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We Make IoT
EASY

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We believe in simplicity. That means making embedded Internet of Things (IoT) development as easy as possible. We also believe in making the fastest, smallest, most secure and highest quality solutions to help our customers achieve the same in their products. Surpassing 6.2 Billion deployments is a strong validation of our beliefs as well as our execution of those beliefs!

Express Logic is a San Diego, California, based developer of Real-Time Operating Systems (RTOS) and middleware products for embedded IoT applications. Founded in 1996, Express Logic has consistently led the industry with best-of-class, Industrial Grade products and responsive, reliable customer support.

6.2 BILLION THINGS

X WARE IoT PLATFORM

Powered by

THREADX RTOS

> We have followed the growth trajectory of THREADX in the wireless and IoT markets since the company's founding, and are increasingly impressed by the widespread industry adoption of THREADX.
>
> *– Chris Rommel, Executive Vice President, VDC Research*

VDC Research
Insights for the Connected World

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X WARE IoT PLATFORM

INDUSTRIAL GRADE

Our IoT solutions are the smallest, fastest, safest, most advanced, and secure available. That's why we call them Industrial Grade. With our Industrial Grade IoT solutions and industry-leading commitment to support, we make embedded IoT development as easy as it gets.

- Comprehensive Solutions: **THREADX**, **FILEX**, **GUIX**, **NETX**, **NETX DUO**, and **USBX**
- IoT Protocol Support: **CoAP**, **MQTT**, **LwM2M**
- Security Support: **IPsec**, **DTLS**, **TLS**

10 YEARS

THREADX has been the leading RTOS in Time-To-Market for the last ten consecutive years per the Embedded Market Forecasters (EMF) surveys!

Preemption-Threshold, Event Chaining, and more

ADVANCED

Pre-certified to SIL 4, ASIL D, Medical Class C, UL, TÜV and more

SAFE

X

FAST

Sub-microsecond context switching, near wire speed networking performance

SMALL

2KB Minimal Footprint, Automatic Scaling

SECURE

IPsec, TLS, DTLS. Common Criteria EAL4+

EASY

Vast processor support, Intuitive API, best-of-class documentation, THREADX Book

BEST-OF-CLASS EMBEDDED IOT DEVELOPMENT

IAR SYSTEMS + expresslogic

IAR Systems and Express Logic deliver the best-of-class development solution for the rapid creation of high-quality, secure, and safe IoT devices.

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We Make IoT **EASY**

Vast Semiconductor Support

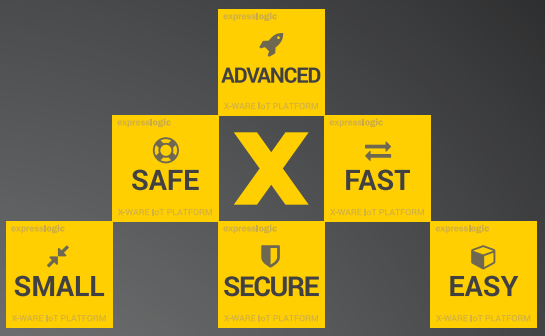
Vast IoT Cloud Support

Mesh Networking Support

THREADX RTOS

THREAD**X** RTOS is Express Logic's advanced Industrial Grade Real-Time Operating System (RTOS) designed specifically for deeply embedded, real-time, and IoT applications running on microcontrollers, microprocessors, or DSPs.

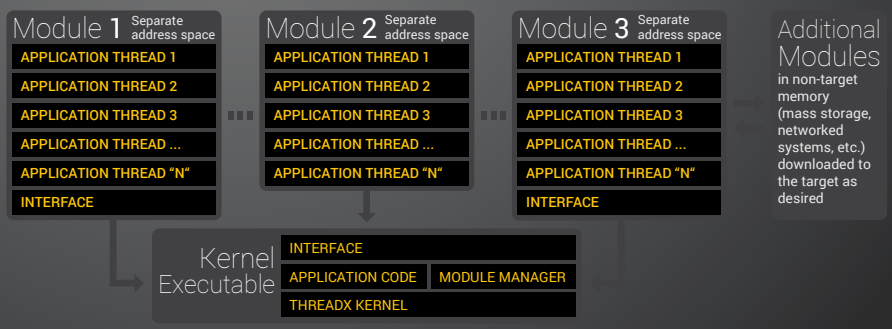
- Industry leader
- Small-footprint (Minimal 2KB)
- Fast & deterministic execution
- Simple, easy-to-use
- Advanced technology
- Multicore support (AMP & SMP)
- Memory protection via THREADX MODULES
- Fastest time-to-market
- Royalty free
- Full, highest-quality source code
- Pre-certified by TUV and UL to IEC 61508 SIL 4, IEC 62304 Class C, ISO 26262 ASIL D, UL/IEC 60730, UL/IEC 60335, UL 1998, and EN 50128 SW-SIL 4
- MISRA-C:2004 and MISRA C:2012 compliant
- Supports most popular architectures
- Supports most popular tools
- No open source



THREADX API

THREADX SERVICES	MESSAGE QUEUES
COUNTING SEMAPHORES	MUTEXES
EVENT FLAGS	BLOCK MEMORY POOLS
BYTE MEMORY POOLS	APPLICATION TIMERS
THREADX CORE SCHEDULER	

THREAD**X** MODULES



SGS TÜV SAAR · c UL us · COMMON CRITERIA CERTIFIED EAL4+

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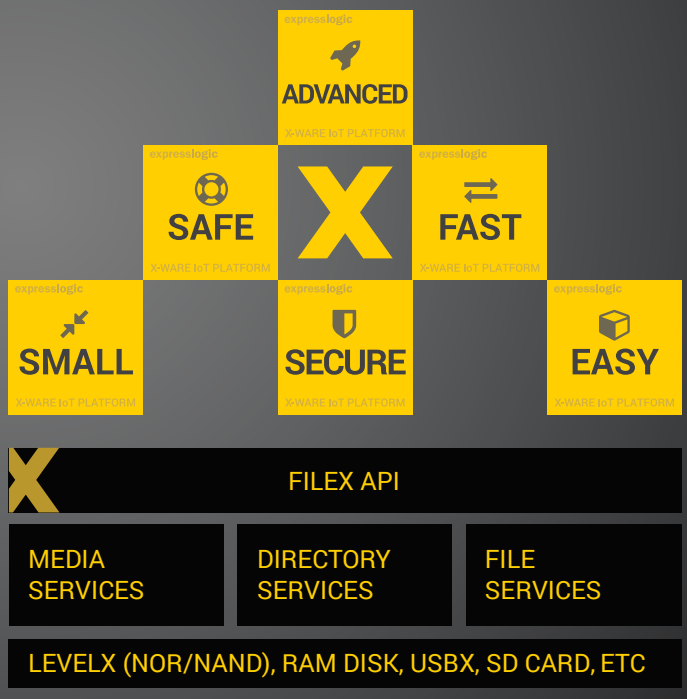
FILEX

Embedded File System

FILEX embedded file system supports all of Microsoft's file formats, including FAT12, FAT16, FAT32 and exFAT. FILEX also offers optional fault tolerance and FLASH wear leveling via an add-on product called LEVELX. Extremely small footprint, fast execution, and superior ease-of-use.

- The industry leading FAT file system
- Small-footprint (9KB Minimal Size)
- Fast execution
- Simple, easy-to-use
- Advanced technology
  - FAT 12/16/32 and exFAT support
  - Multiple partition support
  - Automatic scaling
  - Endian neutral
  - Long file name and 8.3 support
  - Optional fault tolerance support
  - Logical sector cache
  - FAT entry cache
  - Pre-allocation of clusters
  - Contiguous file support
  - Optional performance metrics
  - TRACEX system analysis support
- NOR/NAND wear leveling (LEVELX)
- Fastest time-to-market
- Pre-certified by TUV and UL to IEC 61508 SIL 4, IEC 62304 Class C, ISO 26262 ASIL D, UL/IEC 60730, UL/IEC 60335, UL 1998, and EN 50128 SW-SIL 4
- Royalty free
- Full, highest-quality source code
- Supports most popular architectures
- No open source

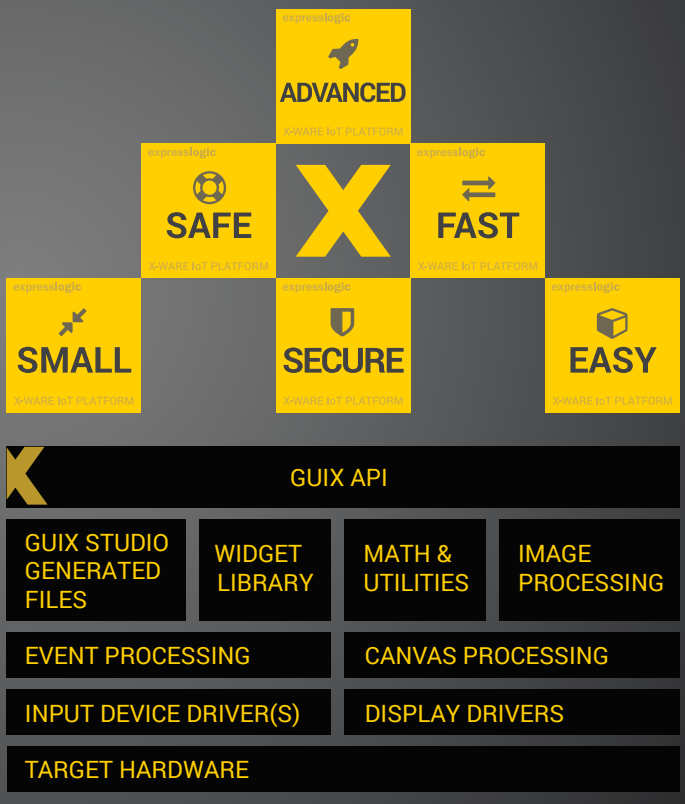


GUIX Embedded GUI

GUIX is fully integrated with THREADX RTOS and is available for many of the same processors supported by THREADX. All of this combined with an extremely small footprint, fast execution, and superior ease-of-use, make GUIX the ideal choice for the demanding user interface.

- The industry leading GUI solution
- Small-footprint (Minimal 13KB)
- Fast execution
- Simple, easy-to-use
- Comprehensive set of built-in widgets
- Complete low-level drawing API
- Default free fonts and easy to add more
- Custom JPG and PNG decoder implementation
- Extensive display and touchscreen support
- GUIX Studio desktop WYSIWYG tool
- Complete Win32 simulation
- Advanced technology
  - Automatic scaling
  - Endian neutral
  - Multiple display and canvas support
  - Supports monochrome through 32-bit true-color with alpha graphics formats
  - Hardware accelerator support
  - Bitmap compression
  - Alpha blending
  - Dithering support
  - Anti-aliasing
  - Skinning and themes
  - Canvas blending
  - Deferred drawing support
  - Multilingual support and UTF-8 encoding
  - Optimized clipping, drawing, & event handling and Z-order maintenance
  - Transitions, Sprites, and animation support
  - Custom widget support

- Fastest time-to-market
- Royalty free
- Full, highest-quality source code
- Supports most popular architectures
- No open source



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NETX Duo

Embedded Network Stack

NETX DUO provides embedded applications with core network protocols such as IPv4, IPv6, TCP and UDP as well as a complete suite of additional, higher level add-on protocols. NETX DUO is also secure via additional add-on security products, including NETX SECURE IPsec and NETX SECURE SSL/TLS/DTLS.

- The IoT industry leading NETX DUO
- Small-footprint (9KB Minimal Size)
- Fast execution
- Simple, easy-to-use
- Safe and Secure
- Interoperability verification
- Phase-II IPv6 ready logo
- IXIA IxANVL validated
- Comprehensive IoT solution section MQTT, CoAP, LWM2M, 6LoWPAN, SSL/TLS/DTLS, IPsec, AutoIP, DHCP, DNS, mDNS, DNS-SD, FTP, HTTP, IPsec, NAT, POP3, PPP, PPPoE, SMTP, SNMP v1/2/3, Telnet, TFTP
- Pre-certified by TUV and UL to IEC 61508 SIL 4, IEC 62304 Class C, ISO 26262 ASIL D, UL/IEC 60730, UL/IEC 60335, UL 1998, and EN 50128 SW-SIL 4
- Advanced technology
- Fastest time-to-market
- Royalty free
- Full, highest-quality source code
- Supports most popular architectures
- No open source

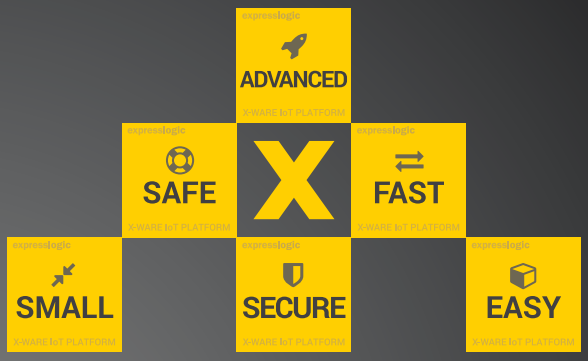
MQTT	COAP	LWM2M
AUTO IP	HTTP	SMTP
DHCP	NAT	SNMP
DNS, MDNS, DNS-SD	POP3	TELNET
FTP, TFTP	PPP, PPPOE	SNTP
NETX DUO API		
IGMP	NETX SECURE DTLS	NETX SECURE TLS
ICMP	UDP	TCP
ARP/RARP	IPV4 & IPV6	NETX SECURE IPSEC
	6LOWPAN	
ETHERNET, WIFI, BLUETOOTH LE, 15.4, ETC.		

USBX

Embedded USB

USBX provides host, device, and OTG support, as well as extensive class support. USBX embedded USB is fully integrated with THREADX, FILEX, NETX, and NETX Duo. All of this, combined with an extremely small footprint, fast execution and superior ease-of-use, for required USB connectivity.

- The industry leading USB solution
  - Host, device, and OTG support
- Small-footprint
- Fast execution
- Simple, easy-to-use
- USB host controller support
- USB device controller support
- Extensive USB host class support
  - ASIX, AUDIO, CDC/ACM, GSER, HID, HUB, PIMA, PRINTER, PROLIFIC, STORAGE, SWAR
- Extensive USB device class support
  - CDC/ACM, CDC/ECM, DFU, HID, PIMA (w/ MTP), RNDIS, STORAGE
- PictBridge support
- Custom class support
- Advanced technology
  - Host, device, and OTG support
  - USB low, full, and high-speed support
  - Automatic scaling
  - Fully integrated with THREADX, FILEX, & NETX
  - Optional performance metrics
  - TRACEX system analysis support
- Broad USB controller support
- Fastest time-to-market
- Royalty free
- Full, highest-quality source code
- Supports most popular architectures
- No open source



USBX HOST API		USBX DEVICE API
ASIX	HUB	CDC/ACM
AUDIO	PIMA	CDC/ECM
CDC/ACM	PRINTER	DFU
GSER	PROLIFIC	HID
HID	STORAGE	PIMA (W/MTP)
CDC/ECM		STORAGE
USB HOST STACK		RNDIS
		USBX DEVICE STACK
OHCI, EHCI, PROPRIETARY HOST CONTROLLERS		PROPRIETARY DEVICE CONTROLLERS

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GUIX Studio

GUI Application Design

GUIX STUDIO provides a complete embedded GUI application design environment, facilitating the creation & maintenance of all graphical elements in the application's GUI. GUIX STUDIO automatically generates C code compatible with the GUIX library, ready to be compiled and run on the target.

- Automatic GUIX code generation
- WYSIWYG intuitive design functionality
- Object creation, editing, cut, copy, and paste operations
- Fully supports multi-lingual applications
- Flexible color palette selection and extension
- Management of all UI resources the application will use for colors, fonts, pixelmaps and strings
- Support for up to 4 displays per project, each with unique resolution, color depth and orientation
- Support for designs with virtually unlimited widgets
- Supports a virtually unlimited number of resources

GUIX STUDIO has 5 major work areas

- Project View
- Target View
- Resource View
- Properties View
- String Table Editor

The Target View is the WYSIWYG screen design and layout area for a GUIX Studio embedded user interface. It is the "canvas" on which the GUI is designed. Objects can be selected, moved, resized and more via simple, intuitive mouse operations. In addition, alignment and Z-order button operations are available in the Target View.

GUIX and GUIX Studio provide all the features necessary to create the most elegant user interfaces. The standard GUIX package includes various sample user interfaces, including a medical device reference, a smart watch reference, a home automation reference, an industrial control reference, an automotive reference, and various sprite and animation examples.

TRACE X

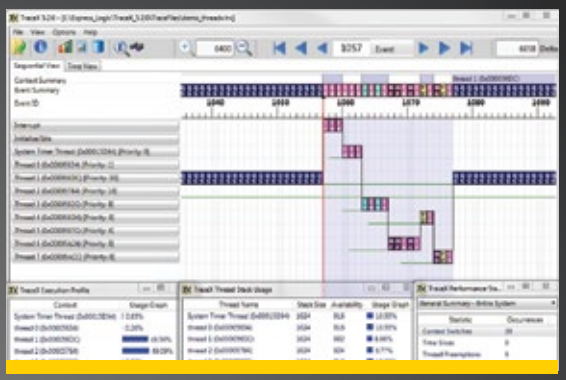
System Event Analysis

TRACEX® is Express Logic's host-based analysis tool that provides developers with a graphical view of system events and enables them to visualize and better understand the behavior of their real-time applications.

- Visual system analysis tool for applications using THREADX, NETX, FILEX, and USBX
- Extensive event search and navigation facilities
- Easily measure delta time between events
- Zoom in-out
- Sequential and time display modes
- Automatically detect priority inversions
- Easily add custom user events
- Built-in performance analysis
  - Execution profile, including Idle and ISR time
  - Thread stack usage profile
  - Performance statistics (context-switches, etc)
  - FILEX statistics (file read/writes, etc.)
  - NETX statistics (packets sent/received, etc.)
- Runs on any Windows host
- No license keys

Event Log Information

Trace information is stored in a circular buffer on the target system, with the buffer location and size determined by the application at run-time. The trace information may be uploaded to the host for analysis at any time – either post-mortem or upon a breakpoint.



Once the event log has been uploaded from target memory to the host, TRACEX displays the events graphically on a horizontal axis representing time, with the various application threads and system routines to which the related events are listed. TRACEX creates a "software logic analyzer" on the host, making system events plainly visible. Events are represented by color coded icons, located at the point of occurrence along the horizontal timeline, to the right of the relevant thread or system routine. When an event icon is selected, the corresponding information for that event is displayed. This provides quick, single-click access to the most immediate information about the event and its immediately surrounding events. TRACEX provides a "Summary" display that shows all system events on a single horizontal line to simplify analysis of systems with many threads.

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** Please note that all timing and size figures listed are estimates and may be different on your development platform.