

In-Circuit Emulator for Z80 and Z180

8085
 HD64180R1
 HD64180Z
 HD647180X0
 HD648180W
 TMP8085
 TMPZ84C00
 TMPZ84C013
 TMPZ84C015
 Z80180
 Z80181
 Z80182
 Z8400
 Z84011
 Z84013
 Z84015
 Z84C00
 Z84C01
 Z84C11
 Z84C13
 Z84C15
 Z84C50
 Z8S180

- 20 MHz no-waitstate emulation
- Interface with C and PLM
- RTOS support for CMX-RTX and VRTX80
- Banking support up to 256 banks
- MMU support
- Support for power down mode
- Port analyzer
- Cost effective 8-bit emulation system
- Software compatible ROM-monitor

The TRACE32-ICE80 supports most of the members of the Z80- and Z180-family from Zilog and Renesas. Its modular and open technology allows the fast integration of new chip designs.

A software compatible ROM monitor is also available.

TRACE32-ICE is a state of the art In-Circuit Emulator, which offers unlimited hardware breakpoints and up to 16MByte dual-ported emulation memory. The real-time trace and trigger work up to the max. speed of the CPU. The analyzer offers selective trace

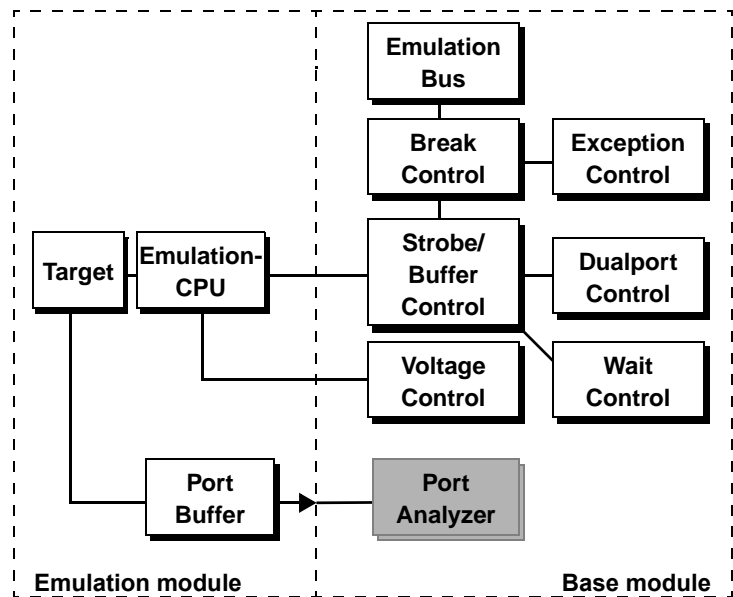
as well as performance analysis and statistic functions.

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.

TRACE32-ICE80 is also available as a compact 8-bit In-Circuit Emulator.

Features

Basics of Operation



The ICE 80 probe is a high-performance emulation system for many derivatives of the Z80 family. The change between different CPU types is done by changing the adapter board.

On the base module there is an extra slot for the TRACE32 Port Analyzer. Depending on the CPU type additional CPU signals can be traced.

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.

- Reset Down
- Reset Up
- No Probe
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

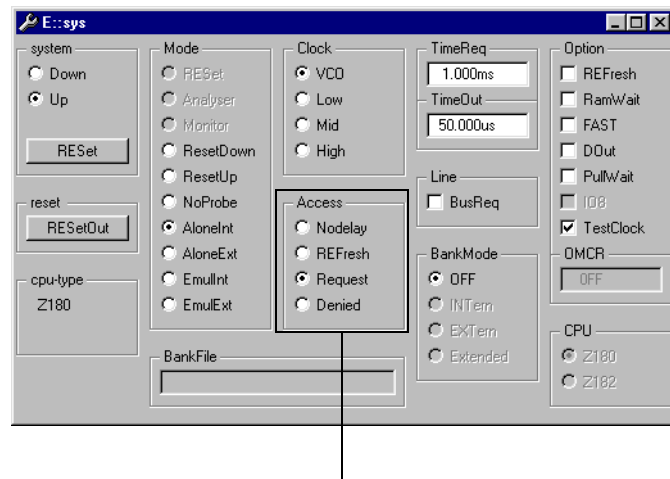
Clock

- Operation with external or internal Clock, up to 25 MHz depending on the derivative
- 0.75..35 MHz internal clock can be chosen using an VCO

Voltage and Clock Monitors for the Target System

This feature prevents failures caused by missing clock or undervoltage.

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. Most modes do not touch real time program execution. However for different demands the user may choose different access modes.

The following dual-port access modes are implemented:

- Nodelay

- REFresh
- Request

In the **Nodelay mode** the dual port access is done between two CPU cycles.

In the **REFresh mode** the dual port access is made on CPU refresh cycles.

In the **Request mode** allow the dual-port access up to the max. speed of the CPU. It runs only on processors with open BUSREQ/BUSACK lines.

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

Memory Banking (only Z80/8085)

To extend the limited address space of the processor, sometimes external memory must be added. The TRACE32-ICE80 supports nearly all additional memory constructions up to 16MByte.

- Max. 256 banks
- With external bank logic
- With internal bank logic
- Banked EPROM

For an external bank logic a separate input probe is needed.

Programming of the on chip EEPROM (HD648180)

ICE-80 supports the programming of the on chip EEPROM. This means the emulator executes an EEPROM write protocol on write cycles to the EEPROM.

MMU Support

The screenshot shows the TRACE32 software interface with two windows. The main window displays a memory dump with columns for record, run, address, address, cycle, .b symbol, and ti.back. The data window shows the MMU mapping table with columns for logical and physical addresses.

record	run	address	address	cycle	.b symbol	ti.back
000033	f	D:00B403	AD:010403	wr-mem	05	1.250us
000032	f	P:4C4C6B	AP:050C6B	opfetchn	20 \\iarz180\iarz80b\sieve+0A3	0.700us
000031	f	D:4C4C6C	AD:050C6C	rd-mem	02 \\iarz180\iarz80b\sieve+0A4	1.175us
000030	f	P:4C4C6F	AP:050C6F	opfetchn	18 \\iarz180\iarz80b\sieve+0A7	1.325us
000029	f	D:4C4C70	AD:050C70	rd-mem	92 \\iarz180\iarz80b\sieve+0A8	1.175us
000028	f	P:4C4C03	AP:050C03	opfetchn	C1 \\iarz180\iarz80b\sieve+3B	1.325us
000027	f	D:00B403	AD:010403	rd-mem	05	1.175us
000026	f	D:00B404	AD:010404	rd-mem	00	1.125us
					C5 \\iarz180\iarz80b\sieve+3C	1.075us
					00	1.425us
					05	1.125us
					11 \\iarz180\iarz80b\sieve+3D	1.075us
					12 \\iarz180\iarz80b\sieve+3E	1.175us
					00 \\iarz180\iarz80b\sieve+3F	1.125us
					CD \\iarz180\iarz80b\sieve+40	0.700us

logical	physical
C:000000--003FFF	A:000000--003FFF
C:000000--00FFFF	A:010000--017FFF
C:4C4000--4C7FFF	A:050000--053FFF
C:FF4000--FF7FFF	A:103000--106FFF

ICE80 supports the built-in MMU of the Z180 processors.

Background Task

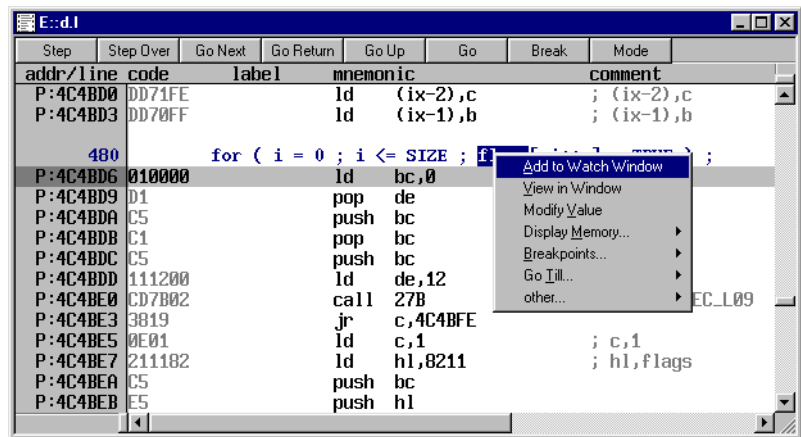
The background task allows:

To process interrupts

To maintain the refresh of a target DRAM

while the emulation is stopped.

HLL Debugging

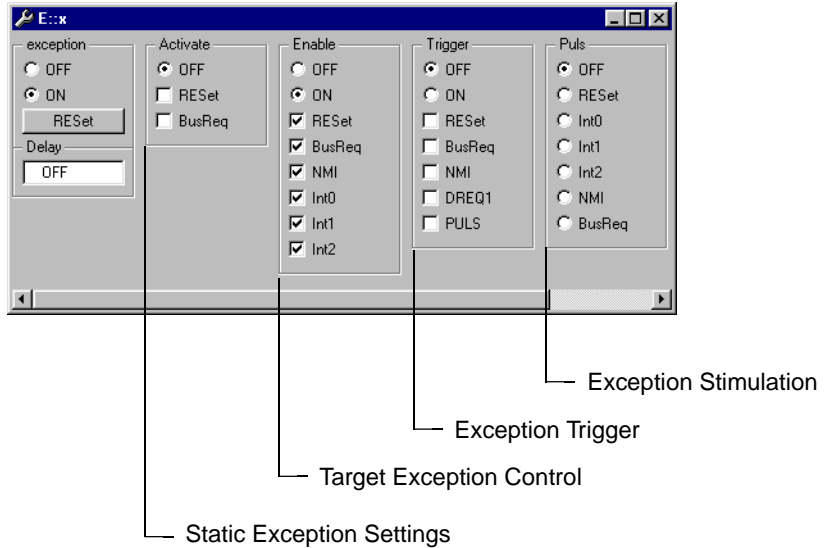


The TRACE32 debugger provides a interface to C and PLM for all standard compilers. For more information on the supported compilers refer to the section "Debug Interfaces".

Full support in real-time for:

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

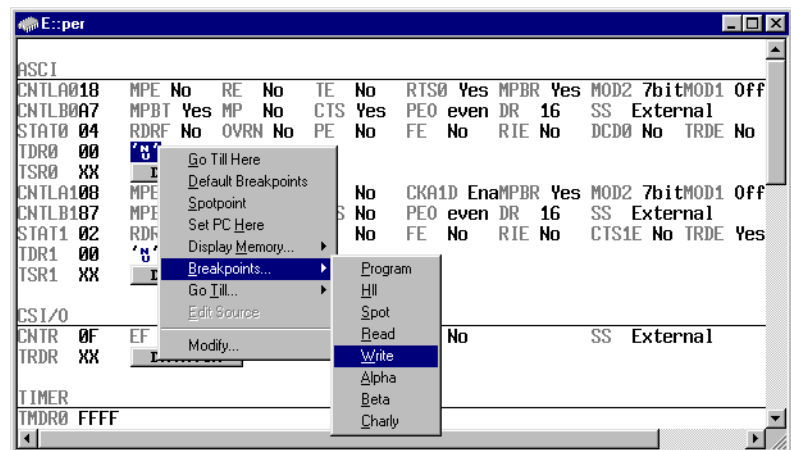
Exception Control



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

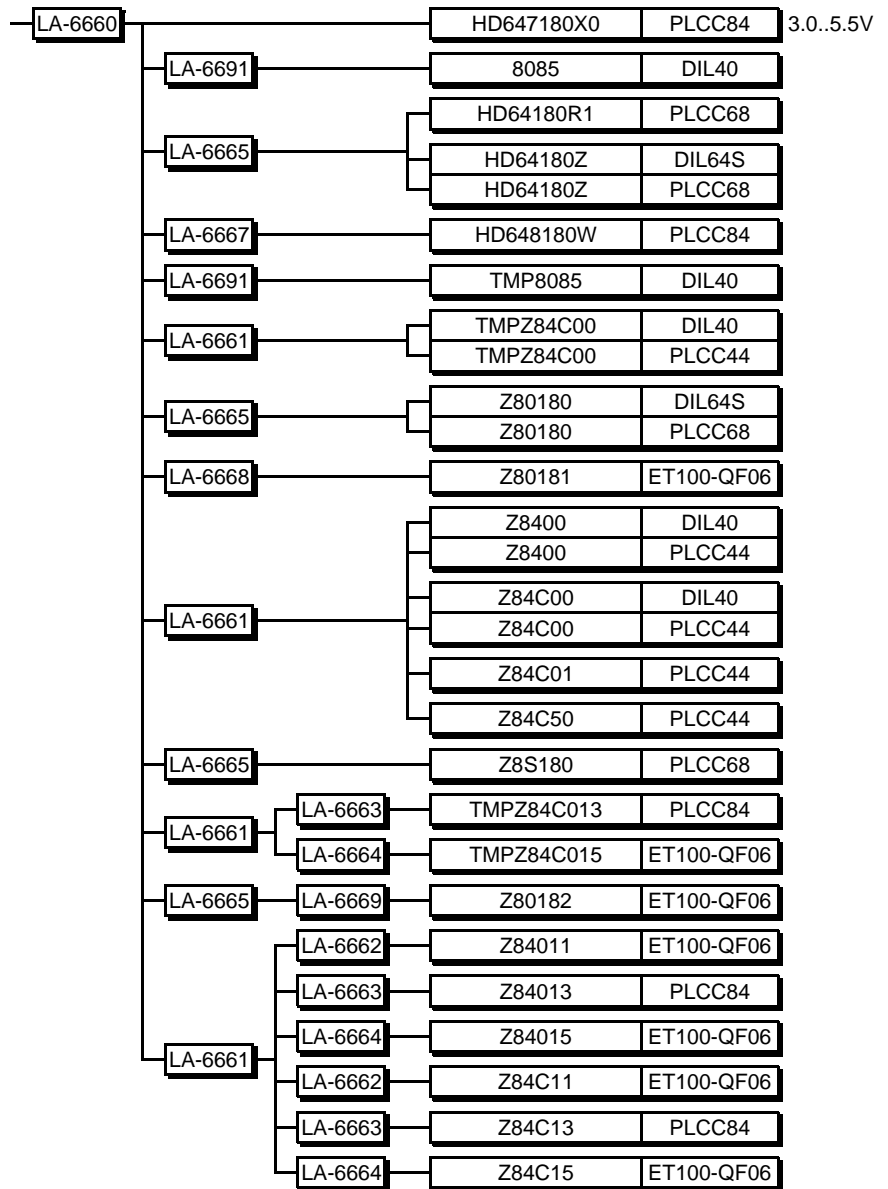
exceptions, to trigger on specific exceptions or to stimulate an exception.

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

Modules Overview



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

Language	Compiler	Company	Option	Comment
ASM	HP-64000 ASM	HP	HP	Source level debugging
ASM	MI-C	ROSE	SYM	Source level debugging
ASM	AS	SDSI	SDS	
C	ICCZ80	IAR Systems AB	UBROF	Z180 and banking sup.
C	MCCZ80	Mentor Graphics Corporation	IEEE	no banking support
C	HT-Z80	Microchip Technology Inc.	HITECH	
C	MI-C	ROSE	SYM/ LOC	No type information
C	UNIWARE-C	SDSI	SDS	
C	CC	Softools Inc.	UBROF	
PLM	ISIS-PL/M	Intel Corporation	SYM/ LOC	no type/local info

RTOS Support

Name	Company	Comment
CMX-RTX	CMX Systems Inc.	
VRTX80	Mentor Graphics Corporation	

Debugger Support

CPU	Debugger	Company	Host
ALL	X-TOOLS / X32	blue river software GmbH	Windows
ALL	CODEWRIGHT	Borland Software Corporation	Windows
ALL	EASYCODE	EASYCODE GmbH	Windows
ALL	ECLIPSE	Eclipse Foundation, Inc	Windows
ALL	RHAPSODY IN MICROC	IBM Corp.	Windows
ALL	RHAPSODY IN C++	IBM Corp.	Windows
ALL	LDRA TOOL SUITE	LDRA Technology, Inc.	Windows
ALL	ATTOL TOOLS	MicroMax Inc.	Windows
ALL	VISUAL BASIC INTERFACE	Microsoft Corporation	Windows
ALL	LABVIEW	NATIONAL INSTRUMENTS Corporation	Windows
ALL	CODE::BLOCKS	Open Source	-
ALL	RAPITIME	Rapita Systems Ltd.	Windows
ALL	DA-C	RistanCASE	Windows
ALL	WINDOWS CE PLATF. BUILDER	Windows	Windows

Operation Voltage and Frequency

The maximum operation frequency of TRACE32-ICE depends on:

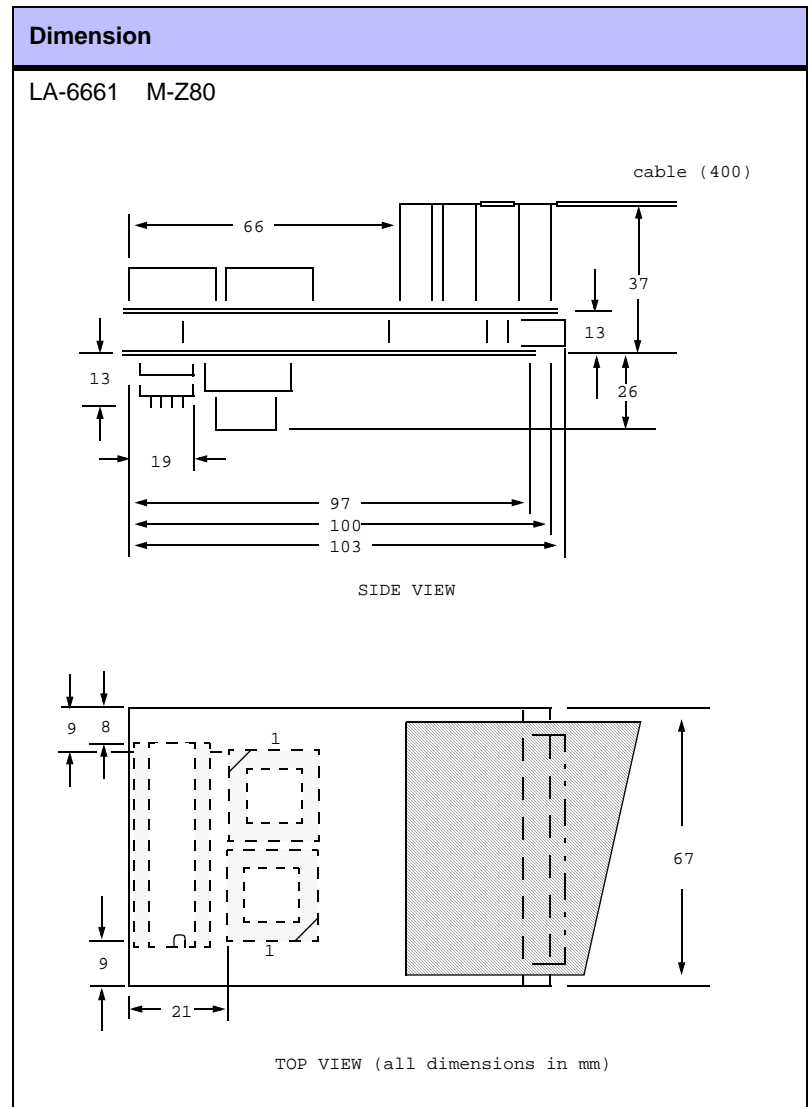
- The max. frequency of the CPU
- The access time of the overlay memory (15ns or 35ns)
- The mapper mode (**Slow** or **Fast**)
- The number of waitstates (WO = 0 waitstates
W1 = 1 waitstate)
- The dual-port access mode

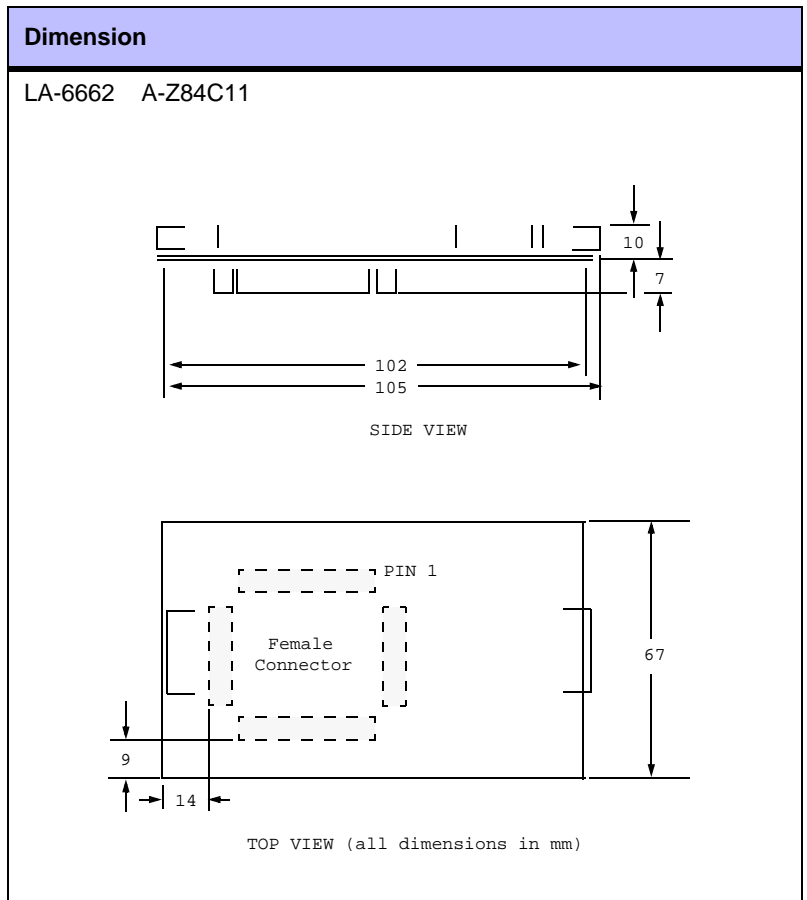
Denied Access

Module	CPU	F-W0-15	F-W0-35	S-W0-15	S-W0-35	S-W1-15	S-W1-35	DRAM
LA-6691	8085	5.0+	5.0+	5.0+	5.0+	5.0+	5.0+	
LA-6665	HD64180R1	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6665	HD64180Z	15.0+	15.0	15.0+	12.6	15.0+	15.0+	10.0
-	HD647180X0	8.0+	8.0+	8.0+	8.0+	8.0+	8.0+	10.0
LA-6667	HD648180W	6.0+	6.0+	6.0+	6.0+	6.0+	6.0+	10.0
LA-6691	TMP8085	5.0+	5.0+	5.0+	5.0+	5.0+	5.0+	
LA-6661	TMPZ84C00	8.0+	8.0+	8.0+	8.0+	8.0+	8.0+	10.0
LA-6661	TMPZ84C013	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	TMPZ84C015	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6665	Z80180	15.0+	15.0	15.0+	12.6	15.0+	15.0+	10.0
LA-6668	Z80181	12.5+	12.5+	12.5+	12.5+	12.5+	12.5+	10.0
LA-6665	Z80182	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z8400	8.0+	8.0+	8.0+	8.0+	8.0+	8.0+	10.0
LA-6661	Z84011	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84013	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84015	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84C00	20.0	13.3	14.5	10.7	20.0+	20.0+	10.0
LA-6661	Z84C01	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84C11	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84C13	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84C15	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6661	Z84C50	10.0+	10.0+	10.0+	10.0+	10.0+	10.0+	10.0
LA-6665	Z8S180	20.0	15.0	16.0	12.6	20.0+	20.0+	

Dimensions

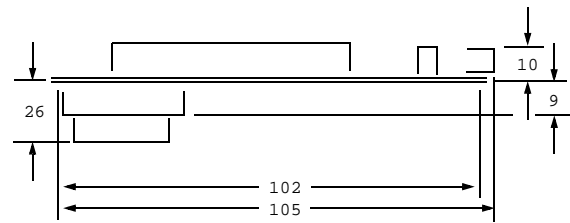
Module Dimensions



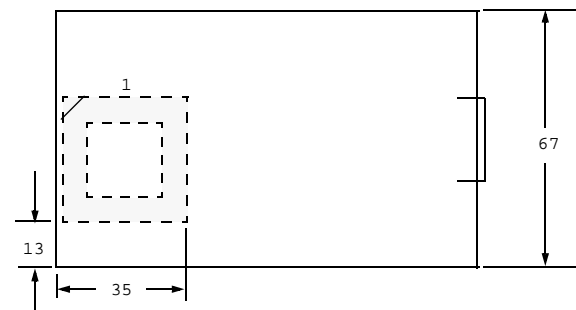


Dimension

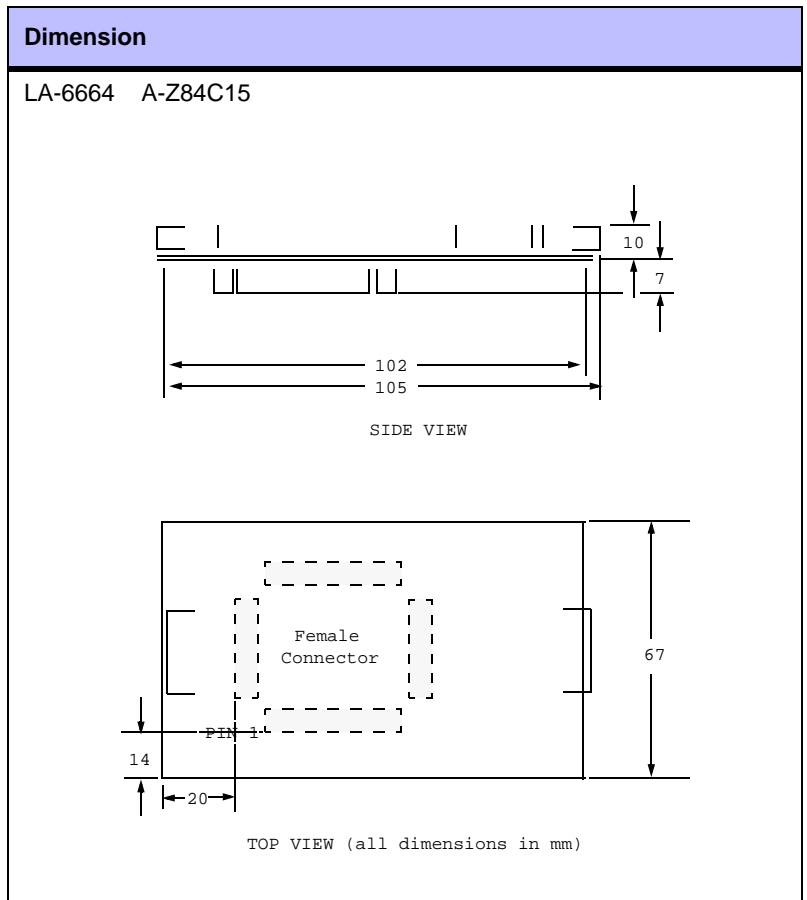
LA-6663 A-Z84C13

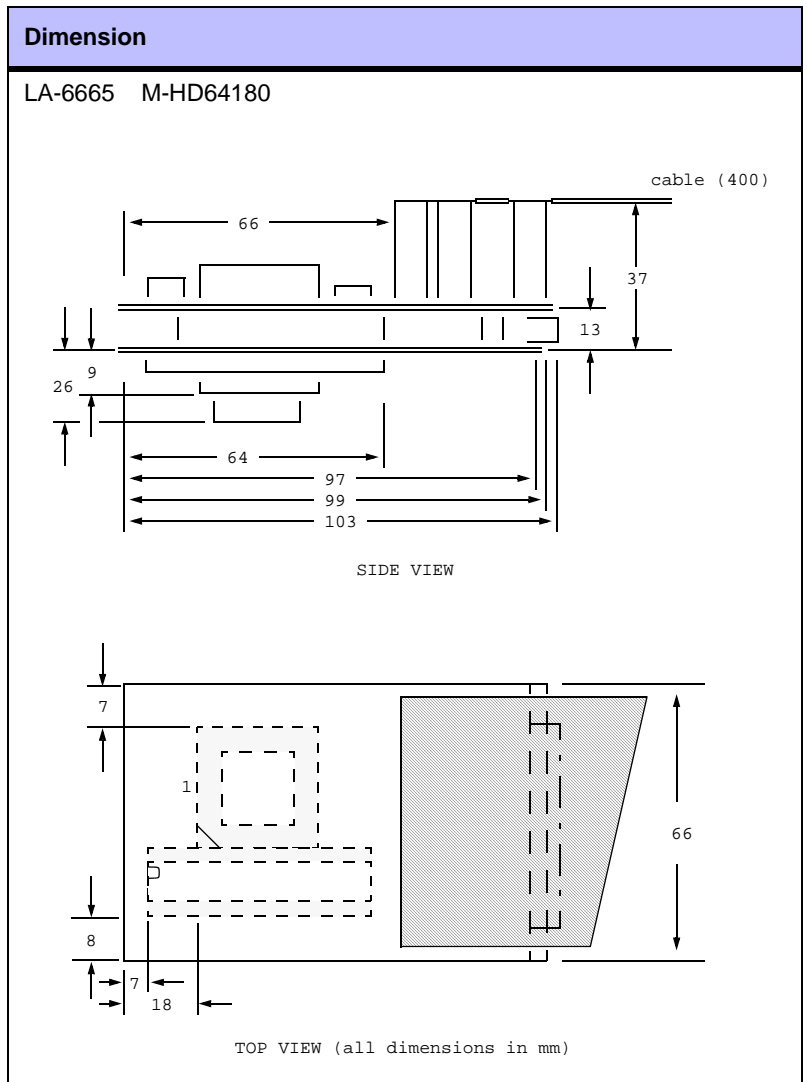


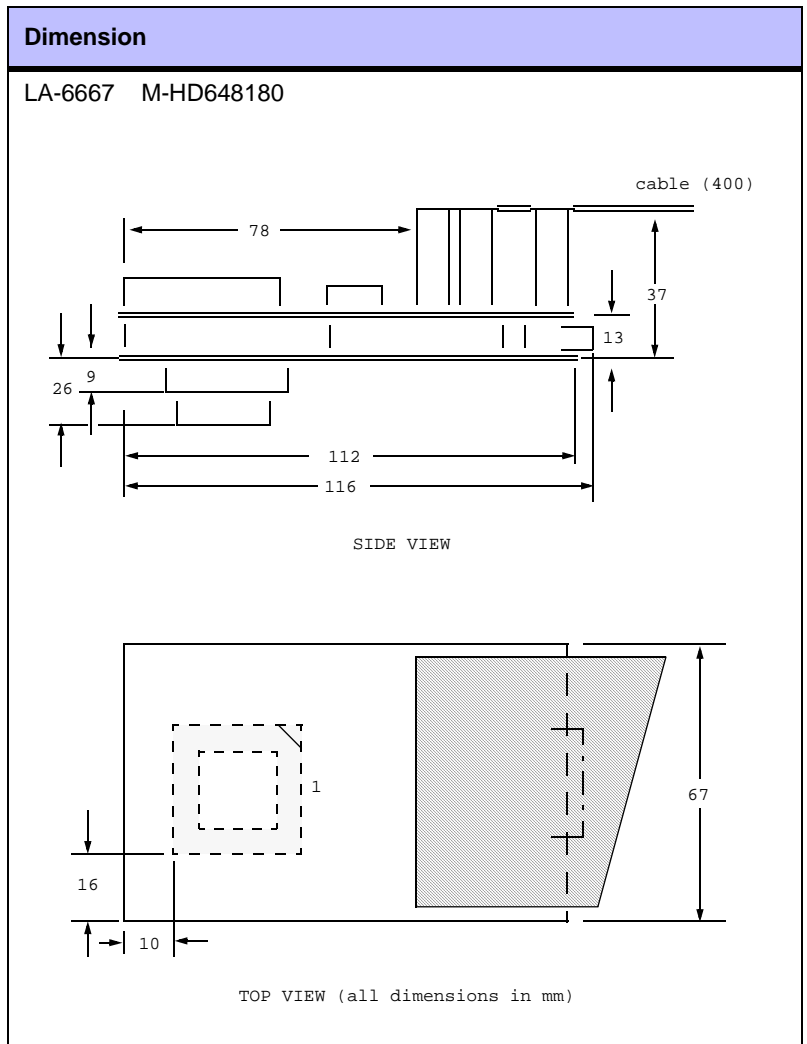
SIDE VIEW



TOP VIEW (all dimensions in mm)

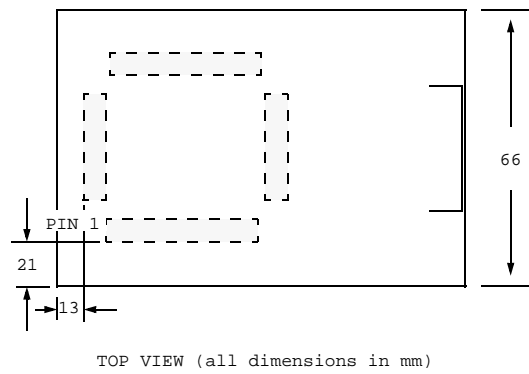
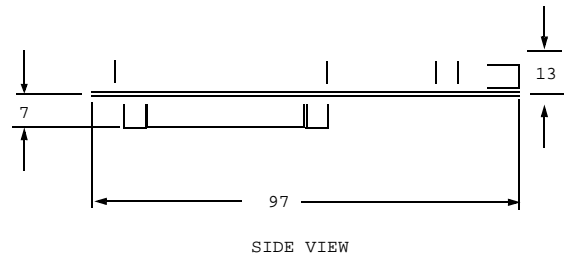


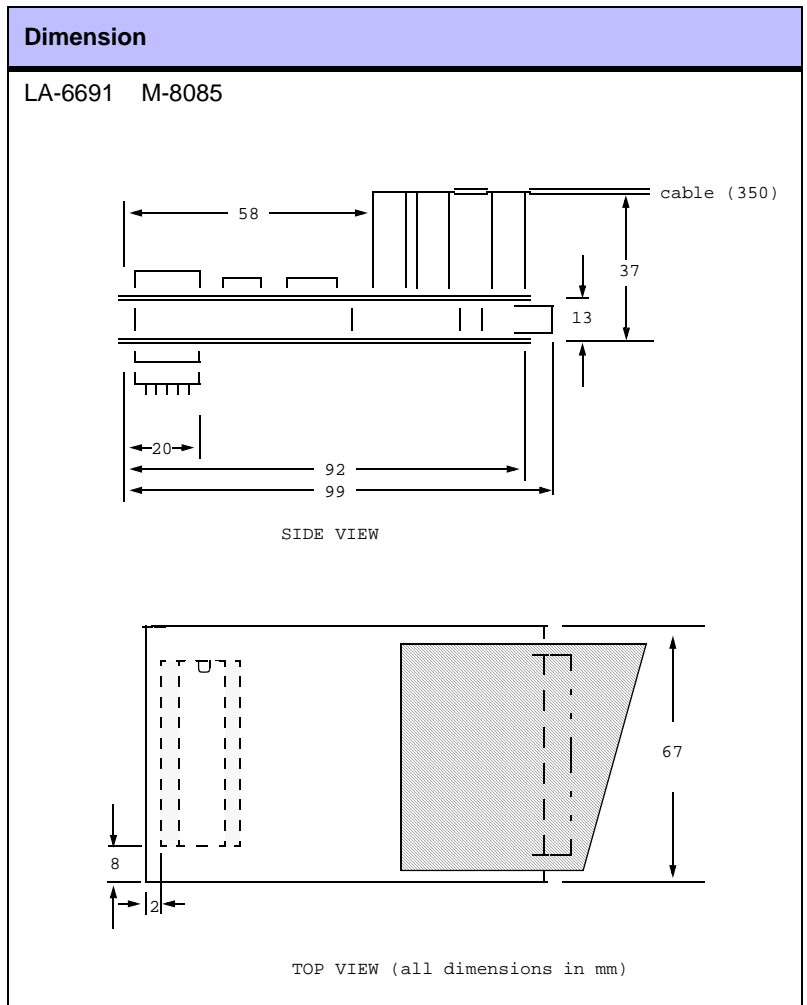




Dimension

LA-6669 A-Z182





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.

CPU	Dimension
TMPZ84C015 Z80181 Z80182 Z84011 Z84015 Z84C11 Z84C15	ET100-QF06 <p style="text-align: center;">100-QF06 TOP-VIEW</p>

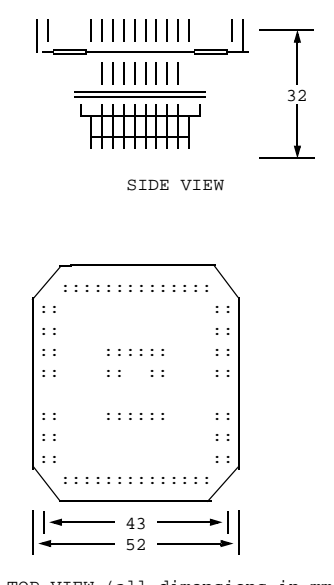
Adapter

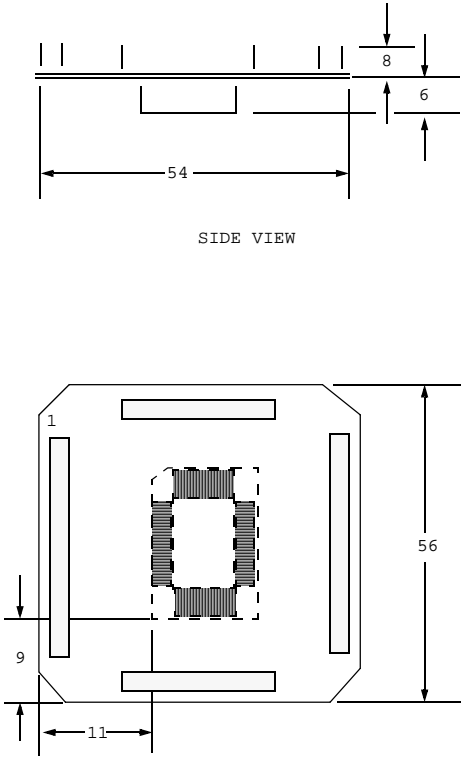
The adapters connect in different ways

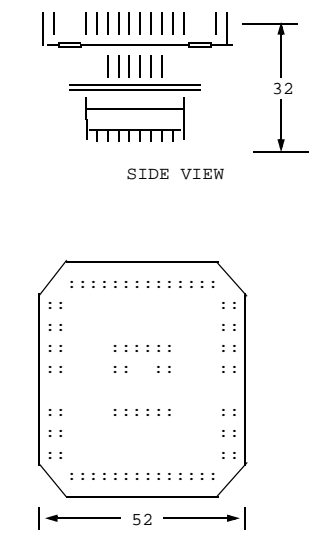
- With Clip-Over Adapters the CPU can stay on the target board.
- With Solder-ON adapters the CPU must be removed

- YAMAICHI and AMP adapters fit to the CPU socket

The following table lists the physical dimensions of these adapters.

Socket CPU	Adapter
ET100-QF06 TMPZ84C015 Z80181 Z80182 Z84011 Z84015 Z84C11 Z84C15	ET-1030 ET100-SET-QF06 Surface Mountable Adapter for ET100 to QF06  <p style="text-align: center;">SIDE VIEW</p> <p style="text-align: center;">TOP VIEW (all dimensions in mm)</p>

Socket CPU	Adapter
<p>ET100-QF06</p> <p>TMPZ84C015 Z80181 Z80182 Z84011 Z84015 Z84C11 Z84C15</p>	<p>YA-1031 ET100-EYA-QF06 Emul. Adapter for YAMAICHI socket ET100-QF06</p>  <p>SIDE VIEW</p> <p>TOP VIEW (all dimensions in mm)</p>

Socket CPU	Adapter
<p>ET100-QF06</p> <p>TMPZ84C015 Z84011 Z84015 Z84C11 Z84C15</p>	<p>ET-1032 ET100-CET-QF06 Clip-Over Adapter for ET100-QF06</p>  <p>SIDE VIEW</p> <p>TOP VIEW (all dimensions in mm)</p>

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.

CPU	ICE	FIRE	ICD DEBUG	ICD MONITOR	ICD TRACE	POWER INTEGRATOR	INSTRUCTION SIMULATOR
8085	YES						
HD64180R1	YES			YES			YES
HD64180Z	YES			YES			YES
HD647180X0	YES						YES
HD648180W	YES						YES
TMP8085	YES						
TMPZ84C00	YES			YES			YES
TMPZ84C013	YES			YES			YES
TMPZ84C015	YES			YES			YES
Z80180	YES			YES			YES
Z80181	YES			YES			YES
Z80182	YES			YES			YES
Z8400	YES			YES			YES
Z84011	YES			YES			YES
Z84013	YES			YES			YES
Z84015	YES			YES			YES
Z84C00	YES			YES			YES
Z84C01	YES			YES			YES
Z84C11	YES			YES			YES
Z84C13	YES			YES			YES
Z84C15	YES			YES			YES
Z84C50	YES			YES			YES
Z8S180	YES			YES			YES

Order Information

Module Description

OrderNo Code	Text
LA-6945 TC-ICE-M-Z80- F	TRACE32 Compact ICE/MPC for Z80 family Fast - System Controller Unit for low-cost high-performance systems 32 Bit CPU, 64 MByte RAM, parallel interface to LPT, USB1.x and ethernet Ethernet for PC LAN/LINUX included Ethernet for Workstation requires Host Driver Package for Workstations on CD (LA-8616) - Universal Emulator Controller for 8-bit, 128 KB Emulation-RAM, 128 KB Break-RAM, dual-port access controller, realtime emulation controller, trigger system, state analyzer with 32K trace buffer, performance analyzer. - Emulation Base Module for Z80-family 20 MHz, slot for Port Analyzer. - HLL-Debugger for C, C++, PASCAL, PL/M, ADA, Modula2
LA-6660 ICE-Z80	ICE-Z80 Base Module Base Module for Z80-family 20 MHz
LA-6661 M-Z80	Module Z80 supports Z80,Z80-CMOS,Z84C00,Z84C00,Z80C01
LA-6662 A-Z84C11	Adapter Z84C11 supports Z84C11 adaption by ET adapter (not included)
LA-6663 A-Z84C13	Adapter Z84C13 supports Z84C13 adaption by PLCC84
LA-6664 A-Z84C15	Adapter Z80-Z84C15 supports Z84C15,TPZ80C015
LA-6665 M-HD64180	Module HD64180-DIL/PLCC supports HD64180, Z180 DIL64/PLCC68, 20 MHz
LA-6667 M-HD648180	Module for HD648180-PLCC supports HD648180 10 MHz
LA-6668 M-Z181	Module Z181 supports Z181 10 MHz target adaption by ET solder-on adapter (not included)
LA-6669 A-Z182	Adapter Z182 Adapter for Z182 Emulation, needs module M-HD64180, target adaption by ET solder-on adapter (not included)
LA-6691 M-8085	Module 8085 supports 8085 up to 10 MHz, adaption by DIL40, no in-line assembler for 8085

Detailed Order Information

Order No.	Code	Text
LA-6945	TC-ICE-M-Z80-F	TRACE32 Compact ICE/MPC for Z80 family Fast
LA-6660	ICE-Z80	ICE-Z80 Base Module
LA-6661	M-Z80	Module Z80
LA-6662	A-Z84C11	Adapter Z84C11
LA-6663	A-Z84C13	Adapter Z84C13
LA-6664	A-Z84C15	Adapter Z80-Z84C15
LA-6665	M-HD64180	Module HD64180-DIL/PLCC
LA-6667	M-HD648180	Module for HD648180-PLCC
LA-6668	M-Z181	Module Z181
LA-6669	A-Z182	Adapter Z182
LA-6691	M-8085	Module 8085
Additional Options		
ET-1032	ET100-CET-QF06	Clip-Over Adapter for ET100-QF06
TO-1260	ET100-ETO-QF06	Emul. Adapter for TO socket ET100-QF06
YA-1031	ET100-EYA-QF06	Emul. Adapter for YAMAICHI socket ET100-QF06
ET-1030	ET100-SET-QF06	Surface Mountable Adapter for ET100 to QF06
TO-1261	ET100-STO-QF06	Emul. Adapter TO-surface mount. ET100-QF06
LA-7518	MON-Z80	ROM Monitor for Z80 on ESI
LA-6450	PA64	Port Analyzer
LA-1921	PLCC-BLOCK-44	PLCC Block 44 Pins
LA-1923	PLCC-BLOCK-68	PLCC Block 68 Pins
LA-1924	PLCC-BLOCK-84	PLCC Block 84 Pins
LA-1925	PLCC-TEST-ADAPTER-44	PLCC Test Adapter 44 Pins
LA-1926	PLCC-TEST-ADAPTER-68	PLCC Test Adapter 68 Pins
LA-1927	PLCC-TEST-ADAPTER-84	PLCC Test Adapter 84 Pins
LA-8811	SIM-80	Instruction Set Simulator for Z80/Z180

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