools, documentation, quickstart guide, Stellaris Peripheral Driver Library, and example source code

Four versions, each only $59:

- EKK-LM3S1968
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3S1968
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S1968
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S1968
  - Code Red Technologies Red Suite with full evaluation license locked to board

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Ethernet Connected MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog						Digital		Hibernate	Package Options
												PWM											ADC (10-bit)									
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S6000s	19	256	64	-	50	-	4	8	1	6	□	6	1	2	□	□	-	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S8000s	12	256	64	-	50	-	4	8	1	6	□	6	1	2	□	□	3	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S9000s	6	256	96	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

Stellaris LM3S6965 Evaluation Kit:

- LM3S6965 Evaluation Board
  - OLED graphics display with 128 x 64 pixel resolution
  - User LED, navigation switches, and select pushbuttons
  - Magnetic speaker
  - LM3S6965 I/O available on labeled break-out pads
  - Standard ARM® 20-pin JTAG debug connector with input and output modes
  - MicroSD card slot
  - Included µIP Web Server (from FreeRTOS.org™)
- Ethernet, USB, and JTAG Cables
- CD containing evaluation software tools, documentation, quickstart guide, Stellaris Peripheral Driver Library, and source code

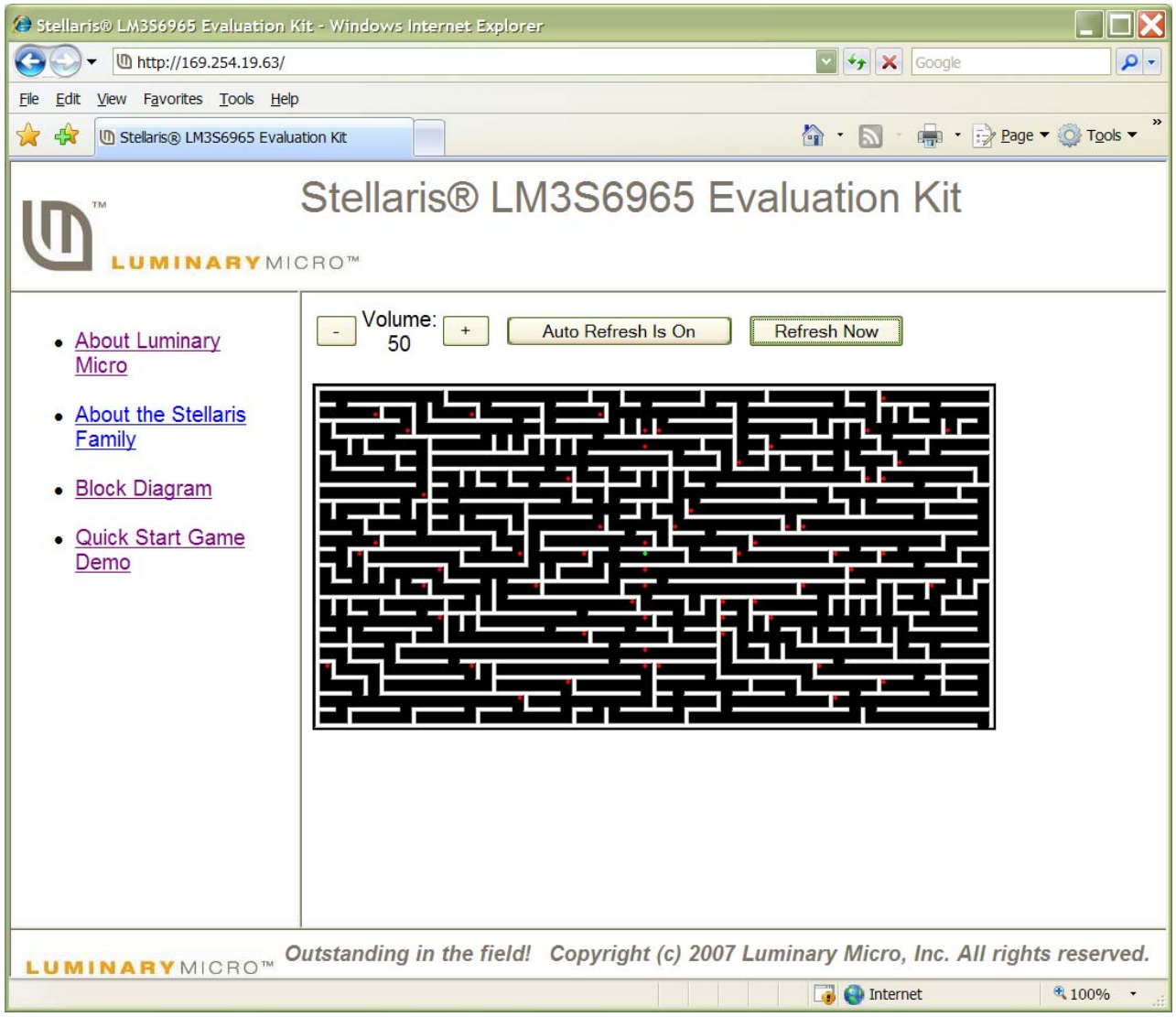
Four versions, each only $69:

- EKK-LM3S6965
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3S6965
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S6965
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S6965
  - Code Red Technologies Red Suite with full evaluation license locked to board

ARM KEIL · RTOS · interniche · SEGGER · CMX · Quadros · ThreadX · IAR SYSTEMS · RTOS · interniche · SEGGER · CMX · Quadros · µC/OS-II · µC/TCP-IP · µC/Modbus · CodeSourcery · RTOS · interniche · code_red · RTOS · interniche

Texas Instruments

LM3S6965 Web Server – Game Mode



USB Connected MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital			Package Options
												PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)	Hibernate	
LM3S3000s	4	128	64	□	50	-	4	8	1	8	□	8	4	1	-	-	-	O/H/D	3	2	2	-	8	1000	□	□	3	-	61	□	64-LQFP 100-LQFP
LM3S5000s	12	256	96	□	80	□	4	8	2	8	□	8	4	2	-	-	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	71	□	64-LQFP 100-LQFP
LM3S9000s	6	256	96	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

Stellaris LM3S3748 Evaluation Kit:

- LM3S3748 Evaluation Board
  - CSTN graphics display (128x128 resolution,16-bit color)
  - User LED, navigation switch and pushbutton
  - Magnetic speaker
  - LM3S3748 I/O available on labeled break-out pads
  - Standard ARM® 20-pin JTAG debug connector with input and output modes
  - MicroSD card slot
- USB and JTAG cables, Jumper wires
- CD containing evaluation software tools, documentation, quickstart guide, and example source code
- USB Flash Drive (128MB)

Four versions, each only $109:

- EKK-LM3S3748
  - ARM RealView MDK tools with 32KB address Limit
- EKI-LM3S3748
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S3748
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S3748
  - Code Red Technologies Red Suite with full evaluation license

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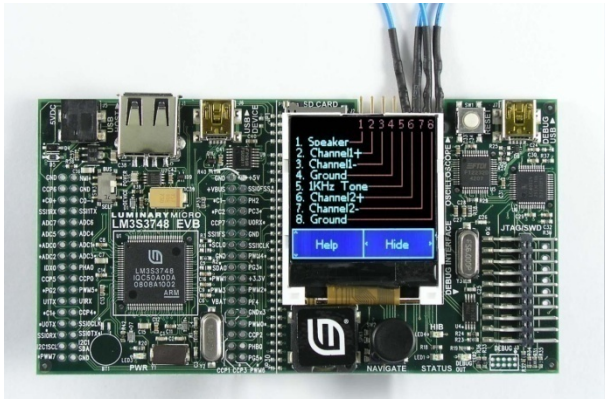
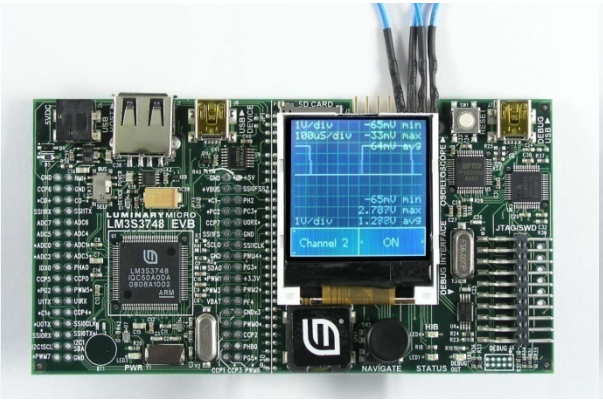
Texas Instruments

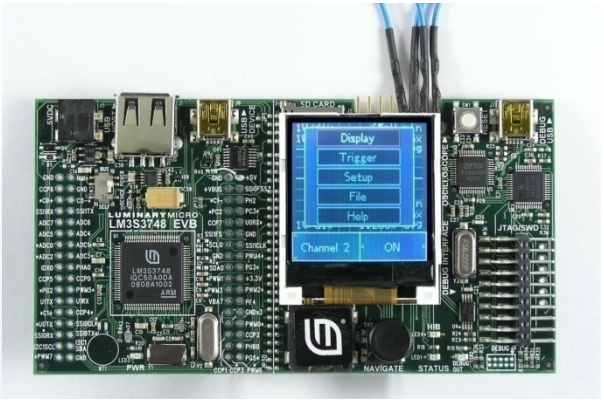
USB Host/Device Oscilloscope Demonstration



Oscilloscope Wiring



Oscilloscope Demo



Oscilloscope Options

USB Host Mode
Data dump to the memory stick

USB Device Mode
Control the demo via a PC

CAN Connected MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital			Package Options
												PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)	Hibernate	
LM3S2000s	26	256	96	□	80	□	4	8	2	8	□	8	4	2	-	-	2	-	3	2	2	□	16	1000	□	□	3	7	60	□	64-LQFP 100-LQFP 108-BGA
LM3S5000s	12	256	96	□	80	□	4	8	2	8	□	8	4	2	-	-	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	71	□	64-LQFP 100-LQFP
LM3S8000s	12	256	64	-	50	-	4	8	1	6	□	6	1	2	□	□	3	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S9000s	6	256	96	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

Stellaris LM3S2965 Evaluation Kit:

- LM3S2965 Evaluation Board
  - OLED graphics display with 128 x 64 pixel resolution
  - User LED, navigation switches, and select pushbuttons
  - Magnetic speaker
  - LM3S2965 I/O available on labeled break-out pads
  - Standard ARM® 20-pin JTAG debug connector with input and output modes
- Standalone CAN device board using Stellaris LM3S2110 microcontroller
- CAN ribbon cable, USB and JTAG cables
- CD containing evaluation software tools, documentation, quickstart guide, Stellaris Peripheral Driver Library, and example source code

Four versions, each only $79:

- EKK-LM3S2965
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3S2965
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S2965
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S2965
  - Code Red Technologies Red Suite with full evaluation license locked to board

Texas Instruments

Ethernet+CAN Connected MCUs

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital		Hibernate	Package Options
												PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S8000s	*12*	256	64	-	50	-	4	8	1	6	□	6	1	2	□	□	3	-	3	2	2	-	8	1000	□	□	3	-	46	□	100-LQFP 108-BGA
LM3S9000s	*6*	256	96	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

Stellaris LM3S8962 Evaluation Kit:

- LM3S8962 Evaluation Board
  - Stellaris LM3S8962 MCU with fully-integrated CAN module
  - OLED graphics display with 128 x 64 pixel resolution
  - User LED, navigation switches, and select pushbuttons
  - Magnetic speaker
  - LM3S8962 I/O available on labeled break-out pads
  - Standard ARM® 20-pin JTAG debug connector with input and output modes
- Standalone CAN device board using Stellaris LM3S2110 microcontroller
- Ethernet cable, CAN ribbon cable, USB and JTAG cables
- CD containing evaluation software tools, documentation, quickstart guide, Stellaris Peripheral Driver Library, and example source code

Four versions, each only $89:

- EKK-LM3S8962
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3S8962
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S8962
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S8962
  - Code Red Technologies Red Suite with full evaluation license locked to board

Texas Instruments

Ethernet+USB OTG Connected MCUs

	MCUs in Series	Memory and Speed				Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog					Digital			Package Options
													PWM											ADC (10-bit)								
		Flash (KB)	SRAM (KB)	ROM SW Library	Ext. Peripheral Interface	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)	Hibernate	
LM3S3000s	4	128	64	□	-	50	-	4	8	1	8	□	8	4	1	-	-	-	O/H/D	3	2	2	-	8	1000	□	□	3	-	61	□	64-LQFP 100-LQFP
LM3S5000s	12	256	96	□	□	80	□	4	8	2	8	□	8	4	2	-	-	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	71	□	64-LQFP 100-LQFP
LM3S9000s	6	256	96	□	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

EK-LM3S9B90

EK-LM3S9B92

Stellaris EK-LM3S9B90 and EK-LM3S9B92 Evaluation Kits:

- Evaluation board
- In-Circuit Debug Interface (BD-ICDI) board
  - Connects to USB port on PC and to 10-pin ARM JTAG connector on the evaluation board
  - 8-pin Power/UART connector provides power and virtual comm-port to the evaluation board.
- Cables
  - USB miniB to USB-A cable, USB-µA to USB-A receptacle cable, USB-µB to USB-A plug cable
  - 10-pin ribbon cable for JTAG/SWD connection, 8-pin ribbon cable for Power/UART connection
- Evaluation Kit CD
  - Complete documentation, including Quickstart and User's Manual
  - Complete source code, schematics, and PCB gerber files.
  - Evaluation software development tools

Four versions, each only $99:

- EKK-LM3S9B9x
  - ARM RealView Microcontroller Development Kit tools with 32KB address Limit
- EKI-LM3S9B9x
  - IAR Embedded Workbench KickStart with 32KB address limit
- EKC-LM3S9B9x
  - CodeSourcery Sourcery G++ GNU with 30-day evaluation license
- EKT-LM3S9B9x
  - Code Red Technologies Red Suite with full evaluation license locked to board

Texas Instruments

LM3S9B96 MCUs Development Kit (DK-LM3S9B96)

	MCUs in Series	Memory and Speed			Core		General Purpose Timer Modules					Motion Control			Serial Interfaces								Analog						Digital		Hibernate	Package Options
												PWM												ADC (10-bit)									
		Flash (KB)	SRAM (KB)	ROM SW Library	Max Speed (MHz)	Internal Precision Oscillator	32-bit Timer	16-bit Timer	Watchdog Timers	CCP	RTC	Outputs	Fault Inputs	QEI	10/100 Ethernet MAC+PHY	IEEE 1588	CAN MAC	USB Full Speed	UART	I^2C	SSI/SPI	I^2S	ADC Channels	ADC Speed (Ksps)	Internal Temp Sensor	LDO Voltage Regulator	Analog Comparators	Digital Comparators	GPIOs (5-V)		
LM3S2000s	*26*	256	96	□	80	□	4	8	2	8	□	8	4	2	-	-	2	-	3	2	2	□	16	1000	□	□	3	7	60	□	64-LQFP 100-LQFP 108-BGA
LM3S5000s	*12*	256	96	□	80	□	4	8	2	8	□	8	4	2	-	-	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	71	□	64-LQFP 100-LQFP
LM3S9000s	*6*	256	96	□	100	□	4	8	2	8	□	8	4	2	□	□	2	O/H/D	3	2	2	□	16	1000	□	□	3	7	65	□	100-LQFP

Stellaris LM3S9B96 Development Kit (425 USD):

- LM3S9B96 Full-Featured Development Board
  - 80 MHz Stellaris LM3S9B96 MCU with fully-integrated Ethernet, CAN, and USB OTG/Host/Device
  - Bright 3.5” QVGA LCD touch-screen display
  - Navigation POT and select pushbuttons
  - Integrated Interchip Sound (I^2S) Audio Interface
  - EPI cards: I/O break-out board and 8 MB SDR SDRAM module
  - MicroSD card interface
  - LM3S9B96 I/O available on labeled break-out pads
  - ARM® 20-pin JTAG debug connector with input and output modes
- 1 GB MicroSD Card, 128 MB USB Flash Drive
- Ethernet cable, CAN ribbon cable, USB and JTAG cables
- CDs containing evaluation software tools, documentation, quickstart guide, StellarisWare Graphics, USB, and Peripheral Driver Libraries, and source code

Evaluation version software tools included in the kit: KEIL An ARM® Company · IAR SYSTEMS · code_red · CodeSourcery

Texas Instruments

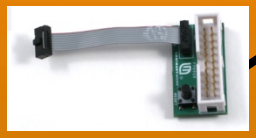
Stellaris: Flexibility in Production Options

1 EVALUATE

Stellaris Quickstart Evaluation Kits

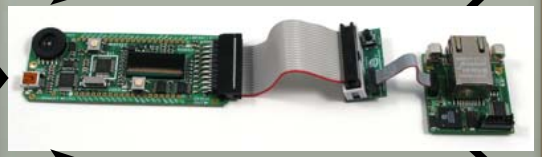
Stellaris Open-Tool Reference Design Kits

10-pin to 20-pin JTAG Adapter



2 CUSTOMIZE

Customize/Debug your Module using any ARM Cortex-M3 JTAG emulator + Tools from Trusted 3rd Parties



3 PRODUCE

Stellaris Modules

Off-the-Shelf & Ready-to-Integrate

PRODUCTION

Stellaris MCUs

Use our Complete Open-Tool HW & SW Design

PRODUCTION

Did You Know?

Any Stellaris evaluation kit can function as an ARM Cortex-M3 USB-to-JTAG emulator.

Texas Instruments

Open-Tool Modules Speed Time-to-Market

Brush DC Motor Control

MDL-BDC

Single unit: 109 USD

Intelligent Display Module

MDL-IDM-L35

Single unit: 185 USD

…with Ethernet

MDL-IDM28

Single unit: 185 USD

…with PoE

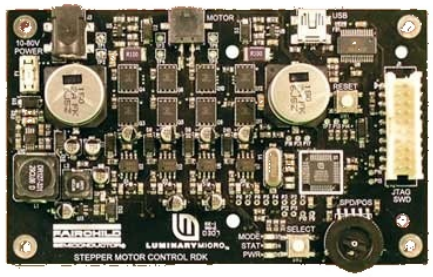
MDL-IDM

Single unit: 199 USD

Ethernet+CAN BLDC Motor Controller

MDL-BLDC

Single unit: 149 USD



STEPPER Motor Control

MDL-STEPPER

Single unit: 169 USD

Serial-to-Ethernet

MDL-S2E

Single unit: 49 USD

AC Induction Motor Control

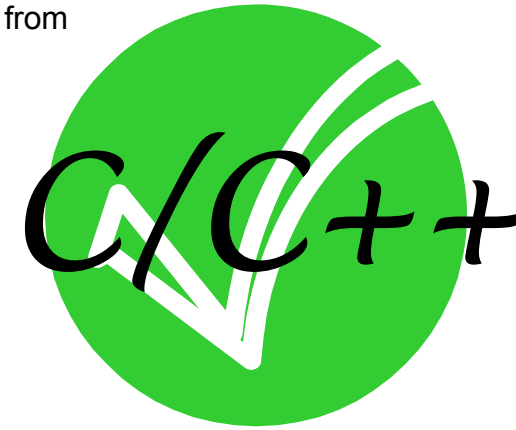
MDL-ACIM

Single unit: 239 USD

Texas Instruments

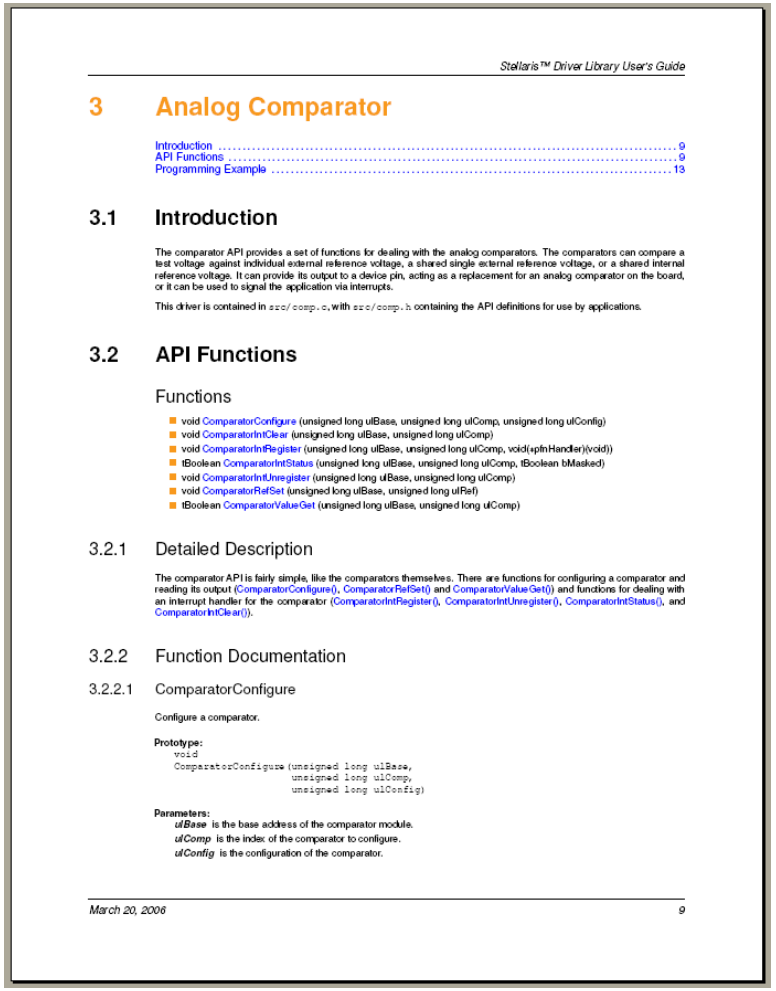
No Assembly Required!

- Cortex-M3 has complete hardware support for interrupts
  - Interrupt Service Routines (ISRs) are purely written in C/C++
  - Interrupt setup is easily done in C/C++
    - C/C++ array which contains the vectors (pointers to the C/C++ functions)
    - Pointer to the stack (a C/C++ array)
- No boot code ASM, no system configuration ASM
  - ARM7 compilers normally comes with a ASM boot routine (in object form) that does setup.
  - For Cortex-M3, no boot routine is needed
    - Cortex-M3 hardware loads the stack pointer from memory and the initial PC from memory and enters as a normal C function.
  - User C/C++ code is all that is required.
- Entire software code base can be written in C/C++
  - ISRs
  - RTOS
  - Application code



StellarisWare™ Peripheral Driver Library

- High-level API interface to complete peripheral set
- *Free license and royalty-free use*
- Simplifies and speeds development of applications
- Can be used for application development or as programming example
- Available as object library and as source code
- Compiles on ARM/Keil, IAR, Code Red, and GNU tools
- Includes **Stellaris Graphics Library** and **Stellaris USB Library**
- **Peripheral driver library functions are preprogrammed in ROM on select Stellaris MCUs**



Stellaris™ Driver Library User's Guide

3 Analog Comparator

3.1 Introduction

The comparator API provides a set of functions for dealing with the analog comparators. The comparators can compare a test voltage against individual external reference voltage, a shared single external reference voltage, or a shared internal reference voltage. It can provide its output to a device pin, acting as a replacement for an analog comparator on the board, or it can be used to signal the application via interrupts.

This driver is contained in `src/comp.c`, with `src/comp.h` containing the API definitions for use by applications.

3.2 API Functions

Functions

- void ComparatorConfigure (unsigned long ulBase, unsigned long ulComp, unsigned long ulConfig)
- void ComparatorIntClear (unsigned long ulBase, unsigned long ulComp)
- void ComparatorIntRegister (unsigned long ulBase, unsigned long ulComp, void(*pfnHandler)(void))
- tBoolean ComparatorIntStatus (unsigned long ulBase, unsigned long ulComp, tBoolean bMasked)
- void ComparatorIntUnregister (unsigned long ulBase, unsigned long ulComp)
- void ComparatorRefSet (unsigned long ulBase, unsigned long ulRef)
- tBoolean ComparatorValueGet (unsigned long ulBase, unsigned long ulComp)

3.2.1 Detailed Description

The comparator API is fairly simple, like the comparators themselves. There are functions for configuring a comparator and reading its output (ComparatorConfigure(), ComparatorRefSet() and ComparatorValueGet()) and functions for dealing with an interrupt handler for the comparator (ComparatorIntRegister(), ComparatorIntUnregister(), ComparatorIntStatus(), and ComparatorIntClear()).

3.2.2 Function Documentation

3.2.2.1 ComparatorConfigure

Configure a comparator.

Prototype:

```
void
ComparatorConfigure(unsigned long ulBase,
                    unsigned long ulComp,
                    unsigned long ulConfig)
```

Parameters:

ulBase is the base address of the comparator module.
ulComp is the index of the comparator to configure.
ulConfig is the configuration of the comparator.

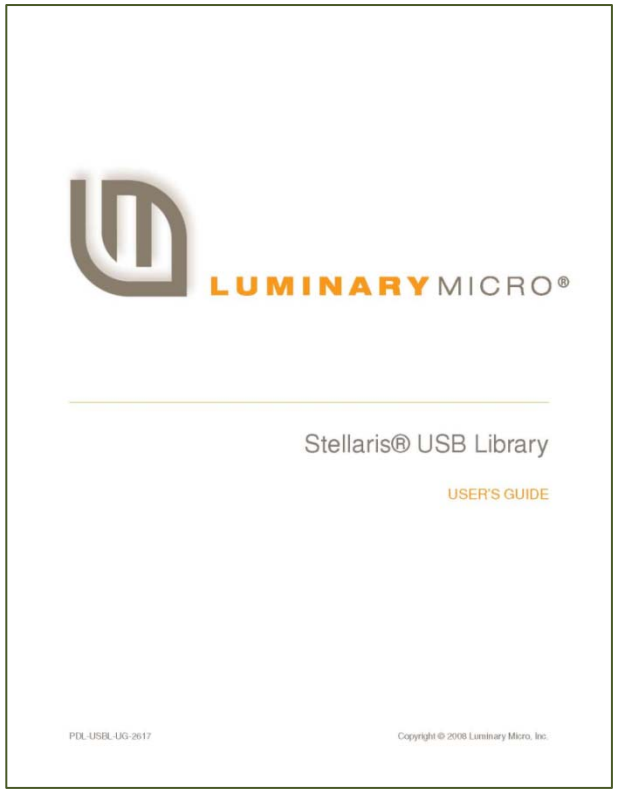
March 20, 2006 9

Introducing StellarisWare™

StellarisWare™ USB Library Stacks and Examples

- USB-IF Compliance
  - Stellaris has passed USB Device and Embedded Host compliance testing

- Examples available:
  - **Device Examples:**
    - HID Keyboard
    - HID Mouse
    - CDC Serial
    - Generic Bulk
    - Device Firmware Upgrade
    - Oscilloscope
  - **Host Examples:**
    - Mass Storage
    - HID Keyboard
    - HID Mouse
  - **Windows INF for supported classes**
    - Points to base Windows drivers
    - Sets config string
    - Sets PID/VID
    - Precompiled DLL saves development time
  - Device framework integrated into USBLib



StellarisWare™ Graphics Library Examples

Primitives

Radio Buttons

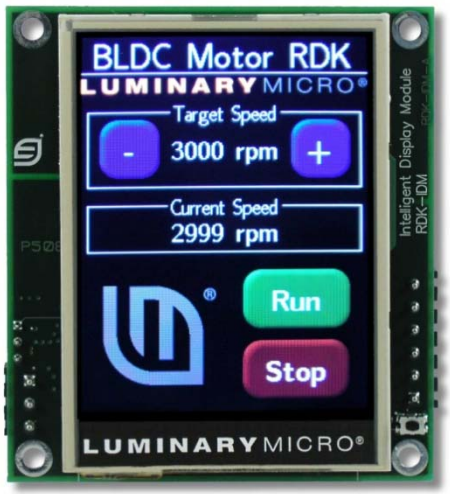
Checkbox

Security Keypad

Canvas

Push Buttons

Container



BLDC Touchscreen Motor Controller

StellarisWare™ - Safe at Home with IEC 60730

The International Electrotechnical Commission (IEC)

- IEC: World's authority in international standards for household appliances
- StellarisWare extension provides support for IEC 60730 Class B safety requirements
- Class B covers most home appliances, such as washers/dryers, refrigerators, freezers, and cookers/stoves
- Free license and royalty-free use for use on Stellaris MCUs
- Library supports both startup and periodic testing requirements of IEC 60730

http://www.iec.ch/index.html

	Module	Description
StellarisWare™ Software	Reset Handler	Performs basic register and memory test out of reset.
	CPU Test	Performs stuck bit testing on the CPU PC and registers.
	SRAM Test	Performs stuck bit testing on the SRAM.
	Flash Test	Performs a CRC test on the Flash.
	ADC Test	Performs a conversion test on an ADC channel connected to a known voltage reference.
		Performs ADC temperature sensor test.
	GPIO Test	Performs GPIO input/output plausibility test.
	Clock/Interrupt Test	Performs tests to check the clock frequency, interrupt handling, and execution.
Stellaris® Hardware	Nested Vector Interrupt Controller	Deterministic, fast interrupt processing for execution certainty.
	Automotive-grade Flash Memory	High reliability non-volatile memory for robust environments.
	Cyclical Redundancy Check in ROM	Especially useful in verifying the contents of memory in a Stellaris microcontroller.
	2 Watchdog Timers	Clocked with precision oscillator, a second WDT takes advantage of the non-maskable interrupt (NMI) handler safety feature of the ARM Cortex-M3 processor.
	Precision Oscillator	Supplies an accurate, independent time base when periodic safety tests are executed.
	Advanced Motion Control with Multiple Fault Conditioning Inputs	Provides quick motor shutdown in low latency situations.
	Quadrature Encoder Inputs	Provides precise, closed loop control of motors.
	Integrated Analog Comparators	Used to trigger Stellaris' accurate ADC and to trigger an interrupt when needed, which is useful for infrequent out-of-range events such as a current or voltage spike.
		Eliminates the performance-wasting requirement of constant CPU polling.
	Internal Temperature Sensor	Used to monitor and shut down an appliance if the appliance overheats.
	10/100 Ethernet MAC/PHY with IEEE 1588 PTP	Offers highly synchronized connectivity features for precision internetworking.
	Controller Area Network (CAN) 2.0 MACs	

StellarisWare™ In-System Programming Options

Stellaris Serial Flash Loader

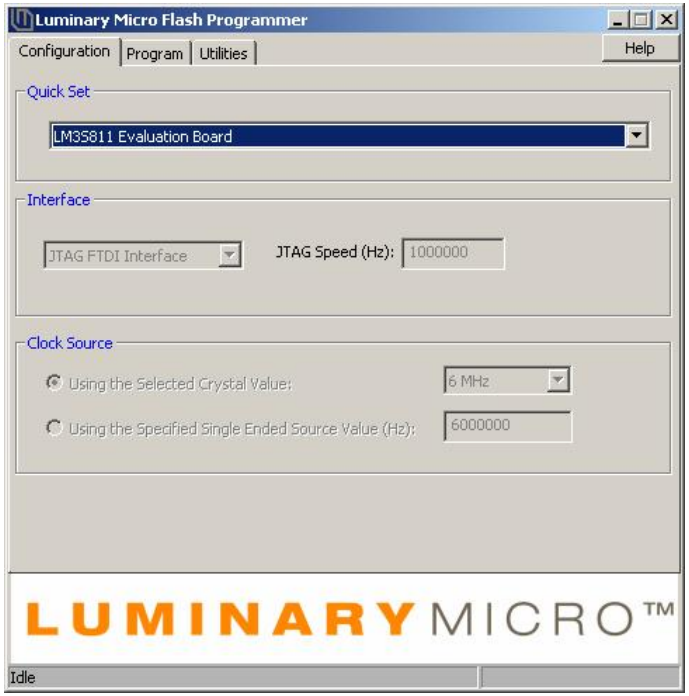
- Small piece of code that allows programming of the flash without the need for a debugger interface.
- All Stellaris MCUs ship with this pre-loaded in flash
- Interface options include UART or SSI
- We supply a Windows™ application (GUI or command line) that makes full use of all commands supported by the serial flash loader (LMflash.exe)
- See application note AN01242

Stellaris Boot Loader

- Small piece of code that can be programmed at the beginning of flash to act as an application loader
- Also used as an update mechanism for an application running on a Stellaris microcontroller.
- Interface options include UART (default), I^2C, SSI, Ethernet, USB
- Included in the Stellaris Peripheral Driver Library with full applications examples
- See application note AN01248
- Preloaded in ROM on select Stellaris Microcontrollers

StellarisWare™ Serial Flash Programming GUI

- **LM Flash Programming GUI**
  - Simple graphical user interface
  - Support for all Evaluation Kits
  - Key features include:
    - Program
    - Verify
    - Erase
    - Read memory
  - Available now
    - http://www.luminarymicro.com/products/software_updates.html



On-chip Software Enhancements (ROM)

StellarisWare™ DriverLib

- High-level API interface to complete peripheral set.
- Simplifies and speeds development of applications.
- Saves user flash by storing peripheral setup and configuration code
- Allows programmer focus to be on the application—not setup

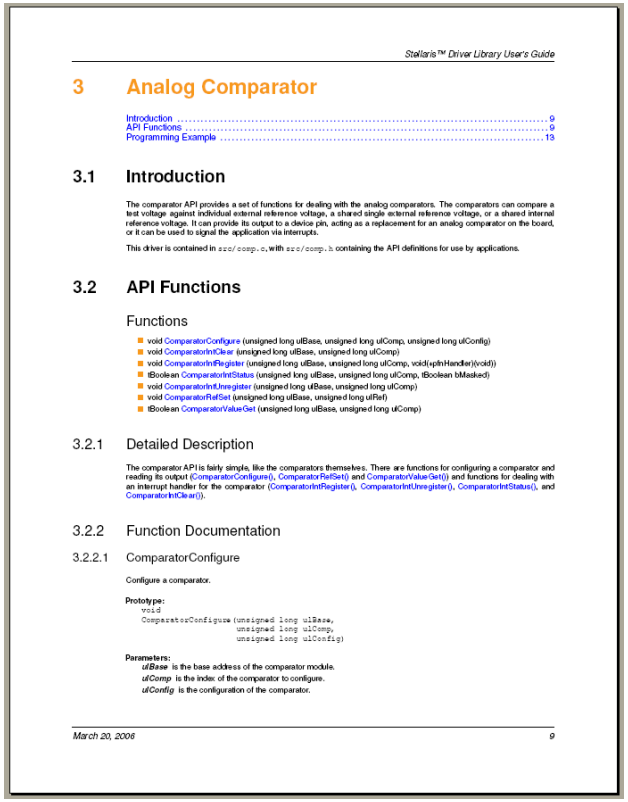
StellarisWare™ Bootloader

- Download code to flash memory for firmware updates
- Interface options include UART (default), I^2C, SSI, Ethernet

Other flash memory-saving options

- Advanced Encryption Standard (AES) tables – for cryptography
  - Supported by the current AES example application
  - Covers all three sizes: 128, 192, 256
- Cyclic Redundancy Check (CRC) functionality – for error detection

StellarisWare™



Stellaris™ Driver Library User's Guide

3 Analog Comparator

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3.1 Introduction

The comparator API provides a set of functions for dealing with the analog comparators. The comparators can compare a test voltage against individual external reference voltage, a shared single external reference voltage, or a shared internal reference voltage. It can provide its output to a device pin, acting as a replacement for an analog comparator on the board, or it can be used to signal the application via interrupts.

This driver is contained in `src/comp.c`, with `src/comp.h` containing the API definitions for use by applications.

3.2 API Functions

Functions

- void ComparatorConfigure (unsigned long ulBase, unsigned long ulComp, unsigned long ulConfig)
- void ComparatorIntClear (unsigned long ulBase, unsigned long ulComp)
- void ComparatorIntRegister (unsigned long ulBase, unsigned long ulComp, void(*pfnHandler)(void))
- tBoolean ComparatorIntStatus (unsigned long ulBase, unsigned long ulComp, tBoolean bMasked)
- void ComparatorIntUnregister (unsigned long ulBase, unsigned long ulComp)
- void ComparatorRefSet (unsigned long ulBase, unsigned long ulRef)
- tBoolean ComparatorValueGet (unsigned long ulBase, unsigned long ulComp)

3.2.1 Detailed Description

The comparator API is fairly simple, like the comparators themselves. There are functions for configuring a comparator and reading its output (ComparatorConfigure(), ComparatorRefSet() and ComparatorValueGet()) and functions for dealing with an interrupt handler for the comparator (ComparatorIntRegister(), ComparatorIntUnregister(), ComparatorIntStatus(), and ComparatorIntClear()).

3.2.2 Function Documentation

3.2.2.1 ComparatorConfigure

Configure a comparator.

Prototype:

```
void
ComparatorConfigure(unsigned long ulBase,
                    unsigned long ulComp,
                    unsigned long ulConfig)
```

Parameters:

ulBase is the base address of the comparator module.
ulComp is the index of the comparator to configure.
ulConfig is the configuration of the comparator.

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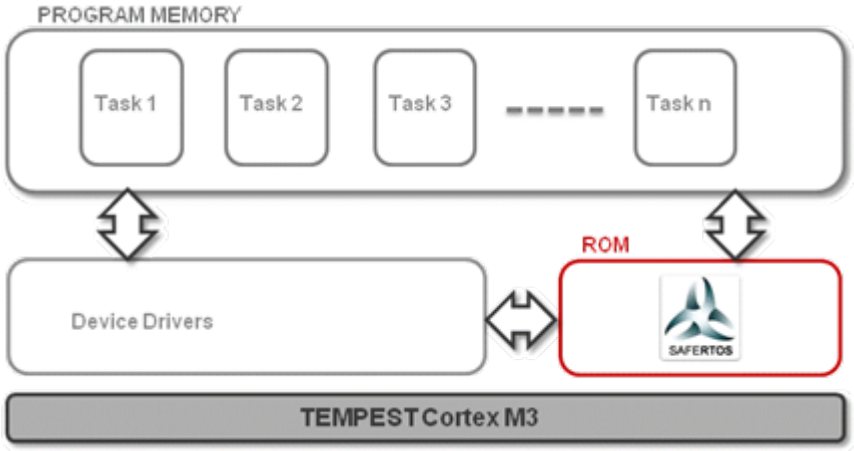
Stored in exclusive ROM on select Stellaris MCUs

SAFE**RTOS** included in the LM3S9B96

- High-integrity RTOS in ROM
- Can be used as a standard operating system *OR* as part of a high integrity application which requires certification to **IEC61508** or **FDA510(k)**

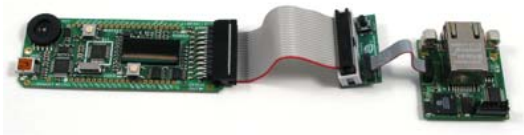


- RTOS **value $65k free** with Tempest LM3S9B96
- Integrated hardware/software solution shortens the time to market and significantly reduces cost for **Industrial** and **Medical** Applications
- Innovative *Design Assurance Pack* available separately from WITTENSTEIN provides **complete turnkey evidence** and process documentation

Development Tools for Stellaris MCUs

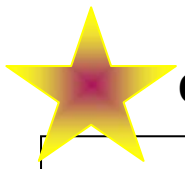
	CodeSourcery	IAR Systems	ARM KEIL	code_red
Eval Kit License	30-day full function. Upgradeable.	32KB address-limited. Upgradeable.	32KB address-limited. Upgradeable.	Full functional; locked to board. Upgradeable.
Compiler	GNU C/C++	IAR C/C++	RealView C/C++	GNU C/C++
Debugger / IDE	gdb / Eclipse	C-SPY / Embedded Workbench	µVision	code_probe / Eclipse-based tool suite
Full Upgrade	199 USD personal edition / 3000 USD full support	2700 USD	MDK-Basic (256 KB) = €2000 (2895 USD)	999 USD (upgrade to run on customer platform)
JTAG Debugger		J-Link, ~299 USD	U-Link, ~199 USD	Red Probe, 150 USD

Remember: In addition to its original use as an evaluation kit, each Stellaris evaluation kit has the built-in capability for use as a simple USB-to-20-pin JTAG debugger.



Conclusion: Stellaris® is The ARM Solution

- **We extend to you the benefits of ARM's Cortex-M3!**
  - Over 140 Cortex-M3-Based Stellaris MCUs in the family
  - On fourth generation of experience
  - Code compatibility from $1 to 1GHz
  - Quick time-to-market with fabulous StellarisWare software
  - Exceptional worldwide support and presence
- **Exclusive Stellaris Features in the ARM Cortex architecture:**
  - Ethernet MAC+PHY
  - Multiple CAN 2.0 Type A/B MACs
  - USB OTG and Host/Device
  - IEEE 1588 PTP hardware assist support
  - Eight channels of motion control PWM
  - Fault conditioning capability for multiple motors
  - 256K Single-cycle Flash up to 50 MHz/ 64K Single-cycle SRAM
  - Analog Comparators and QEIs
  - Cortex-M3 Memory Protection Unit
- **Stellaris Family Advantages:**
  - Performance with Single-cycle Flash, Faster internal bus for I/O
  - Robust, real-time connectivity with USB, CAN, Ethernet MAC+PHY, and IEEE 1588 PTP
  - Augmented analog capability
  - Superior motion control technology



Conclusion: Stellaris is <u>the</u> industrial connectivity solution!

Industrial Control Segments

Stellaris Means Building Control:

- Control capability for precision gas/liquid manipulation
- Rich lighting management with 32-bit performance
- CAN/Ethernet connectivity for Building Management (elevators, doors, windows, restrooms)

Specific Stellaris Wins:

- Lighting Controls
  - LED Drivers
  - Panel Motor Controller
- HVAC
  - Pump Inverter
  - Compressor Motor
- Building Automation
  - Audio

Stellaris Means Automation:

- Design for accurate factory motion control
- Performance and integration yields factory multi-tasking (drive a motor while measuring attributes)
- CAN and Ethernet connect factory machines for remote accessibility
- USB Host for field updates and data dumping

Specific Stellaris Wins:

- Machines
  - Controllers
  - Sorters
  - Analyzers
  - Component Motors
- Monitors
  - Ethernet Bridges
  - Sensors

Stellaris Means Security Monitoring and Control:

- Robust industrial control capability for invulnerable security systems
- ARM Cortex-M3 ISRs for event multi-tasking
- Ethernet connected systems for remote monitoring and concurrent control (Motor control in connected CCTV cameras)
- USB Host for video storage, Device for CPU playback

Specific Stellaris Wins:

- Surveillance
  - Alarm Systems
  - CCTV
- Access Control
  - Building Access
  - Safe Disposal
- Emergency Alarm Control

Industrial Control Segments

Stellaris Means Transaction Control:

- 32-bit performance for massive data retrieval, recognition, and manipulation
- Performance and integration for print-head control
- Ethernet / USB connectivity for Storefront (card swipes, ATMs, vending machines)
- Enhanced single-cycle memory footprint for more complex EPOS systems

Specific Stellaris Wins:

- Point-of-Sale
  - Printers
  - Data Acquisition
- AutoID
  - Tag Scanner
  - Vehicle ID
  - Inventory RFID

Stellaris Means Medical:

- Motion Control capability for precision robotics and drilling
- Intelligent analog-to-digital for precision input
- CAN/Ethernet connectivity for remote monitoring

Specific Stellaris Wins:

- Motor Control
  - Dental Drilling Machine
  - Robotic DNA Extraction
- Pumps and Analyzers
  - Blood Analyzer
  - Spinal Column Correction Analyzer

Stellaris Means Toys:

- Control capability for precision robotics
- Processing speed for multifunction
- Low-power for long battery life
- Small package for small enclosures
- Ethernet connectivity for Remote Access (Remote vacuum initiation, digital home automation)
- USB for CPU connection, power, consumer connect

Specific Stellaris Wins:

- Toys
  - Remote Control
  - Motors
- Handhelds
  - Gaming accessories
- Digital Home
  - Remote Vacuums
  - Audio / Video