

NOHAU

Parts List

Nohau In-Circuit Emulators

for the

STMicroelectronics

EMUL-ST10-PC

including the Super10



Parts List

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In-Circuit Emulators for the ST10 and Super10 Architecture

NEW! Package Deals

EMUL-ST10, 256 low-cost package	Package includes the following: POD-ST10-256-50, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 256-50-LCPKG
EMUL-ST10, 256 package	Package includes the following: POD-ST10-256-50, EMUL-ST10-PC/TR-ST10R-201, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 256-50-PKG
EMUL-ST10, 256 low-cost package	Package includes the following: POD-ST10-FA-256-80, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 256-80-LCPKG
EMUL-ST10, 256 package	Package includes the following: POD-ST10-FA-256-80, EMUL-ST10-PC/TR-ST10-FA, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 256-80-PKG
EMUL-ST10, 1M package	Package includes the following: POD-ST10-1M-50, EMUL-ST10-PC/TR-ST10R-201, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 1M-50-PKG
EMUL-ST10, 1M package	Package includes the following: POD-ST10-FA-1M-80, EMUL-ST10-PC/TR-ST10-FA, EMUL-PC/EPC or USB, the Getting Started manual, and the Seehau software. Pods are available for all of the ST10 derivatives.	EMUL-ST10-PC/ 1M-80-PKG

Note: Optional XPER Modules and Daughterboards are not included.

Note: For 5V targets choose the 50 MHz package. If your target is 3V, choose the 80 MHz package.

Examples of How to Order EMUL-ST10 Systems with Daughtercards

Listed below are two examples of what parts to order for your EMUL-ST10 system with a daughtercard. Use the examples as a guide to help you in your ordering of a Nohau emulator system. To order a system with a different daughtercard refer to page 13 of this price list. There are photos of systems and adapters to help you in your ordering. If you need assistance please contact your local rep, www.nohau.com/rep, or Nohau technical support: support@nohau.com or sales@nohau.com.

ST10F269 System

EMUL-ST10-PC/1M-50-PKG	Emulator Package	
EMUL-ST10-PC/XP269 6	Daughterboard	295.00
		Order Total

The system will also include the power supply, a BNC trace trigger cable, the trace probe set, the Getting Started Manual and the Seehau Debugger software. If you need assistance please contact your local rep, www.nohau.com, or Nohau technical support: support@nohau.com.

Introduction

What this document is and about pricing

This price list is designed to be used by engineers, buyers and purchasing agents. It is widely quoted and used as an information source by Nohau representatives. The latest version is available from the Nohau website or from your local Nohau representative. If this document contains no prices then it is called the parts list and is designed for distribution outside of the USA. In this case, contact your local Nohau rep for the price list for your country. Your rep may distribute this document with local prices listed. You can find the name of your rep by contacting Nohau as listed on this document. Any US dollar prices shown are valid in the USA only.

What an emulator is and what it does

An emulator is a scientific device used by engineers to design their computers faster and more accurately. The emulator temporarily replaces the microcontroller in the customer target system. The emulator behaves exactly like the processor with the added benefit of allowing you to view data and code inside the processor and control the operation of the CPU. You can load user code, view it in machine code or C source, set breakpoints on addresses and preset variables and registers. You can view data changes in real-time with the Shadow RAM feature. The emulator can be operated in stand-alone mode so development work can begin before the target system is available or complete.

Bondout Chips

Nohau makes two emulators for the ST10 and one for the Super10. The Nohau EMUL-ST10 emulators use one of three ST bondout microcontrollers as the emulation processor. One is the 50 MHz ST10R201, the second is the 80 MHz FA ST10R202 and the third is the Super10 ST10R302. These special processors contain a ST10 or Super10 core surrounded with special emulation logic that provides emulator access to the internal busses. The user target application sees the standard ST10 microcontroller and the emulator sees a special ST10 processor with the emulation features including special signals and the internal XBUS (not Super10), CPU and ROM bus. This gives the emulator visibility into the CPU core and the ability to trigger on internal reads, writes and ALU results. The bondouts support both internal (single-chip) and external memory modes. Emulation RAM in the 50 MHz emulator provides ROM emulation using the bondout 32 bit ROM bus allowing program fetch and execution at full speed with zero wait states. The 50 MHz emulator has no internal RAM on the ROM bus as it has its own RAM for this purpose.

The FA emulator contains 256 Kbytes of static RAM inside the bondout chip and is connected to the internal 32 bit ROM bus. This is in addition to the 256K or 1Mbyte of external emulation RAM. This internal RAM provides the fastest possible execution times with zero wait states.

The Super10 emulator contains 512 Kbytes of static RAM inside the bondout chip and is connected to the internal 64 bit ROM bus. This is in addition to the 256K or 1Mbyte of external emulation RAM. The internal static RAM provides the fastest possible execution times with zero wait states. The Super10 does not contain the XBUS like the other ST10 family members.

For more detailed information on bondouts refer to "The Embedded Software Engineer's Guide to In-Circuit Emulation" document located on our website. For information on other written documentation refer to the Application Notes on our Website section later in this document.

What the trace does and why people order one

You can set triggers on specified addresses and data which will stop the emulation and/or trace memory when this action occurs. This alerts you that the specified event has occurred and you may now use the information stored by the emulator to find any hardware or software errors. The trace memory records the microcontroller cycles including data reads and writes for user specified conditions. You can view the trace memory to find out what your code was actually doing at a particular time. Most people purchase the optional trace card due to its unique ability to save many hours of engineering time looking for elusive bugs.

Introduction (Continued)

- Seehau - the Nohau debugger for the emulator** The emulator and its software is designed to be relatively intuitive to use. The Nohau debugging software is called Seehau, and updates are available free on the website or directly from any Nohau office or representatives anywhere in the world. Seehau is macro based enabling automatic operation. Seehau operates under Windows 95, 98, NT, XP, ME and 2000. For more information about the benefits of Seehau, see www.nohau.com for the latest data sheets or call your Nohau representative.
- ST ST10, Infineon C166 Cross Support** STMicroelectronics and Infineon provide the ST10 and C166 families respectively. These families are related and compatible to some extent. Nohau makes two emulators for the Infineon C166 and C166S-V2 families and three for the ST10 and Super10 families. It is possible to provide support for Infineon chips with the ST10 emulator and vice versa. Contact Nohau technical support for cross support of various devices and their specifications.
- Compiler Support** Nohau supports Altium (formerly Tasking) and Keil C compilers and assemblers including Altium C++ Preprocessor. Debugging formats supported are IEEE695, Intel HEX and OMF166. Nohau and its representatives are authorized distributors of both Altium and Keil and provide technical support. It is possible to make changes to your source code in Seehau and then call your compiler. The resulting object code is then loaded into the emulator for further debugging.
- RTOS Support** Nohau provides RTOS support through an ActiveX mechanism. Currently CMX is supported. It is possible to support a customer developed RTOS also. See the Nohau website for details. OSEK support is currently under development.
- ST10-Flash Programming Utility** There is a downloadable program available for free on our website to program the embedded flash memory of the ST10F168 and ST10F269. The download is available at: www.nohau.com/downloads_misc_utilities.html.
- More info is available** For more information on the entire embedded tool chain, get your copy of "The Embedded Software Engineer's Guide to In-Circuit Emulation" from your Nohau rep or from www.nohau.com. Nohau has other informative documents available from the same sources. Any questions can be directed to your Nohau rep or sales@nohau.com.

General Features

Pod Boards

- The ST10 Family** The STMicroelectronics ST10 family started with the 163 and continued through the F167, F168 and F269 to the latest parts F276 and F280. The part numbering scheme indicates the mask ROM version (ST10167), FLASH (ST10F168) and ROMless (ST10R272L). The Multiply ACCumulate (MAC) unit presence is indicated by a 2 as the first digit i.e. 272 rather than 172. The newer devices contain at least one Controller Area Network (CAN) module with the F269 having two CAN modules. The 50 MHz pod supports 5 volt parts and 3 volt parts with an optional mezzanine board (see page 19).
- The FA emulator supports only 3 volt parts to speeds of 80 (or 90) MHz and with specified targets to 100 MHz (see the Product Support Tables on page 9). Some of these parts can also be supported with the Nohau EMUL166 emulator. The Super10 is a more powerful member of the ST10 family featuring one clock per instruction and operation to 100 MHz. The EMUL-Super10 supports these devices at 3 volts.

General Features (Continued)

Pod Boards (Continued)

Super10 The Super10 is the latest member of the ST10 family which was targeted initially for the disk drive market. This device is very fast (up to 100 MHz) and uses one clock cycle per instruction. The other ST10 family members use two cycles per instruction. The Super10 has its own bondout. The emulator and trace cards are not compatible with the ST10 50 or 80 MHz emulators. The footprint for the target adapter is compatible but the signals generally are not. The Super10 uses advanced pipeline and other techniques to provide very fast processing times. Seehau is used for both the ST10 and Super10 emulators.

The Emulator or Pod Board for the ST10 Emulator Nohau completely supports the ST10 family with three emulators. The first is the 50 MHz EMUL-ST10, the second is the 80 (or 90 MHz) EMUL-ST10FA and the third is the 100 MHz EMUL-Super10. The FA emulator is specified by Nohau to 80 MHz but the bondout is characterized by ST to 90 MHz. Each emulator uses a different STMicroelectronics bondout. The first two are usually specified by their maximum frequency (50 or 80 MHz) and the last as the Super10. The 50 MHz is very popular due to its ability to support many popular derivatives such as the F167, F168 and the F269.

The pod board is the main circuit board. The target adapter plugs into the bottom and the optional trace card plugs into the top. There is a socket for the daughtercard which is used for support of newer derivatives. The communications interface and the 5 volt power supply plugs into the emulator board. The emulator contains the STMicroelectronics bondout.

Nohau emulators operate in true real time without stealing CPU cycles for housekeeping functions. Nohau makes a new emulator pod for every new STMicroelectronics bondout rather than patching the new bondout to old emulator designs. This ensures full access to all bondout features. Nohau supports Altium and Keil C166 compilers and assemblers.

Emulating new XBUS peripherals The bondout will not incorporate all the ST10 family peripherals of a particular derivative to be supported. Examples are the CAN ports and extra XRAM. These are all situated on the XBUS which is an internal representation of the external bus. The problem of providing these peripherals is solved with the STMicroelectronics two chip emulation system. A daughtercard containing a production chip which will provide the XBUS peripherals to be emulated is plugged into the emulator. The emulator firmware then places this chip into emulation mode. The bondout can now access these peripherals as if they were in the bondout itself and still at full speed. A major advantage is you are given the latest peripheral modules from the daughtercard chip. For this reason, Nohau will use all the modules from the daughtercard even if these modules are in the bondout. Check the Product Support Table to see if you need to install a daughtercard to support your microcontroller. Recall the Super10 does not have an XBUS so the two chip emulation system is therefore not applicable.

General Features (Continued)

Trace Cards

EMUL-ST10 Trace Background

Each of the three Nohau emulators for the ST10 have different trace cards. They are not interchangeable due to their specialized construction for high speed performance. Nohau uses the advanced trace and trigger facilities contained inside the bondout chip for maximum speed and versatility. The trace board for the EMUL-ST10 operates to 50 MHz and the trace board for the EMUL-ST10FA is rated for 90 MHz. Trace boards are optional on ST10 and Super10 emulators and they can be purchased and added at any time. Trace boards add trace memory for execution, data read and write history recording, triggers and Shadow RAM. The trace display includes address, data, timestamp, processor status, program flow, special bondout bus states, source code and labels. Shadow RAM displays data writes in real time without stealing emulation cycles. The trace board can be viewed and triggers can be configured "on the fly" without stealing CPU cycles for these housekeeping functions.

There are two versions of Shadow RAM implemented on the Nohau ST10 emulators. TR Shadow (for Trace Shadow) is implemented on the trace board and is collected and displayed in real time without stealing CPU cycles. Only the 50 MHz emulator has this feature. You need the optional trace card to get this Shadow RAM feature.

The other, called Shadow RAM, updates the data window contents using Nohau's ability to inject a read instruction directly into the decode stage of the CPU pipeline bypassing the fetch stage and going directly to the execute stage. This method uses a minimal loss of real time as only a few cycles of instruction time are taken from the user program. These few cycles are normally unnoticeable. This injection sequence can be prioritized with the Monitor Code Interrupt Level setting in the Seehau software. This will prevent injections from happening during speed sensitive routines that must not be slowed down such as a fast servos. This is done by setting the Monitor Mode interrupt level lower than the routine in question.

Nohau uses the same method to inject a write cycle into the pipeline. This feature is accessible as the "Fast-Break-Write" feature. It is not really a "break" since the code is injected into the pipeline rather than having program control diverted to the emulator firmware known as the monitor mode. The monitor mode would take up much more time from the user program than the very fast direct injection of instructions.

The 50 MHz, FA emulator and the Super10 have this Shadow RAM feature. You do not need the trace card as this trace function is implemented on the emulator POD board. Only the 50 MHz emulator has both TR Shadow and Shadow RAM.

The Trace card for the Super10

The Super10 is a new ST10 CPU core. This core is not compatible with the regular ST10 family. It is emulated with its own bondout and a new Nohau emulator. The trace card for the Super10 plugs into the emulator as in the ST10 emulator. It provides 128K frames of recorded executed instructions, Shadow RAM, filtering and four levels of advanced triggers. This trace card operates to 100 MHz and while it is an option, most people order the emulator with this trace card. The Shadow RAM uses the special Nohau Fast-Break-Read feature to update contents with minimal loss of real time. The other ST10 emulators update in real time as described above.

General Features (Continued)

Target Adapters and Evaluation Boards

Target Adapter Basics	Target adapters are used to connect the emulator to your target system. Adapters should be carefully chosen in terms of cost, reusability, reliability and mechanical sturdiness. Each application requires different solutions. There are many methods used to connect Nohau ST10 emulators to the target boards. For detailed information please see the Nohau application note "Adapter Guide for the C167 and ST10 Emulator Families". It is available on the Nohau website or from your Nohau representative. There are four main methods to connect to your target as described below.
Solder-down Adapters	<p>The solder-down adapter is the most reliable but needs special preparation of the target board. This adapter normally comes in two parts: the part that solders to the target board in place of the target chip, and a circuit board assembly that connects this part to the emulator. There are photos of these parts starting on page 16. The cost can be high and the part soldered down can't be easily removed and reused. This part can be purchased separately for replacement purposes.</p> <p>There are two types of solder down adapters: Emulation Technology (ET) and Yamaichi. The Emulation Technology adapters are very common. The Yamaichi can also plug in the real chip but it requires a slightly larger circuit board pad size for secure electrical connection and this can cause some design problems especially for the 144 pin versions. These solutions offer excellent electrical connections and sturdiness.</p>
Dedicated headers	Dedicated headers are placed on the target board by the hardware designer. They are inexpensive and sturdy but require circuit board space around the target. An example is the connector for PHYTEC kitCON boards (see page 21).
Clipover adapters	The Nohau clipover uses the Delta Probe concept which reduces many concerns normally found with clipover adapters. The Nohau Delta Probe features direct metallic connections that provide intermittent free operation. The Delta Probe can be removed and reinstalled many times with the proper amount of care and skill. If damaged, they can be repaired for a modest fee by JM Engineering, the manufacturer of the Delta Probe. The interface board assembly between the Delta Probe and the emulator is made by Nohau. See www.jmecorp.com for more information.
Flex Cables	Nohau has designed and made a high speed flex cable. This economical and popular cable works at speeds in excess of 100 MHz and can be used with every Nohau ST10 target adapter. This cable is a true Faraday cage being entirely shielded even on its edges. This cable is a 50 ohm transmission line and is made of several layers for excellent crosstalk reduction. This cable consists of the cable itself and two rotational boards. One board connects the emulator at one end of the cable and the other connects any standard ST10 or C166 target adapter to the cable. By rotating these boards, the cable can approach the target from any of the four quadrants providing access no matter what the hardware configuration. These two boards can be replaced to use the cable for other microcontroller families. A photo of this cable system is on page 20.
Extender Boards	Nohau supplies a number of extender boards that raise the emulator away from the target by 0.5 to a few inches for access purposes. One board provides a way to disconnect any signal path and to connect other test equipment. Another provides 3 volt support and more are planned. These boards generally fit between the emulator and any standard target adapter.

General Features (Continued)

Target Adapters and Evaluation Boards (Continued)

PHYTEC
kitCON
evaluation
boards

The PHYTEC series of evaluation boards for the ST10 are easily connected to Nohau emulators. These economical boards make excellent reference designs offering a stable platform for comparison purposes. These are available through Nohau or PHYTEC directly (see page 20). For more detailed information go to: www.phytec.com.

PHYTEC
phyCore
Modules

PHYTEC manufactures the phyCORE system. The phyCORE target boards are used in customer series production and have no easy method of connection to the emulators. This allows for compact, inexpensive designs with low EMI emissions. A special board, called a phyCORE Debugging Module, is the same as the series version but with special headers to allow fast and reliable connections to the Nohau emulator. See www.phytec.com for more information.

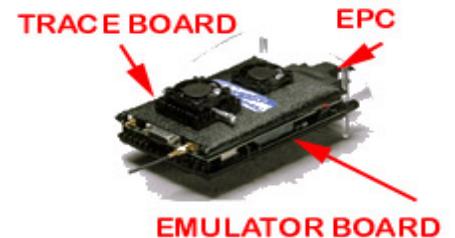
What parts do I need to order?

What parts do
I need to
order?

An ST10 emulator system consists of the emulator pod or body, a communications system to your PC, and the optional trace card.

A daughtercard may be needed depending on the ST10 derivative you want to support (see the Product Support table on page 9). A target adapter will normally be needed to connect the emulator to the target system.

There are various flavors of these components that you will select to configure your desired system. Your local Nohau representative or the Nohau technical support team are able to assist you with selecting the appropriate components. The Seehau debugging software, technical support, warranty, accessories and manuals are automatically included and need not be specified in your order.



Minimum System Requirements

- Pentium 200 or higher
- 2x or better CD ROM
- 40 MB Free Hard Disk Space
- Windows 95, 98, 2000Pro, ME, XP or NT
- RAM for Windows 95/98/ME: 64MB
- RAM for Windows NT/2000Pro/XP: 128MB

It is possible to run Seehau on slower and smaller machines such as laptops. Nohau technical support reports that Seehau, as any large Windows based program, runs more reliably in larger and faster machines.

General Features (Continued)

Application Notes on our website

The following is a list of information that can be found on Nohau's website. Go to www.nohau.com/documents and then select either the Technical Publications link, the Technical Application Notes link or the Nohau Manual link. There are also data sheets available on our website for the emulator and the Seehau software.

Materials listed under the Technical Publications link:

The Software Engineer's Guide to In-Circuit Emulation: Increase Your Debugging Skills!

Product Focus: Nohau gives RTOS users easy access to the Seehau Interface.

Pinouts for the ST10 emulator direct connect headers.

Pinouts for the ST10-F280 emulator adapter connection headers.

Flex Cable Set-up and Assembly.

List of MCUs Supported.

Extender Board adapter for the C167 and ST10 emulators.

Materials listed under the Technical Application Notes link:

Emulation with the Nohau EMUL-ST10 Emulator.

Adapter guide for and ST10 Emulator Families.

Case Studies - Connecting to targets.

Connecting the EMUL-ST10 Emulators to your target system.

Configuring the External Access for the EMUL-ST10 Families.

Configuring Your Trace Triggers Using EMUL-ST10 Emulators (50MHz).

How to Emulate the STF276 with the Nohau EMUL-ST10.

Getting Started with your EPC interfaced Emulator System.

How to Connect and Emulate the STF269 with the Nohau EMUL-ST10.

Materials listed under the Nohau Manuals/EMUL-ST10:

Seehau ST10 - the Getting Started Guide.

Super10 - the Getting Started Guide.

General Features (Continued)

Product Support Tables

These charts display how the STMicroelectronics ST10 family parts are supported by Nohau emulators. These tables list parts supported by the POD-ST10-256-50, POD-ST10-256-50N and the POD-ST10FA-256-80 emulators respectively. At this time there is only one Super10 derivative, this is supported by the Nohau Super10 emulator. Contact Nohau for additional support for future Super10 derivatives. Package types, speeds, ROM, ROMless and temperature ranges are not listed. Nohau emulators support all these derivatives. There are unannounced STMicroelectronics and Infineon derivatives that Nohau currently supports or will support. Contact Nohau technical support in the USA at support@nohau.com for information on these parts.

A complete system consists of the following: an emulator, a daughterboard (if required), a communication interface, an optional trace card and a target adapter.

POD-ST10-256-50 5V SUPPORT

ST10-16x	ST10-2xx	Infineon C16x
ST10F163	ST10R262	▲ C167CR
ST10R163	▲ ST10F269	C161O/V/K
ST10R165	ST10F172L	C161O - 3V
▲ ST10C167	ST10R272	C163
▲ ST10F167	ST10R272L	C165
▲ ST10R167		C165 - 3V
▲ ST10F168		C167
		▲ C167SR

Nohau can provide 3 volt support with an adapter board - call Nohau for availability.

POD-ST10-256-50N 5V SUPPORT

ST10-2xx		
▲ ST10F276	▲ ST10F272Z	▲ ST10F272-E
▲ ST10F280	▲ ST10F273Z	▲ ST10F272-B
▲ ST10F271Z	▲ ST10F272Z	

POD-ST10FA-256-80 3V SUPPORT

ST10-16x	ST10-2xx	Infineon C16x
The FA emulator only supports 3 volt parts.	ST10F262	C161O - 3V
	ST10R262	C163
	ST10R172L	C165 - 3V
	ST10R272	
	ST10R272L	

▲ = Pods that need a daughtercard. Please refer to page 12 for the list of daughtercards.

Pod Boards

50-MHz Pod Boards

50-MHz pod board with 256K emulation memory	This pod operates at speeds up to 50 MHz. It has 256K of emulation RAM on the external bus. This RAM can simulate ROM or FLASH on the ST10 32 bit ROM bus. This pod is equipped with a 12.5 MHz oscillator to achieve 50 MHz without a target. Contact Nohau for other oscillator options. This pod supports the 262, 272, F168, F167, 167CR, 165, 163, 161 V/K/O and the F269. Some derivatives need a daughterboard (see the product support chart on page 7). This 5 V pod uses the ST10R201 bondout microcontroller. It can support 3 V derivatives with the 3 volt adapter isolator, part number EMUL166-PC-ADP-3V. An adapter is required to connect to the target (see the "Emulator to Target Adapters and Accessories" section). Use only the 50-MHz trace board for trace options with this pod. Includes the EMUL-ST10 In-Circuit Emulator Getting Started Manual, and external 5 volt power supply.	POD-ST10-256-50
50-MHz pod with 1MB memory	Same as POD-ST10-256-50 above, with 1 MB of external memory.	POD-ST10-1M-50
50-MHz pod with 256K memory	Same as POD-ST10-256-50 above. This pod supports the F276 and F280.	POD-ST10-256-50N
50-MHz pod with 1M memory	Same as POD-ST10-256-50 above, with 1 MB of external memory. This pod supports the F276 and F280.	POD-ST10-1M-50N

80-MHz FA Pod Boards *(These Pods are now specified to 90 MHz) 3 volts

80/90-MHz pod board with 256K of emulation memory	This pod operates at speeds up to 90 MHz. It has 256K of emulation RAM on the external bus and 256K of emulation RAM internal to the bondout chip on the internal ROM bus. This pod is equipped with a 20-MHz oscillator to achieve 80 MHz without a target. Contact Nohau for other oscillator options. This pod supports the 262, 272, C161O-3V, C165 and the C165-3V. Some derivatives need a daughterboard (see the product support chart on page 7). This 3.3 V pod uses the ST10R202 bondout microcontroller. This pod is not 5 V tolerant and will not support 5 V parts. An adapter is required to connect to the target (see the "Emulator to Target Adapters and Accessories" section). Use only the 80-MHz trace board for trace options with this pod. Includes the EMUL-ST10 In-Circuit Emulator Getting Started Manual, and external 5 volt power supply.	POD-ST10-FA-256-80
80/90-MHz pod with 1MB memory	Same as POD-ST10-FA-256-80 above, with 1 MB of external memory.	POD-ST10-FA-1M-80

Pod Boards (continued)

100-MHz Pods - Super10

100-MHz pod board with 256K of emulation memory	This pod operates at speeds up to 100 MHz. It has 256K of emulation RAM on the external bus. This pod is equipped with a 20-MHz oscillator to achieve 50 MHz without a target. The emulator contains 512 Kbytes of static RAM inside the bondout chip and is connected to the internal 64 bit ROM bus. This pod uses the ST10R302 bondout microcontroller. Includes the EMUL-Super10 In-Circuit Emulator Getting Started Manual, and external 5 volt power supply.	POD-SUPER10-256-100
100-MHz pod with 1MB memory	Same as above but with 1MB of external memory.	POD-SUPER10-1M-100

Super10 emulator sales and trials are restricted to firms and individuals who have signed the appropriate Super10 NDA (non disclosure agreement) with STMicroelectronics. Contact Nohau technical support in Campbell, California (support@nohau.com) for further details.

Solutions for On-Chip Debug

NEXUS Debugger

Nohau adds NEXUS Level 1, 2 and 3 support to its Super10 family of full in-circuit emulators. Level 1 support provides Watchpoint capabilities for complex Hardware Breakpoints. The Watchpoints also provide event in and event out for connections to other types of test equipment. Level 2/3 support adds trace and filtering. Scalable support for Level 2 and 3 can be added later. Full Nexus specification is used for transparent single-chip or external mode emulation. Connects to your target with a single 38-pin Mictor connector for Level 1 and dual 38-pin Mictor connectors for Level 2 and 3 and runs on Windows 98/ME/XP or 2000.



Nexus Level 1 The EMUL-SUPER10-NEXUS-L1 supports devices which have NEXUS Level 1, 2 or 3 support. The emulator provides loading of code, Run Control, Shadow Memory, Events. The EMUL-SUPER10-NEXUS-L1 connects to the target board using a 38-pin Mictor connector. The connection to the host PC is with the USB port. Includes the EMUL-SUPER10-NEXUS Getting Started Manual, Seehau software and the USB cable.

EMUL-SUPER10-NEXUS-L1

Nexus Trace The trace has 128K memory size and is available only for Level 2/3.

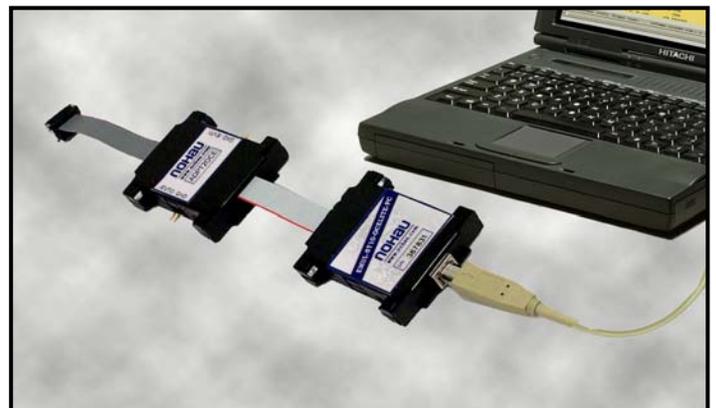
EMUL-SUPER10-NEXUS-Trace

Nexus Level 2/3 The EMUL-SUPER10-NEXUS-L2/L3 consists of the EMUL-SUPER10-NEXUS-L1 with the EMUL-SUPER10-NEXUS-Trace to provide trace and filtering. The EMUL-SUPER10-NEXUS-L2/L3 connects to the target board using two 38-pin Mictor connectors. The connection to the host PC is with the USB port.

EMUL-SUPER10-NEXUS-L2/L3

OCELite Debugger

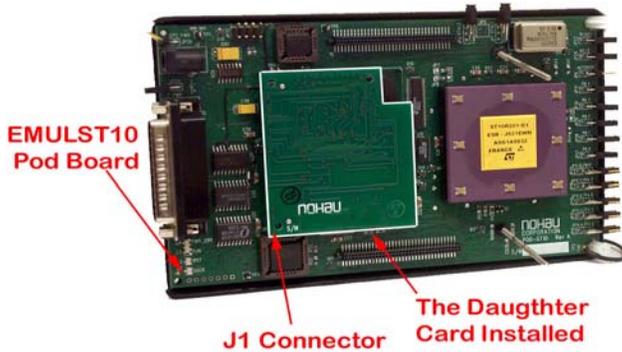
The EMUL-ST10-OCELite-PC operates to 100 MHz and supports all Super10 derivatives incorporating the OCELite debug interface. There is Shadow RAM for real-time memory display. The on chip events provides two event levels that detect Instruction Fetch addresses, Read address or Write address AND'd or OR'd with data values to provide complex breakpoints. The host PC connection is through USB and runs on Windows 98/ME/XP or 2000.



OCELite The EMUL-ST10-OCELite-PC hardware is comprised of two parts, the EMUL-PC/USB-JTAG and the ADPT20CE cable adapter. The ADPT20CE has the 20 pin NEXUS type "A" connector that plugs into the target. The target board connector is an AMP connector part # 104549-2. It also has an Event IN, Event OUT and two ground pins. The EMUL-ST10-OCELite-PC connects to the host PC through the USB port.

EMUL-ST10-OCELite-PC

Daughterboards for Xperipherals and XRAM (not for Super10)



EMULST10-PC/XP167
EMULST10-PC/XP168
EMULST10-PC/XP269



EXISEL/ODP4 Module



Optional daughterboard	This is an optional daughterboard that supports up to 16K of RAM located on the XBUS.	EMUL-PC /XRAM
Daughterboard for the ST10x167 or the C167CR	This daughterboard is required to emulate the ST10x167 or the C167CR. It fits on header J1 of the ST10 pod board and gives the ability to emulate the CAN module in the C167CR.	EMULST10-PC /XP167
Daughterboard for the ST10F168	This daughterboard is required to emulate the ST10F168. It fits on header J1 of the ST10 pod board and gives the added ability to emulate the CAN module in the previously mentioned CPUs. Contact Nohau for unlisted parts.	EMULST10-PC /XP168
Daughterboard for the ST10F269	This daughterboard is required to emulate the ST10F269. This card provides the two CAN modules, RTC, and XRAM XBUS peripherals (see photo above). Refer to the technical publication on our website, "How to connect and Emulate the STF269 with the Nohau EMUL-ST10".	EMUL-ST10-PC/XP269
Register replacement unit for the ST10F269	Optional register replacement module that plugs in between the emulator and the adapter for the EMUL-ST10-PC/XP269. This module recreates the ODP4 and EXISEL registers which are not provided by the bondout chip. Refer to the technical publication on our website, "How to connect and Emulate the STF269 with the Nohau EMUL-ST10".	EMUL-ST10-PC/ADP269
Daughterboard for the ST10F276	This daughterboard is required to emulate the following microcontrollers ST10F276, ST10F271Z, ST10F272Z, ST10F273, ST10F272-E, & ST10F272-B. It requires POD-ST10-xxx-50N. This card provides the two CAN modules, RTC, and XRAM XBUS peripherals. Refer to the technical publication on our website, "How to connect and Emulate the STF276 with the Nohau EMUL-ST10".	EMUL-ST10-PC/XP276
Daughterboard for the ST10F280	This daughterboard is required to emulate the ST10F280. It requires POD-ST10-xxx-50N. This card provides the two CAN modules and XRAM XBUS peripherals. Refer to the technical publication on our website, "How to connect and Emulate the STF280 with the Nohau EMUL-ST10".	EMUL-ST10-PC/XP280

Trace Options

50-MHz External Trace Card for the EMUL-ST10 50 MHz Emulator

This optional board adds trace and trigger capabilities to the pod. The 176-bit wide trace records include address, data, timestamp, processor status, data reads and writes and user-defined external data. Shadow RAM records memory writes and displays them during emulation. Includes external probes and a cable. This board mounts on top of the EMUL-ST10 pod.

50-MHz trace board 50-MHz trace with 128K deep buffer. This trace can trigger and filter on code execution data, read and write addresses and on data values. It features an advanced seven level trigger and filter function which includes two timers.

**EMUL-ST10-PC
/TR-ST10R-201**

80-MHz External Trace Card for the EMUL-ST10-FA 80 MHz Emulator

This optional board adds trace and trigger capabilities to the pod. The 176-bit wide trace records include address, data, timestamp, processor status, data reads and writes and user-defined external data. Includes external probes and a cable. This board mounts on top of the EMUL-ST10-FA pod. It can be operated to 100 MHz.

80-MHz trace board 80-MHz trace with 128K deep buffer. This trace can trigger and filter on code execution data, read and write addresses and on data values.

**EMUL-ST10-PC
/TR-ST10-FA**

100-MHz External Trace Card for the EMUL-Super10 100 MHz Emulator

This optional board adds trace and trigger capabilities to the pod. The 240-bit wide trace records include address, data, timestamp, processor status, data reads and writes and user-defined external data. Includes external probes and a cable. This board mounts on top of the EMUL-Super10 pod.

100-MHz trace board 100-MHz trace with 128K deep buffer. This trace can trigger and filter on code execution, read and write operations including the data values.

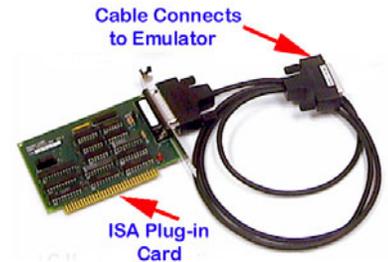
**EMUL-Super10-
PC /TR128-100**

Communication Interfaces

These communication interfaces are used to connect the pod board to the PC.

ISA plug-in board This communication interface is an ISA plug-in board (EMUL-LC/ISA) which communicates with the pod board. Includes CBL-B-LC25/25.

EMUL-PC/LC-B



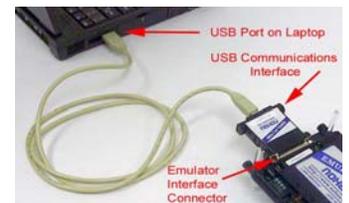
EPC-LPTx printer port Emulator Parallel Cable that communicates with the pod through a standard PC parallel port (LPTx).

EMUL-PC/EPC



USB Interface The new USB interface is available now. This cable connects to the USB connector on the appropriately equipped PC and to the emulator with the standard 25 pin D shell connector. This cable will work with all Windows versions that support USB such as Windows 2000, 98 and 95 OSR2.

EMUL-PC/USB



Faster USB Interface This is a new USB interface that provides for a faster pod communication time. It can be used with any of the emulators but its features are most utilized when paired with the POD-ST10-FA-256-80 or the POD-ST10-FA-1M-80. This cable connects to the USB connector on the appropriately equipped PC and to the emulator with the standard 25 pin D shell connector. This cable will work with all Windows versions that support USB such as Windows 2000, 98 and 95 OSR2.

EMUL-PC/USB-FI/O

Emulator to Target Adapters and Accessories

The capital letters in the chart below correspond to the pictures below the chart. The photos below may not be exactly as illustrated.

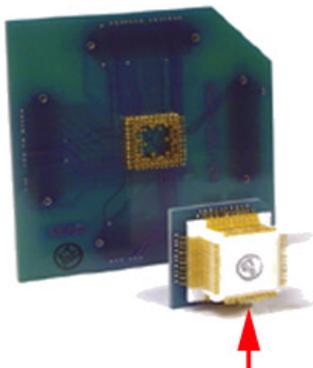
Note: Flex cables are available. Please see the "Extender Flex Cable Assemblies" section in this price list. You can use the flex cables with all the adapters.

Adapter Summary - Use this chart to select the correct adapter

MCU	F167, F168 and F269	R172 and R272	Infineon C161
Adapters for kitCON 16x	EMUL166-PC/ADP-EVAL-167CR See photo C	A solder-down adapter has to be used.	EMUL166-PC/ADP-EVAL-161 O/V/K See photo C

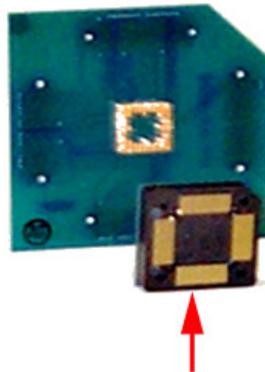
MCU	F167, F168 and F269	R172 and R272	Infineon C161
Solder- Down Adapters	ET/AS-C167-QF10S-NOH 144 Pin. See photo A	ET/R163/C165-QF49S-NOH 100 Pin. See photo A	ET/AS-C161-QF14S-NOH 80 Pin. See photo A
	ET/AS-C167-QF10S-YAM-NOH 144 Pin. See photo B	ET/R163/C165-QF49YAM-NOH 100 Pin. See photo B	ET/AS-C161-QF14YAM-NOH 80 Pin. See photo B
Replacement Socket	ET/EPP-144-QF10-SM 144 Pin. See photo A	ET/EPP-100-QF49-SM 100 Pin. See photo A	ET/EPP-080-QF14A-SM 80 Pin. See photo A

A



The Solder-down Base is made by Emulation Technology

B



The base screws onto a Yamaichi socket that is soldered onto your target board

C

This adapter can be with direct connect headers mounted on the target board



This adapter is used to connect the EMULST10 Emulator to the PHYTEC ST10 Evaluation Boards

Emulator to Target Adapters and Accessories (Continued)

F167, F168 and F269

144-pin
adapter for the
F167/168/ 269

A 144-pin adapter with 4*40-pin connectors (female) on both sides. It fits between the pod bottom connectors and the target. It is used by F167, F168, and F269 target boards and Phytec kitCON ST10 board. (See picture C on page 15.)

**EMUL166-
PC/ADP-EVAL-
167CR**

144-pin
adapter for the
F167/168/269
(square)

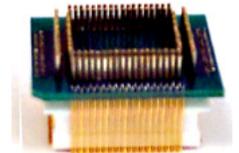
A 144-pin MQFP adapter for the square F167, F168, F269 and C167 /CR/SR. The bottom adapter solders to the user board. Additional solder-down base is available, part number ET/EPP-144-QF10-SM. (See picture A on page 15.)

**ET / AS-C167-
QF10S-NOH**

Replacement
solder-down
adapter

A replacement 144-pin MQFP solder-down adapter for the ET/AS-C167-QF10S-NOH, listed above.

**ET / EPP-144-
QF10-SM**



144-pin
Yamaichi
adapter
(square)

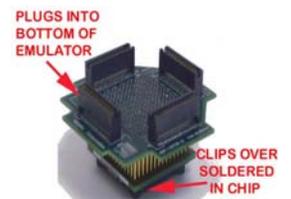
A 144-pin MQFP adapter for the square F167, F168 and F269. The bottom portion of this adapter screws down to the top of the Yamaichi 144-pin socket (the solder-down adapter IC149-144-K11453-05 is not included. It can be purchased through Adapters.com). The top board connects to the bottom of the pod. (See picture B on page 15.)

**ET / AS-C167-
QF10S-YAM-
NOH**

Clip-over
probe

A clipover Delta Probe for the STMicroelectronics ST10 144-pin microcontrollers such as F167, F168 and F269.

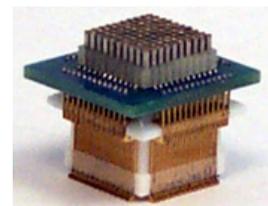
**EMUL166-
PC/ADP-144PIN-
DELTA**



Emulator to Target Adapters and Accessories (Continued)

R172 and R272

<p>100-pin adapter for the 163 and 165 (square)</p>	<p>A 100-pin TQFP adapter for the R172, R272 and the square Infineon 163 and 165. The bottom portion solders to the user board. Additional solder-down base is available, part number ET/EPP-100-QF49-SM. (See picture A on Page 12.)</p>	<p>525.00</p>	<p>ET / R163/C165-QF49S-NOH</p>
<p>Replacement solder-down adapter</p>	<p>A replacement 100-pin TQFP solder-down adapter for the ET/R163/C165-QF49S-NOH, listed above.</p>		<p>ET / EPP-100-QF49-SM</p>
<p>100-pin adapter for the 163 and 165 Yamaichi (square)</p>	<p>A 100-pin TQFP adapter for the R172, R272 and the square Infineon 163 and 165. The bottom portion of this adapter screws down to the top of the Yamaichi 100-pin socket (solder-down adapter IC149-100-014-S5 is not included, it can be purchased through Adapters.com). The top board connects to the bottom of the pod. (See picture B on Page 15.)</p>		<p>ET / R163 / C165-QF49YAM-NOH</p>



ET / R163 / C165-QF49YAM-NOH

Emulator to Target Adapters and Accessories (Continued)

Infineon C161

C161 O/V/K Phytec kitCON Adapter This adapter fits between the pod bottom connectors and the target. It is used by C161 O/V/K target boards and Phytec kitCON C161 board. (See picture **C** on Page 15.)

80-pin adapter for the C161 (square) An 80-pin MQFP adapter for the square C161. The bottom portion solders to the user board. An additional solder-down base is available: part number ET/EPP-080-QF14A-SM. (See picture **A** on Page 15.)

Replacement solder-down adapter A replacement 80-pin MQFP solder-down adapter for the ET/AS-C161-QF14S-NOH, listed above.

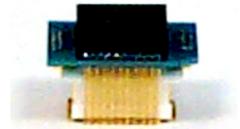
80-pin adapter for the C161 V/K/O An 80-pin MQFP adapter for the square C161 V/K/O. The bottom portion of this adapter screws down to the top of the Yamaichi 80-pin socket (solder-down adapter IC149-080-017-B5 is not included, it can be purchased through Adapters.com). The top board connects to the bottom of the pod. (See picture **B** on Page 15.)

EMUL166-PC/ADP-EVAL-161 O/V/K

ET / AS-C161-QF14S-NOH

ET / EPP-080-QF14A-SM

ET / AS-C161-QF14YAM-NOH



Isolator/Extender Cards

Isolator / extender for all ST10 pods Isolator/extender for all ST10 pods. Adds about 1" of clearance between pod and target and has jumpers allowing individual isolation of each pin to the target. Pin-out drawings of the isolator/extender cards are available on Nohau's website: www.nohau.com.

3V Adapter / Isolator This new mezzanine board inserts between the emulator and the target adapter to provide 3 volt target operation. Currently this supports any 3 volt parts but will support all future ST10 3 volt versions. There are jumpers to allow any parallel port to be disconnected from the target. They are not bit selectable.

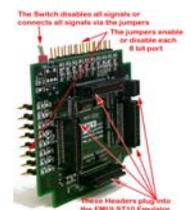
Socket adapter A PQFP socket adapter, base solders down into 144-pin QFP AMP production socket footprint.

ISO166/ST10-EXT



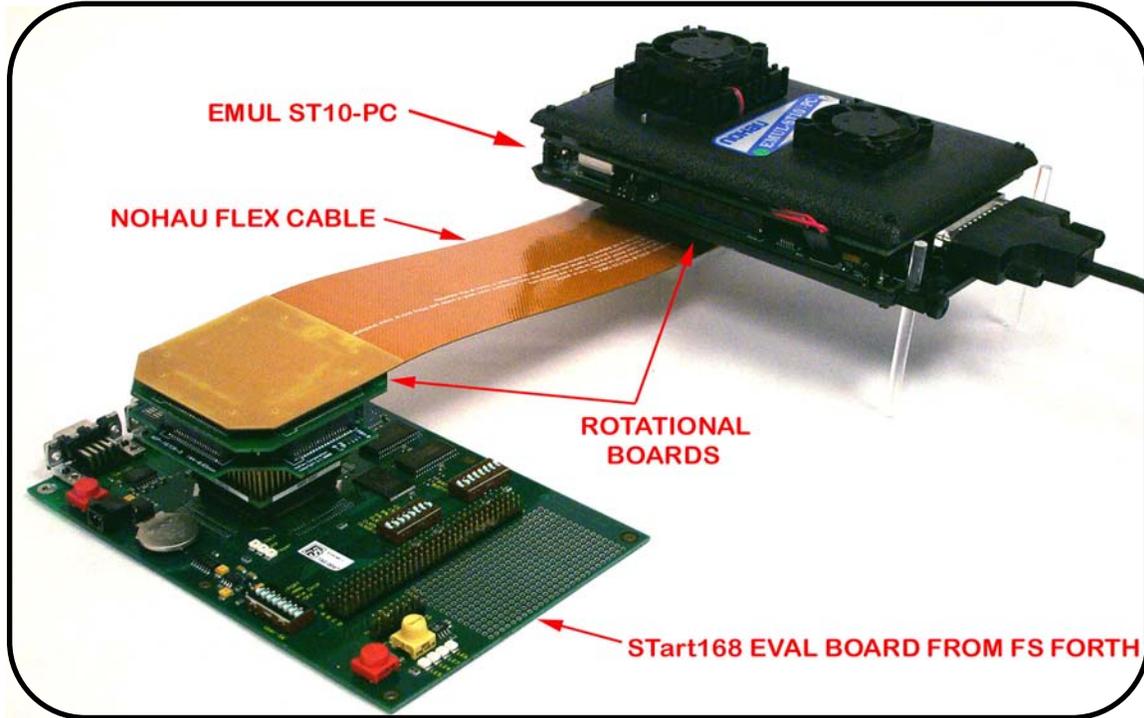
PLUGS ONTO TARGET ADAPTER

EMUL166-PC-ADP-3V



EMUL-PC/ADP-PGA144



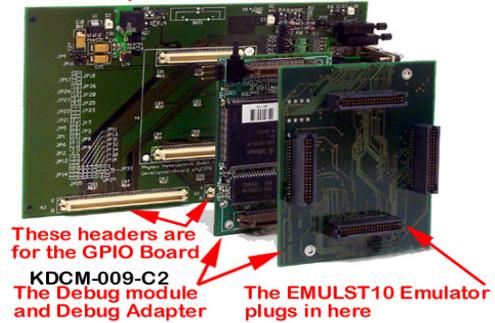


Evaluation Boards From PHYTEC

Evaluation boards from PHYTEC can be purchased through Nohau, your Nohau representative or directly from PHYTEC: www.phytec.com or 1-800-278-9913.



HD+ Development Board



Evaluation board for the ST10F168	kitCON-ST10F168 evaluation board that is easily connected to the Nohau ST10 emulator with the adapter EMUL166-ADP/EVAL-167CR listed below.	KC-167-CT8
Evaluation board for the ST10F269	kitCON-ST10F269 evaluation board that is easily connected to the Nohau ST10 emulator with the adapter EMUL166-ADP/EVAL-167CR listed below.	KC-269
ST10-144 pin Phytec kitCON adapter	A 144-pin adapter with 4*40-pin connectors (female) on both sides. It fits between the pod bottom connectors and the target. It is used by custom F167, F168 and F269 target boards and the Phytec kitCON ST10 boards. (See picture C on page 15.)	EMUL166-PC/ADP-EVAL-167CR
The four headers to be soldered to the kitCON board are included. If you purchase an emulator and you have (or purchase) a PHYTEC kitCON board, the adapters for the kitCON-ST10 family are free.		
phyCORE module for the ST10F168	This is a series production module designed for use in a customer final product or a PHYTEC development board. This phyCORE module contains an ST10F168 controller, FLASH, RAM and support circuitry in a compact package. To connect a Nohau emulator for program development, a special debug module is available.	PCM-009-C2
phyCORE module for the ST10F269	This is a series production module designed for use in a customer final product or a PHYTEC development board. This high-speed phyCORE module is populated with the ST10F269 and an Ethernet controller, FLASH, RAM and support circuitry in a compact package. To connect a Nohau emulator for program development, a special debug module is available.	PCM-018-C3
Debug module	This module (DCM-002) has the same electrical characteristics and pinout as the phyCORE module and is used in its place during the debugging phase. The Nohau emulator plugs into the debug module via the DA-004-C2 converter adapter. No additional target adapter is needed although the Nohau Flex cable and isolator boards can be used. This part (KDCM-009-C2) consists of part numbers: DCM-002 and DA-004-C2.	KDCM-009-C2
HD200 5V development board	This board provides a base for the phyCORE or debugging module for development or evaluation purposes. A GPIO board can be connected to the development board to provide peripherals such as a motor, LEDs and pushbuttons.	PCM-997
GPIO	This board connects to the Development board to add useful devices such as a DC motor, potentiometers, pushbuttons, LEDs, dipswitches, and connection for a serial LCD. Wire wrap and breadboard areas are provided as well as all microcontroller signal lines.	PCM-989

Software Support Packages

Compiler Packages

Altium (formerly Tasking)

C Compiler; Assembler; Linker; Simulator; EDE

80C166 C-compiler, assembler, linker, simulator and EDE plus C++ Preprocessor. TK019012

**TASKING/C166P
KG-C**

80C166 C-compiler, assembler, linker, simulator and EDE. TK019002.

**TASKING/C166P
KG**

Tasking is a registered trademark of Altium.

Keil Software, Inc.

Assembler; C Compiler

Keil C166 Developer's Kit for Windows. Includes: A166 Assembler, C166 Compiler, 166 Utilities, RTX166 Tiny, dScope-166, and μVision.

KEIL / PK166

Keil C166 Compiler Kit. Includes: A166 Assembler, C166 Compiler, 166 Utilities, RTX166 Tiny, and μVision.

KEIL / CA166

Keil Software is a registered trademark of Keil Software, Inc.

RTOS Packages

CMX Systems, Inc.

CMX-RTX is a truly preemptive, multi-tasking, RTOS supporting the entire Infineon C166 microcontroller family. This RTOS offers the smallest footprint, the fastest context switching times, and the shortest interrupt latency times available on the market today. Each additional user is \$2,300 each. A smaller version called Tiny+ is available for \$3,000.

**80C16x-CMX-
RTX**

CMXKAware is an ActiveX object that runs in conjunction with the Seehau debugger software. It presents all of the RTOS specific information on the screen. This RTOS debugging module can control the emulator. This feature can be pre-viewed in the standard Seehau software package. Access it by clicking on - View/RealtimeOS/Select/CMXKAware. No target resources are used.

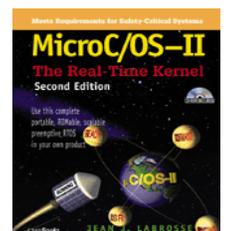
**80C16x-
CMXKAware**

CMX Systems is a trademark of CMX Systems, Inc.

Micrium, Inc.

MicroC/OS-II RTOS 600 page book by Jean Labrosse. This includes a CD-ROM with source code. ISBN 1-57820-103-9.

MicroC/OS-II



Micrium is a trademark of Micrium, Inc.

Software Support Packages (continued)

ST10 Flash Programming Utility

There is a downloadable program available for free on our website to program the embedded flash memory of the ST10F168 and ST10F269. The download is available at: www.nohau.com/downloads_misc_utilities.html.

Extended Hardware Warranties

Purchase of each major EMULST10-PC item is covered by a one-year warranty as described elsewhere in this list. At the end of the first year, an additional year of hardware service coverage is available. Coverage must be continuous and is not available if coverage has lapsed. An additional year of coverage can also be purchased each year at the time an additional paid year's coverage ends.

It is the customer's responsibility to renew hardware warranties. No warranty expiration reminder notices will be sent to customers by Nohau.

Communication interface extended warranty coverage, 1 year

Communication
interface

Trace extended warranty coverage, 1 year

Trace

***Pod extended warranty coverage, 1 year**

Pod

*Bondout chips are warranted for one replacement if Nohau determines the failure was not due to damage caused by the user's action.

Non-Warranty Repair

Repair service for units beyond an applicable initial one-year warranty period, repairs not covered by that warranty, or for customers who have elected to not carry an extended hardware warranty. The hourly rate includes parts, with the exception of bondouts and some adapters

Hourly rate

Minimum charge

Maximum charge

One half the purchase price.