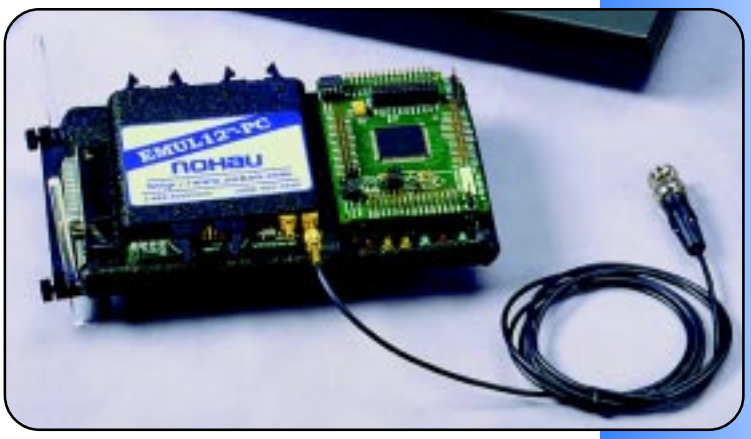
# 2008 Parts List

## Nohau Brand In-Circuit Emulators

**EMUL12-PC**




**February 2008**

ICE Technology 800.68.NOHAU 1.800.686.6428

2006 Parts List

# In-Circuit Emulators for the Freescale S12X, HCS12 & HC12

## Interactive Table of Content (click on the links to jump to the relevant page)

# In-Circuit Emulators for the Freescale S12X, HCS12 & HC12

## NEW! Package Deals

Add **-USB** or **-EPC** to the below packages part numbers to specify what is the chosen communication device to the PC.

### S12X Full-Emulator packages

**Supported CPUs: MC9S12XDP512, MC9S12XEP100, MC9S12XFR128, MC9S12XFxxxx, MC9S12XExxxx, MC9S12XDxxx, MC9S12XCxxx, MC9S12XBxxx, and MC9S12XAxxx sub-families**

* S12X 50MHz full-emulator low-cost package

Package includes the following: EMUL-S12X/2M-50 emulator motherboard, your choice of S12X CPU-Module personality card, either the EMUL-PC/USB or EMUL-PC/EPC communication cable, the Getting Started manual and the Seehau software. This package does NOT include hardware trace unit. Includes integrated debug support for the dual-core S12X and XGate co-processor within the Seehau user-interface software.

Emulator features – 2MByte emulation RAM operates at full-speed. Unlimited number of hardware and software breakpoints. Execution out of emulation RAM or internal S12X Flash. Support for all the S12X specific silicon features - including ones that are not possible to debug with a BDM such as: Debug through Resets and COP watchdog Resets, debug through all power-down and wake-up modes including the fast STOP wake-up, debug through self-clock mode, and debug through intensive and un-limited speed-changed. 2MByte Shadow memory allows inspection of S12X core memory and SFR register reads and writes in run-time, entirely non-intrusively. The PRU recreates the S12X ports A, B, C, D, E & K, and operates at both 5V and 3.3V. Supports target operation in both Single-Chip mode and Expanded Mode. All the S12X signals are available for probing on header pins with clear signal-name markings. A PLL on the emulator automatically generates any user-specified clock frequency to feed to the S12X.

Internal trace support is included with this package, and supplies limited tracing (128 frames maximum), and triggering of S12X and/or XGate instruction execution or read/writes.

**EMUL-S12X-PC/ 2M-50-LCPKG**

* S12X 50MHz full-emulator with hardware trace package

Package includes the following: EMUL-S12X/2M-50 emulator motherboard, your choice of S12X CPU-Module personality card, the EMUL12-PC/TR1024-50 Trace unit, either the EMUL-PC/USB or EMUL-PC/EPC communication cable, the Getting Started manual, and the Seehau software. Includes integrated debug support for the dual-core S12X and XGate co-processor in the Seehau user-interface software. Includes both hardware trace support and S12X Internal-Trace support.

This package includes all the emulator features as explained above for the EMUL-S12X-PC/2M-50-LCPKG. In addition it includes the following Hardware-Trace features:

Hardware trace – operates to 50MHz bus speed. Trace memory can record up to 1 million frames of S12X history - each 72-bit wide. Includes triggers and filter memory of 8MByte to cover the entire S12X 8MByte of Global address space. Allows execution Code Coverage for 100% detection of which instructions executed, and which didn't in the entire application. Includes statistical performance analyzer, to detect what percentage of the S12X processing power is spent in each function or group of code lines. Can record and trigger on both the execution history, and data reads and writes simultaneously. Can be set to also record and trigger on Instruction fetches, free cycles, and BDM reads and writes. Includes a 44-bit time-stamp information with a timeout period of over 3 days in time resolution of 10nSEC. Can record 16 additional user-specified signals using two MISC connectors. Includes trigger input and trigger output to operate the trace along with additional test equipment like an oscilloscope and a logic-analyzer.

The hardware trace records only S12X operations – it does not record or trigger on XGate co-processor operations, since these are not visible on the S12X external bus (the internal trace CAN record and trigger on XGate operations and is included in the package as well).

**EMUL-S12X-PC/ 2M-50-PKG**

# NEW! Package Deals (continued from the previos page)

Add **-USB** or **-EPC** to the below packages part numbers to specify what is the chosen communication device to the PC.

## HCS12 Full-Emulator packages

**Supported CPUs: MC9S12 A512, A256, A128, A64, A32, MC9S12 B256, B128, B64, MC9S12 C128, C96, C64, C32, MC9S12 DP512, DT512, DJ512, DP256, DT256, DJ256, DG256, DT128, DJ128, DG128, DB128, DJ64, D64, D32, MC9S12 E256, E128, E64, E32, MC9S12 KT256, KG256, KG128, K64, K32, T64**

| | | |
|---|---|---|
| HCS12 full-emulator low-cost package | Package includes the following: EMUL-S12/1M-33, your choice of personality card, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. | **EMUL-S12-PC/ 1M-LCPKG** |
| HCS12 full-emulator with trace package | Package includes the following: EMUL-S12/1M-33, your choice of personality card, EMUL12-PC/TR128-25, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. **Add a full BDM to this package for only $995. Order part number: EMUL12-PC/BDM-Special. For a BDM description see page 20.** | **EMUL-S12-PC/ 1M-PKG** |

## S12H256 Full-Emulator packages

**Supported CPUs: MC9S12H256, H128 and H64**

| | | |
|---|---|---|
| S12H256 low-cost package | Package includes the following: EMUL-S12D/1M-16, EMUL12-PC/CPU-MCU-MC9S12H256-16, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. | **EMUL-S12D-PC/ 1M-LCPKG** |
| S12H256 full-emulator with trace package | Package includes the following: EMUL-S12D/1M-16, EMUL12-PC/CPU-MCU-MC9S12H256-16, EMUL12-PC/TR128-16N, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. **Add a full BDM to this package for only $995. Order part number: EMUL12-PC/BDM-Special. For a BDM description see page 20.** | **EMUL-S12D-PC/ 1M-PKG** |

## HC12-D Full-Emulator packages

**Supported CPUs: HC12 Old Generation 68HC912D60, DA128, DG128, D60A, DA128A, DG128A and DT128A**

| | | |
|---|---|---|
| HC12D full-emulator low-cost package | Package includes the following: EMUL12-D/512-16, your choice of personality card, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. | **EMUL12-D-PC/ 512-LCPKG** |
| HC12D full-emulator with trace package | Package includes the following: EMUL12-D/512-16, your choice of personality card, EMUL12-PC/TR128-16N, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. **Add a full BDM to this package for only $995. Order part number: EMUL12-PC/BDM-Special. For a BDM description see page 20.** | **EMUL12-D-PC/ 512-PKG** |

## HC12-B Full-Emulator packages

**Supported CPUs: 68HC912B32, BC32, BD32 and BE32**

| | | |
|---|---|---|
| HC12B full-emulator low-cost package | Package includes the following: EMUL12-B/128-16, your choice of personality card, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. | **EMUL12-B-PC/ 128-LCPKG** |
| HC12B full-emulator with trace package | Package includes the following: EMUL12-B/128-16, your choice of personality card, EMUL12-PC/TR128-16N, EMUL-PC/EPC, the Getting Started manual, a cable and the Seehau software. **Add a full BDM to this package for only $995. Order part number: EMUL12-PC/BDM-Special. For a BDM description see page 20.** | **EMUL12-B-PC/ 128-PKG** |

# 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. The Nohau HC12 emulator is a portable, handheld device and can go anywhere with your laptop and a 5 volt regulated power supply.

**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 trace 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. You need the trace for the DG-OSEK12 kernal aware debugging control to provide the real time task/services, service coverage and stack coverage graphical displays.

**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 rep anywhere in the world. Seehau is macro based enabling automatic operation. Seehau operates under Windows 95, 98, NT, Me, XP and 2000Pro. For more information about the benefits of Seehau, see www.nohau.com for the latest data sheets or call your Nohau rep.

**More info is available**

For more information on the entire embedded tool chain, get your copy of "The Software Engineer's Guide to In-Circuit Emulation For Motorola Microcontrollers" 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.

**HC12, DP256 and HCS12**

The original HC12 microcontrollers ran at 8 MHz bus speed. They are the B32 family, D60, DA128 and DG128 devices. They are supported with the “B” and “D” emulator pods respectively. Motorola did a die shrink that resulted in the D60A, DT128A and the DG128A. These parts also run at 8 MHz bus speed and are supported by the “D” emulator pods. All these parts are called “HC12” in this document.

In 2000, Motorola announced a new series of HC12 devices called “HCS12”. They run at speeds up to 33 MHz. The first device announced was the MC9S12DP256, followed by ten more family devices in 2001 one of which was the H256. Several more were released in 2002 with the most recent in 2003 being the C32 and T64. All these parts are addressed as HCS12 in this document and are supported by the "S12" emulator pods, with the exception of the H256, H128 and H64 that are supported only by the "S12D" emulator pod. It is important to note that there are members of this family named DG128, DT128, and D64 that are not the same parts as the standard HC12 parts. See the chart on the next page for a summary and the listing of the appropriate emulator pods, personality and trace cards.

**BDM offer, new device support**

A BDM emulator can be purchased for half price with every full emulator with trace card purchased. Nohau is currently working on HC12 devices that Motorola has not released yet except to key customers. For emulation support please contact Nohau USA at sales@nohau.com. Nohau will support all HC12 devices. Nohau emulators are Made in the USA and supported everywhere.

# Supported S12X, HCS12 and HC12 Derivative Chart

| | FAMILY | PROCESSOR | BUS SPEED | POD | PERSONALITY CARD | PIN COUNT |
|---|---|---|---|---|---|---|
| Flash/ E² supported Y = yes N = no. | | | | | | |
| **S12X A, B, C, D, E and F Families Support** | | | | | | |
| **Using the EMUL-S12X/1M-50 Emulator motheboard** | | | | | | |
| * | Y/Y | S12XDP512 | 40 | EMUL-S12X/2M-50 | EMUL12-PC/CPU-MC9S12XDP512-40 | 80, 112 & 144 |
| * | Y/Y | S12XEP100 | 50 | EMUL-S12X/2M-50 | EMUL12-PC/CPU-MC9S12XEP100-50 | 80, 112, 144 & 208 |
| * | Y/Y | S12XFR128 | 40 | EMUL-S12X/2M-50 | EMUL12-PC/CPU-MC9S12XFR128-40 | 64, 80, 112 & 144 |

| FAMILY | PROCESSOR | BUS SPEED | POD | PERSONALITY CARD | PIN COUNT |
|---|---|---|---|---|---|
| Flash/ E² supported Y = yes N = no. | | | | | |
| **HCS12 A, B, C, D, E, K and T Families** | | | | | |
| **Using the EMUL-S12/1M-33 Emulator motheboard** | | | | | |
| Y/Y | A512 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP512-25 | 80 & 112 |
| Y/Y | A256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP256-25 | 80 & 112 |
| Y/Y | A128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT128-25 | 80 &112 |
| Y/Y | A64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DJ64-25 | 80 & 112 |
| Y/Y | A32 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12D32-25 | 80 |
| Y/Y | B256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12B128-25 | 80 & 112 |
| Y/Y | B128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12B128-25 | 80 & 112 |
| Y/Y | B64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12B128-25 | 80 & 112 |
| Y/Y | C128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12C128-25 | 48, 52 & 80 |
| Y/Y | C96 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12C128-25 | 48, 52 & 80 |
| Y/Y | C64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12C128-25 | 48, 52 & 80 |
| Y/Y | C32 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12C32-25 | 48, 52 & 80 |
| Y/Y | DP512 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP512 -25 | 80 & 112 |
| Y/Y | DT512 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP512 -25 | 80 & 112 |
| Y/Y | DJ512 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP512 -25 | 80 & 112 |
| Y/Y | DP256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DP256 -25 | 80 & 112 |
| Y/Y | DT256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT256-25 | 80 & 112 |
| Y/Y | DJ256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT256-25 | 80 & 112 |
| Y/Y | DG256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT256-25 | 80 & 112 |
| Y/Y | DT128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT128-25 | 80 & 112 |
| Y/Y | DJ128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT128-25 | 80 & 112 |
| Y/Y | DG128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT128-25 | 80 & 112 |
| Y/Y | DB128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DT128-25 | 80 & 112 |
| Y/Y | DJ64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DJ64-25 | 80 & 112 |
| Y/Y | D64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12DJ64-25 | 80 & 112 |
| Y/Y | D32 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12D32-25 | 80 |
| **HCS12 A, B, C, D, E, K and T Families continue on the next page…** | | | | | |

Note[1]: Use the EMUL-S12/1M-33 for all new HCS12 emulators.

# Supported HC12 and HCS12 Derivative Chart (continued)

| FAMILY | PROCESSOR | BUS SPEED | POD | PERSONALITY CARD | PIN COUNT |
|---|---|---|---|---|---|
| Flash/ E² supported Y = yes N = no. | | | | | |
| **HCS12 A, B, C, D, E, K and T Families (Contiued from the previous page)** | | | | | |
| **Using the EMUL-S12/1M-33 Emulator motheboard** | | | | | |
| Y/Y | E256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12E128-25 | 80 & 112 |
| Y/Y | E128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12E128-25 | 80 & 112 |
| Y/Y | E64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12E128-25 | 80 & 112 |
| Y/Y | E32 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12E128-25 | 80 & 112 |
| Y/Y² | KT256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12KG128-25 | 80 & 112 |
| Y/Y² | KG256 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12KG128-25 | 80 & 112 |
| Y/Y | KG128 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12KG128-25 | 80 & 112 |
| Y/Y² | K64 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12KG128-25 | 80 & 112 |
| Y/Y² | K32 | 25 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12KG128-25 | 80 & 112 |
| Y/Y | T64 | 16 | EMUL-S12/1M-33 | EMUL12-PC/CPU-MC9S12T64-16 | 80 |
| **HCS12 - H256, H128 and H64 support** | | | | | |
| **Using the EMUL-S12D/1M-16 Emulator motheboard** | | | | | |
| Y/Y | H256 | 16 | EMUL-S12D/1M-16 | EMUL12-PC/CPU-MC9S12H256-16 | 112 & 144 |
| Y/Y | H128 | 16 | EMUL-S12D/1M-16 | EMUL12-PC/CPU-MC9S12H256-16 | 112 & 144 |
| Y/Y | H64 | 16 | EMUL-S12D/1M-16 | EMUL12-PC/CPU-MC9S12H256-16 | 112 & 144 |
| **HC12B 0.65 MICRON** | | | | | |
| **Using the EMUL12-B/128-16 Emulator motheboard** | | | | | |
| Y/Y | B32 | 8 | EMUL12-B/128-16 | EMUL12-PC / CPU-68HC912B32 | 80 |
| | BC32 & BD32 | 8 | EMUL12-B/128-16 | EMUL12-PC / CPU-68HC912BC32 | 80 |
| | BE32 | 8 | EMUL12-B/128-16 | EMUL12-PC / CPU-68HC912BE32 | 80 |
| **HC12D 0.65 MICRON** | | | | | |
| **Using the EMUL12-D/512-16 Emulator motheboard** | | | | | |
| | D60 | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912D60 | 80 & 112 |
| Y/Y | DA128 | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912DA128 | 80 & 112 |
| Y/Y | DG128 | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912DG128 | 80 & 112 |
| **HC12 0.5 MICRON** | | | | | |
| **Using the EMUL12-D/512-16 Emulator motheboard** | | | | | |
| | D60A | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912D60A | 80 & 112 |
| Y/N | DA128A | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912DA128A | 80 & 112 |
| Y/N | DG128A | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912DG128A | 80 & 112 |
| Y/N | DT128A | 8 | EMUL12-D/512-16 | EMUL12-PC/CPU-68HC912DT128A | 80 & 112 |

Note[1]: Use the EMUL-S12/1M-33 for all new HCS12 emulators.

Note[2]: Please note that these processors are currently being implemented, please contact Nohau for availability.

# General Features

**The emulator parts**

The basic Nohau HC12, HCS12 or S12X emulator consists of an emulator motherboard, a CPU personality board, power supply, debugger software (Seehau) and a communications interface. You can run this system stand-alone without any target hardware. Add a target adapter and you can run in your target board. Add an optional trace card and you can trigger and record CPU instructions and their bus operations.

Nohau makes five full emulator pods or motherboards. They are the "S12X", "S12", S12D", "D" and "B" models. See the chip support chart on the previous page for the chips each emulator motherboard supports.

**Connecting to the PC and the software Seehau**

The Nohau emulator is a handheld portable design that runs off a regulated 5 volt power supply and connects to a Windows based PC through a communications interface, the options are LPT port, ISA card and USB cable. The photo here depicts the "B" and "D" emulators with the BDM. The Seehau debugger software that is installed on the PC controls the emulator and provides the graphical user interface (GUI). The trace card is optional and can be added later according to your needs and budget.


**Target adapter basics**

Nohau provides many types of target adapters to connect the emulator to your target board. The two options are solder-down adapters or custom headers on the target board. In both cases, the HC12 processor must not be mounted on the board since an HC12 cannot be tri-stated. A target HC12 and the emulator will conflict with each other preventing operation. Nohau supplies a BDM emulator which allows background debug mode (BDM) operation. The target must have an operating HC12 processor and the specified Motorola header installed.

**Full and BDM emulator differences**

The full emulator offers superior debugging power not found on the BDM emulator. The BDM emulator does not offer trace or trigger capabilities and has only 2, 3, or 4 hardware breakpoints (depending of the CPU used). The full emulator has unlimited number of hardware and software breakpoints. The BDM emulator does not have emulation RAM but does have Shadow RAM like the full emulator. The BDM emulator can program the target processor FLASH and EEPROM and the full emulator can program these memories on the processor mounted on the personality card. For more information regarding emulator features go to http://www.nohau.com/emul12pc.html.

**Compilers, code formats and RTOS's**

The emulator will accept user code in various formats from assemblers and compilers. Elf-Dwarf, IEEE695 and S-records are the three most popular formats for the HC12. Nohau supports all the popular compiler vendors. Source code and labels for both C and assembler will appear in the source windows and trace windows because of these formats. The emulator automatically detects which format is being loaded without user intervention. Nohau is a distributor of many compiler packages and are listed under Compiler Packages section on page 58. Nohau also distributes real time operating system (RTOS) packages. Contact your local Nohau rep for other embedded components they offer.

**Clock and bus speeds**

There are two ways to specify speed of a Motorola HC12 processor. One is clock speed and the other is bus speed. Typically the clock speed is twice the bus speed. An 8 MHz bus speed translates to a 16 MHz clock speed. Motorola/Freescale has in the past used clock speed in its literature discussions. Nohau's part numbers have reflected this scheme. For example, consider the EMU12-D/512-16. The clock speed is 16 MHz and the bus speed is 8 MHz. The suffix -16 states the speed.

Starting with the HCS12 Motorola/Freescale is now using bus speed in their device names partly because speeds are up dramatically. The newer HCS12 parts such as the MC9S12DP256 run at 25 MHz bus speed or 50 MHz clock compared to 8/16 MHz available on the "D" and "B" series. The S12X parts run at either 40MHz or 50MHz bus-speed.

## General Features (Continued)

**Pod speed**

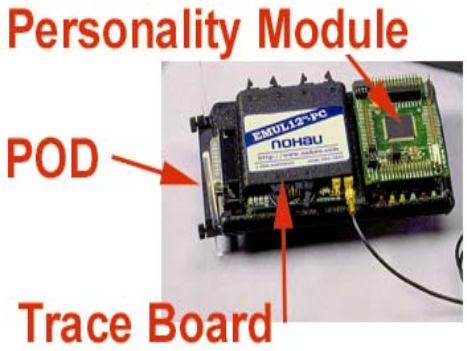
The "B" and "D" emulators will be described in terms of clock speed. Therefore their part numbers will not change. These boards are all 16 MHz clock or 8 MHz bus speed. The HCS12 and S12X, will be stated in terms of bus speed. The "S12X" runs to 50MHz bus speed, the "S12" runs to 33MHz and the "S12D" runs to 16MHz. The S12X parts are specified to 50MHz or 40MHz and the Nohau S12X emulator runs to 50MHz bus speed. The HCS12 parts are specified to 25 MHz and Nohau now has a new emulator body, called the "S12" that runs to a maximum of 33 MHz bus speed. Personality modules for the S12X are suitable for the 40MHz and 50MHz versions, and for the S12 in the 25 MHz versions.

**Trace speed**

There are three trace cards available. All 3 are specified at the bus speed. They operate at 50MHz, 25MHz or 16MHz. The 50MHz trace can be used for the S12X with the EMUL-S12X emulator motherboiard only. The 25MHz and 16MHz trace boards operate with the HCS12 and HC12 Old-Generation emulaor motherboards (but not with the S12X emulator motherboard).

**What parts do I need to order ?**

A full HC12 emulator system consists of the emulator pod or body, a CPU personality module, a communications system to your PC, and the optional trace card. 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. The Seehau debugging software, technical support, warranty, accessories and manuals are automatically included and need not be specified in your order. Technical support is available from your local rep and/or directly from the factory in California and is supplied at no charge. Contact your local Nohau rep or Nohau directly if you want assistance.




To purchase an HC12 emulator system you must specify these items:

| | |
|---|---|
| 1) Emulator base | *-Starting on page 11* |
| 2) Personality card | *-Starting on page 11* |
| 3) Trace card if chosen | *-See page 17* |
| 4) Communications interface (from the emulator to the PC) | *-See page 21* |
| 5) Target adapter | *-Starting on page 22* |

## Minimum System Requirements

- Pentium 200 or higher for optimum performance
- 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 on larger and faster machines.

# General Features (Continued)

## Information on our Website

The following is a list of documents that can be found on Nohau's website. Go to www.nohau.com/documents and you will see various links that will provide you with detailed family specific information. The "Product News" link contains the latest information on Nohau's products as they are released. The "Nohau Manuals" link contains downloadable manuals for each family. The "Technical Publications" and the "Technical Application Notes" links contain technical family specific information. Seehau software and data sheets are also available on our website.

**Materials listed under the Technical Publications Link:**

SLaunch "Seehau Launcher"
Flex Cable Set-up and Assembly Instructions
List of CPUs Supported by Nohau Corporation
The Software Engineers Guide to In-circuit Emulation for the Motorola Microcontrollers
Product Focus: Nohau gives RTOS users easy access to the Seehau Interface

**Materials listed under the Technical Application Notes Link:**

Case Studies -connecting to Targets
Tips on using PLL with the MC9S12DP256: HCS12 PLL circuit calculator by Motorola
HCS12 Expanded Mode Bus-design and HCS12ICE use in Expanded-Mode Guide
Emulating Through an HCS12 COP Reset
Using a Nohau BDM Emulator to Debug an HCS12 Application
Operating Instructions for the MC9S12H256 CPU Module
Operating Instructions for the MC9S12DP256 CPU Module
Operating Instructions for the MC9S12T64 CPU Module
Operating Instructions for the MC9S12C32 CPU Module
Operating Instructions for the MC9S12E128 CPU Module
Pin outs for the HC12 'DG128' showing signal names on connection headers
Pin outs for the HC12 'D60' showing signal names on connection headers
Pin outs for the HCS12 'DP256' showing signal names on connection headers
Pin outs for the HCS12 'H256' showing signal names on connection headers
Pin outs for the HCS12 'C32' showing signal names on connection headers
Pin outs for the HCS12 'T64' showing signal names on connection headers
Pin outs for the HCS12 'E128' showing signal names on connection headers
Flex Cable Target Adapter for Nohau Supporting Motorola's HCS12

**Materials listed under Nohau Manuals / EMUL12-PC:**

Seehau 12 -the EMUL12-PC In-circuit Emulation Getting Started Manual
Trace - What is a Trace and How Does it Help Debug a Microcontroller System?
Getting Started for the B32/BC32
POD-B32/BC32 - Hardware Manual
D60 Getting Started
POD-D60 - Hardware Manual
POD-DA128 - Hardware Manual
DA/DG128 Getting Started
S12D Family Getting Started
H256 Family Getting Started
Flash EEPROM Support Chart

# Emulator Motherboards, Personality Modules and Trace

## S12X Family Support - MC9S12XDP512, MC9S12XEP100, MC9S12XFR128, MC9S12X Axxx, Bxxx, Cxxx, Dxxxx, Exxxx and Fxxxx sub-families

The S12X full featured emulator motherboard supports the entire S12X family. It is known as the "EMUL-S12X" and support S12X operation at either 5V or 3.3V. Operation is supported up to 50MHz bus-speed at 5V VDDX supply, and up to 40MHz at 3.3V VDDX supply. See the chip support chart on pages 6-7 for the complete part numbers.

The S12X personalty modules, and S12X trace board are compatible with the S12X emulator motherboard.

## EMUL-S12X Emulator Motherboard

| | | |
|---|---|---|
| * S12X Emulator motherboard runs to 50MHz bus-speed | Emulator motherboard for the S12X family of microcontrollers for up-to 50MHz bus-speed at 5V VDDX supply, and up to 40MHz bus-speed at 3.3V VDDX supply. Emulator features – 2MByte emulation RAM operates at full-speed - like the internal S12X Flash. Unlimited number of hardware and software breakpoints. Execution out of emulation RAM or internal S12X Flash. Support for all the S12X specific silicon features - including ones that are not possible to debug with a BDM such as: Debug through Resets and COP watchdog Resets, debug through all power-down and wake-up modes including the fast STOP wake-up, debug through self-clock mode, and debug through intensive and un-limited speed-changed. 2MByte Shadow memory allows inspection of S12X core memory and SFR register reads and writes in run-time, entirely non-intrusively. The PRU recreates the S12X ports A, B, C, D, E & K, and operates automatically at either 5V or 3.3V. Supports target operation in both Single-Chip mode and Expanded Mode. A PLL on the emulator automatically generates any user-secified clock frequency to feed to the S12X.<br>Internal trace support is included with this package, and supplies limited tracing (128 frames maximum), and triggering of S12X and/or XGate instruction execution or read/writes. | **EMUL-S12X/2M-50** |

## EMUL-S12X Personality Modules

**All the below S12X CPU-Modules are compatible with the EMUL-S12X Emulator-Motherboard, and support the folowing common features:** All the S12X signals are available for probing on header pins with clear signal-name markings on the CPU-Module. There are socket pins for the analog components of the crystal and the PLL loop-filter, to be placed next to the S12X on the CPU-Module to cancel the need for these analog low-voltage signals to travel all the way to the target. Jumpers exist on all the S12X voltages, allowing supplying them from either the emulator system or the target system. 5V or 3.3V operation is possible.

| | | |
|---|---|---|
| * S12XDP512 Personality-Module | CPU-Module for the MC9S12XDP512 microcontroller and the S12XD, S12XB and S12XA families to 40MHz bus speed. | **EMUL12-PC/CPU-MC9S12XDP512-40** |
| * S12XEP100 Personality-Module | CPU-Module for the MC9S12XEP100 microcontroller and the S12XE family to 50MHz bus speed. | **EMUL12-PC/CPU-MC9S12XEP100-50** |
| * S12XFR128 Personality-Module | CPU-Module for the MC9S12XFR128, MC9S12XFE128 microcontrollers and the S12XF family to 40MHz bus speed. | **EMUL12-PC/CPU-MC9S12XFR128-40** |

## S12X Hardware Trace Unit

* See the section "Trace Unit" on page 16 for the S12X Trace unit - EMUL12-PC/TR1024-50

# Emulator Motherboards, Personality Modules and Trace

## HCS12 Family Support (MC9S12DP256, MC9S12 Axxx, Bxxx, Cxxx, Dxxxx, Exxx, Hxxx, Kxxx and Txx)

There are two full featured emulators that support the entire HCS12 family. They are known as the the newer "EMUL-S12" that runs to a maximum speed of 33 MHz, and the "EMUL-S12D" that runs to a maximum speed of 16 MHz. The EMUL-S12 is recommended for new HCS12 designs as it supports the HCS12 Axxx, Bxxx, Cxxx, Dxxx, Exxx, Kxxx, and Txxx families to 25 MHz bus-speed at both 5V and 3.3V. The EMUL-S12D motherboard is used to support the HCS12 Hxxx family to 16 MHz bus-speed. See the chip support chart on pages 4-5 for the complete part numbers. The 112-pin production chip can be special ordered on the personality card if desired. A socket is not recommended due to the high frequency operation of these parts.

The HCS12 emulator-motherborads do not support the HC12 (old-generation) family that is supported by the HC12 “B” and the “D” emulators. Contact Nohau California for unannounced HCS12 devices supported by this emulator. For more information on the subset derivatives read the Motorola engineering bulletins EB386 and EB388 found on Motorola's website under the HCS12 microcontroller section.

## HCS12 (MC9S12DP256, MC9S12 Axxx, Bxxx, Cxxx, Dxxxx, Exxx, Hxxx, Kxxx and Txx) Support

***Note:*** The EMUL-S12 emulator motherboard should be used for all of the HCS12 derivatives except for the MC9S12H family, which is supported by the EMUL-S12D motherboard.

## EMUL-S12 Emulator Motherboard

Emulator motherboard runs at 33 MHz

This emulator has 1M paged emulation memory and 64K non-paged emulation memory, 128K Shadow Memory, an unlimited number of no-skid page aware hardware and software breakpoints, a full Nohau CMOS port replacement unit (PRU). Paging is supported and the breakpoints, trace and triggers are page aware. It supports the full-operation of the internal CPU PLL, internal COP Watchdog and both on-chip or off-chip supply of the 2.5V VDD. It supports all HC12 operating modes including single-chip and external modes, all RESET modes and the on-chip FLASH and EEPROM modules. It runs up to 33 MHz bus speed (66 MHz clock) at 5V and 30 MHz bus speed at 3.3V. For a complete system add a 25 MHz personality card, target adapter and the optional trace card.

**EMUL-S12/1M-33**

***Note:*** This emulator requires the 25 MHz personality modules, except for the S12T.

## EMUL-S12 Upgrade Information

See section "Upgrade Information" on page 17 for details.

## EMUL-S12 Personality Modules

S12B128 PM 25 MHz

The MC9S12B128 Personality module to support the MC9S12B256, MC9S12B128 and MC9S12B64 at 25 MHz bus speed. Supports both 3.3 V and 5 V CPU and recreated ports operation to 25 MHz bus-speed. This module plugs into the EMUL-S12/1M-33 emulator.

**EMUL12-PC/CPU-MC9S12B128-25**

EMUL-S12 Personality Modules are continued on the next page.

## HCS12 (MC9S12DP256, MC9S12, Axxx, Bxxx, Cxxx, Dxxxx, Exxx, Hxxx, and Txx) Support continued

### EMUL-S12 Personality Modules continued from previous page

| | | |
|---|---|---|
| S12C128 PM 25 MHz | The MC9S12C128 Personality module to support the MC9S12C128, MC9S12C96 and MC9S12C64 at 25 MHz bus speed. Supports the 48 pin, the 52 pin and the 80 pin packages. Supports both 3.3 V and 5 V CPU and recreated ports operation to 25 MHz bus-speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12C128-25** |
| S12C32 PM 25 MHz | The MC9S12C32 Personality module to support the MC9S12C32 at 25 MHz bus speed. It has a special ability to regenerate the page address lines externally, and can thus use either paged or non-paged programming models. Supports the 48-pin, the 52-pin and the 80-pin packages, and both 3.3 V and 5 V CPU and recreated ports operation to 25 MHz bus-speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12C32-25** |
| S12DP512 PM 25 MHz | The MC9S12DP512 Personality module to support the MC9S12DP512, MC9S12DT512, MC9S12DJ512 and MC9S12A512 at 25 MHz bus speed. May also emulate operation of other MC9S12Dxxx and MC9S12Axxx family members at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12DP512-25** |
| S12DP256 PM 25 MHz | The MC9S12DP256 Personality module to support the MC9S12DP256 at 25 MHz bus speed. May also emulate operation of other MC9S12Dxxx and MC9S12Axxx family members at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12DP256-25** |
| S12DT256 PM 25 MHz | The MC9S12DT256 Personality module to support the latest 0L91N mask-set of the MC9S12DT256, MC9S12DJ256 and MC9S12DG256 at 25 MHz bus speed. May also emulate operation of other MC9S12Dxxx and MC9S12Axxx family members at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12DT256-25** |
| S12DT128 PM 25 MHz | The MC9S12DT128 Personality module to support the MC9S12DT128, MC9S12DJ128, MC9S12DG128, MC9S12DB128 and MC9S12A128 at 25 MHz bus speed. This module supports the ByteFlight protocol. May also emulate operation of other MC9S12Dxxx and MC9S12Axxx family members at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12DT128-25** |
| S12DJ64 PM 25 MHz | The MC9S12DJ64 Personality module to support the MC9S12DJ64, MC9S12D64 and MC9S12A64 at 25 MHz bus speed. May also emulate operation of other MC9S12Dxxx and MC9S12Axxx family members at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12DJ64-25** |
| S12D32 PM 25 MHz | The MC9S12D32 Personality module to support the MC9S12D32 and MC9S12A32 at 25 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12D32-25** |
| S12E128 PM 25 MHz | The MC9S12E128 Personality module to support the MC9S12E256, MC9S12E128, MC9S12E64 and MC9S12E32 at 25 MHz bus speed. Supports the 80-pin and 112-pin packages, and both 3.3 V and 5 V CPU and recreated ports operation to 25 MHz bus-speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12E128-25** |
| S12KG128 PM 25 MHz | The MC9S12KG128 Personality module to support the MC9S12KT256, MC9S12KG256, MC9S12KG128, MC9S12K64 and MC9S12K32 at 25 MHz bus speed. Supports both 3.3 V and 5 V CPU and recreated ports operation to 25 MHz bus-speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12KG128-25** |
| S12T64 PM 16 MHz | The MC9S12T64 Personality module to support the MC9S12T64 and other MC9S12T family devices at 16 MHz bus speed. This module plugs into the EMUL-S12/1M-33 emulator. | **EMUL12-PC/CPU-MC9S12T64-16** |

# Emulator Motherboards, Personality Modules and Trace (Continued)

## EMUL-S12D Emulator support for the MC9S12 H256, H128 and H64

| | | | |
|---|---|---|---|
| Emulator motherboard runs at 16 MHz | This emulator has 1M paged emulation memory and 64K non-paged emulation memory, 128K Shadow Memory, an unlimited number of no-skid page aware hardware and software breakpoints, a full Nohau CMOS port replacement unit (PRU). Paging is supported and the breakpoints, trace and triggers are page aware. It supports the full-operation of the internal CPU PLL, internal COP Watchdog and both on-chip or off-chip supply of the 2.5V VDD. It supports all HC12 operating modes including single-chip and external modes, all RESET modes and the on-chip FLASH and EEPROM modules. It runs up to 16 MHz bus speed (32 MHz clock). For a complete system add a personality card, communications interface, target adapter and the optional trace card. | | **EMUL-S12D/1M-16** |
| HCS12 Trace Adapter | The EMUL-S12D/1M-16 emulator requires an adapter between it and the trace card that is automatically supplied when it and the trace are ordered together. It is supplied at no cost and its part number is EMUL-S12D-TRACE-ADAPTER. No other emulator pod needs this adapter. | Free | **EMUL-S12D-TRACE-ADAPTER** |

## MC9S12H256 Personality Module for the EMUL-S12D Emulator Motherboard

The H256 personality module, listed below, should be used to plug into the H256 16 MHz emulator (EMUL-S12D/1M-16).

| | | |
|---|---|---|
| S12H256 PM 16 MHz | The H256 Personality module to support the MC9S12H256 at 16 MHz bus speed. This module contains the superset 144-pin microcontroller chip part # PC9S12H256VFV. It contains circuitry to emulate H256 LCD ports. Only target connection is with flex cable. | **EMUL12-PC/CPU-MC9S12H256-16** |

# Emulator Motherboards, Personality Modules and Trace (Continued)

## HC12 Old-Generation D60, D60A, DA128, DA128A, DG128, DG128A and DT128A Support

| | | |
|---|---|---|
| Emulator motherboard | This full featured emulator supports the entire HC12 "D" family and is known as the “D” emulator. It supports the D60, D60A, DA128, DA128A, DG128, DG128A, and the DT128A devices from the standard HC12 family (not HCS12). Paging is supported and the breakpoints, trace and triggers are page aware. The emulator requires a personality card according to the target device. This emulator has 512K emulation memory, 128K Shadow Memory, 4M paged hardware breakpoints in addition to 64K non-paged hardware breakpoints, an unlimited number of no-skid hardware and software breakpoints, a full Nohau CMOS Port replacement Unit (PRU) and VDD support from 2.7 to 5.25 volts. It supports all HC12 operating modes including single-chip and external modes, all RESET modes and the on-chip FLASH and EEPROM modules.<br><br>It runs up to 16 MHz clock speed (8 MHz bus). For a complete system add a personality card, communications interface, target adapter and the optional trace card. These chips normally come in a 112-pin package. | **EMUL12-D/512-16** |
| Personality module for D60 | The D60 Personality module to support the 68HC912D60. | **EMUL12-PC/CPU-68HC912D60** |
| Personality module for D60A | The D60A Personality module to support the 68HC912D60A. | **EMUL12-PC/CPU-68HC912D60A** |
| Personality module for DA128 | The DA128 Personality module to support the 68HC912DA128. | **EMUL12-PC/CPU-68HC912DA128** |
| Personality module for DA128A | The DA128A Personality module to support the 68HC912DA128A. | **EMUL12-PC/CPU-68HC912DA128A** |
| Personality module for DG128 | The DG128 Personality module to support the 68HC912DG128. | **EMUL12-PC/CPU-68HC912DG128** |
| Personality module for DG128A | The DG128A Personality module to support the 68HC912DG128A. | **EMUL12-PC/CPU-68HC912DG128A** |
| Personality module for DT128A | The DT128A Personality module to support the 68HC912DT128A. | **EMUL12-PC/CPU-68HC912DT128A** |

## HC12 Old-Generation B32, BC32, BD32 and BE32 Support

| | | |
|---|---|---|
| Handheld emulator motherboard | This full featured emulator supports the entire B32 family and is known as the “B” emulator. It supports the B32, BC32, BD32 and the BE32. The emulator requires a personality card according to the target device. This emulator has 128K emulation memory, 128K Shadow Memory, an unlimited number of no-skid hardware and software breakpoints, a full Nohau CMOS Port replacement Unit (PRU) and VDD support from 2.7 to 5.25 volts. It supports all HC12 operating modes including single-chip and external modes, all RESET modes and the on-chip FLASH and EEPROM modules.<br><br>It runs up to 16 MHz clock speed (8 MHz bus). A socket can be mounted on the personality card for easy changing of the emulation CPU. For a complete system add a personality card, communications interface, target adapter and the optional trace card. These chips normally come in an 80-pin package. | **EMUL12-B/128-16** |
| Personality module for the B32 | A Personality module for the EMUL12-B/128-16 to support the 68HC912B32. | **EMUL12-PC/CPU-68HC912B32** |
| Personality module for the BC32 | A Personality module for the EMUL12-B/128-16 to support the 68HC912BC32. | **EMUL12-PC/CPU-68HC912BC32** |
| Personality module for the BD32 | A Personality module for the EMUL12-B/128-16 to support the 68HC912BD32. This module supports the ByteFlight protocol. | **EMUL12-PC/CPU-68HC912BD32** |
| Personality module for the BE32 | A Personality module for the EMUL12-B/128-16 to support the 68HC912BE32. | **EMUL12-PC/CPU-68HC912BE32** |

# Emulator Motherboards, Personality Modules and Trace (Continued)

## Trace Units

### Trace Card / Speed Information

The trace cards are available in three speed grades - 50MHz, 25MHz and 16MHz
The 50MHz trace board (EMUL12-PC/TR1024-50) operates with the S12X emulator family (It does not support the EMUL-S12, EMUL-S12D, EMUL12-D and EMUL12-B emulator motherboards).

The 25MHz and 16MHz trace boards (EMUL12-PC/TR128-25 and EMUL12-PC/TR128-16N) operate with the HCS12 family, and with the HC12 family (they do not support the S12X family and the EMUL-S12X emulator motherboard). They operate up to the Trace specified speed rating. The trace cards are rated in terms of bus speed even for the “B” and “D” emulators which themselves are rated in clock speed. The EMUL-S12D/1M-16 emulator body requires an adapter that is automatically supplied with the pod and trace combination. See the EMUL-S12D-TRACE-ADAPTER description on page 14.
The trace cards are optional and can be added later. Most people purchase the trace cards since they are such a powerful debugging tool.

| | | |
|---|---|---|
| 16 MHz Trace board | This trace card operates up to 16 MHz bus speed and records up to 128K frames. It works with the "B", “D” and “S12D” pods up to 16 MHz. The trace records user specified fetched and/or executed instructions, data operations, free, interrupt, STOP, WAIT, RESET and BDM cycles. Instructions and source code (mixed mode or assembly) can be displayed. The three triggers are sequential and since the pipeline is fully decoded, false triggering on fetched yet not executed instructions does not happen. The trace card contains a time stamp and has the ability to show when an instruction was fetched, executed and the appropriate data reads and writes. The triggers and trace memory are bank aware and the page number is displayed in the trace window attached to the 16 bit HEX address. You can add and modify the trigger settings and view the trace without stopping the target emulation. The triggers will stop the trace or the trace and emulation as the user selects. | **EMUL12-PC/ TR128-16N** |
| 25 MHz Trace board | As described above. It operates to 25 MHz bus speed and is designed for the 25 MHz “S12” pods. It will also function with the “B”, “D” and S12D emulators. | **EMUL12-PC/ TR128-25** |
| 50 MHz Trace board | Hardware trace for the S12X family. This hardware trace operates to 50MHz bus speed. Includes trace memory to record up to 1 million frames of S12X history – each frame 72 bit wide. Includes triggers and filter memory of 8MByte to cover the entire S12X 8MByte of Global address space. Allows execution Code Coverage for 100% detection of which instructions executed, and which didn't in the entire application. Includes statistical performance analyzer, to detect what percentage of the S12X processing power is spent in each function or group of code lines. The hardware trace can record and trigger on both the execution history, and data reads and writes simultaneously. Can be set to also record and trigger on Instruction fetches, free cycles, and BDM reads and writes. Includes a 44-bit time-stamp information with a timeout period of over 3 days in time resolution of 10nSEC. Can record 16 additional user-specified signals using two MISC connectors. Includes trigger input and trigger output to operate the trace along with additional test equipment like an oscilloscope and a logic-analyzer.<br>The hardware trace records only S12X operations – it does not record or trigger on XGate co-processor operations, since these are not visible on the S12X external bus (the internal trace CAN record and trigger on XGate operations and is included). | **EMUL12-PC/ TR1024-50** |

## Upgrade Information

* Upgrades are available if the board to be upgraded is a working board in good condition, as judged by Nohau Corporation. Upgrades are available when replacing the same type of board. For example upgrading an HC12 emulator motherboard with a newer HCS12 emulator motherboard. Upgrading an HC12 trace board with a higher speed HC12 trace board, etc. Upgrade warranty period is three months or until the expiration of the original warranty period, whichever is longer. Since in the HC12 family a generation of parts lasts for 3 - 4 years, the refunded price towards upgrades depends on the time since the purchase of the upgraded board, as follows:

0 - 6 months after the purchase - refund 100% the list price of the old board towards an upgrade.
7 - 12 months after the purchase - refund 80% the list price of the old board towards an upgrade.
13 - 24 months after the purchase - refund 66% the list price of the old board towards an upgrade.
25 - 36 months after the purchase - refund 50% the list price of the old board towards an upgrade.
37 months or more after the purchase - refund 33% the list price of the old board towards an upgrade.

The cost of the upgrade is then:
List price of the new board - refund for the returned board as specified above + $100 for handling

**For Example:**

1. To upgrade an EMUL12-PC/TR128-16N trace board to a higher speed EMUL12-PC/TR128-25 trace board, 4 months after the purchase of the older board:
(This upgrade is considered immediate, and therefore has relatively low cost that represents the price difference between the boards.)

Upgrade cost = 5500 - 100/100 * 4500 + 100 = $1100

2. To upgrade an EMUL12-PC/TR128-16N trace board to an EMUL12-PC/TR128-25 trace board, 4 years after the purchase of the older board:

Upgrade cost = 5500 - 33/100 * 4500 + 100 = $4115

3. To upgrade an EMUL-S12D/1M-16 emulator motherboard to a newer technology higher speed EMUL-S12/1M-33 emulator motherboard, 30 months after the purchase of the older board:

Upgrade cost = 6000 - 50/100 * 5500 + 100 = $3350

# BDM Debugger (EMUL12-PC/BDM)

The Nohau BDM emulator is a low-cost debugging tool for all HC12 devices. This debugger needs a working HC12 target as it operates through a special serial port on the HC12 microcontroller. This BDM debugger operates with the same Seehau software as the full HC12 emulators and has the ability to operate and program an HC12 on a target board. All HC12 devices including the A4 are supported. It works with the EPC or USB communications interface to connect to your PC.

You can load a program and single-step or run the target processor. Source code will be available for HLL debugging. Other options include setting software and hardware breakpoints, viewing memory in real-time with the Shadow RAM, and programming FLASH and EEPROM. Low voltage support is automatic.


Variable, arrays and structures can be easily viewed in a variety of formats. The emulator runs at full clock speed. A BDM emulator is more robust than a monitor, but with less features than a full emulator. It does not have the emulation RAM, trace and triggers of a full feature emulator but is still capable of serious debugging sessions.

## ***S12X, HCS12 and HC12 BDMs with S12X dual-core debug support and S12X Internal Trace support:***

| | | |
|---|---|---|
| * S12X, HCS12 and HC12 BDM-USB with internal-trace | Complete BDM debugger system for the S12X, HCS12 and HC12 devices, with all of the above mentioned features and USB Cable. Includes integrated dual-core S12X and XGate debug suport. S12X Internal trace support is included with this BDM, and supplies limited tracing (128 frames maximum), and triggering of S12X and/or XGate instruction execution or read/writes. Includes the EMUL12-PC/BDM-S12X-TRC-POD, EMUL-PC/USB interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the S12X BDM Getting Started User's Guide. | **EMUL12-PC/ BDM-S12X-TRC-USB** |
| * S12X, HCS12 and HC12 BDM-EPC with internal-trace | Complete BDM debugger system for the S12X, HCS12 and HC12 devices, with all of the above mentioned features and EPC Cable. Includes integrated dual-core S12X and XGate debug suport. S12X Internal trace support is included with this BDM, and supplies limited tracing (128 frames maximum), and triggering of S12X and/or XGate instruction execution or read/writes. Includes the EMUL12-PC/BDM-S12X-TRC-POD, EMUL-PC/EPC parallel interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the S12X BDM Getting Started User's Guide. | **EMUL12-PC/ BDM-S12X-TRC-EPC** |

## ***S12X, HCS12 and HC12 BDMs with S12X dual-core debug support (wit NO Internal Trace support):***

| | | |
|---|---|---|
| * S12X, HCS12 and HC12 BDM-USB | Complete BDM debugger system for the S12X, HCS12 and HC12 devices, with all of the above mentioned features and USB Cable. Includes integrated dual-core S12X and XGate debug suport. Includes the EMUL12-PC/BDM-S12X-POD, EMUL-PC/USB interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the S12X BDM Getting Started User's Guide. | **EMUL12-PC/ BDM-S12X-USB** |
| * S12X, HCS12 and HC12 BDM-EPC | Complete BDM debugger system for the S12X, HCS12 and HC12 devices, with all of the above mentioned features and EPC Cable. Includes integrated dual-core S12X and XGate debug suport. Includes the EMUL12-PC/BDM-S12X-POD, EMUL-PC/EPC parallel interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the S12X BDM Getting Started User's Guide. | **EMUL12-PC/ BDM-S12X-EPC** |

*Continued in the next page - HCS12 and HC12 BDMs (with NO Internal Trace support)*

# BDM Debugger (EMUL12-PC/BDM) (Continued from the previous page)

***HCS12 and HC12 BDMs (with NO Internal Trace support):***

| | | |
|---|---|---|
| HCS12 and HC12 BDM-USB | Complete BDM debugger system for the HCS12 and HC12 devices, with all of the above mentioned features and USB Cable. Includes the EMUL12-PC/BDM-POD, EMUL-PC/USB interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the EMUL12-PC/BDM/MANUAL User's Guide. | **EMUL12-PC/ BDM-USB** |
| HCS12 and HC12 BDM-EPC | Complete BDM debugger system for the HCS12 and HC12 devices, with all of the above mentioned features and EPC Cable. Includes the EMUL12-PC/BDM-POD, EMUL-PC/EPC parallel interface, power supply adapter (EMUL-PC/EPC/ADP), power supply (2.4 AMP), Seehau high level debugger software and the EMUL12-PC/BDM/MANUAL User's Guide. | **EMUL12-PC/ BDM-EPC** |

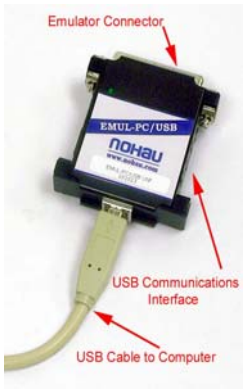
# Communication Interfaces

One of these communication interfaces is used to connect the emulator with the host PC containing Seehau. The interface looks like a cable but with additional logic to provide the proper communications channel to the emulator.

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 and they are Windows 2000Pro/Me/XP and 98.

**EMUL-PC / USB**




EPC-LPTx printer port

The Emulator Parallel Cable communicates through the PC LPTx port. Works great for laptops as the Nohau handheld emulators are very portable. The EPC cable allows your PC to access a printer or many other devices using the LPTx port.

**EMUL-PC / EPC**

# Emulator to Target Connection Methods

## Target Adapters

In the following descriptions of the adapters and flex cables we refer to some of them as "sets". A "set" means that the adapter or flex cable contains all the necessary parts to connect the emulator to the target board. The sets are listed under their specific sub-families. The information is presented first with representative photos, then with charts and followed on the next page by detailed adapter descriptions. The replacement components that make up the sets are listed starting on page 49 of this document.

The HC12 CPUs mostly come in Quad-Flat-Pack (QFP) packages of 48, 52, 80, 112 or 144-pins. In order to connect the emulator system to the target QFP pin pattern (where the CPU will eventually be placed), an adapter set is usually used. The basic adapter set consists of two components - the solder down adapter base (either NQ or TQ), and an adapter PCB.

The solder down adapter base, is a special part designed for adapters. On its bottom it has pins arranged in the specified QFP pin pattern. These pins are soldered down on the target QFP pin pattern. It has an identical mechanical QFP structure as the CPU. On its top side, the adapter base has a special pin grid array (PGA) male pin arrangement, which is used to connect to an adapter PCB. Nohau usually uses solder down adapter bases made by Tokyo Eletech (see below for more details).

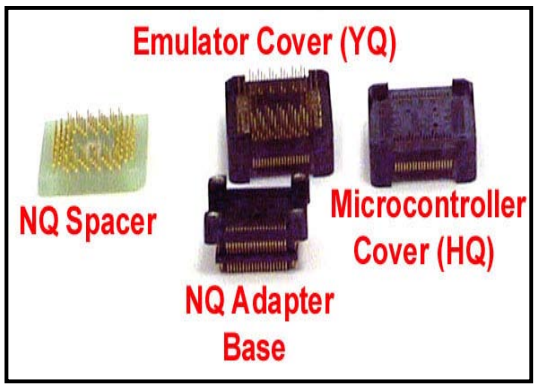
The adapter PCB is used to connect the emulator motherboard bottom connector and the solder down base top connector. Its top side plugs to the header pins on the bottom of the emulator motherboard, and its bottom side plugs to the PGA male pins on the top of the QFP adapter base.

Together the solder down adapter base and the adapter PCB form a basic adapter set, used to connect the emulator system to the QFP pin pattern on the target.

Another less common connection method is to design 0.1" header sockets on the target, so the headers on the emulator bottom will plug directly into the target sockets. The reason it is less common is because you still have to remove the processor from the target because it can't be tri-stated. The mechanical dimensions and pin arrangement of the emulator headers are available at: www.nohau.com/documents and they are located under the technical publications link. Please contact support@nohau.com for the required information.

## Tokyo Eletech NQ and TQ QFP Adapter Notes

The Tokyo Eletech NQ adapter is made up of three parts called NQ/HQ/YQ - sockets. The bottom NQ part solders to the target board in place of the target CPU. The HQ microcontroller cover part allows a real HC12 chip to be used on the adapter instead of the emulator for final testing. The third YQ emulator cover part connects the emulator to this solder-down adapter base. There is also an optional sacrificial spacer that is used to protect the solder-down adapter male pins and to provide about 1/8” (3.75mm) of clearance. Replacement solder-down parts can be purchased separately.




The Tokyo Eletech TQ adapter is used for connecting a target board to an emulator. It is simpler and less expensive than the NQ adapter. There is no provision to install a real chip in the target using a TQ adapter.


## BGA Solder-Down Adapters

The MC9S12XEP100 is offerred additionally in the 208 pin BGA package. For these newest BGA options, Nohau offers BGA solder-down adapter kits, that are similar in concept to the above NQ QFP adapter kit, but use a BGA solder-down base. These BGA adapter kits allow the option to connect the solder-down base on the target either to the emulator system, or to a BGA solder-socket to mount an actual S12X device for stand-alone operation of the same physical target board. (for more details, refer to the relevant S12X sub-family adapter kits)

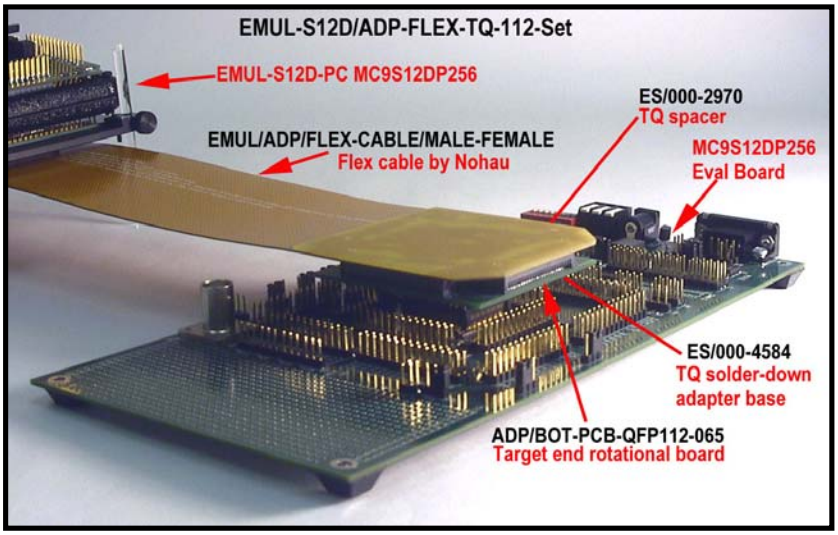
# Emulator to Target Connection Methods (Continued)

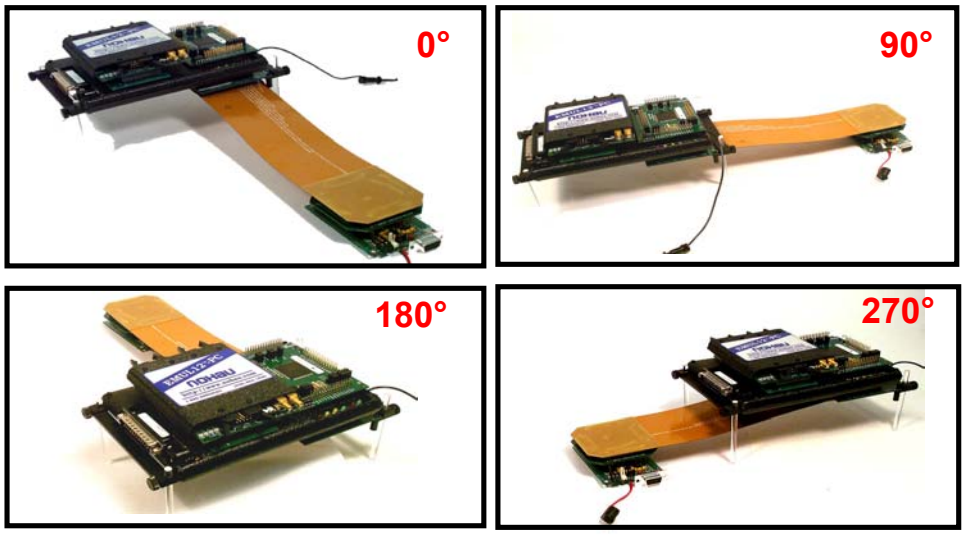
## Flex Cables

A flex cable adapter may be used in applications where access to the target is limited, so a plain solder-down adapter can not be used, since the emulator would have to be physically positioned above the target. The Nohau flex cable allows for all the signals from the solder-down adapter on the target to escape from the target at any of the four directions - 0°, 90°, 180° or 270°. A typical Nohau flex cable adapter consists of the following four basic elements: the flex cable, a top emulator end rotational board, a bottom target end rotational board, and a Tokyo Eletech solder-down base - TQ or NQ.

The top rotational board is used to connect between the emulator motherboard and the flex cable. The bottom target end rotational board is used to connect between the Tokyo Eletech solder-down base and flex cable. Both top and bottom rotational boards can be plugged to the flex cable in orientation of 0°, 90°, 180° and 270°. Connecting both rotational boards to the flex cable using one of these orientations allows for the flex cable to escape from the target at any of these four directions.

Nohau offers several flex cable types which are used for different flex cable adapters. The most common is the Nohau complete flex design using Nohau rotational boards and the Nohau flex cable with opposite Male-Female connectors. This flex cable allows the top and bottom rotational boards to be also plugged into each other for a plain no-flex cable adapter solution. (This last flex cable design supports all the new S12X and HCS12 derivatives). There is also the Motorola flex cable with the Motorola top and bottom adapter boards which are not rotational, and the Motorola rotational boards using the Nohau flex cable. These are for the older HC12 (old-generation) devices, and for the MC9S12H family. Each S12X, HCS12 and HC12 sub family is usually offered with several flex cable options for all the various pin-counts and available packages.



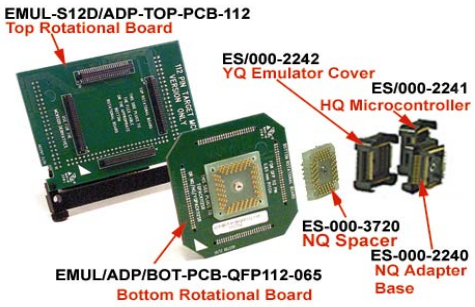



# Emulator to Target Adapter Examples

The following examples of plain adapter (no flex) and flex cable sets are only representations of the HC12 sets.

## NQ Plain Adapter Set Examples (no flex)

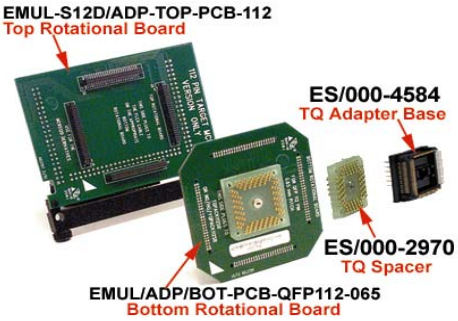

80 Pin




112 Pin

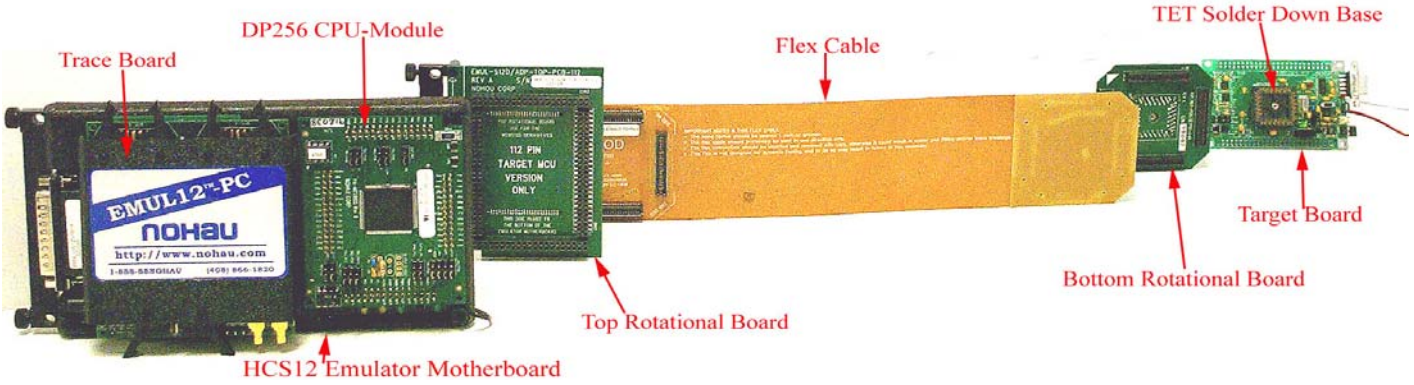
## TQ Plain Adapter Set Examples (no flex)


80 Pin




112 Pin

## Adapter Flex Cable Set Example



# Emulator to Target Adapter Organization

The Target Adapters are divided up into the following S12X, HCS12 and HC12 sub-families to make it easier to determine the traget adapter parts you need:

## S12X Sub-families Target Adapters

**S12X E, D, B, and A** sub-families consist of the MC9S12XDP512, MC9S12EP100 and other S12X parts. The charts and adapter descriptions can be found on pages 26-32.

**S12XF** sub-family consist of the MC9S12XFR128, MC9S12XFE128 and other S12XF parts. The charts and adapter descriptions can be found on pages 33-38.

## HCS12 Sub-families Target Adapters

**HCS12 C** consists of C32, C64, C96 and C128. The charts and adapter descriptions can be found on pages 39-42.

**HCS12 K, D, B and A** consists of KT256, KG256, KG128, K64, K32, DP512, DT512, DJ512, DP256, DT256, DJ256, DG256, DT128, DJ128, DG128, DB128, DJ64, D64, D32, B256, B128, B64, A512, A256, A128, A64 and A32. The charts and adapter descriptions can be found on pages 43-46.

**HCS12 E** consists of E256, E128, E64 and E32. The charts and adapter descriptions can be found on pages 47-49.

**HCS12 H** consists of H256, H128 and H64. The charts and adapter descriptions can be found on pages 50-51.

**HCS12 T** consists of T64. The charts and adapter descriptions can be found on pages 52-53.

## HC12 Sub-families Target Adapters

**HC12 B** consists of B32, BC32, BD32 and BE32. The charts and adapter descriptions can be found on pages 54-55.

**HC12 D** consists of D60, D60A, DA128, DA128A, DG128, DG128A and DT128A. The charts and adapter descriptions can be found on pages 56-57.

## How the adapters are organized within each sub-family

**At the beginning of each sub-family there are three charts, then detailed descriptions with part numbers and prices.**

| | |
|---|---|
| **Adapter Sets Selection Chart** | This chart includes **all** of the adapter set part numbers available for that specific sub-family, both the plain adapter sets (no flex) and the adapter sets that include the flex cables. It has the sets organized by rows of NQ then TQ plain adapter sets, then NQ and TQ Flex cable adapter sets. The part numbers are in columns by the pin count of the adapters. |
| **Plain Adapter Sets Component Chart** | This chart expands the information in the first chart above. It lists the individual part numbers that make up the plain adapter sets. It has the plain adapter sets organized by rows of pin count, first by pin count of the NQ adapters then by the TQ adapters. |
| **Flex Cable Adapter Sets Component Chart** | This chart also expands the information in the first chart. It lists the individual part numbers that make up the flex cable adapter sets. It has the flex cable adapter sets organized by rows of pin count, first by pin count of the NQ adapters then by the TQ adapters. |

Following the charts in each section, the detailed descriptions of the sets are listed including the part numbers and prices. These follow the same structure as the charts where they are first done by pin count, first by NQ then TQ with the plain adapter sets section first, then the flex cable sets section.

# Emulator to Target Adapters and Accessories

## S12X E, D, B and A Family Adapter Sets Selection Chart
**(MC9S12XDP512, MC9S12XEP100, etc.)**

| | 80 Pin | 112 Pin | 144 Pin |
|---|---|---|---|
| **NQ Adapter Base Set** | EMUL-S12XD/ADP-NQ-80-Set<br>Price: | EMUL-S12XD/ADP-NQ-112-Set<br>Price: | EMUL-S12XD/ADP-NQ-144-Set<br>Price: |
| **TQ Adapter Base Set** | EMUL-S12XD/ADP-TQ-80-Set<br>Price: | EMUL-S12XD/ADP-TQ-112-Set<br>Price: | EMUL-S12XD/ADP-TQ-144-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12XD/ADP-FLEX-NQ-80-Set<br>Price: | EMUL-S12XD/ADP-FLEX-NQ-112-Set<br>Price: | EMUL-S12XD/ADP-FLEX-NQ-144-Set<br>Price: |
| **TQ Adapter Base + Flex Cable Set** | EMUL-S12XD/ADP-FLEX-TQ-80-Set<br>Price: | EMUL-S12XD/ADP-FLEX-TQ-112-Set<br>Price: | EMUL-S12XD/ADP-FLEX-TQ-144-Set<br>Price: |

| | 208 Pin BGA 1mm ball-pitch S12XE Adapters |
|---|---|
| **BGA adapter set with Tin-Lead solder-spheres base** | EMUL-S12XE/ADP-BGA-208-TL-Set<br>Price: |
| **BGA adapter set with Lead-Free SAC305 solder-spheres base** | EMUL-S12XE/ADP-BGA-208-LF-Set<br>Price: |
| **Flex-Cable BGA adapter set with Tin-Lead solder-spheres base** | EMUL-S12XE/ADP-FLEX-BGA-208-TL-Set<br>Price: |
| **Flex-Cable BGA adapter set with Lead-Free SAC305 solder-spheres base** | EMUL-S12XE/ADP-FLEX-BGA-208-LF-Set<br>Price: |

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Plain Adapter Sets Component Chart

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| 80-Pin NQ | EMUL-S12XD/ADP-NQ-80-Set<br>Price: | ES/000-2177 (NQPACK080SB)<br>Price: | ES/000-2178 (HQPACK080SB)<br>Price: | ES/000-2179 (YQPACK080SB)<br>Price: | ES/000-3660 (YQSOCKET080SBF)<br>Price: |
| 80-Pin TQ | EMUL-S12XD/ADP-TQ-80-Set<br>Price: | ES/000-4534 (TQPACK080SB)<br>Price: | | | ES/000-2870 (TQSOCKET080SBW)<br>Price: |
| 112-Pin NQ | EMUL-S12XD/ADPNQ-112-Set<br>Price: | ES/000-2240 (NQPACK112SB)<br>Price: | ES/000-2241 (HQPACK112SB)<br>Price: | ES/000-2242 (YQPACK112SB)<br>Price: | ES/000-3720 (YQSOCKET112SBF)<br>Price: |
| 112-Pin TQ | EMUL-S12XD/ADP-TQ-112-Set<br>Price: | ES/000-4584 (TQPACK112SB)<br>Price: | | | ES/000-2970 (TQSOCKET112SBW)<br>Price: |
| 144-Pin NQ | EMUL-S12XD/ADP-NQ-144-Set<br>Price: | ES/000-2303 (NQPACK144SD)<br>Price: | ES/000-2304 (HQPACK144SD)<br>Price: | ES/000-2305 (YQPACK144SD)<br>Price: | ES/000-3776 (YQSOCKET144SDF)<br>Price: |
| 144-Pin TQ | EMUL-S12XD/ADP-TQ-144-Set<br>Price: | ES/000-4632 (TQPACK144SD)<br>Price: | | | ES/000-3065 (TQSOCKET144SDG)<br>Price: |

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | BGA Solder-Down Base | BGA Microcontroller IC Adapter | BGA Spacer | Rotational Boards |
| 208-Pin BGA with Tin-Lead base | EMUL-S12XE/ADP-BGA-208-TL-Set<br>Price: | ES/000-4078-01<br>Price: | ES/140-1127-00<br>Price: | ES/030-1127-00<br>Price: | EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM |
| 208-Pin BGA with Lead-Free base | EMUL-S12XE/ADP-BGA-208-LF-Set<br>Price: | ES/000-4078-00<br>Price: | ES/140-1127-00<br>Price: | ES/030-1127-00<br>Price: | EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM |

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Adapter Flex Cable Sets Component Chart

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **80-Pin NQ** | EMUL-S12XD/ADP-FLEX-NQ-80 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2177/9/8 (NQ/HQ/YQPACK080SB)<br>Price: | ES/000-3660 (YQSOCKET080SBF)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **80-Pin TQ** | EMUL-S12XD/ADP-FLEX-TQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4534 (TQPACK080SB)<br>Price: | ES/000-2870 (TQSOCKET080SBW)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **112-Pin NQ** | EMUL-S12XD/ADP-FLEX-NQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2240/1/2 (NQ/HQ/YQPACK112SB)<br>Price: | ES/000-3720 (YQSOCKET112SBF)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **112-Pin TQ** | EMUL-S12XD/ADP-FLEX-TQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4584 (TQPACK112SB)<br>Price: | ES/000-2970 (TQSOCKET112SBW)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **144-Pin NQ** | EMUL-S12XD/ADP-FLEX-NQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2303/4/5 (NQ/HQ/YQPACK144SD)<br>Price: | ES/000-3776 (YQSOCKET144SDF)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050 |
| **144-Pin TQ** | EMUL-S12XD/ADP-FLEX-TQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4632 (TQPACK144SD)<br>Price: | ES/000-3065 (TQSOCKET144SDG)<br>Price: | EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050 |

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement BGA Adapter base + BGA IC Adapter | Replacement BGA Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **208-Pin BGA with Tin-Lead base** | EMUL-S12XE/ADP-FLEX-BGA-208-TL-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4078-01 and ES/140-1127-00<br>Price: | ES/030-1127-00<br>Price: | EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM |
| **208-Pin BGA with Lead-Free base** | EMUL-S12XE/ADP-FLEX-BGA-208-LF-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4078-00 and ES/140-1127-00<br>Price: | ES/030-1127-00<br>Price: | EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM |

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Adapter Sets (MC9S12XDP512, MC9S12XEP100 etc.)

### S12X E, D, B and A Plain QFP Adapter Sets (no flex cable)

| | | |
|---|---|---|
| * S12XD & S12XE 80-pin NQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 80-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XD/ ADP-NQ-80-Set** |
| * S12XD & S12XE 80-pin TQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 80-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XD/ ADP-TQ-80-Set** |
| * S12XD & S12XE 112-pin NQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 112-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720 (YQSOCKET112SBF) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XD/ ADP-NQ-112-Set** |
| * S12XD & S12XE 112-pin TQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 112-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XD/ ADP-TQ-112-Set** |
| * S12XD & S12XE 144-pin NQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 144-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2303 (NQPACK144SD), a microcontroller cover, part # ES/000-2304 (HQPACK144SD), an emulator cover, part # ES/000-2305 (YQPACK144SD), a spacer, part # ES/000-3776 (YQSOCKET144SDF) and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XD/ ADP-NQ-144-Set** |
| * S12XD & S12XE 144-pin TQ adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 144-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4632 (TQPACK144SD), a spacer, part # ES/000-3065 (TQSOCKET144SDG) and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XD/ ADP-TQ-144-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Adapter Sets (MC9S12XDP512, MC9S12XEP100 etc.) continued

### S12X E, D, B and A Flex-Cable QFP Adapter Sets

| | | |
|---|---|---|
| * S12XD & S12XE 80-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 80-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 80-pin top (emulator end) and bottom (target end) rotational boards, part #EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XD/ADP-FLEX-NQ-80-Set** |
| * S12XD & S12XE 80-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 80-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XD/ADP-FLEX-TQ-80-Set** |
| * S12XD & S12XE 112-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 112-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720(YQSOCKET112SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XD/ADP-FLEX-NQ-112-Set** |
| * S12XD & S12XE 112-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 112-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XD/ADP-FLEX-TQ-112-Set** |

S12X E, D, B and A Flex-Cable Adapter Sets continue on the next page

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Adapter Sets (MC9S12XDP512, MC9S12XEP100 etc.) continued

### S12X E, D, B and A Flex-Cable QFP Adapter Sets (Continued)

| | | |
|---|---|---|
| * S12XD & S12XE 144-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 144-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2303 (NQPACK144SD), a microcontroller cover, part # ES/000-2304 (HQPACK144SD), an emulator cover, part # ES/000-2305 (YQPACK144SD), a spacer, part # ES/000-3776 (YQSOCKET144SDF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE,and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XD/ADP-FLEX-NQ-144-Set** |
| * S12XD & S12XE 144-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XD or S12XE emulator system to an S12XD or S12XE family 144-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4632 (TQPACK144SD), a spacer, part # ES/000-3065 (TQSOCKET144SDG) , a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XD/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XD/ADP-FLEX-TQ-144-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## S12X E, D, B and A Family Adapter Sets (MC9S12XDP512, MC9S12XEP100 etc.) continued

### S12XE 208 pin BGA Adapter Sets (with & without Flex-Cable)

The S12XE family is additionally offered in a 208-pin BGA package with 1mm ball-pitch, that is not available for the S12XD, S12XB and S12XA families. The following four BGA adapter-sets offer options to connect an S12XE target board that uses the 208-pin BGA footprint to an S12XE full-emulator system. These four adapter-sets share many common components, and differ from one another by the two options of: **(a)** With or without Flex-Cable. **(b)** With a solder down BGA base with Tin-Lead solder-spheres which requires traditional Tin-Lead BGA-target assembly process, or alternatively a solder-down BGA base with Lead-Free (RoHS Compliant) SAC305 solder-spheres which requires higher-temperature Lead-Free BGA-target assembly process. All four adapter-sets contain all the required components to connect an S12XE emulator system to an S12XE family 208-pin BGA target footprint. They connect the target board to either the S12XE emulator system, or to an S12XE microcontroller IC soldered on the supplied IC adapter - to test stand alone or BDM operation with the same physical target.

The connection of the following 4 adapter sets is done as follows: **(a)** The BGA solder-down base is soldered by the user on his target BGA footprint. **(b)** The BGA spacer plugs to the top side of the solder-down base. **(c)** For emulator connection, the bottom rotational board plugs to the top side of the BGA spacer, and on the other side plugs directly to the top-rotational board and the S12XE emulator system, or through the Flex-Cable, to the top rotational board and the S12XE emulator system. **(d)** For stand-alone or BDM operation of the same physical target board, a BGA microcontroller is soldered by the user on top of the IC adapter, which plugs on its other side to the top side of the BGA spacer.

| | | |
|---|---|---|
| * S12XE BGA 208-pin adapter set - Tin-Lead base (non-ROHS compliant) | This set contains the required components to connect an S12XE emulator system to an S12XE family 208-pin BGA target footprint. This set consists of a BGA solder-down base with Tin-Lead solder-spheres, part # ES/000-4078-01, a microcontroller IC adapter, part # ES/140-1127-00, a BGA spacer, part # ES/030-1127-00, and the 208-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM. | **EMUL-S12XE/ ADP-BGA-208-TL-Set** |
| * S12XE BGA 208-pin adapter set - Lead-Free base (ROHS compliant) | This set contains the required components to connect an S12XE emulator system to an S12XE family 208-pin BGA target footprint. This set consists of a BGA solder-down base with Lead-Free SAC305 solder-spheres (RoHS Compliant), part # ES/000-4078-00, a microcontroller IC adapter, part # ES/140-1127-00, a BGA spacer, part # ES/030-1127-00, and the 208-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM. | **EMUL-S12XE/ ADP-BGA-208-LF-Set** |
| * S12XE flex-cable BGA 208-pin adapter set - Tin-Lead base (non-ROHS compliant) | This set contains the required components to connect an S12XE emulator system to an S12XE family 208-pin BGA target footprint using a flex-cable. This set consists of a BGA solder-down base with Tin-Lead solder-spheres, part # ES/000-4078-01, a microcontroller IC adapter, part # ES/140-1127-00, a BGA spacer, part # ES/030-1127-00, a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 208-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM. | **EMUL-S12XE/ ADP-FLEX-BGA-208-TL-Set** |
| * S12XE flex-cable BGA 208-pin adapter set - Lead-Free base (ROHS compliant) | This set contains the required components to connect an S12XE emulator system to an S12XE family 208-pin BGA target footprint using a flex-cable. This set consists of a BGA solder-down base with Lead-Free SAC305 solder-spheres (RoHS Compliant), part # ES/000-4078-00, a microcontroller IC adapter, part # ES/140-1127-00, a BGA spacer, part # ES/030-1127-00, a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 208-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XE/ADP-TOP-PCB-208 and ADP/BOT-PCB/S12XE-BGA208-1MM. | **EMUL-S12XE/ ADP-FLEX-BGA-208-LF-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Adapter Sets Selection Chart
**(MC9S12XFR128, MC9S12XFE128, etc.)**

| | 64 Pin | 80 Pin | 112 Pin | 144 Pin |
|---|---|---|---|---|
| **NQ Adapter Base Set** | EMUL-S12XF/ADP-NQ-64-Set<br>Price: | EMUL-S12XF/ADP-NQ-80-Set<br>Price: | EMUL-S12XF/ADP-NQ-112-Set<br>Price: | EMUL-S12XF/ADP-NQ-144-Set<br>Price: |
| **TQ Adapter Base Set** | EMUL-S12XF/ADP-TQ-64-Set<br>Price: | EMUL-S12XF/ADP-TQ-80-Set<br>Price: | EMUL-S12XF/ADP-TQ-112-Set<br>Price: | EMUL-S12XF/ADP-TQ-144-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12XF/ADP-FLEX-NQ-64-Set<br>Price: | EMUL-S12XF/ADP-FLEX-NQ-80-Set<br>Price: | EMUL-S12XF/ADP-FLEX-NQ-112-Set<br>Price: | EMUL-S12XF/ADP-FLEX-NQ-144-Set<br>Price: |
| **TQ Adapter Base + Flex Cable Set** | EMUL-S12XF/ADP-FLEX-TQ-64-Set<br>Price: | EMUL-S12XF/ADP-FLEX-TQ-80-Set<br>Price: | EMUL-S12XF/ADP-FLEX-TQ-112-Set<br>Price: | EMUL-S12XF/ADP-FLEX-TQ-144-Set<br>Price: |

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Plain Adapter Sets Component Chart

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **64-Pin NQ** | EMUL-S12XF/ADP-NQ-64-Set<br>Price: | ES/000-2105 (NQPACK064SD)<br>Price: | ES/000-2106 (HQPACK064SD)<br>Price: | ES/000-2107 (YQPACK064SD)<br>Price: | ES/000-3610 (YQSOCKET064SDF)<br>Price: |
| **64-Pin TQ** | EMUL-S12XF/ADP-TQ-64-Set<br>Price: | ES/000-4492 (TQPACK064SD)<br>Price: | | | ES/000-2786 (TQSOCKET064SDW)<br>Price: |
| **80-Pin NQ** | EMUL-S12XF/ADP-NQ-80-Set<br>Price: | ES/000-2177 (NQPACK080SB)<br>Price: | ES/000-2178 (HQPACK080SB)<br>Price: | ES/000-2179 (YQPACK080SB)<br>Price: | ES/000-3660 (YQSOCKET080SBF)<br>Price: |
| **80-Pin TQ** | EMUL-S12XF/ADP-TQ-80-Set<br>Price: | ES/000-4534 (TQPACK080SB)<br>Price: | | | ES/000-2870 (TQSOCKET080SBW)<br>Price: |
| **112-Pin NQ** | EMUL-S12XF/ADP-NQ-112-Set<br>Price: | ES/000-2240 (NQPACK112SB)<br>Price: | ES/000-2241 (HQPACK112SB)<br>Price: | ES/000-2242 (YQPACK112SB)<br>Price: | ES/000-3720 (YQSOCKET112SBF)<br>Price: |
| **112-Pin TQ** | EMUL-S12XF/ADP-TQ-112-Set<br>Price: | ES/000-4584 (TQPACK112SB)<br>Price: | | | ES/000-2970 (TQSOCKET112SBW)<br>Price: |
| **144-Pin NQ** | EMUL-S12XF/ADP-NQ-144-Set<br>Price: | ES/000-2303 (NQPACK144SD)<br>Price: | ES/000-2304 (HQPACK144SD)<br>Price: | ES/000-2305 (YQPACK144SD)<br>Price: | ES/000-3776 (YQSOCKET144SDF)<br>Price: |
| **144-Pin TQ** | EMUL-S12XF/ADP-TQ-144-Set<br>Price: | ES/000-4632 (TQPACK144SD)<br>Price: | | | ES/000-3065 (TQSOCKET144SDG)<br>Price: |

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Flex Cable Adapter Sets Component Chart

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **64-Pin NQ** | EMUL-S12XF/ADP-FLEX-NQ-64-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2105/6/7 (NQ/HQ/YQPACK064SD)<br>Price: | ES/000-3610 (YQSOCKET064SDF)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050 |
| **64-Pin TQ** | EMUL-S12XF/ADP-FLEX-TQ-64-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4492 (TQPACK064SD)<br>Price: | ES/000-2786 (TQSOCKET064SDW)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050 |
| **80-Pin NQ** | EMUL-S12XF/ADP-FLEX-NQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2177/9/8 (NQ/HQ/YQPACK080SB)<br>Price: | ES/000-3660 (YQSOCKET080SBF)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **80-Pin TQ** | EMUL-S12XF/ADP-FLEX-TQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4534 (TQPACK080SB)<br>Price: | ES/000-2870 (TQSOCKET080SBW)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **112-Pin NQ** | EMUL-S12XF/ADP-FLEX-NQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2240/1/2 (NQ/HQ/YQPACK112SB)<br>Price: | ES/000-3720 (YQSOCKET112SBF)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **112-Pin TQ** | EMUL-S12XF/ADP-FLEX-TQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4584 (TQPACK112SB)<br>Price: | ES/000-2970 (TQSOCKET112SBW)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **144-Pin NQ** | EMUL-S12XF/ADP-FLEX-NQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2303/4/5 (NQ/HQ/YQPACK144SD)<br>Price: | ES/000-3776 (YQSOCKET144SDF)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050 |
| **144-Pin TQ** | EMUL-S12XF/ADP-FLEX-TQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4632 (TQPACK144SD)<br>Price: | ES/000-3065 (TQSOCKET144SDG)<br>Price: | EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050 |

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Adapter Sets (MC9S12XFR128, MC9S12XFE128 etc.)

### S12XF Plain QFP Adapter Sets (no flex cable)

| | | |
|---|---|---|
| * S12XF 64-pin NQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 64-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2105 (NQPACK064SD), a microcontroller cover, part # ES/000-2106 (HQPACK064SD), an emulator cover, part # ES/000-2107 (YQPACK064SD), a spacer, part # ES/000-3610 (YQSOCKET064SDF) and the 64-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050. | **EMUL-S12XF/ ADP-NQ-64-Set** |
| * S12XF 64-pin TQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 64-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4492 (TQPACK064SD), a spacer, part # ES/000-2786 (TQSOCKET064SDW) and the 64-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050. | **EMUL-S12XF/ ADP-TQ-64-Set** |
| * S12XF 80-pin NQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 80-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XF/ ADP-NQ-80-Set** |
| * S12XF 80-pin TQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 80-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XF/ ADP-TQ-80-Set** |
| * S12XF 112-pin NQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 112-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720 (YQSOCKET112SBF) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XF/ ADP-NQ-112-Set** |
| * S12XF 112-pin TQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 112-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XF/ ADP-TQ-112-Set** |

S12XF Plain Adapter Sets continue on the next page

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Adapter Sets (MC9S12XFR128, MC9S12XFE128 etc.) (Continued)

### S12XF Plain QFP Adapter Sets (no flex cable) (continued)

| | | |
|---|---|---|
| * S12XF 144-pin NQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 144-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2303 (NQPACK144SD), a microcontroller cover, part # ES/000-2304 (HQPACK144SD), an emulator cover, part # ES/000-2305 (YQPACK144SD), a spacer, part # ES/000-3776 (YQSOCKET144SDF) and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XF/ ADP-NQ-144-Set** |
| * S12XF 144-pin TQ adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 144-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4632 (TQPACK144SD), a spacer, part # ES/000-3065 (TQSOCKET144SDG) and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XF/ ADP-TQ-144-Set** |

### S12XF Flex-Cable QFP Adapter Sets

| | | |
|---|---|---|
| * S12XF 64-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 64-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2105 (NQPACK064SD), a microcontroller cover, part # ES/000-2106 (HQPACK064SD), an emulator cover, part # ES/000-2107 (YQPACK064SD), a spacer, part # ES/000-3610 (YQSOCKET064SDF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 64-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050. | **EMUL-S12XF/ADP-FLEX-NQ-64-Set** |
| * S12XF 64-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 64-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4492 (TQPACK064SD), a spacer, part # ES/000-2786 (TQSOCKET064SDW) , a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 64-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-64 and ADP/BOT-PCB-QFP64-050. | **EMUL-S12XF/ADP-FLEX-TQ-64-Set** |
| * S12XF 80-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 80-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 80-pin top (emulator end) and bottom (target end) rotational boards, part #EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XF/ADP-FLEX-NQ-80-Set** |

S12XF Flex-Cable Adapter Sets continue on the next page

# Emulator to Target Adapters and Accessories (Continued)

## S12XF Family Adapter Sets (MC9S12XFR128, MC9S12XFE128 etc.) (Continued)

### S12XF Flex-Cable QFP Adapter Sets (no flex cable) (continued)

| | | |
|---|---|---|
| * S12XF 80-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 80-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12XF/ADP-FLEX-TQ-80-Set** |
| * S12XF 112-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 112-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720(YQSOCKET112SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XF/ADP-FLEX-NQ-112-Set** |
| * S12XF 112-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 112-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12XF/ADP-FLEX-TQ-112-Set** |
| * S12XF 144-pin NQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 144-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down NQ adapter base, part # ES/000-2303 (NQPACK144SD), a microcontroller cover, part # ES/000-2304 (HQPACK144SD), an emulator cover, part # ES/000-2305 (YQPACK144SD), a spacer, part # ES/000-3776 (YQSOCKET144SDF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XF/ADP-FLEX-NQ-144-Set** |
| * S12XF 144-pin TQ flex-cable adapter set | This set contains the required components to connect an S12XF emulator system to an S12XF family 144-pin QFP target using a flex-cable, and allows connecting to the target at one any of 4 directions. This set consists of a solder-down TQ adapter base, part # ES/000-4632 (TQPACK144SD), a spacer, part # ES/000-3065 (TQSOCKET144SDG) , a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE, and the 144-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12XF/ADP-TOP-PCB-144 and ADP/BOT-PCB-QFP144-050. | **EMUL-S12XF/ADP-FLEX-TQ-144-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 C Family Adapter Sets Selection Chart (C32, C64, C96 and C128)

| | 48 Pin | 52 Pin | 80 Pin |
|---|---|---|---|
| **NQ Adapter Base Set** | EMUL-S12C/ADP-NQ-48-Set<br>Price: | EMUL-S12C/ADP-NQ-52-Set<br>Price: | EMUL-S12C/ADP-NQ-80-Set<br>Price: |
| **TQ Adapter Base Set** | EMUL-S12C/ADP-TQ-48-Set<br>Price: | EMUL-S12C/ADP-TQ-52-Set<br>Price: | EMUL-S12C/ADP-TQ-80-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12C/ADP-FLEX-NQ-48-Set<br>Price: | EMUL-S12C/ADP-FLEX-NQ-52-Set<br>Price: | EMUL-S12C/ADP-FLEX-NQ-80-Set<br>Price: |
| **TQ Adapter Base + Flex Cable Set** | EMUL-S12C/ADP-FLEX-TQ-48-Set<br>Price: | EMUL-S12C/ADP-FLEX-TQ-52-Set<br>Price: | EMUL-S12C/ADP-FLEX-TQ-80-Set<br>Price: |

## HCS12 C Family Plain Adapter Sets Component Chart (C32, C64, C96 and C128)

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **48-Pin NQ** | EMUL-S12C/ADP-NQ-48-Set<br>Price: | ES/000-2075<br>Price: | ES/000-2076<br>Price: | ES/000-2077<br>Price: | ES/000-3574<br>Price: |
| **48-Pin TQ** | EMUL-S12C/ADP-TQ-48-Set<br>Price: | ES/000-4468<br>Price: | | | ES/000-2726<br>Price: |
| **52-Pin NQ** | EMUL-S12C/ADP-NQ-52-Set<br>Price: | ES/000-2085<br>Price: | ES/000-2086<br>Price: | ES/000-2087<br>Price: | ES/000-3588<br>Price: |
| **52-Pin TQ** | EMUL-S12C/ADP-TQ-52-Set<br>Price: | ES/000-4472<br>Price: | | | ES/000-2756<br>Price: |
| **80-Pin NQ** | EMUL-S12C/ADP-NQ-80-Set<br>Price: | ES/000-2177<br>Price: | ES/000-2178<br>Price: | ES/000-2179<br>Price: | ES/000-3660<br>Price: |
| **80-Pin TQ** | EMUL-S12C/ADP-TQ-80-Set<br>Price: | ES/000-4534<br>Price: | | | ES/000-2870<br>Price: |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 C Family Flex Cable Adapter Sets Component Chart (C32, C64, C96 and C128)

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **48-pin NQ** | EMUL-S12C/ADP-FLEX-NQ-48 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2075/6/7 | ES/000-3574 | EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050 |
| **48-pin TQ** | EMUL-S12C/ADP-FLEX-TQ-48 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4468 | ES/000-2726 | EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050 |
| **52-pin NQ** | EMUL-S12C/ADP-FLEX-NQ-52 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2085/6/7 | ES/000-3588 | EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065 |
| **52-pin TQ** | EMUL-S12C/ADP-FLEX-TQ-52 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4472 | ES/000-2756 | EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065 |
| **80-pin NQ** | EMUL-S12C/ADP-FLEX-NQ-80 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2177/8/9 | ES/000-3660 | EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **80-pin TQ** | EMUL-S12C/ADP-FLEX-TQ-80 Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4534 | ES/000-2870 | EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 C Family Adapter Sets (C32, C64, C96 and C128)

### HCS12 C Family Plain Adapter Sets (no flex cable)

| | | |
|---|---|---|
| S12C 48-pin NQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 48-pin QFP target. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2075 (NQPACK048SD), microcontroller cover (HQ) part # ES/000-2076 (HQPACK048SD), emulator cover (YQ) part # ES/000-2077 (YQPACK048SD), spacer part # ES/000-3574 (YQSOCKET048SDF) and the 48-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050. | **EMUL-S12C/ADP-NQ-48-Set** |
| S12C 48-pin TQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 48-pin QFP target. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4468 (TQPACK048SD), a spacer part # ES/000-2726 (TQSOCKET048SDG) and the 48-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050. | **EMUL-S12C/ADP-TQ-48-Set** |
| S12C 52-pin NQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 52-pin QFP target. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2085 (NQPACK052SB), microcontroller cover (HQ) part # ES/000-2086 (HQPACK052SB), emulator cover (YQ) part # ES/000-2087 (YQPACK052SB), spacer part # ES/000-3588 (YQSOCKET052SBF) and the 52-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065. | **EMUL-S12C/ADP-NQ-52-Set** |
| S12C 52-pin TQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 52-pin QFP target. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4472 (TQPACK052SB), a spacer part # ES/000-2756 (TQSOCKET052SBW) and the 52-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065. | **EMUL-S12C/ADP-TQ-52-Set** |
| S12C 80-pin NQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 80-pin QFP target. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2177 (NQPACK080SB), microcontroller cover (HQ) part # ES/000-2178 (HQPACK080SB), emulator cover (YQ) part # ES/000-2179 (YQPACK080SB), spacer part # ES/000-3660 (YQSOCKET080SBF) and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12C/ADP-NQ-80-Set** |
| S12C 80-pin TQ adapter set | This adapter set contains the required components to connect an S12C emulator system to an MC9S12C family 80-pin QFP target. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4534 (TQPACK080SB), a spacer part # ES/000-2870 (TQSOCKET080SBW) and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12C/ADP-TQ-80-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 C Family Adapter Sets (C32, C64, C96 and C128) (continued)

### HCS12 C Family Flex Cable Adapter Sets

| | | |
|---|---|---|
| S12C 48-pin NQ Flex cable set | A 48-pin flex cable set made by Nohau. This set contains the required components to con-nect an S12C emulator system to an MC9S12C family 48-pin QFP target using a flex cable. This set consists of a solder-down NQ adapter base part# ES/000-2075 (NQPACK048SD), a microcontroller cover (HQ) part # ES/000-2076 (HQPACK048SD), an emulator cover (YQ) part# ES/000-2077 (YQPACK048SD), a spacer part # ES/000-3574 (YQSOCKET048SDF), a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and an 48-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050. | **EMUL-S12C/ADP-FLEX-NQ-48-Set** |
| S12C 48-pin TQ Flex cable set | A 48-pin flex cable set made by Nohau. This set contains the required components to connect an S12C emulator system to an MC9S12C family 48-pin QFP target using a flex cable. This set consists of a solder-down TQ adapter base part# ES/000-4468 (TQPACK 048SD), a spacer part # ES/000-2726 (YQSOCKET048SDG), a flex cable part # EMUL/ADP /FLEX-CABLE/MALE-FEMALE and an 48-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-48 and ADP/BOT-PCB-QFP48-050. | **EMUL-S12C/ADP-FLEX-TQ-48-Set** |
| S12C 52-pin NQ Flex cable set | A 52-pin flex cable set made by Nohau. This set contains the required components to connect an S12C emulator system to an MC9S12C family 52-pin QFP target using a flex cable. This set consists of a solder-down NQ adapter base part# ES/000-2085 (NQPACK052SB), a microcontroller cover (HQ) part # ES/000-2086 (HQPACK052SB), an emulator cover (YQ) part# ES/000-2087 (YQPACK052SB), a spacer part # ES/000-3588 (YQSOCKET052SBF), a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and an 52-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065. | **EMUL-S12C/ADP-FLEX-NQ-52-Set** |
| S12C 52-pin TQ Flex cable set | A 52-pin flex cable set made by Nohau. This set contains the required components to connect an S12C emulator system to an MC9S12C family 52-pin QFP target using a flex cable. This set consists of a solder-down TQ adapter base part# ES/000-4472 (TQPACK 052SB), a spacer part # ES/000-2756 (YQSOCKET052SBW), a flex cable part # EMUL/ ADP/FLEX-CABLE/MALE-FEMALE and an 52-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12C/ADP-TOP-PCB-52 and ADP/BOT-PCB-QFP52-065. | **EMUL-S12C/ADP-FLEX-TQ-52-Set** |
| S12C 80-pin NQ Flex cable set | A 80-pin flex cable set made by Nohau. This set contains the required components to connect an S12C emulator system to an MC9S12C family 80-pin QFP target using a flex cable. This set consists of a solder-down NQ adapter base part# ES/000-2177 (NQPACK 080SB), a microcontroller cover (HQ) part # ES/000-2178(HQPACK080SB), an emulator cover (YQ) part# ES/000-2179 (YQPACK080SB), a spacer part # ES/000-3660 (YQSOCKET080SBF), a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and an 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12C/ADP-FLEX-NQ-80-Set** |
| S12C 80-pin TQ Flex cable set | A 80-pin flex cable set made by Nohau. This set contains the required components to connect an S12C emulator system to an MC9S12C family 80-pin QFP target using a flex cable. This set consists of a solder-down TQ adapter base part# ES/000-4534 (TQPACK 080SB), a spacer part # ES/000-2870 (YQSOCKET080SBW), a flex cable part # EMUL/ ADP/FLEX-CABLE/MALE-FEMALE and an 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12C/ADP-FLEX-TQ-80-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 K, D, B and A Family Adapter Sets Selection Chart (MC9S12 KT256, KG256, KG128, K64, K32, DP512, DT512, DJ512, DP256, KT256, DJ256, DG256, DT128, DJ128, DG128, DB128, DJ64, D64, D32, B256, B128, B64, A512, A256, A128, A64 and A32)

| | 80 Pin | 112 Pin |
|---|---|---|
| **NQ Adapter Base Set** | EMUL-S12D/ADP-80SD-NQ-Set<br>Price: | EMUL-S12D/ADP-112SD-NQ-Set<br>Price: |
| **TQ Adapter Base Set** | EMUL-S12D/ADP-80SD-TQ-Set<br>Price: | EMUL-S12D/ADP-112SD- TQ-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12D/ADP-FLEX-NQ-80-Set<br>Price: | EMUL-S12D/ADP-FLEX-NQ-112-Set<br>Price: |
| **TQ Adapter Base + Flex Cable Set** | EMUL-S12D/ADP-FLEX-TQ-80-Set<br>Price: | EMUL-S12D/ADP-FLEX-TQ-112-Set<br>Price: |

## HCS12 K, D, B and A Family Plain Adapter Sets Component Chart

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **80-Pin NQ** | EMUL-S12D/ADP-80SD-NQ-Set<br>Price: | ES/000-2177<br>Price: | ES/000-2178<br>Price: | ES/000-2179<br>Price: | ES/000-3660<br>Price: |
| **80-Pin TQ** | EMUL-S12D/ADP-80SD-TQ-Set<br>Price: | ES/000-4534<br>Price: | | | ES/000-2870<br>Price: |
| **112-Pin NQ** | EMUL-S12D/ADP-112SD-NQ-Set<br>Price: | ES/000-2240<br>Price: | ES/000-2241<br>Price: | ES/000-2242<br>Price: | ES/000-3720<br>Price: |
| **112-Pin TQ** | EMUL-S12D/ADP-112SD-TQ-Set<br>Price: | ES/000-4584<br>Price: | | | ES/000-2970<br>Price: |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 K, D, B and A Family Adapter Flex Cable Sets Component Chart

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **80-Pin NQ** | EMUL-S12D/ADP-FLEX-NQ-80-Set<br><br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2177/9/8 | ES/000-3660 | EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **80-Pin TQ** | EMUL-S12D/ADP-FLEX-TQ-80-Set<br><br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4534 | ES/000-2870 | EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **112-Pin NQ** | EMUL-S12D/ADP-FLEX-NQ-112-Set<br><br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2240/1/2 | ES/000-3720 | EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **112-Pin TQ** | EMUL-S12D/ADP-FLEX-TQ-112-Set<br><br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4584 | ES/000-2970 | EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 K, D, B and A Family Adapter Sets (MC9S12 KT256, KG256, KG128, K64, K32, DP512, DT512, DJ512, DP256, KT256, DJ256, DG256, DT128, DJ128, DG128, DB128, DJ64, D64, D32, B256, B128, B64, A512, A256, A128, A64 and A32)

### HCS12 K, D, B and A Family Plain Adapter Sets (no flex cable)

| | | |
|---|---|---|
| S12K/D/B/A 80-pin NQ adapter set | This adapter set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx target using an 80-pin QFP solder-down adapter. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2177, microcontroller cover (HQ) part # ES/000-2178, emulator cover (YQ) part # ES/000-2179, spacer part # ES/000-3660 and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12D/ADP-80SD-NQ-Set** |
| S12K/D/B/A 80-pin TQ adapter set | This adapter set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx target using an 80-pin QFP solder-down adapter. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4534, a spacer part # ES/000-2870 and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12D/ADP-80SD-TQ-Set** |
| S12K/D/B/A 112-pin NQ adapter set | This adapter set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx target using a 112-pin QFP solder-down adapter. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2240, a microcontroller cover (HQ) part # ES/000-2241, an emulator cover (YQ) part # ES/000-2242, a spacer part # ES/000-3720 and the 112-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12D/ADP-112SD-NQ-Set** |
| S12K/D/B/A 112-pin TQ adapter set | This adapter set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx target using a 112-pin QFP solder-down adapter. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4584, a spacer part # ES/000-2970 and the 112-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12D/ADP-112SD-TQ-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 K, D, B and A Family Adapter Sets (continued)

### HCS12 K, D, B and A Family Flex Cable Adapter Sets

| | | |
|---|---|---|
| S12K/D/B/A 80-pin NQ Flex cable set | An 80-pin flex cable set made by Nohau. This set consists of a solder-down NQ adapter base part# ES/000-2177, a microcontroller cover (HQ) part # ES/000-2178, an emulator cover (YQ) part# ES/000-2179, a spacer part # ES/000-3660, a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and an 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. This set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx 80-pin QFP target. | **EMUL-S12D/ADP-FLEX-NQ-80-Set** |
| S12K/D/B/A 80-pin TQ Flex cable set | An 80-pin flex cable set made by Nohau. This set consists of a solder-down TQ adapter base part# ES/000-4534, a spacer part # ES/000-2870, a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. This set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx 80-pin QFP target. | **EMUL-S12D/ADP-FLEX-TQ-80-Set** |
| S12K/D/B/A 112-pin NQ Flex cable set | A 112-pin flex cable set made by Nohau. This set consists of a solder-down NQ adapter base part# ES/000-2240, a microcontroller cover (HQ) part # ES/000-2241, an emulator cover (YQ) part# ES/000-2242, a spacer part # ES/000-3720, a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 112-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. This set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx 112-pin QFP target. | **EMUL-S12D/ADP-FLEX-NQ-112-Set** |
| S12K/D/B/A 112-pin TQ Flex cable set | A 112-pin flex cable set made by Nohau. This set consists of a solder-down TQ adapter base part# ES/000-4584, a spacer part # ES/000-2970, a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 112-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12D/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. This set contains the required components to connect an "S12D" or "S12" motherboard to an MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx 112-pin QFP target. | **EMUL-S12D/ADP-FLEX-TQ-112-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 E Family Adapter Sets Selection Chart (MC9S12 E256, E128, E64 and E32)

| | 112 Pin | 80 Pin |
|---|---|---|
| **NQ Adapter Base Set** | EMUL-S12E/ADP-NQ-112-Set | EMUL-S12E/ADP-NQ-80-Set |
| **TQ Adapter Base Set** | EMUL-S12E/ADP-TQ-112-Set | EMUL-S12E/ADP-TQ-80-Set |
| **NQ Adapter Base + Flex cable Set** | EMUL-S12E/ADP-FLEX-NQ-112-Set | EMUL-S12E/ADP-FLEX-NQ-80-Set |
| **TQ Adapter Base + Flex cable Set** | EMUL-S12E/ADP-FLEX-TQ-112-Set | EMUL-S12E/ADP-FLEX-TQ-80-Set |

## HCS12 E Family (E256, E128, E64 and E32) Plain Adapter Sets Component Chart

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **80-Pin NQ** | EMUL-S12E/ADP- NQ-80-Set<br>Price: | ES/000-2177<br>Price: | ES/000-2178<br>Price: | ES/000-2179<br>Price: | ES/000-3660<br>Price: |
| **80-Pin TQ** | EMUL-S12E/ADP-TQ-80-Set<br>Price: | ES/000-4534<br>Price: | | | ES/000-2870<br>Price: |
| **112-Pin NQ** | EMUL-S12E/ADP-NQ-112-Set<br>Price: | ES/000-2240<br>Price: | ES/000-2241<br>Price: | ES/000-2242<br>Price: | ES/000-3720<br>Price: |
| **112-Pin TQ** | EMUL-S12E/ADP-TQ-112-Set<br>Price: | ES/000-4584<br>Price: | | | ES/000-2970<br>Price: |

## HCS12 E Family (E256, E128, E64 and E32) Adapter Flex Cable Sets Component Chart

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **80-Pin NQ** | EMUL-S12E/ADP-FLEX-NQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2177/9/8 | ES/000-3660 | EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **80-Pin TQ** | EMUL-S12E/ADP-FLEX-TQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4534 | ES/000-2870 | EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065 |
| **112-Pin NQ** | EMUL-S12E/ADP-FLEX-NQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2240/1/2 | ES/000-3720 | EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |
| **112-Pin TQ** | EMUL-S12E/ADP-FLEX-TQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-4584 | ES/000-2970 | EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065 |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 E Family (E256, E128, E64 and E32) Adapter Sets

| | | |
|---|---|---|
| 80-pin NQ adapter set | This set contains the required components to connect an S12E emulator system to an MC9S12E family 80-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12E/ADP-NQ-80-Set** |
| 80-pin TQ adapter set | This set contains the required components to connect an S12E emulator system to an MC9S12E family 80-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW) and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12E/ADP-TQ-80-Set** |
| 112-pin NQ adapter set | This set contains the required components to connect an S12E emulator system to an MC9S12E family 112-pin QFP target. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720 (YQSOCKET112SBF) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12E/ADP-NQ-112-Set** |
| 112-pin TQ adapter set | This set contains the required components to connect an S12E emulator system to an MC9S12E family 112-pin QFP target. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW) and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12E/ADP-TQ-112-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 E Family (E256, E128, E64 and E32) Flex Cable Adapter Sets

| | | |
|---|---|---|
| 80-pin NQ flex cable set | An 80-pin flex cable set made by Nohau. This set contains the required components to connect an S12E emulator system to an MC9S12E family 80-pin QFP target using a flex cable. This set consists of a solder-down NQ adapter base, part # ES/000-2177 (NQPACK080SB), a microcontroller cover, part # ES/000-2178 (HQPACK080SB), an emulator cover, part # ES/000-2179 (YQPACK080SB), a spacer, part # ES/000-3660 (YQSOCKET080SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12E/ADP-FLEX-NQ-80-Set** |
| 80-pin TQ flex cable set | A 80-pin flex cable set made by Nohau. This set contains the required components to connect an S12E emulator system to an MC9S12E family 80-pin QFP target using a flex cable. This set consists of a solder-down TQ adapter base, part # ES/000-4534 (TQPACK080SB), a spacer, part # ES/000-2870 (TQSOCKET080SBW), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 80-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-065. | **EMUL-S12E/ADP-FLEX-TQ-80-Set** |
| 112-pin NQ flex cable set | A 112-pin flex cable set made by Nohau. This set contains the required components to connect an S12E emulator system to an MC9S12E family 112-pin QFP target using a flex cable. This set consists of a solder-down NQ adapter base, part # ES/000-2240 (NQPACK112SB), a microcontroller cover, part # ES/000-2241 (HQPACK112SB), an emulator cover, part # ES/000-2242 (YQPACK112SB), a spacer, part # ES/000-3720 (YQSOCKET112SBF), a flex cable, part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12E/ADP-FLEX-NQ-112-Set** |
| 112-pin TQ flex cable set | A 112-pin flex cable set made by Nohau. This set contains the required components to connect an S12E emulator system to an MC9S12E family 112-pin QFP target using a flex cable. This set consists of a solder-down TQ adapter base, part # ES/000-4584 (TQPACK112SB), a spacer, part # ES/000-2970 (TQSOCKET112SBW), a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 112-pin top (emulator end) and bottom (target end) rotational boards, part # EMUL-S12E/ADP-TOP-PCB-112 and ADP/BOT-PCB-QFP112-065. | **EMUL-S12E/ADP-FLEX-TQ-112-Set** |

# Emulator to Target Adapters and Accessories (Continued)

For the HCS12 H family, Nohau does not offer plain adapter sets at this time.

## HCS12 H Family Adapter Flex Cable Sets Selection Chart (H256, H128 and H64)

| | 112 Pin | 144 Pin |
|---|---|---|
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12H/ADP-FLEX-NQ-112-Set<br>Price: | EMUL-S12H/ADP-FLEX-NQ-144-Set<br>Price: |
| **TQ Adapter Base + Flex Cable Set** | EMUL-S12H/ADP-FLEX-TQ-112-Set<br>Price: | EMUL-S12H/ADP-FLEX-TQ-144-Set<br>Price: |

## HCS12 H Family Adapter Flex Cable Sets Component Chart (H256, H128 and H64)

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/YQ/HQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **112-Pin NQ** | EMUL-S12H/ADP-FLEX-NQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX/UNIV | ES/000-2240/1/2 | ES/000-4584 | EMUL-S12D/ADP-S12-112HD |
| **112-Pin TQ** | EMUL-S12H/ADP-FLEX-TQ-112-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX/UNIV | ES/000-4584 | ES/000-2970 | EMUL-S12D/ADP-S12-112HD |
| **144-Pin NQ** | EMUL-S12H/ADP-FLEX-NQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX/UNIV | ES/000-2303/4/5 | ES/000-3776 | EMUL-S12D/ADP-S12-144HD |
| **144-Pin TQ** | EMUL-S12H/ADP-FLEX-TQ-144-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX/UNIV | ES/000-4632 | ES/000-3065 | EMUL-S12D/ADP-S12-144HD |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 H Family Flex Cable Adapter Sets

| | | |
|---|---|---|
| S12H 112-pin NQ Flex cable set | A complete flex cable 112-pin NQ adapter set for MC9S12Hxxx derivatives. Consists of a NQ solder-down base part # ES/000-2240, a microcontroller cover (HQ) part # ES/000-2241, an emulator cover (YQ) part # ES/000-2242, a spacer part # ES/000-3720, a flex cable part # EMUL/ADP/FLEX/UNIV and the 112-pin emulator end and target end rotational boards part # EMUL-S12D/ADP-S12-112HD. | **EMUL-S12H/ADP-FLEX-NQ-112-Set** |
| S12H 112-pin TQ Flex cable set | A complete flex cable 112-pin TQ adapter set for MC9S12Hxxx derivatives. Consists of a TQ solder-down base part # ES/000-4584, spacer part # ES/000-2970, a flex cable part # EMUL/ADP/FLEX/UNIV and the 112-pin emulator end and target end rotational boards part # EMUL-S12D/ADP-S12-112HD. | **EMUL-S12H/ADP-FLEX-TQ-112-Set** |
| S12H 144-pin NQ Flex cable set | A complete flex cable 144-pin NQ adapter set for MC9S12Hxxx derivatives. Consists of a NQ solder-down base part # ES/000-2303, a microcontroller cover (HQ) part # ES/000-2304, an emulator cover (YQ) part # ES/000-2305, a spacer part # ES/000-3776, a flex cable part # EMUL/ADP/FLEX/UNIV and the 144-pin emulator end and target end rotational boards part # EMUL-S12D/ADP-S12-144HD. | **EMUL-S12H/ADP-FLEX-NQ-144-Set** |
| S12H 144-pin TQ Flex cable set | A complete flex cable 144-pin TQ adapter set for MC9S12Hxxx derivatives. Consists of a TQ solder-down base part # ES/000-4632, spacer part # ES/000-3065, a flex cable part # EMUL/ADP/FLEX/UNIV and the 144-pin emulator end and target end rotational boards part # EMUL-S12D/ADP-S12-144HD. | **EMUL-S12H/ADP-FLEX-TQ-144-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 T Family Adapter Sets Selection Chart (T64)

| | 80 Pin |
|---|---|
| **NQ Adapter Base Set** | EMUL-S12T/ADP-NQ-80-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | EMUL-S12T/ADP-FLEX-NQ-80-Set<br>Price: |

## HCS12 T Family Plain Adapter Sets Component Chart (T64)

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ Spacer |
| **80-Pin NQ** | EMUL-S12T/ADP-NQ-80-Set<br>Price: | ES/000-2174<br>Price: | ES/000-2175<br>Price: | ES/000-2176<br>Price: | ES/000-3658<br>Price: |

## HCS12 T Family Adapter Flex Cable Sets Component Chart (T64)

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ or NQ/HQ/YQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **80-Pin NQ** | EMUL-S12T/ADP-FLEX-NQ-80-Set<br>Price: | Nohau Flex | EMUL/ADP/FLEX-CABLE/MALE-FEMALE | ES/000-2174/5/6 | ES/000-3658 | EMUL-S12T/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-050 |

# Emulator to Target Adapters and Accessories (Continued)

## HCS12 T Family Adapter Sets (T64)

### HCS12 T Family Plain Adapter Set (no flex cable)

| | | |
|---|---|---|
| S12T 80-pin NQ adapter set | This adapter set contains the required components to connect an S12T emulator system to an MC9S12T family 80-pin QFP target. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2174 (NQPACK080SD), microcontroller cover (HQ) part # ES/000-2175 (HQPACK080SD), emulator cover (YQ) part # ES/000-2176 (YQPACK080SD), spacer part # ES/000-3658 (YQSOCKET080SDF) and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12T/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-050. | **EMUL-S12T/ADP-NQ-80-Set** |

### HCS12 T Family Flex Cable Adapter Set

| | | |
|---|---|---|
| S12T 80-pin NQ Flex cable set | An 80-pin flex cable set made by Nohau. This set contains the required components to connect an S12T emulator system to an MC9S12T family 80-pin QFP target using a flex cable. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2174 (NQPACK080SD), microcontroller cover (HQ) part # ES/000-2175 (HQPACK080SD), emulator cover (YQ) part # ES/000-2176 (YQPACK080SD), spacer part # ES-000-3658 (YQSOCKET080SDF), a flex cable part # EMUL/ADP/FLEX-CABLE/MALE-FEMALE and the 80-pin top (emulator end) and bottom (target end) rotational boards part # EMUL-S12T/ADP-TOP-PCB-80 and ADP/BOT-PCB-QFP80-050. | **EMUL-S12T/ADP-FLEX-NQ-80-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HC12 B Family Adapter Sets Selection Chart (B32, BC32, BD32 and BE32 )

| | 80 Pin |
|---|---|
| **NQ Adapter Base Set** | ES/180-5550-00-NQ-Set<br>Price: |
| **TQ Adapter Base Set** | ES/180-5550-10-TQ-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | N/A |
| **TQ Adapter Base + Flex Cable Set** | EMUL/ADP/FLEX-B80M-Set<br>Price: |

## HC12 B Family Plain Adapter Sets Component Chart (B32, BC32, BD32 and BE32 )

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **80-Pin NQ** | ES/180-5550-00-NQ-Set<br>Price: | ES/000-2177<br>Price: | ES/000-2178<br>Price: | ES/000-2179<br>Price: 814 | ES/000-3660<br>Price: |
| **80-Pin TQ** | ES/180-5550-10-TQ-Set<br>Price: | ES/000-4534<br>Price: | | | ES/000-2870<br>Price: |

## HC12 B Family Flex Cable Adapter Sets Component Chart (B32, BC32, BD32 and BE32)

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **80-Pin TQ** | EMUL/ADP/FLEX-B80M-Set<br>Price: | Motorola CABLE | SC1200009 | ES/000-4534<br>Price: | ES/000-2870<br>Price: | Motorola board |

# Emulator to Target Adapters and Accessories (Continued)

## HC12 B Family Adapter Sets (B32, BC32, BD32 and BE32)

### HC12 B Family Plain Adapter Sets (no flex cable)

| | | |
|---|---|---|
| 12B 80-pin NQ adapter set | An 80-pin QFP solder-down adapter set. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2177, microcontroller cover (HQ) part # ES/000-2178, emulator cover (YQ) part # ES/000-2179, spacer part # ES/000-3660 and an adapter mezzanine board. | **ES/180-5550-00-NQ-Set** |
| 12B 80-pin TQ adapter set | An 80-pin QFP solder-down adapter set. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4534 and an adapter mezzanine board. | **ES/180-5550-10-TQ-Set** |

### HC12 B Family Flex Cable Adapter Sets

| | | |
|---|---|---|
| 12B 80-pin TQ Motorola Flex cable set | An 80-pin flex cable set made by Motorola, part # SC1200009. This set consists of a solder-down TQ adapter base part # ES/000-4534, a spacer part # ES/000-2870, a Motorola CBLE and a Motorola emulator end target adapter board. | **EMUL/ADP/FLEX - B80M-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## HC12 D Family Adapter Sets Selection Chart (D60, D60A, DA128, DA128A, DG128, DG128A and DT128A)

| | 80 Pin | 112 Pin |
|---|---|---|
| **NQ Adapter Base Set** | EMUL12-D/ADP-80SD-NQ-Set<br>Price: | EMUL12-D/ADP-112SD-NQ-Set<br>Price: |
| **TQ Adapter Base Set** | EMUL12-D/ADP-80SD-TQ-Set<br>Price: | EMUL12-D/ADP-112SD-TQ-Set<br>Price: |
| **NQ Adapter Base + Flex Cable Set** | N/A | N/A |
| **TQ Adapter Base + Flex Cable Set** | N/A | EMUL/ADP/FLEX-DX-112M-Set<br>Price: |

## HC12 D Family Plain Adapter Sets Chart

| Pin Count | Adapter Set | Parts that make up the set and can be purchased separately | | | |
|---|---|---|---|---|---|
| | | NQ or TQ Adapter Base | HQ Microcontroller Cover | YQ Emulator Cover | NQ or TQ Spacer |
| **80-Pin NQ** | EMUL12-D/ADP-80SD-NQ-Set<br>Price: | ES/000-2177<br>Price: | ES/000-2178<br>Price: | ES/000-2179<br>Price: | ES/000-3660<br>Price: |
| **80-Pin TQ** | EMUL12-D/ADP-80SD-TQ-Set<br>Price: | ES/000-4534<br>Price: | | | N/A |
| **112-Pin NQ** | EMUL12-D/ADP-112SD-NQ-Set<br>Price: | ES/000-2240<br>Price: | ES/000-2241<br>Price: | ES/000-2242<br>Price: | ES/000-3720<br>Price: |
| **112-Pin TQ** | EMUL12-D/ADP-112SD-TQ-Set<br>Price: | ES/000-4584<br>Price: | | | ES/000-2970<br>Price: |

## HC12 D Family Flex Cable Adapter Sets Chart

| Pin Count | Flex Cable Set | Flex Cable Type | Flex Cable Part # | Replacement Adapter TQ | Replacement Spacer | Replacement Rotational Boards |
|---|---|---|---|---|---|---|
| **112-Pin TQ** | EMUL/ADP/FLEX-DX-112M-Set<br>Price: | Motorola Rigid Flex Cable | SC1200012 | ES/000-4584 | ES/000-2970 | Motorola board |

# Emulator to Target Adapters and Accessories (Continued)

## HC12 D Family Adapter Sets (D60, D60A, DA128, DA128A, DG128, DG128A and DT128A)

### HC12 D Family Plain Adapter Sets (no flex cable)

| | | |
|---|---|---|
| 12D 80-pin NQ adapter set | An 80-pin adapter set for the D60, D60A, DA128, DA128A, DG128, DG128A and DT128A with the "D" emulator. This set consists of a Tokyo Eletech 80-pin NQ adapter base part # ES/000-2177, microcontroller cover (HQ) part # ES/000-2178, emulator cover (YQ) part # ES/000-2179, spacer part # ES/000-3660, the EMUL-12D/ADP/112P/80P-D60 112-pin to 80-pin adapter and the adapter mezzanine board. | **EMUL12-D/ADP-80SD-NQ-Set** |
| 12D 80-pin TQ adapter set | An 80-pin adapter set for the D60, D60A, DA128, DA128A, DG128, DG128A and DT128A with the "D" emulator. This set consists of a Tokyo Eletech 80-pin TQ adapter base part # ES/000-4534, the EMUL-12D/ADP/112P/80P-D60 112-pin to 80-pin adapter and the adapter mezzanine board. | **EMUL12-D/ADP-80SD-TQ-Set** |
| 12D 112-pin NQ adapter set | A 112-pin adapter set for the D60, D60A, DA128, DA128A, DG128, DG128A and DT128A with the "D" emulator. This set consists of a Tokyo Eletech NQ adapter base part # ES/000-2240, microcontroller cover (HQ) part # ES/000-2241, emulator cover (YQ) part # ES/000-2242, spacer part # ES/000-3720 and the adapter mezzanine board. | **EMUL12-D/ADP-112SD-NQ-Set** |
| 12D 112-pin TQ adapter set | A 112-pin adapter set for the D60, D60A, DA128, DA128A, DG128, DG128A and DT128A with the "D" emulator. This set consists of a Tokyo Eletech TQ adapter base part # ES/000-4584, a spacer part # ES/000-2970 and the adapter mezzanine board. | **EMUL12-D/ADP-112SD-TQ-Set** |

### HC12 D Family Flex Cable Adapter Sets

| | | |
|---|---|---|
| 12D 112-pin TQ Motorola Flex cable set | A 112-pin flex cable set made by Motorola, part # SC1200012. This set consists of a solder-down TQ adapter base part # ES/000-4584, a spacer part # ES/000-2970, a Motorola Rigid Flex Cable and a Motorola emulator end target adapter board. The flex cable is used to move the emulator away from the target board. The assembly is inserted between the emulator and the adapter. All parts can be purchased separately. | **EMUL/ADP/FLEX-Dx-112M-Set** |

# Emulator to Target Adapters and Accessories (Continued)

## Individual Adapters

112-pin socket

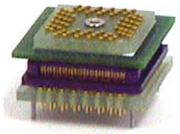
A 112-pin CTI socket that allows a 112-pin HC12 microcontroller chip to be plugged into a target board with an ES/000-4584 solder-down adapter base. The EMUL12-D/ADP-112SD-NQ-Set (listed above) is a more robust solution than this.

**ES/210-5726-00**

HC12 D 112-pin to 80- pin adapter

This is a converter adapter made by Motorola, part # SC1200027-N. This adapter is used to convert a 112-pin adapter to an 80-pin package for the D60, DA128, DA128A, DG128, or DG128A emulator. This adapter is used with the ES/000-2177/78/79 (NQ) adapter or the ES/000-4534 (TQ) adapter (not included, refer to page 48 for a description).

**EMUL-12D/ADP 112P/80P-D60**



HC12 B Winslow 80-pin QFP to PGA adapter

A Winslow 80-pin QFP to PGA adapter. This adapter is an unpopulated CPU module, that can be used with the EMUL12-B/128-16. Solder a 68HC912B32, 68HC912BC32, 68HC912BE32 or a 68HC912BD32 CPU on this adapter in order to use it as a CPU module.

**WA08065DQAET**


Isolator Adapter

A set of four isolator strips that can be inserted between the pod and the adapter, with individual DIP switches for each pin. This is useful for diagnosing signal conflicts between the pod and the target.

**EMUL-PC/ISO-160**


Motorola parts can be ordered through Micro Logic, Inc. directly by calling (248) 673-0144.

* Nohau Male-Female Flex Cable

A Nohau 10-inch flex cable with male connectors on one end and female connectors on the opposite end. It requires the 80 or 112-pin top (emulator end) rotational board and the bottom (target end) rotational board listed below.

**EMUL/ADP/FLEX-CABLE/MALE/FEMALE**

## Individual Rotational Boards

### S12X E, D, B and A Family Rotational Boards

| | | | |
|---|---|---|---|
| | S12X E/D/B/A Top emulator end 80-pin rotational board | The top emulator end rotational board for the 80-pin adapters used for the S12XD and S12XE families. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 80-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP80-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12XD/ ADP-TOP-PCB-80** |
| | S12X E/D/B/A Top emulator end 112-pin rotational board | The top emulator end rotational board for the 112-pin adapters used for the S12XD and S12XE families. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 112-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP112-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12XD/ ADP-TOP-PCB-112** |
| | S12X E/D/B/A Top emulator end 144-pin rotational board | The top emulator end rotational board for the 144-pin adapters used for the S12XD and S12XE families. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 144-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP144-050) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12XD/ ADP-TOP-PCB-144** |
| * | S12XE Top emulator end 208-pin rotational board | The top emulator end rotational board for the 208-pin adapters used for the S12XE family. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug either directly into the 208-pin bottom rotational board (ADP/BOT-PCB/S12XE-BGA208-1MM) to form an adapter, or to the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12XE/ ADP-TOP-PCB-208** |
| | S12X E/D/B/A Bottom target end 80-pin rotational board | The bottom target end rotational board for the QFP 80-pin 0.65mm pitch adapters. This board plugs into a QFP 80-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 80-pin top rotational board (EMUL-S12XD/ADP-TOP-PCB-80) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP80-065** |
| | S12X E/D/B/A Bottom target end 112-pin rotational board | The bottom target end rotational board for the QFP 112-pin 0.65mm pitch adapters. This board plugs into a QFP 112-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 112-pin top rotational board (EMUL-S12XD/ADP-TOP-PCB-112) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP112-065** |
| | S12X E/D/B/A Bottom target end 144-pin rotational board | The bottom target end rotational board for the QFP 144-pin 0.50mm pitch adapters. This board plugs into a QFP 144-pin 0.50mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 144-pin top rotational board (EMUL-S12XD/ADP-TOP-PCB-144) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP144-050** |
| * | S12XE Bottom target end 208-pin BGA rotational board | The bottom target end rotational board for the S12XE BGA 208-pin 1mm pitch adapter. This board plugs on its bottom side into a 208-pin BGA spacer and the BGA solder-down base, part # ES/030-1127-00 (spacer) and either ES/000-4078-01 (Tin-Lead base) or ES/000-4078-00 (Lead-Free base). The four headers on the top plug into either the 208-pin top rotational board (EMUL-S12XE/ADP-TOP-PCB-208) to form an adapter, or to the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **ADP/BOT-PCB/S12XE-BGA208-1MM** |

## Individual Rotational Boards (continued)

## S12XF Family Rotational Boards

| | | | |
|---|---|---|---|
| S12XF Top emulator end 64-pin rotational board | The top emulator end rotational board for the 64-pin adapters used for the S12XF family. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 64-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP64-050) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | 220.00 | **EMUL-S12XF/ ADP-TOP-PCB-64** |
| S12XF Top emulator end 80-pin rotational board | The top emulator end rotational board for the 80-pin adapters used for the S12XF family. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 80-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP80-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | 220.00 | **EMUL-S12XF/ ADP-TOP-PCB-80** |
| S12XF Top emulator end 112-pin rotational board | The top emulator end rotational board for the 112-pin adapters used for the S12XF family. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 112-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP112-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | 220.00 | **EMUL-S12XF/ ADP-TOP-PCB-112** |
| S12XF Top emulator end 144-pin rotational board | The top emulator end rotational board for the 144-pin adapters used for the S12XF family. This board connects to the bottom of the EMUL-S12X emulator. The four headers on the bottom plug into either the 144-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP144-050) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | 220.00 | **EMUL-S12XF/ ADP-TOP-PCB-144** |
| S12XF Bottom target end 64-pin rotational board | The bottom target end rotational board for the QFP 64-pin 0.50mm pitch adapters. This board plugs into a QFP 64-pin 0.50mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 64-pin top rotational board (EMUL-S12XF/ADP-TOP-PCB-64) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | | **EMUL/ADP/BOT-PCB/QFP64-050** |
| S12XF Bottom target end 80-pin rotational board | The bottom target end rotational board for the QFP 80-pin 0.65mm pitch adapters. This board plugs into a QFP 80-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 80-pin top rotational board (EMUL-S12XF/ADP-TOP-PCB-80) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | | **EMUL/ADP/BOT-PCB/QFP80-065** |
| S12XF Bottom target end 112-pin rotational board | The bottom target end rotational board for the QFP 112-pin 0.65mm pitch adapters. This board plugs into a QFP 112-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 112-pin top rotational board (EMUL-S12XF/ADP-TOP-PCB-112) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | | **EMUL/ADP/BOT-PCB/QFP112-065** |
| S12XF Bottom target end 144-pin rotational board | The bottom target end rotational board for the QFP 144-pin 0.50mm pitch adapters. This board plugs into a QFP 144-pin 0.50mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 144-pin top rotational board (EMUL-S12XF/ADP-TOP-PCB-144) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | | **EMUL/ADP/BOT-PCB/QFP144-050** |

## Individual Rotational Boards (continued)

## HCS12 C Family Rotational Boards

| | | |
|---|---|---|
| S12C Top emulator end 48-pin rotational board | The top emulator end rotational board for the 48-pin adapters used for the MC9S12C. This board connects to the bottom of the EMUL-S12 emulator. The four headers on the bottom plug into either the 48-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP48-050) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12C/ADP-TOP-PCB-48** |
| S12C Top emulator end 52-pin rotational board | The top emulator end rotational board for the 52-pin adapters used for the MC9S12C. This board connects to the bottom of the EMUL-S12 emulator. The four headers on the bottom plug into either the 52-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP52-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12C/ADP-TOP-PCB-52** |
| Bottom target end 48-pin rotational board | The bottom target end rotational board for the QFP 48-pin 0.50mm pitch adapters. Used to support the S12C family. This board plugs into a QFP 48-pin 0.50mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 48-pin top rotational board (EMUL-S12C/ADP-TOP-PCB-48) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP48-050** |
| Bottom target end 52-pin rotational board | The bottom target end rotational board for the QFP 52-pin 0.65mm pitch adapters. Used to support the S12C family. This board plugs into a QFP 52-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 52-pin top rotational board (EMUL-S12C/ADP-TOP-PCB-52) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP52-065** |

## Individual Rotational Boards (continued)

## HCS12 K, D, B and A Family Rotational Boards

| | | |
|---|---|---|
| S12K/D/B/A Top emulator end 80-pin rotational board | The top emulator end rotational board for the 80-pin adapters used for the MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx. This board connects to the bottom of the EMUL-S12 or EMUL-S12D emulator. The four headers on the bottom plug into either the 80-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP80-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12D/ADP-TOP-PCB-80** |
| S12K/D/B/A Top emulator end 112-pin rotational board | The top emulator end rotational board for the 112-pin adapters used for the MC9S12DP256, Axxx, Bxxx, Dxxxx and Kxxxx. This board connects to the bottom of the EMUL-S12 or EMUL-S12D emulator. The four headers on the bottom plug into either the 112-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP112-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12D/ADP-TOP-PCB-112** |
| S12K/D/B/A Bottom target end 80-pin rotational board | The bottom target end rotational board for the QFP 80-pin 0.65mm pitch adapters. This board plugs into a QFP 80-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 80-pin top rotational board (EMUL-S12D/ADP-TOP-PCB-80) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP80-065** |
| S12K/D/B/A Bottom target end 112-pin rotational board | The bottom target end rotational board for the QFP 112-pin 0.65mm pitch adapters. This board plugs into a QFP 112-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 112-pin top rotational board (EMUL-S12D/ADP-TOP-PCB-112) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP112-065** |

## Individual Rotational Boards (continued)

## HCS12 E Family Rotational Boards (MC9S12 E256, E128, E64 and E32)

| | | |
|---|---|---|
| HCS12 E Top emulator end 80-pin rotational board | The top emulator end rotational board for the 80-pin adapters used for the MC9S12E128. This board connects to the bottom of the EMUL-S12 emulator. The four headers on the bottom plug into either the 80-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP80-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12E/ADP-TOP-PCB-80** |
| HCS12 E Top emulator end 112-pin rotational board | The top emulator end rotational board for the 112-pin adapters used for the MC9S12E128. This board connects to the bottom of the EMUL-S12 emulator. The four headers on the bottom plug into either the 112-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP112-065) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12E/ADP-TOP-PCB-112** |
| HCS12 E Bottom target end 80-pin rotational board | The bottom target end rotational board for the QFP 80-pin 0.65mm pitch adapters. This board plugs into a QFP 80-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 80-pin top rotational board (EMUL-S12D/ADP-TOP-PCB-80) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/ MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP80-065** |
| HCS12 E Bottom target end 112-pin rotational board | The bottom target end rotational board for the QFP 112-pin 0.65mm pitch adapters. This board plugs into a QFP 112-pin 0.65mm pitch Tokyo Eletech solder-down TQ or NQ base. The four headers on the top plug into either the 112-pin top rotational board (EMUL-S12D/ADP-TOP-PCB-112) to form an adapter, or it can be used with the flex cable (EMUL/ADP/FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL/ADP/BOT-PCB/QFP112-065** |

## Individual Rotational Boards (continued)

### HCS12 H Family Rotational Boards

To try and help distinguish the rotational boards we have added "HD", "T" and an "EE" to the part numbers listed below. Please note that "HD" stands for H256, "T" stands for target and "EE" stands for emulator end.

| | | |
|---|---|---|
| Nohau 10-inch flex cable | A Nohau 10-inch flex cable to extended adapter away from the emulator board. Requires rotational board pair (EMUL-S12D/ADP-S12-112HD or -144HD) for connection at each end. | **EMUL/ADP/FLEX/UNIV** |
| H256 pair of 112-pin rotational boards | Pair of two rotational boards for the 112-pin H256 that mates to the Nohau flex cable part number EMUL/ADP/FLEX/UNIV (listed above). The two included rotational boards are: EMUL-S12D/ADP-S12-112HD-T and EMUL-S12D/ADP-S12-HD-EE, listed below. | **EMUL-S12D/ADP-S12-112HD** |
| H256 144-pin pair of rotational boards | Pair of two rotational boards for the 144-pin H256 that mates to the Nohau flex cable part number EMUL/ADP/FLEX/UNIV (listed above). The two included rotational boards are: EMUL-S12D/ADP-S12-144HD-T and EMUL-S12D/ADP-S12-HD-EE listed below. | **EMUL-S12D/ADP-S12-144HD** |
| H256 target end 112-pin rotational board | This is the rotational board that connects the Nohau flex cable to the 112-pin target and is half of the 112-pin pair listed above. The purpose of this board is to add 112-pin capability to the 144-pin rotational board pair listed above. This is made by Motorola and their part number is M68TAS12HHNTE-10. | **EMUL-S12D/ADP-S12-112HD-T** |
| H256 target end 144-pin rotational board | This is the rotational board that connects the Nohau flex cable to the 144-pin target and is half of the 144-pin pair listed above. The purpose of this board is to add 144-pin capability to the 112-pin rotational board pair listed above. This is made by Motorola and their part number is M68TA144NTE-10. | **EMUL-S12D/ADP-S12-144HD-T** |
| H256 Replacement rotational board - emulator end | Replacement rotational board for the emulator end. It is included with the purchase of part numbers EMUL-S12D/ADP-S12-112HD or EMUL-S12D/ADP-S12-144HD, listed above. This is made by Motorola and their part number is M68PPBS12HN-10. | **EMUL-S12D/ADP-S12-HD-EE** |

### HCS12 T Family Rotational Boards

| | | |
|---|---|---|
| S12T Top emulator end 80-pin rotational board | The top emulator end rotational board for the 80-pin targets used for the MC9S12T64. This board connects to the bottom of the EMUL-S12 emulator. The four headers on the bottom plug into either the 80-pin bottom rotational board (EMUL/ADP/BOT-PCB/QFP80-050) to form an adapter, or it can be used with the flex cable (EMUL/ADP/ FLEX-CABLE/MALE-FEMALE) to extend the emulator away from the target. | **EMUL-S12T/ADP-TOP-PCB-80** |
| S12T bottom 80-pin rotation board | Universal bottom rotational adapter board for QFP 80-pin, 0.50mm pitch. Supports the S12T family. | **ADP/BOT-PCB/QFP80-050** |

### HC12 B and D Family Rotational Boards

These rotational boards are made by Motorola and can be ordered directly from Motorola or through Micro Logic, Inc. directly by calling (248) 673-0144.

# Emulator to Target Adapters and Accessories (Continued)

## 48-pin Replacement Adapter Components

| | | |
|---|---|---|
| 48-pin NQ adapter base | A replacement 48-pin solder-down adapter NQ base (NQPACK048SD). | **ES/000-2075** |
| 48-pin HQ CPU cover | A replacement 48-pin solder-down adapter NQ microcontroller cover (HQPACK048SD). | **ES/000-2076** |
| 48-pin YQ emulator cover | A replacement 48-pin solder-down adapter NQ emulator cover (YQPACK048SD). | **ES/000-2077** |
| 48-pin NQ spacer | A replacement 48-pin NQ spacer between the solder-down base and the adapter PCB (YQSOCKET048SDF). Used for the ES/000-2075/76/77. | **ES/000-3574** |
| 48-pin TQ adapter base | A replacement 48-pin solder-down TQ adapter base (TQPACK048SD). | **ES/000-4468** |
| 48-pin TQ spacer | A replacement 48-pin TQ spacer between the solder-down base and the adapter PCB (YQSOCKET048SDG). | **ES/000-2726** |

## 52-pin Replacement Adapter Components

| | | |
|---|---|---|
| 52-pin NQ adapter base | A replacement 52-pin solder-down adapter NQ base (NQPACK052SB). | **ES/000-2085** |
| 52-pin HQ CPU cover | A replacement 52-pin solder-down adapter NQ microcontroller cover (HQPACK052SB). | **ES/000-2086** |
| 52-pin YQ emulator cover | A replacement 52-pin solder-down adapter NQ emulator cover (YQPACK052SB). | **ES/000-2087** |
| 52-pin NQ spacer | A replacement 52-pin NQ spacer between the solder-down base and the adapter PCB (YQSOCKET052SBF). Used for the ES/000-2085/86/87. | **ES/000-3588** |
| 52-pin TQ adapter base | A replacement 52-pin solder-down TQ adapter base (TQPACK052SB). | **ES/000-4472** |
| 52-pin TQ spacer | A replacement 52-pin TQ spacer between the solder-down base and the adapter PCB (YQSOCKET052SBW). | **ES/000-2756** |

# Emulator to Target Adapters and Accessories (Continued)

## 64-pin Replacement Adapter Components

| | | |
|---|---|---|
| * 64-pin NQ adapter base | A replacement 64-pin solder-down adapter NQ base (NQPACK064SD). | **ES/000-2105** |
| * 64-pin HQ CPU cover | A replacement 64-pin solder-down adapter NQ microcontroller cover (HQPACK064SD). | **ES/000-2106** |
| * 64-pin YQ emulator cover | A replacement 64-pin solder-down adapter NQ emulator cover (YQPACK064SD). | **ES/000-2107** |
| * 64-pin NQ spacer | A replacement 64-pin NQ spacer between the solder-down base and the adapter PCB (YQSOCKET064SDF). Used for the above ES/000-2105/06/07. | **ES/000-3610** |
| * 64-pin TQ adapter base | A replacement 64-pin solder-down TQ adapter base (TQPACK064SD). | **ES/000-4492** |
| * 64-pin TQ spacer | A replacement 64-pin TQ spacer between the solder-down base and the adapter PCB (YQSOCKET064SDW). | **ES/000-2786** |

## 80-pin Replacement Adapter Components

| | | |
|---|---|---|
| **S12T** 80-pin NQ adapter base | An S12T replacement 80-pin solder-down adapter NQ base (NQPACK080SD). | **ES/000-2174** |
| **S12T** 80-pin HQ CPU cover | An S12T replacement 80-pin solder-down adapter NQ microcontroller cover (HQPACK080SD). | **ES/000-2175** |
| **S12T** 80-pin YQ emulator cover | An S12T replacement 80-pin solder-down adapter NQ emulator cover (YQPACK052SD). | **ES/000-2176** |
| **S12T** 80-pin NQ spacer | A replacement 80-pin NQ spacer between the solder-down base and the adapter PCB (YQSOCKET052SDF). Used for the ES/000-2174/75/76. | **ES/000-3588** |

# Emulator to Target Adapters and Accessories (Continued)

## 80-pin Replacement Adapter Components (continued)

| | | |
|---|---|---|
| 80-pin NQ adapter base | A replacement 80-pin solder-down adapter NQ base (NQPACK080SB). | **ES/000-2177** |
| 80-pin HQ CPU cover | A replacement 80-pin solder-down adapter NQ microcontroller cover (HQPACK080SB). | **ES/000-2178** |
| 80-pin YQ emulator cover | A replacement 80-pin solder-down adapter NQ emulator cover (YQPACK080SB). | **ES/000-2179** |
| Complete 80-pin NQ solder-down | This part consists of the NQ 80-pin solder-down adapter base (NQPACK080SB), the emulator cover (YQPACK080SB) and the microcontroller cover (HQPACK080SB). | **ES/000-2177/78/79** |
| 80-pin NQ spacer | A replacement 80-pin NQ spacer between the solder-down base and the adapter PCB (YQSOCKET080SBF). Used for the ES/000-2177/78/79. | **ES/000-3660** |
| 80-pin TQ adapter base | A replacement 80-pin solder-down TQ adapter base (TQPACK080SB). | **ES/000-4534** |
| 80-pin TQ spacer | A replacement 80-pin TQ spacer between the solder-down base and the adapter PCB (TQSOCKET080SBW). Used for the ES/000-4534 adapter. | **ES/000-2870** |
| 112- pin to 80-pin adapter | This is a converter adapter made by Motorola, part # SC1200027-N. This adapter is used to convert a 112-pin adapter to an 80-pin package for the D60, DA128, DA128A, DG128, or DG128A emulator. This adapter is used with the ES/000-2177/78/79 (NQ) adapter or the ES/000-4534 (TQ) adapter. | **EMUL-12D/ADP 112P/80P-D60**  |

## 112-pin Replacement Adapter Components

| | | |
|---|---|---|
| 112-pin NQ adapter base | A replacement 112-pin NQ solder-down adapter base (NQPACK112SB). | **ES/000-2240** |
| 112-pin HQ CPU cover | A replacement 112-pin NQ microcontroller cover (HQPACK112SB)). | **ES/000-2241** |
| 112-pin YQ emulator cover | A replacement 112-pin NQ emulator cover (YQPACK112SB)). | **ES/000-2242** |
| 112-pin NQ spacer | A replacement 112-pin NQ spacer (YQSOCKET112SBF). Used for the ES/000-2240/41/42 adapter. | **ES/000-3720** |
| 112-pin TQ adapter base | A replacement 112-pin QFP TQ solder-down adapter base (TQPACK112SB). | **ES/000-4584** |
| 112-pin TQ spacer | A replacement 112-pin TQ spacer (TQSOCKET112SBW). | **ES/000-2970** |

# Emulator to Target Adapters and Accessories (Continued)

## 144-pin Replacement Adapter Components

| | | |
|---|---|---|
| 144-pin NQ adapter base | A replacement 144-pin NQ solder-down adapter base 0.5mm pitch (NQPACK144SD). | **ES/000-2303** |
| 144-pin HQ CPU cover | A replacement 144-pin NQ microcontroller cover (HQPACK144SD). | **ES/000-2304** |
| 144-pin YQ emulator cover | A replacement 144-pin NQ emulator cover (YQPACK144SD). | **ES/000-2305** |
| 144-pin NQ spacer | A replacement 144-pin NQ spacer (YQSOCKET144SDF). Used for the ES/000-2303/4/5 adapter. | **ES/000-3776** |
| 144-pin TQ adapter base | A replacement 144-pinTQ solder-down adapter base 0.5mm pitch (TQPACK144SD). | **ES/000-4632** |
| 144-pinTQ spacer | A replacement 144-pin TQ spacer with 3mm guide pins (TQSOCKET144SDG). | **ES/000-3065** |

## 208-pin BGA Replacement Adapter Components

| | | |
|---|---|---|
| * 208-pin Tin-Lead BGA adapter base | A replacement 208-pin BGA solder-down base with Tin-Lead solder-spheres (non-RoHS Compliant). This Tin-Lead adapter base requires traditional Tin-Lead BGA assembly temperature and assembly process. | **ES/000-4078-01** |
| * 208-pin Lead-Free BGA adapter base | A replacement 208-pin BGA solder-down base with Lead-Free SAC305 solder-spheres (RoHS Compliant). This Lead-Free adapter base requires higher-temperature Lead-Free BGA assembly process. | **ES/000-4078-00** |
| * 208-pin BGA IC adapter | A replacement 208-pin BGA IC adapter, to solder a BGA microcontroller on, and plug into the 208-pin BGA solder-down base, or the 208-pin BGA spacer to test stand-alone or BDM operation with the same physical target board. | **ES/140-1127-00** |
| * 208-pin BGA spacer | A replacement 208-pin spacer. Used to adapt between the 208-pin BGA solder-down base which plugs on its bottom side, and either the 208-pin BGA bottom rotational board, or the 208-pin BGA IC adapter, which both plug on its top side. Several BGA spacers may be stacked together if greater elevation of the adapter from the traget board is needed (each additional spacer elevates the higher adapter parts by additional 3mm). | **ES/030-1127-00** |

# Software Support Packages

## Debugger Packages

### Dearborn Group, Inc.

*Debugger*

This is an Active-x control for OSEK/VDX kernel aware debugging. It provides task, stack, timer, event and message information. The real-time graph displays of task/services, service coverage and stack coverage require the trace card. **DG-OSEK-12**

DG is a trademark of the Dearborn Group, Inc.

## Compiler Packages

### COSMIC Software, Inc.

*Assembler; C Compiler, Linker*

This package provides a full 68HC12 ANSI/ISO standard C compiler, Motorola mcuASM standard assembler, relocating linker, runtime libraries and binary utility programs including librarian, hex file generator, absolute listing generator and object module inspector. Windows 95/98 and NT/2000. **COSMIC/CWSH12**

COSMIC is a trademark of COSMIC Software, Inc.

### IAR Systems Software, Inc.

*Assembler; C Compiler, Linker*

This package contains an ANSI optimized C compiler, C-SPY simulator, relocatable macro assembler, linker, librarian, complete ANSI runtime libraries and a fully integrated development environment under Win98/ME/NT4/2000/XP. The add-ons include additional C-SPY debugger engines interfacing to a variety of hardware evaluation boards or emulators. 50% discount offered on all C-SPY add-ons if purchased with the Embedded Workbench. **IAR/EW6812**

IAR is a trademark of IAR Systems Software, Inc.

### Metrowerks (Formerly HiWare)

*Assembler; C Compiler, Linker*

This package has unlimited data visualization, access to 170 software beans, unlimited C and assemble, EC++/C++ limited to 1K, processor expert basic and software beans for HCS12 derivatives, and no limitation on number of files/subprojects. **CWHC12STD**

This package includes the features in the standard package listed above plus: decoder, maker, libmaker, bean wizard, code coverage that allows the user to isolate unused portions of code, profiler/performance analysis to identify and optimize critical code, software trace/logic analyzer combined with breakpoints, session recorder and player, advanced complex beans, C++/EC++/compact C++ C source encryption tools, i_Logix 'Rhapsody in MicroC' support, hardware interface with SDI, and OSEK awareness. **CWHC12PRO**

Metrowerks and HiWare are trademarks of Metrowerks.

# Software Support Packages (continued)

## RTOS Packages

### CMX Systems, Inc.

CMX-RTX is a truly preemptive, multi-tasking, RTOS supporting the entire HC12 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 $1,750 each. If you want the product developed specifically for your site the cost would be $6,000.

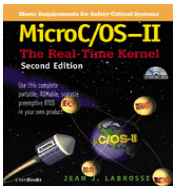
**68HC12-CMX-RTX**

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.

# Evaluation Boards

Evaluation boards for the A4, B32 and BC32 are available through Nohau or directly through Axiom Manufacturing: www.axman.com.

Evaluation boards for the D60 and DG128 are available through Technological Arts: www.technologicalarts.com.

For information on Motorola evaluation boards please contact Nohau California.

# Books

This book explores the M68HC12 microcontroller family from the programmer's perspective. It also devotes considerable space to the description of selected on-chip peripherals available on various family members.
Written by: Gordon Doughman
Also available on the web at HTTP://www.annabooks.com.

**Programming the Motorola M68HC12 Family**

## Extended Hardware Warranties

Purchase of each major EMUL12–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 been allowed to lapse. An additional year of coverage may 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 |
| **Emulator motherboard extended warranty coverage, 1 year** | Emulator motherboard |
| **Trace extended warranty coverage, 1 year** | Trace |
| **CPU module extended warranty coverage, 1 year** | CPU module |

## Non-Warranty Repairs

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 the parts, with the exception of bondouts and some adapters.

| | |
|---|---|
| **Hourly rate** | |
| **Minimum charge** | |
| **Maximum charge** | One half the purchase price. |