

In-Circuit Emulator for 386

386DX
386EX
386SX

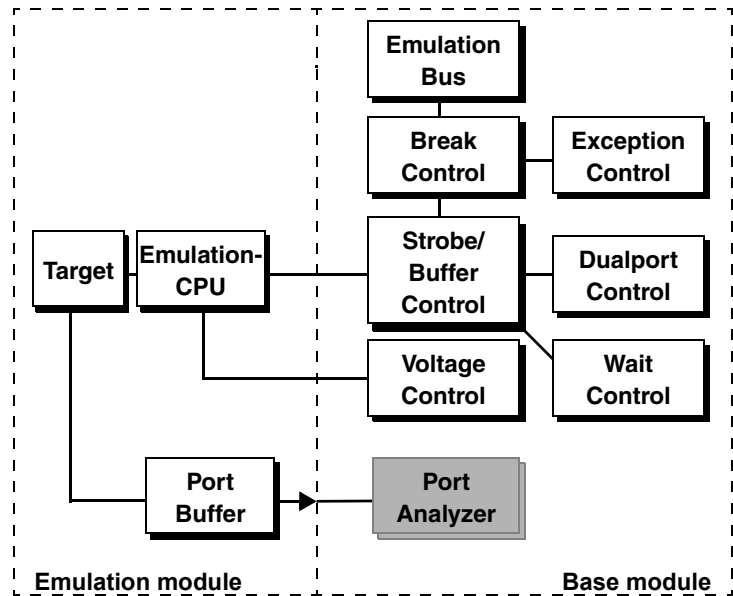
- Supports real mode and protected mode
- Support for 5V and 3.3V derivatives
- Support for all privilege levels
- Works with C, C++, PL/M, M2 and ADA compilers
- Display of hidden registers
- Debugging in boot memory
- Hidden wait system
- Dual ported memory
- Paging support
- MMU support
- FPU support
- CASE tools interface
- RTOS support
- Windows95, NT and X windows interface

The TRACE32-ICE386 supports microprocessor and controller from AMD and Intel. Its modular and open technology allows the fast integration of new chip designs.

A software compatible ROM Monitor is also available.

TRACE32 works with the highest variety of host interfaces. The communication link to the host is done by the printer port, a fibre optic interface or ethernet allowing a high-speed transfer.

Basics of Operation



The ICE-386 is a high-performance emulation system for microprocessors and controller from AMD and Intel.

On the emulation base there is an extra slot for the TRACE32 Port Analyzer. Depending on CPU type various signals can be traced. Some probes have connectors to trace external target lines.

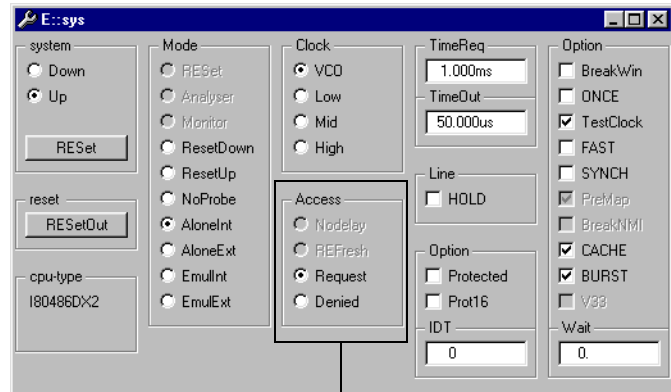
Operating Modes

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
- No Probe
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

Dual-Port Access



Dual port access modes

All TRACE32 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 mode is implemented:

- Request

In the **Request mode** the Hold/Hlda line of the CPU is used to implement dual-port cycles. 386EX has Hold/Hlda function shared with port function on the same pin. To implement dual-port access it is necessary to use this pins as Hold/Hlda.

In the **Denied mode** the dual port access is switched off.

Max. Operation Frequency

- 20 MHz 0 wait
- 30 MHz 1 wait
- 40 MHz 2 wait

Clock

- Operation with external or internal Clock
- 1..40 MHz internal clock

Wait System

- Additional wait cycles (1-15) may be specified
- Hidden Wait System (0-5).

TRACE32 provides a better timing on high speed target systems by generating internal (hidden) waitstates together with a 'synthetic' target interface.

Operation Modes

- Real Mode
- Protected Mode
- Virtual 8086 mode

Memory Models

ICE-386 supports the following memory models:

- Flat mode (uniform 4GB address space)
- Protected flat mode (separate program and data space)
- Large mode (multiple selectors used)

MMU Support

logical	cal	sel	p	dpl	type
PR:0000:00000000--00000007	A:03FFFC00--03FFFC07	0000:	N	dpl=0	system invalid
		0000:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
		0010:	N	dpl=0	system invalid
PR:0010:00000000--0000CFFF	A:000FF000--0010BFFF	0018:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
PR:0020:00000000--00003FFF	A:0010C000--0010FFFF	0020:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
PR:0020:00000000--0000FCFF	A:03FF0000--03FFFCFF	0028:	V	dpl=0	code nonconf readable byte noaccess avl=0 16-bit
PR:0030:00000000--0000FBFF	A:03FEC000--03FFBFFF	0030:	V	dpl=0	code nonconf readable byte noaccess avl=0 16-bit
PR:0030:00000000--0000FBFF	A:00110000--0011FBFF	0038:	V	dpl=0	code nonconf readable byte noaccess avl=0 16-bit
PR:0040:00000000--0000FFFF	A:03F00000--03FF7FFF	0040:	V	dpl=0	data expup writable byte noaccess avl=0 32-bit
PR:0040:00000000--0000FFFF	A:00000000--0000FFFF	0040:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
PR:0050:00000000--0000AFFF	A:00010000--000247FF	0050:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
PR:0050:00000000--0000AFFF	A:00030000--0003FFFF	0058:	V	dpl=0	data expup writable byte noaccess avl=0 16-bit
PR:0060:00000000--0000FFFF	A:02000000--0200FFFF	0060:	V	dpl=0	data expup writable byte noaccess avl=0 32-bit
PR:0060:00000000--0000FFFF	A:00100000--0013FFFF	0068:	V	dpl=0	data expup writable byte noaccess avl=0 32-bit
		0070:	V	dpl=0	system LDT 03FFBC00 03FF
		0078:	V	dpl=0	system LDT 0311FC00 03FF
PR:0080:00000000--00003FFF	A:03FFBC00--03FFBFFF	0080:	V	dpl=0	code nonconf readable byte noaccess avl=0 32-bit
PR:0080:00000000--FFFFFFF7	A:FFFFFFFF--FFFFFFF7	0080:	V	dpl=3	code conf readable page accessed avl=1 32-bit

- Display of the descriptor table
- Target MMU scanning

HLL Debugging

The screenshot shows the TRACE32 debugger window with the following assembly code and a context menu open over the highlighted instruction:

addr/line	code	label	mnemonic	comment
PP:00023976	2BC0		sub	eax, eax
PP:00023978	8945EC		mov	[ebp-14], eax
1494		for (i = 0 ; i <= SIZE ; flags[i++] = TRUE) ;		
PP:0002397B	8945F8		mov	[ebp-8], eax
PP:0002397E	8B4DF8		mov	ecx, [ebp-8]
PP:00023981	83F912		cmp	ecx, +12
PP:00023984	7F0E		jg	23994
PP:00023986	C681881		mov	byte ptr [ecx+116881], 1
PP:0002398D	41		inc	ecx
PP:0002398E	894DF8		mov	[ebp-8], ecx
PP:00023991	EBEB		jmp	2397E
PP:00023993	90		nop	
1496		<= SIZE ; i++)		
PP:00023994	C745F80		mov	dword ptr [ebp-8], 0
PP:0002399B	8B4DF8		mov	ecx, [ebp-8]
PP:0002399E	83F912		cmp	ecx, +12

The context menu is open over the instruction at address 0002397B, showing options: Go Till Here, Default Breakpoints, Spotpoint, Set PC Here, Display Memory..., Breakpoints..., Go Till..., Edit Source, List There, Assemble here..., and Modify here...

The TRACE32 debugger provides a interface for C, C++, PL/M,M2 and ADA for all standard compilers. For more information on the supported compilers refer to the section "Debug Interfaces".

Full support in real-time for:

- Break-before-line operation
- HLL single step in real-time
- Trigger and trace on local variables

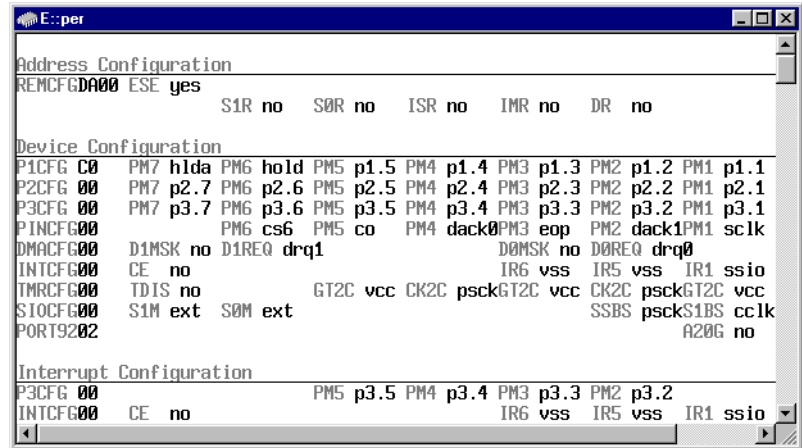
Background Task

The background task allows:

- To process interrupts

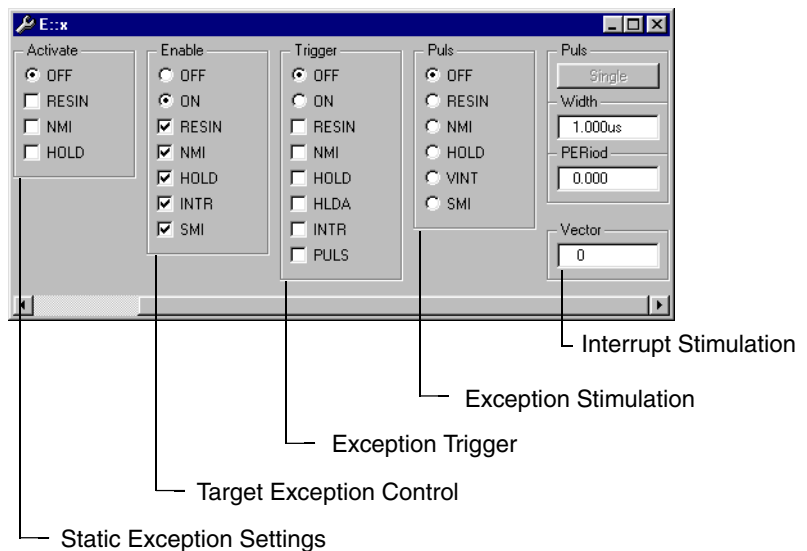
- To maintain the refresh of a target DRAM while the emulation is stopped.

CPU Peripherals



- 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
-

Exception Control



The TRACE32 exception controller allows to permanently activate an exception, to enable or disable specific

exceptions, to trigger on specific exceptions or to stimulate an exception.

FPU Support

The display and modification of the FPU registers is supported.

On-Circuit Emulation

- Support for Clip-Over adapters

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 Real Mode

CPU	Language	Compier	Compan y	Option
X86 REAL	ASM	AXLS		HP
X86 REAL	C	BORLANDC	Borland Software Corporation	EOMF-86
X86 REAL	C	ORGANON	CAD-UL Electronic Services GmbH	EOMF-86
X86 REAL	C	IC86	Intel Corporation	OMF-86
X86 REAL	C	MCC86	Mentor Graphics Corporation	EOMF-86
X86 REAL	C	MSC/MSVC-16BIT	Microsoft Corporation	EOMF-86
X86 REAL	C	MSC/MSVC	Microsoft Corporation	EXE/TD
X86 REAL	C	ICC86	TASKING	OMF-86
X86 REAL	C	ICC86	TASKING	IEEE

CPU	Language	Compiler	Company	Option
X86 REAL	C++	BORLANDC	Borland Software Corporation	EXE/TD
X86 REAL	C++	MSVC-16BIT	Microsoft Corporation	EXE/CV
X86 REAL	MODULA	LOGITECH-M2	Terra Datentechnik	MAP/REF
X86 REAL	PASCAL	TEK-PASCAL	Tektronix	TEK
X86 REAL	PLM	PL/M86	Intel Corporation	OMF-86

Compiler Support Protected Mode

CPU	Language	Compiler	Company	Option
X86	C	SCO-UNIX-CC		COFF
X86	C	GNU-C	Free Software Foundation, Inc.	DBX
X86	C	GNU-C	Free Software Foundation, Inc.	ELF/DWARF2
X86	C	GCC386	Greenhills Software Inc.	COFF
X86	C	IC386	Intel Corporation	OMF-386
X86	C	IC286	Intel Corporation	OMF-286
X86	C	MCC386	Mentor Graphics Corporation	EOMF-386
X86	C	MSVC-1.5	Microsoft Corporation	EOMF-386
X86	C	MSVC	Microsoft Corporation	EXE/CV
X86	C	MSVC	Microsoft Corporation	OMF-386/CV
X86	C	MSVC/CSI	Microsoft Corporation	EOMF-386
X86	C	HC386	Synopsys, Inc	OMF386/SPF
X86	C	HIGHC	Synopsys, Inc	ELF/DWARF
X86	C++	BORLAND-C	Borland Software Corporation	EXE/BC5

CPU	Language	Compiler	Company	Option
X86	C++	ORGANON	CAD-UL Electronic Services GmbH	OMF386++
X86	C++	GNU-C++	Free Software Foundation, Inc.	DBX
X86	C++	MSVC	Microsoft Corporation	EXE/CV4
X86	C++	HC386	Synopsys, Inc	OMF/SPF
X86	C++	HIGH-C++	Synopsys, Inc	ELF/DWARF

RTOS Support Real Mode

Company	Product	Comment
Oracle Corporation	ChorusOS	
Mentor Graphics Corporation	Nucleus PLUS	
Wind River Systems	pSOS+	2.1 to 2.5, 3.0
Quadros Systems Inc.	RTXC 3.2	
Wind River Systems	VxWorks	5.x and 6.x

RTOS Support Protected Mode

Company	Product	Comment
Oracle Corporation	ChorusOS	
-	Linux	Kernel Version 2.4 and 2.6, 3.x, 4.x
Mentor Graphics Corporation	Nucleus	
Quadros Systems Inc.	RTXC 3.2	
Wind River Systems	VxWorks	5.x to 7.x
Microsoft Corporation	Windows CE	6.0
Microsoft Corporation	Windows Embedded Compact	EC7, EC2013
Microsoft Corporation	Windows Standard	XP, Vista, 7, 8, 10

Debugger Support Real Mode

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

CPU	Debugger	Company
	EASYCODE	EASYCODE GmbH
	ECLIPSE	Eclipse Foundation, Inc
	CHRONVIEW	Inchron GmbH
	LDRA TOOL SUITE	LDRA Technology, Inc.
	UML DEBUGGER	LieberLieber Software GmbH
	SIMULINK	The MathWorks Inc.
	ATTOL TOOLS	MicroMax Inc.
	VISUAL BASIC INTERFACE	Microsoft Corporation
	LABVIEW	NATIONAL INSTRUMENTS Corporation
	RAPITIME	Rapita Systems Ltd.
	RHAPSODY IN MICROC	IBM Corp.
	RHAPSODY IN C++	IBM Corp.
	DA-C	RistanCASE
	TRACEANALYZER	Symtavision GmbH
	TA INSPECTOR	Timing Architects GmbH
	UNDODB	Undo Software
	VECTORCAST UNIT TESTING	Vector Software
	VECTORCAST CODE COVERAGE	Vector Software

Debugger Support Protected Mode

CPU	Debugger	Company
	WINDOWS CE PLATF. BUILDER	-
	CODE::BLOC KS	-
	C++TEST	-
	ADENEO	-
	X-TOOLS / X32	blue river software GmbH
	CODEWRIGH T	Borland Software Corporation
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	EASYCODE	EASYCODE GmbH
	ECLIPSE	Eclipse Foundation, Inc
	CHRONVIEW	Inchron GmbH
	LDRA TOOL SUITE	LDRA Technology, Inc.
	UML DEBUGGER	LieberLieber Software GmbH
	SIMULINK	The MathWorks Inc.
	ATTOL TOOLS	MicroMax Inc.
	VISUAL BASIC INTERFACE	Microsoft Corporation
	LABVIEW	NATIONAL INSTRUMENT S Corporation
	RAPITIME	Rapita Systems Ltd.
	RHAPSODY IN MICROC	IBM Corp.

CPU	Debugger	Company
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	DA-C	RistanCASE
	TRACEANALY ZER	Symtavigation GmbH
	TA INSPECTOR	Timing Architects GmbH
	UNDODB	Undo Software
	VECTORCAS T UNIT TESTING	Vector Software
	VECTORCAS T CODE COVERAGE	Vector Software

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

Denied Access

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.

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Dimensions

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.

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

Module Description

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 Kaffan
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 Slidrecht
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

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 Sehnde
Phone: +49 8102 9876 174
FAX: +49 5138 6185 3
EMAIL: klaus.hommann@lauterbach.com

Germany South

Lauterbach GmbH
 Andreas Grimm
 Altlaufstr. 40
 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"
 Bhagyavanagar 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 Kattan
 Suite 2, Level 3
 144 Marsden Street
 Parramatta NSW 2150
 Phone: +61 2 9687 1880
 FAX: +61 2 9687 1881
 EMAIL: sales@emlogi.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-Siegersbrunn
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 Kupyń
1111 Main Street, Suite 620
USA-Vancouver, WA, 98660
Phone: +1 503 524 2222
FAX: +1 503 524 2223
EMAIL: bob.kupyń@lauterbach.com

Additional Information

<http://www.lauterbach.com>

Lauterbach GmbH

Altlaufstr. 40
D-85635 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 Ferrieri 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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