



## FIRE Emulator for Freescale 68HC12 / MCS12 / S12X

**MC68HC912D60**  
**MC68HC912DG128**  
**MC68HC912DT128**  
**MC9S12A128**  
**MC9S12A256**  
**MC9S12A64**  
**MC9S12B128**  
**MC9S12B256**  
**MC9S12B64**  
**MC9S12C128**  
**MC9S12C32**  
**MC9S12C64**  
**MC9S12C96**  
**MC9S12D64**  
**MC9S12DB128**  
**MC9S12DG128**  
**MC9S12DG256**

- Full support for STAR12 and HC12 family
- Easy upgrade from HC12 to STAR12
- Support for S12X family
- Supports Cosmic, Metrowerks, IAR and INTRON Compilers
- Supports no-waitstate emulation up to 40 MHz (ECLK)
- Support for all CPU modes
- Configurable Trace
- Supports full Voltage range
- Dual-port access to emulation and target memory
- Dynamic peripheral window
- Programming and emulation of on chip EEPROM and FLASH
- User interface compatible to BDM debugger
- Solder-On, TET and YAMAICHI adapters
- Support of all derivatives, also non-public versions

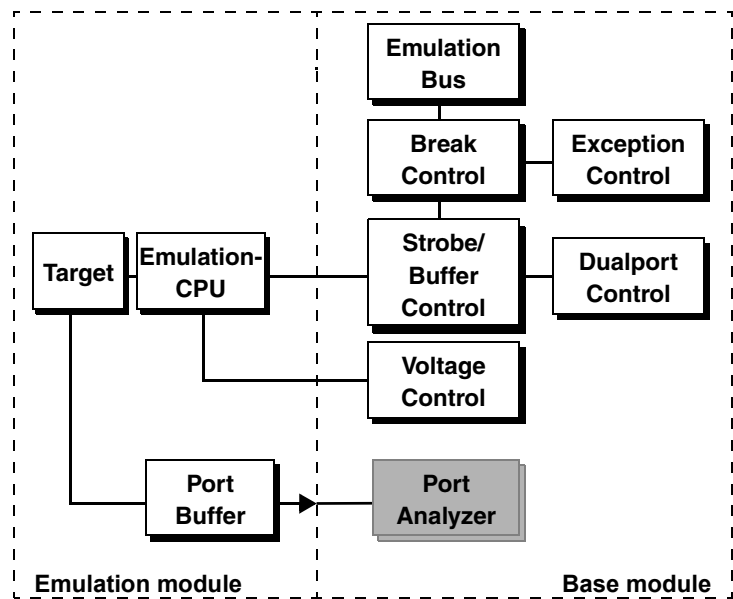
The FIRE-12 emulator module is designed to support all HC12 and STAR12 derivatives. The modular concept of the TRACE32-Fire is continued within the HC12/STAR12 specific units. There is a Fire-12 family module which can be used for all derivatives. Different sizes of emulation,

break and flag memory are available to adjust the system to the application. A small, cpu specific module defines which HC12/STAR12 derivative is emulated. So changing from an HC12 derivative to a STAR12 derivative (for example from HC12DG128 to MCS912DP256) is a easy job. Trigger and trace can be configured in a wide range to support different needs of designers. Software-

designer can put their point of view on the execution of instructions undisturbed of prefetches or unused cycles, while hardware designers can concentrate on the cycles on the MCU's bus interface. The FLASH memory is emulated by an extra emulation system with separate breakpoints and execution flags for code coverage.

## Features

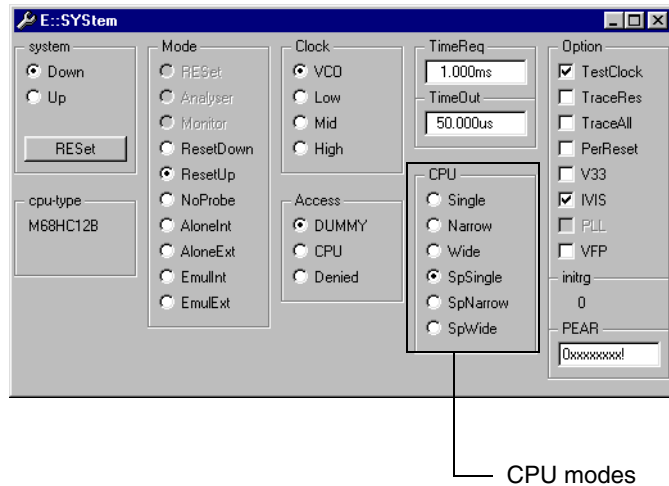
### Basics of Operation



The FIRE12 probe is a high performance emulation system for all derivatives of the 68HC12 family. The change between different CPU types is done by changing the emulation module.

An additional slot in the base module allows to use a port analyzer to get time and state trace features for all MCU I/O lines.

## CPU Modes



The emulator can run in Normal Single Chip, in Normal Expanded Narrow, in Normal Expanded Wide, in Special

Single Chip, in Special Expanded Narrow and in Special Expanded Wide Mode.

## Operating Modes

The Emulator can work in stand-alone mode with internal clock or in active mode with internal or the target clock. On power-down of the target system the emulator tristates its output buffers and isolates its internal emulation circuits.

The operation modes are as follows:

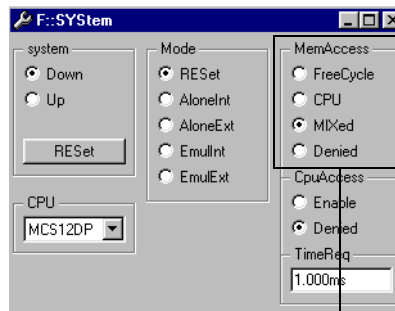
- Reset Down
- Reset Up
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

## Clock

- Operation with external or internal clock
- 1..35 MHz internal clock

## Clock Fail Detection

## Dual Port Access Modes



Dual port access modes

All FIRE\_12 memories are dual-ported. The dual-port access makes it possible to display and modify the contents of the overlay memory, to set or delete breakpoints or use the flag memory while the application is running in real-time.

The following dual-port access modes are implemented:

- FreeCycle
- CPU
- MIXed
- DENIED

In the **FreeCycle mode** the dual port access is made on CPU unused cycles.

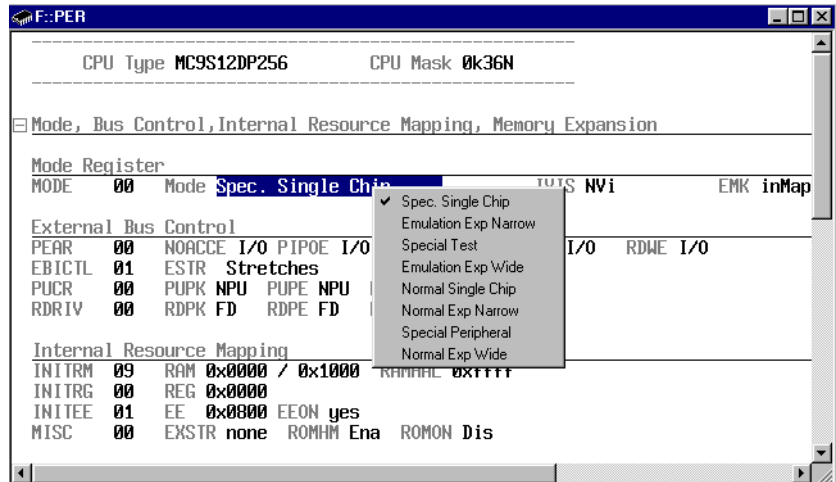
In the **CPU mode** the dual port access is made by the CPU's lite integration module. In this mode, the mem-

ory seen by the CPU is read. This means the content of the internal registers and the target memory can be read while the emulation is running in real-time.

The **MIXed mode** combines the modes FreeCycle and CPU in a smart way to relieve the user from choosing the mode. Nevertheless the other modes may be necessary for the needs of certain applications.

In the **Denied Mode** the dual-port access is switched off.

## Peripheral Window



- Display of onchip peripherals
- User definable display of the onchip peripherals
- Definition is done interactive supported by softkeys
- Pull down menus for settings
- Additional description for each field

The FIRE-12 emulation system automatically detects the remapping of the peripherals if IVIS (visibility of internal cycles) is on.

## Programming and Emulation of the on chip EEPROM

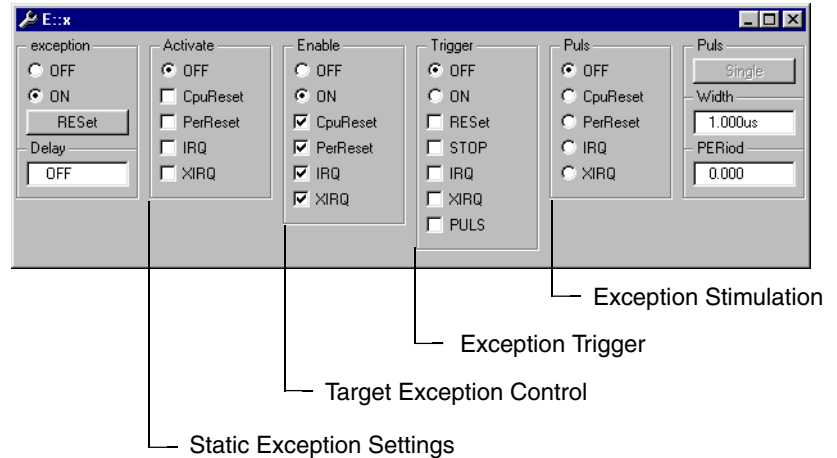
FIRE-12 supports the programming of the on chip EEPROM. This means the emulator executes an EEPROM write protocol on write cycles to the EEPROM.

## Programming and Emulation of the on chip FLASH

FIRE-12 supports the on chip flash memory to allow 0 waitstates emulation in expanded mode. Therefore the emulator can generate the flash programming voltage.

For the emulation of the on chip flash the internal breakpoints of the CPU are used.

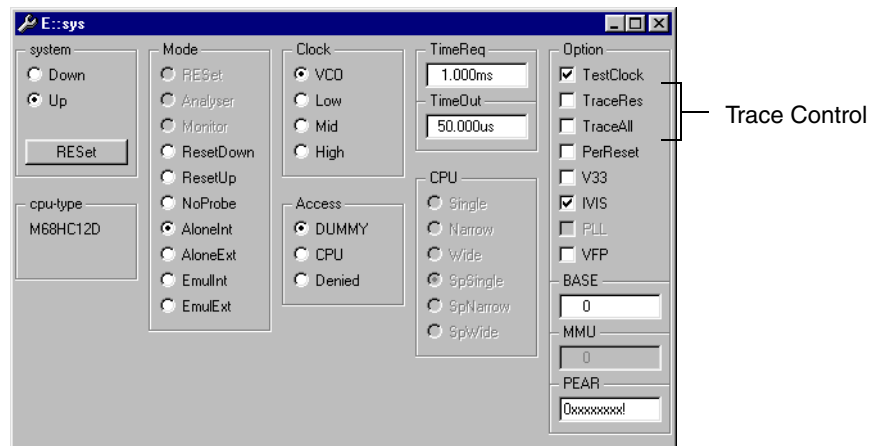
## Exception Control



Exception system is used to control and simulate all special CPU lines like RESET or interrupt inputs. This is especially useful during the develop-

ment phase, allowing to disable CPU input lines, or to simulate certain events.

## Trace Control



By default dual-port cycles and cycles to the CPU's firmware are not traced by the analyzer.

The following trace control options are available:

- TraceRes
- TraceAll

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## Emulation Modules

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### Modules Overview

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## Debug Interfaces

**TRACE32-PowerView** supports most compilers, realtime operation systems and debuggers.

New integrations are mostly done on customers request. If your compiler or RTOS is not supported now, please ask us !

## Compiler Support

| CPU    | Language | Compiers     | Company            | Option     |
|--------|----------|--------------|--------------------|------------|
| 68HC12 | C        | CX68HC12     | Cosmic Software    | COSMIC     |
| 68HC12 | C        | ICC6812      | IAR Systems AB     | UBROF      |
| 68HC12 | C        | HICROSS-HC12 | NXP Semiconductors | HICROSS    |
| 68HC12 | C        | HICROSS      | NXP Semiconductors | ELF/DWARF2 |

## RTOS Support

| Company                    | Product           | Comment  |
|----------------------------|-------------------|----------|
| Elektrobit Automotive GmbH | Elektrobit tresos | via ORTI |
| Evidence                   | Erika             | via ORTI |
| Vector                     | osCAN             | via ORTI |

| Company                    | Product   | Comment                        |
|----------------------------|-----------|--------------------------------|
| -                          | OSEK      | via ORTI                       |
| NXP Semiconductors         | OSEKturbo | via ORTI/former MetrowerksOSEK |
| Elektrobit Automotive GmbH | ProOSEK   | via ORTI                       |
| Quadros Systems Inc.       | RTXC 3.2  |                                |
| Micrium Inc.               | uC/OS-II  | 2.0 to 2.92                    |

## Debugger Support

| CPU | Debugger                  | Company                      |
|-----|---------------------------|------------------------------|
|     | WINDOWS CE PLATF. BUILDER | -                            |
|     | CODE::BLOCKS              | -                            |
|     | C++TEST                   | -                            |
|     | ADENEO                    | -                            |
|     | X-TOOLS / X32             | blue river software GmbH     |
|     | CODEWRIGHT                | Borland Software Corporation |
|     | CODE CONFIDENCE TOOLS     | Code Confidence Ltd          |
|     | CODE CONFIDENCE TOOLS     | Code Confidence Ltd          |
|     | EASYCODE                  | EASYCODE GmbH                |
|     | ECLIPSE                   | Eclipse Foundation, Inc      |
|     | CHRONVIEW                 | Inchron GmbH                 |
|     | LDRA TOOL SUITE           | LDRA Technology, Inc.        |

| CPU | Debugger                        | Company                                 |
|-----|---------------------------------|---|
|     | UML<br>DEBUGGER                 | LieberLieber<br>Software<br>GmbH        |
|     | SIMULINK                        | The<br>MathWorks<br>Inc.                |
|     | ATTOL<br>TOOLS                  | MicroMax Inc.                           |
|     | VISUAL<br>BASIC<br>INTERFACE    | Microsoft<br>Corporation                |
|     | LABVIEW                         | NATIONAL<br>INSTRUMENT<br>S Corporation |
|     | RAPITIME                        | Rapita<br>Systems Ltd.                  |
|     | RHAPSODY<br>IN MICROC           | IBM Corp.                               |
|     | RHAPSODY<br>IN C++              | IBM Corp.                               |
|     | DA-C                            | RistanCASE                              |
|     | TRACEANALY<br>ZER               | Symtavision<br>GmbH                     |
|     | TA<br>INSPECTOR                 | Timing<br>Architects<br>GmbH            |
|     | UNDODB                          | Undo<br>Software                        |
|     | VECTORCAS<br>T UNIT<br>TESTING  | Vector<br>Software                      |
|     | VECTORCAS<br>T CODE<br>COVERAGE | Vector<br>Software                      |

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## Operation Voltage and Frequency

The maximum operation frequency of TRACE32-ICE depends on:

- The max. frequency of the CPU
- The access time of the overlay memory (15ns or 35ns)

- The mapper mode (**S**low or **F**ast)
- The number of waitstates  
(W0 = 0 waitstates  
W1 = 1 waitstate)
- The dual-port access mode

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## Denied, Nodelay Access

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### Operating Voltage

This list contains information on probes available for other voltage ranges.

Probes not noted here supply an operation voltage range from 4.5V to 5.5V. tbd

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## Dimensions

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### Module Dimensions

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## Connectors

On each emulation module there are half-size connectors to:

- Connect the emulation module directly to the target by providing the corresponding connectors also on the target hardware
- Connect a standard adapter from Emulation Technology, YAMAICHI, AMP, TOKYO ELETECH etc.

The following table lists the physical dimensions of these connectors.

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## Adapter

The adapters connect in different ways

- With Clip-Over Adapters the CPU can stay on the target board.
- With Solder-ON adapters the CPU must be removed

- YAMAICHI and AMP adapters fit to the CPU socket

The following table lists the physical dimensions of these adapters.

Not necessary.

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## Available Tool Chain

TRACE32 provides a complete set of development tools for this family. This includes:

- The In-Circuit Emulator TRACE32-ICE
- The high speed RISC Emulator TRACE32-FIRE
- The BDM/JTAG/ONCE etc. based In-Circuit Debugger TRACE32-ICD
- The ROM Monitor based In-Circuit Debugger TRACE32-ICD

- The ICD Trace, a trace extension to the BDM/JTAG debuggers or ROM monitors
- Evaluation boards, which can be used until the target hardware is available.
- The Instruction Set Simulator (SIM), a software tool for code test without any hardware

The following list give an overview which development tools are available for the specific derivatives of this family.

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## Order Information

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### Module Description

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### Detailed Order Information

## Contact

### International Representative

#### Argentina

Anacom Eletronica Ltda.  
Mr. Rafael Sorice  
Rua Nazareth, 807, Barcelona  
BR-09551-200 São Caetano do Sul, SP  
Phone: +55 11 3422 4200  
FAX: +55 11 3422 4242  
EMAIL: rsorice@anacom.com.br

#### Australia

Embedded Logic Solutions P/L  
Mr. Ramzi Kattan  
Suite 2, Level 3  
144 Marsden Street  
Parramatta NSW 2150  
Phone: +61 2 9687 1880  
FAX: +61 2 9687 1881  
EMAIL: sales@emlogic.com.au

#### Austria

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Belgium

Tritec Benelux B.V.  
Mr. Robbert de Voogt  
Stationspark 550  
NL-3364 DA Sliedrecht  
Phone: +31 184 41 41 31  
FAX: +31 184 42 36 11  
EMAIL: software@tritec.nl

#### Brazil

Anacom Eletronica Ltda.  
Mr. Rafael Sorice  
Rua Nazareth, 807, Barcelona  
BR-09551-200 São Caetano do Sul, SP  
Phone: +55 11 3422 4200  
FAX: +55 11 3422 4242  
EMAIL: rsorice@anacom.com.br

#### Canada

Lauterbach Inc.  
Mr. Udo Zoettler  
4 Mount Royal Ave.  
USA-Marlborough, MA 01752  
Phone: +1 508 303 6812  
FAX: +1 508 303 6813  
EMAIL: info\_us@lauterbach.com

#### China Beijing

Lauterbach Technologies Co., Ltd  
Mr. Linglin He  
Beijing Office  
A3 South Lishi Road, XiCheng District  
Beijing 100037, P.R. China  
Phone: +86 10 68023502  
FAX: +86 10 68023523  
EMAIL: linglin.he@lauterbach.com

#### China Shenzhen

Lauterbach Technologies Co., Ltd  
1406/E Xihaimingzhu Building  
No.1 Taoyuan Road, Nanshan District  
Shenzhen 518052, P.R. China  
Phone: +86 755 8621 0671  
FAX: +86 755 8621 0675  
EMAIL: emily.zhang@lauterbach.com

#### Germany South

Lauterbach GmbH  
Andreas Grimm  
Altlaufstr. 40

#### China Suzhou

Lauterbach Technologies Co., Ltd  
Mr. Linglin He  
Hengyu Square, Rm 709  
No. 188, Xing Hai Street  
Suzhou, 215021 P.R. of China  
Phone: +86 512 6265 8030  
FAX: +86 512 6265 8032  
EMAIL: info\_cn@lauterbach.com

#### Czech. Republic

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Denmark

Nohau Danmark A/S  
Mr. Flemming Jensen  
Klausdalsbrovej 493  
DK-2730 Herlev  
Phone: +45 44 52 16 50  
FAX: +45 44 52 26 55  
EMAIL: info@nohau.dk

#### Egypt

Wantech Egypt  
Mr. Wagih A. Nawara  
5 Shafik Ghalie St., Suite 2  
Off Pyramids Road, Giza  
Cairo 12111  
Phone: +20 100 1251955  
FAX: +20 100 1250349  
EMAIL: sales@wantech.net.com

#### Finland

Nohau Solutions Finland  
Mr. Martti Viljainen  
Teknobulevardi 3-5  
FI-01531 Vantaa  
Phone: +358 40 546 1469  
FAX: +358 9 2517 8101  
EMAIL: sales@nohau.fi

#### France

Lauterbach S.A.R.L.  
Mr. Jean-Pierre Paradiso  
Europarc - Le Hameau B  
135 Chemin Des Bassins  
F-94035 Créteil Cedex  
Phone: +33 1 49 56 20 30  
FAX: +33 1 49 56 20 39  
EMAIL: info\_fr@lauterbach.com

#### Germany

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Germany North

Lauterbach GmbH  
Mr. Klaus Hommann  
Leonhardring 5  
D-31319 Seifnde  
Phone: +49 8102 9876 174  
FAX: +49 5138 6185 3  
EMAIL: klaus.hommann@lauterbach.com

D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 190  
FAX: +49 8102 9876 187  
EMAIL: andreas.grimm@lauterbach.com

**Greece**

Lauterbach GmbH  
 Altlaufstr. 40  
 D-85635 Höhenkirchen-Siegertsbrunn  
 Phone: +49 8102 9876 0  
 FAX: +49 8102 9876 999  
 EMAIL: info@lauterbach.com

**Hungary**

Lauterbach GmbH  
 Altlaufstr. 40  
 D-85635 Höhenkirchen-Siegertsbrunn  
 Phone: +49 8102 9876 0  
 FAX: +49 8102 9876 999  
 EMAIL: info@lauterbach.com

**India-Bangalore**

Electro Systems Associates Pvt. Ltd.  
 Mr. G. V. Gurunatham  
 S-606, World Trade Center  
 Malleswaram West, No.26/1, Dr. Rajkumar  
 Road  
 India - Bangalore 560055  
 Phone: +91 80 67648888  
 FAX: +91 80 23475615  
 EMAIL: Trace32sales@esaindia.com

**India-Chennai**

Electro Systems Associates Pvt. Ltd.  
 Mr. D. Kannan  
 No.109 /59A , Ground Floor  
 IV Avenue, Ashok Nagar  
 India - Chennai - 600 083 Tamilnadu  
 Phone: +91 044-24715750  
 FAX: ++91 44 24715750  
 EMAIL: chennai@esaindia.com

**India-Delhi**

Electro Systems Associates Pvt. Ltd.  
 Mr. R.K. Bhandari  
 No. 705, 7th Floor, Laxmi Deep  
 Shivajinagar  
 India - Delhi - 110 092  
 Phone: +91 11-22549351  
 FAX:  
 EMAIL: delhi@esaindia.com

**India-Hyderabad**

Electro Systems Associates Pvt. Ltd.  
 Mr. C.V.M. Sri Ram Murthy  
 Shop No. 14, "Global Enclave"  
 Bhagyanagar Colony, Kukat pally  
 India - Hyderabad 500 072  
 Phone: +91 40-23063346  
 FAX: +91 40-23063346  
 EMAIL: hyderabad@esaindia.com

**India-Pune**

Electro Systems Associates Pvt. Ltd.  
 Mr. R K Bhandari  
 Shriram Complex, 1126/1, Model Colony  
 Shivajinagar  
 India - Pune - 411 016  
 Phone: +91 20 - 30462035 / 25663  
 FAX: +91 20-25677202  
 EMAIL: pune@esaindia.com

**Ireland**

Lauterbach Ltd.  
 Mr. Barry Lock  
 11 Basepoint Enterprise Centre  
 Stroudley Road  
 Basingstoke, Hants RG24 8UP  
 Phone: +44-1256-333-690  
 FAX: +44-1256-336-661  
 EMAIL: info\_uk@lauterbach.com

**Israel**

Itec Ltd.  
 Mr. Mauri Gottlieb  
 P.O.Box 10002  
 IL-Tel Aviv 61100  
 Phone: +972 3 6491202  
 FAX: +972 3 6497661  
 EMAIL: general@itec.co.il

**Italy**

Lauterbach Srl  
 Mr. Maurizio Menegotto  
 Via Enzo Ferrieri 12  
 I-20153 Milano  
 Phone: +39 02 45490282  
 FAX: +39 02 45490428  
 EMAIL: info\_it@lauterbach.com

**Japan**

Lauterbach Japan, Ltd.  
 Mr. Kenji Furukawa  
 3-8-8 Shinyokohama  
 Kouhoku-ku, Nisso 16th Building  
 Yokohama-shi, Japan 222-0033  
 Phone: +81 45 477 4511  
 FAX: +81 45 477 4519  
 EMAIL: info@lauterbach.co.jp

**Luxembourg**

Tritec Benelux B.V.  
 Mr. Robbert de Voogt  
 Stationspark 550  
 NL-3364 DA Sliedrecht  
 Phone: +31 184 41 41 31  
 FAX: +31 184 42 36 11  
 EMAIL: software@tritec.nl

**Malaysia**

Flash Technology  
 Mr. Teo Kian Hock  
 No 61 , # 04-15 Kaki Bukit Av 1  
 Shun Li Industrial Park  
 SGP-Singapore 417943  
 Phone: +65 6749 6168  
 FAX: +65 6749 6138  
 EMAIL: teokh@flashtech.com.sg

**Mexico**

Lauterbach Inc.  
 Mr. Udo Zoettler  
 4 Mount Royal Ave.  
 USA-Marlborough, MA 01752  
 Phone: +1 508 303 6812  
 FAX: +1 508 303 6813  
 EMAIL: info\_us@lauterbach.com

**Netherlands**

Tritec Benelux B.V.  
 Mr. Robbert de Voogt  
 Stationspark 550  
 NL-3364 DA Sliedrecht  
 Phone: +31 184 41 41 31  
 FAX: +31 184 42 36 11  
 EMAIL: software@tritec.nl

**New Zealand**

Embedded Logic Solutions P/L  
 Mr. Ramzi Kaitan  
 Suite 2, Level 3  
 144 Marsden Street  
 Parramatta NSW 2150  
 Phone: +61 2 9687 1880  
 FAX: +61 2 9687 1881  
 EMAIL: sales@emlogic.com.au

**Norway**

Nohau Solutions AB  
 Mr. Jörgen Nilsson  
 Derbyvägen 4  
 SE-21235 Malmö  
 Phone: +46 40 592 206  
 FAX: +46-40 592 229  
 EMAIL: sales@nohau.se

**Poland**

QUANTUM Sp. z o.o.  
 Mr. Aleksander Bil  
 ul. Jeleniogorska 6  
 54-056 Wrocław  
 Phone: +48 71 362 6356  
 FAX: +48 71 362 6357  
 EMAIL: info@quantum.com.pl

**Portugal**

Captura Electronica, SCCL  
Mr. Juan Martinez  
c/Duero, 40  
E-08031 Barcelona  
Phone: +34 93 429 5730  
FAX: +34 93 407 0778  
EMAIL: info@captura-el.com

**Romania**

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

**Russia**

RTSoft  
Mr. Alexey Isaev  
Nikitinskaya 3  
RUS-105037 Moscow  
Phone: +7 495 742 6828  
FAX: +7 495 742 6829  
EMAIL: sales@rtsoft.msk.ru

**Singapore**

Flash Technology  
Mr. Teo Kian Hock  
No 61, # 04-15 Kaki Bukit Av 1  
Shun Li Industrial Park  
SGP-Singapore 417943  
Phone: +65 6749 6168  
FAX: +65 6749 6138  
EMAIL: teokh@flashtech.com.sg

**South Korea, Pangyo**

MDS Technology Co., Ltd.  
Mr. Sangheon Lee  
3FL, Hancom Tower  
49, Daewangpangyo-ro 644, Bundang-gu  
Seongnam-si, Gyeonggi-do, 463-400, ROK  
Phone: +82-31-627-3000  
FAX: +82-31-627-3100  
EMAIL: trace32@mdstec.com

**Spain**

Captura Electronica, SCCL  
Mr. Juan Martinez  
c/Duero, 40  
E-08031 Barcelona  
Phone: +34 93 429 5730  
FAX: +34 93 407 0778  
EMAIL: info@captura-el.com

**Sweden**

Nohau Solutions AB  
Mr. Jörgen Nilsson  
Derbyvägen 4  
SE-21235 Malmö  
Phone: +46 40 592 206  
FAX: +46 40 592 229  
EMAIL: sales@nohau.se

**Switzerland**

JDT Jberg DatenTechnik  
Mr. Andreas Jberg  
Zimmereistrasse 2  
CH-5734 Reinach AG  
Phone: +41 62 7710 886  
FAX:  
EMAIL: Andreas.Jberg@jdt.ch

**Taiwan**

Superlink Technology Corp.  
Mr. Sulin Huang  
3F-8, No. 77, Sec. 1, Xintaiwu Rd., Xizhi District,  
New Taipei City 22101, Taiwan, R.O.C.  
Phone: +886 2 26983456  
FAX: +886 2 26983535  
EMAIL: info.stc@superlink.com.tw

**Tunisia**

Lauterbach Consulting S.A.R.L.  
Mr. Khaled Jmal  
Route El Ain Km 3.5  
TN-3062 Sfax  
Phone: +216-74611730  
FAX: +216-74611723  
EMAIL: info\_tn@lauterbach.com

**Turkey-1**

Tektronik Muh. ve Tic. A.S.  
Mr. Hakan Yavuz  
CyberPlaza B-Blok, 702B  
Bilkent  
06800 Ankara  
Phone: +90 312 437 3000  
FAX: +90 312 437 1616  
EMAIL: info@tektronik.com.tr

**Turkey-2**

G3TEK Embedded Technologies Ltd.  
Mr. Celal Aygun  
Ilkyerlesim Mah. 445.  
Sok. No: 48  
06370 Batikent/Ankara  
Phone: +90 312 3324769  
FAX: +90 312 3324769  
EMAIL: info@g3tek.com

**UK**

Lauterbach Ltd.  
Mr. Barry Lock  
11 Basepoint Enterprise Centre  
Stroudley Rd  
Basingstoke, Hants RG24 8UP  
Phone: +44 1256 333 690  
FAX: +44 1256 350 301  
EMAIL: info\_uk@lauterbach.com

**USA East**

Lauterbach Inc.  
Mr. Udo Zoettler  
4 Mount Royal Ave.  
USA-Marlborough, MA 01752  
Phone: +1 508 303 6812  
FAX: +1 508 303 6813  
EMAIL: info\_us@lauterbach.com

**USA West**

Lauterbach Inc.  
Mr. Bob Kupyn  
1111 Main Street, Suite 620  
USA-Vancouver, WA, 98660  
Phone: +1 503 524 2222  
FAX: +1 503 524 2223  
EMAIL: bob.kupyn@lauterbach.com

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## Additional Information

<http://www.lauterbach.com>

### Lauterbach GmbH

Altlaufstr. 40  
D-35635 Höhenkirchen-Siegertsbrunn  
Tel. ++49 8102 9876-0 FAX -999  
info@lauterbach.com  
http://www.lauterbach.de

### Lauterbach Inc.

4 Mount Royal Ave.  
Marlboro MA 01752  
Phone (508) 303 6812 FAX (508) 303 6813  
info\_us@lauterbach.com  
http://www.us.lauterbach.com

### Lauterbach Ltd.

11 Basepoint Enterprise Ctre Stroudley Road  
Basingstoke, Hants RG24 8UP  
Phone ++44-1256-333-690 FAX -661  
info\_uk@lauterbach.com  
http://www.lauterbach.co.uk

### Lauterbach S.A.R.L.

135 Chemin Des Bassins  
F-94035 Créteil Cedex  
Phone ++33-149-562-030  
FAX ++33-149-562-039  
info\_fr@lauterbach.com  
http://www.lauterbach.fr

### Lauterbach Japan, Ltd.

3-9-5 Shinyokohama Kouhoku-ku  
Yokohama-shi Japan 222-0033  
Phone ++81-45-477-4511 FAX -4519  
info\_j@lauterbach.com  
http://www.lauterbach.co.jp

### Lauterbach s.r.l.

Lauterbach s.r.l.  
Via Enzo Ferreri 12  
I-20153 Milano  
Phone ++39 02 45490282  
FAX ++39 02 45490428  
info\_it@lauterbach.it  
http://www.lauterbach.it

### Suzhou Lauterbach Consulting Co.,Ltd.

Room 1605, Xing Hai International Square  
No.200, Xing Hai Street  
Suzhou, 215021 PR of China  
Phone: 0086-512 6265 8030  
FAX: 0086-512 6265 8032  
info\_cn@lauterbach.cn  
http://www.lauterbach.cn

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