

Two red lines intersect on a blue background. One line starts from the top right and goes down to the left. The other line starts from the top left and goes down to the right. They intersect at a point marked with a small white circle. The background is a gradient of blue, darker at the top and lighter at the bottom.

ETAS ETK11.0 Emulator Probe for Freescale MPC5500 Family

User Guide

Copyright

The data in this document may not be altered or amended without special notification from ETAS GmbH. ETAS GmbH undertakes no further obligation in relation to this document. The software described in it can only be used if the customer is in possession of a general license agreement or single license. Using and copying is only allowed in concurrence with the specifications stipulated in the contract.

Under no circumstances may any part of this document be copied, reproduced, transmitted, stored in a retrieval system or translated into another language without the express written permission of ETAS GmbH.

© **Copyright 2021** ETAS GmbH, Stuttgart

The names and designations used in this document are trademarks or brands belonging to the respective owners.

ETK11.0 User Guide R05 EN - 11.2021

Contents

1	About this Document	6
1.1	Classification of Safety Messages	6
1.2	Presentation of Instructions	6
1.3	Typographical Conventions	7
1.4	Presentation of Supporting Information	7
2	Basic Safety Notices	8
2.1	General Safety Information	8
2.2	Requirements for Users and Duties for Operators	8
2.3	Intended Use	8
2.4	Identifications on the Product	12
2.5	Taking the Product Back and Recycling	13
2.6	Declaration of Conformity	13
	2.6.1 CE Declaration of Conformity (European Union)	13
	2.6.2 UKCA Declaration of Conformity (Great Britain)	13
2.7	RoHS Conformity	13
	2.7.1 European Union	13
	2.7.2 China	14
2.8	Declarable Substances	14
2.9	Use of Open Source Software	14
3	Introduction	15
3.1	Applications	15
3.2	Features	15
4	Hardware Description	16
4.1	Architecture	16
4.2	Microcontroller Interface	17
4.3	Samtec Connector	18
4.4	Data Emulation and Data Measurement	18
	4.4.1 Data Emulation Memory	18
	4.4.2 Measurement Data Memory	19
	4.4.3 Triggering of Measurement Data Acquisition	20
	4.4.4 Data Retention in Data Emulation and Measurement Data Memory ...	22
4.5	Data Flash Memory	22
4.6	Code Flash Memory	23
4.7	Power Supply	23
4.8	Serial ETK Interface	24
4.9	Status LEDs	25
4.10	Braindead Flashing	26
4.11	Reset	27

5	Installation	28
5.1	Connection to the ECU	28
5.2	Connecting to the Power Supply	28
5.2.1	Permanent Power Supply inside ECU available, Scenario 1	28
5.2.2	Permanent Power Supply inside ECU available, Scenario 2	29
5.2.3	Permanent Power Supply inside ECU not available	29
5.2.4	Isolated Power Supply inside ECU	29
6	ETK Configuration	30
6.1	Overview	30
6.2	ETK Configuration Tool	30
6.3	Configuration Features	31
6.4	Connection List	33
7	Technical Data	35
7.1	System Requirements	35
7.1.1	ETAS Hardware	35
7.1.2	PC with one Ethernet Interface	35
7.1.3	Supported Software	36
7.2	Supported Microcontrollers	36
7.3	Environmental Conditions	36
7.4	Configuration	37
7.5	Serial ETK Interface	37
7.6	Power Supply	37
7.7	ECU Switched Power Monitoring	37
7.8	Test Characteristics	38
7.9	Electrical Characteristics	39
7.10	Signal Description	40
7.11	Switching Characteristics	42
7.11.1	Read Timing: Data Emulation and Measurement Data DPR	42
7.11.2	Write Timing: Data Emulation and Measurement Data DPR	43
7.12	Mechanical Dimensions	44
7.12.1	ETK11.0	44
8	Cables and Accessories	46
8.1	Interface Cables	46
8.1.1	Interface Cable KA54 (with PG Cable Gland)	46
8.1.2	Interface Cable KA55	48
8.1.3	Interface Cable CBAM200	48
8.2	Power Supply Cables	49
8.2.1	Cable ETV	49
8.2.2	Cable with Filtercoil ETV2	49
8.2.3	Cable K70	49
8.2.4	Cable KA50	50
8.2.5	Cable CBM200	50
8.3	Adapters	51
8.3.1	ETK - ECU Adapter ETAE10	51

9	Ordering Information	52
9.1	ETK11.0	52
9.2	Connector ECU - ETK	52
9.3	Adapters	52
9.4	Cables	52
	9.4.1 Interface Cables	52
	9.4.2 Power Supply Cables.....	53
9.5	Power Supply	53
10	ETAS Contact Addresses	54
	Figures	55
	Index	56

1 About this Document

1.1 Classification of Safety Messages

The safety messages used here warn of dangers that can lead to personal injury or damage to property:



DANGER

indicates a hazardous situation with a high risk of death or serious injury if not avoided



WARNING

indicates a hazardous situation of medium risk which could result in death or serious injury if not avoided.



CAUTION

indicates a hazardous situation of low risk which may result in minor or moderate injury if not avoided.

NOTICE

indicates a situation which may result in damage to property if not avoided.

1.2 Presentation of Instructions

The target to be achieved is defined in the heading. The necessary steps for this are in a step-by-step guide:

Target definition

1. Step 1
2. Step 2
3. Step 3
- > Result

1.3 Typographical Conventions

Software

OCI_CANTxMessage msg0 =	Code snippets are presented on a gray background and in the Courier font. Meaning and usage of each command are explained by means of comments. The comments are enclosed by the usual syntax for comments.
Choose File → Open .	Menu commands are shown in boldface.
Click OK .	Buttons are shown in boldface.
Press <ENTER>.	Keyboard commands are shown in angled brackets.
The "Open File" dialog box is displayed.	Names of program windows, dialog boxes, fields, etc. are shown in quotation marks.
Select the file <code>set up . exe</code> .	Text in drop-down lists on the screen, program code, as well as path- and file names are shown in the Courier font.
<i>A distribution</i> is always a one-dimensional table of sample points.	General emphasis and new terms are set in italics.

Hardware

Bold	Menu commands, buttons, labels of the product
<i>Italic</i>	Emphasis on content and newly introduced terms

1.4 Presentation of Supporting Information



NOTE

Contains additional supporting information.

2 Basic Safety Notices

This chapter contains information about the following topics:

2.1 General Safety Information

- General Safety Information 8
- Requirements for Users and Duties for Operators 8
- Intended Use 8
- Identifications on the Product 12
- Taking the Product Back and Recycling 13
- Declaration of Conformity 13
- RoHS Conformity 13
- Declarable Substances 14
- Use of Open Source Software 14

Please observe the Product Safety Notices ("ETAS Safety Notice") and the following safety notices to avoid health issues or damage to the device.



NOTE

Carefully read the documentation (Product Safety Advice and this User Guide) that belongs to the product prior to the startup.

ETAS GmbH does not assume any liability for damages resulting from improper handling, unintended use or non-observance of the safety precautions.

2.2 Requirements for Users and Duties for Operators

The product may be assembled, operated and maintained only if you have the necessary qualification and experience for this product. Improper use or use by a user without sufficient qualification can lead to damages or injuries to one's health or damages to property.

The safety of systems using the product is the responsibility of the system integrator.

General Safety at Work

The existing regulations for safety at work and accident prevention must be followed. All applicable regulations and statutes regarding operation must be strictly followed when using this product.

2.3 Intended Use

An ETK is an electronic component that is installed in a vehicle control unit (ECU) to read data from the ECU or write data to the ECU.

Application Area of the Product

This product was developed and approved for automotive applications. For use in other application areas, please contact your ETAS contact partner.

Requirements for Operation

The following requirements are necessary for safe operation of the product:

- Use the product only according to the specifications in the corresponding User Guide. With any deviating operation, the product safety is no longer ensured.
- Observe the regulations applicable at the operating location concerning electrical safety as well as the laws and regulations concerning work safety!
- Do not apply any voltages to the connections of the product that do not correspond to the specifications of the respective connection.
- Connect only current circuits with safety extra-low voltage in accordance with EN 61140 (degree of protection III) to the connections of the product.
- The power supply for the product must be safely disconnected from the supply voltage. For example, use a car battery or a suitable lab power supply.
- Use only lab power supplies with double protection to the supply system.
- Ensure that the connections of the power supply are easily accessible.
- The module does not have an operating voltage switch.
 - Switch on the product by connecting the power supply cable with the power supply or by switching on the power supply.
 - Switch off the product by disconnecting it from the power supply or by switching off the power supply.



DANGER

Connect the power cord only with a vehicle battery or with a lab power supply! A connection to power outlets is prohibited.

Route the power cord in such a way that it is protected against abrasion, damages, deformation and kinking. Do not place any objects on the power cord.

Never apply force to insert a plug into a socket. Ensure that there is no contamination in and on the connection, that the plug fits the socket, and that you correctly aligned the plugs with the connection.

Do not use the product in a wet or damp environment.

Do not use the product in potentially explosive atmospheres.

Keep the surfaces of the product clean and dry.

Potential Equalization



CAUTION

Danger from inadvertent current flow!

Depending on the design, the shield of the Ethernet cables can be connected with the housing of the module. Install the products only on components with the same electrical potential or isolate the products from the components.

Requirements for the technical State of the Product

The product is designed in accordance with state-of-the-art technology and recognized safety rules. The product may be operated only in a technically flawless condition and according to the intended purpose and with regard to safety and dangers as stated in the respective product documentation. If the product is not used according to its intended purpose, the protection of the product may be impaired.

Maintenance and Cleaning

The product is maintenance-free. Use a lightly moistened, soft, lint-free cloth for cleaning the product. Ensure that no moisture can enter. Never spray cleaning agents directly onto the product. Do not use any sprays, solvents or abrasive cleaners which could damage the product.

Transport and Installation



CAUTION

The ETK can be damaged or destroyed!

Some components of the ETK board may be damaged or destroyed by electrostatic discharges. Please keep the ETK in its storage package until it is installed.

The board should only be taken from its package, configured, and installed at a work place that is protected against static discharge.



CAUTION

During installation and removal, ECU and ETK must be in a de-energized state!



CAUTION

Risk of short circuiting the internal signals of the ETK!

When you mount the ETK to the ECU, you must ensure that the screws and washers used will not penetrate the ETK printed circuit board.

**CAUTION**

Differences in case ground potentials can cause high currents to flow through the shields of the cables that connect various system modules.

Ensure that the module mounting surfaces are at the same electrical potential or insulate the modules from their mounting surfaces.

Cabling

Use exclusively ETAS cables at the connections of the product! Adhere to the maximum permissible cable lengths! Observe the assignment of the cables to the connectors! Detailed information about cabling is located in the ETK User Guides.

2.4 Identifications on the Product



Fig. 2-1 Adhesive Label (Example: Label for XETK-S14.0)

The following symbols are used for identifications of the product: (

Symbol	Description
	The User Guide must be read prior to the startup of the product!
	WEEE symbol, see chapter 2.5 on page 13
	CE conformity symbol (European Union), see chapter 2.6.1 on page 13
	UKCA conformity symbol (Great Britain), see chapter 2.6.2 on page 13)
	China RoHS symbol, see chapter 2.7.2 on page 14
	China RoHS symbol, see chapter 2.7.2 on page 14
	Symbol for electrostatic sensitive components
XETK-S14.0A	Product designation (example)
F 00K 110 722	Order number of the product (example)
SN: yyxxxxx	Serial number (7-digit)
XXXX/YY	Product version
ZZZZ	Year of manufacture
ETAS GmbH, PO Box 300220, 70442 Stuttgart, Germany	Manufacturer's address

**NOTE**

For symbols and product information one or several adhesive labels can be used.

2.5 Taking the Product Back and Recycling

The European Union has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are setup throughout the EU for the collection, treating and recycling of electronic waste.

This ensures that the devices are recycled in a resource-saving way representing no danger to health or the environment.



Fig. 2-2 WEEE-Symbol

The WEEE symbol (see Fig. 2-2 on page 13) on the product or its packaging shows that the product must not be disposed of as residual garbage.

The user is obliged to collect the old devices separately and return them to the WEEE take-back system for recycling. The WEEE directive concerns all ETAS devices but not external cables or batteries.

For more information on the ETAS GmbH Recycling software, contact the ETAS sales and service locations.

2.6 Declaration of Conformity

2.6.1 CE Declaration of Conformity (European Union)

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable product-specific European Directives. The CE Declaration of Conformity for the product is available upon request.

2.6.2 UKCA Declaration of Conformity (Great Britain)

With the UKCA mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable standards and directives of Great Britain. The UKCA declaration of conformity for the product is available on request.

2.7 RoHS Conformity

2.7.1 European Union

The EU Directive 2011/65/EU limits the use of certain dangerous materials for electrical and electronic devices (RoHS conformity).

This product does not contain any of the restricted substances specified in the EU Directive 2011/65/EU or exceeds the maximum concentrations stipulated therein. For individual electronic components used in our products, there are currently no equivalent alternative substances, which is why we make use of the exception 7A and 7C-I in Annex III of this Directive.

ETAS confirms that the product corresponds to this directive which is applicable in the European Union.

2.7.2 China

ETAS confirms that the product meets the product-specific applicable guidelines of the China RoHS (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in China with the China RoHS marking affixed to the product or its packaging.

2.8 Declarable Substances

European Union

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with substances that are subject to declaration in accordance with the REACH regulation (EU) no.1907/2006.

Detailed information is located in the ETAS download center in the customer information "REACH Declaration" (www.etas.com/Reach). This information is continuously being updated.

2.9 Use of Open Source Software

The product uses Open Source Software (OSS). This software is installed in the product at the time of delivery and does not have to be installed or updated by the user. Reference shall be made to the use of the software in order to fulfill OSS licensing terms. Additional information is available in the document "OSS Attributions List" at the ETAS website www.etas.com.

3 Introduction

This chapter contains information about the following topics:

- Applications 15
- Features 15

3.1 Applications

The ETK11.0 is an emulator test probe (ETK) for the Freescale MPC5500 microcontroller family with an external bus interface available. It is a typical parallel ETK with a 16 bit interface.

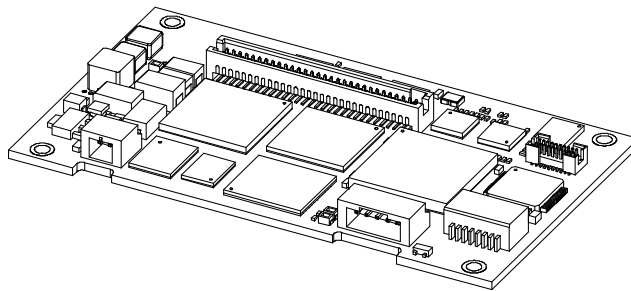


Fig. 3-1 ETK11.0

It is compatible with the ETAS calibration and development system interface (e.g. ES690, ES590, ES591, ES910 and ES1000.2/ES1000.3 with ES1232-A). Earlier systems (e.g. MAC2, ES1000.1 with ES1201 board) are not supported.

3.2 Features

- Applicable for Freescale MPC5500 family microcontrollers with an external bus interface
- Supports 16- and 8-bit accesses to each memory
- CPU bus interface voltage configurable to 2.5 V or 3.3 V
- Two pages of data emulation memory available, each with 1 MByte
- One page of measurement data memory available, 256 KByte
- Permanent storage of emulation data in flash memory
- RAM adaptor mode
- Can drive "Boot configuration" to configure the CPU
- ECU flashing via ETK
- Enable or disable the ETK by ECU software
- Brainless flashing under ProF control
- Serial interface with 100 Mbit/s to the calibration and development system
- Permanent storage of configuration in E²PROM
- Firmware update (programming of the logic device) through software; removal of ETK or ECU not necessary

For more technical data see chapter "Technical Data" on page 35.

4 Hardware Description

This chapter contains information about the following topics:

- Architecture 16
- Microcontroller Interface 17
- Samtec Connector 18
- Data Emulation and Data Measurement 18
- Data Flash Memory 22
- Code Flash Memory 23
- Power Supply 23
- Serial ETK Interface 24
- Status LEDs 25
- Braindead Flashing 26
- Reset 27

4.1 Architecture

Fig. 4-1 "ETK11.0 Architecture" shows the block diagram of the ETK11.0. The microcontroller can read and write from one of the two pages of the data emulation memory and can write its data directly to the measurement data memory. These two memories (data emulation memory, measurement data memory) are accessed using two separate chip selects. The data emulation Reference Page and Working Page are realized in one DPR while the measurement data memory is realized in another DPR.

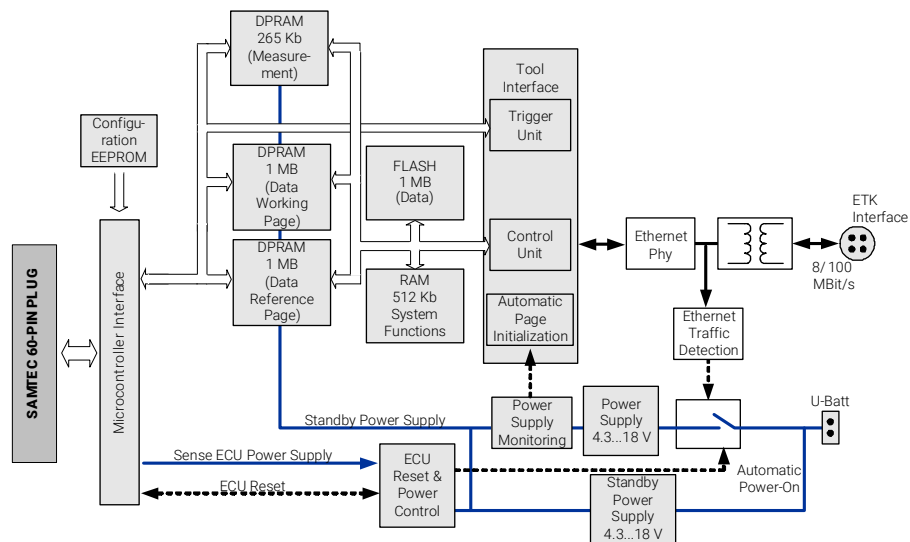


Fig. 4-1 ETK11.0 Architecture

While the microcontroller accesses the program data (not the program code) out of the data emulation memory, the content of the data emulation memory can simultaneously be modified by the calibration and development system through the serial ETK-interface. This process enables adjustments of parameters, characteristic lines and maps through the calibration and development

system. Using an additional measurement data memory area, the ECU microcontroller can send data to the calibration and development system which receives, buffers and processes this measured data.

A flash memory is available for permanent storage of the adjusted parameters (program data).

The 100 Mbit/s serial interface provides communication with the calibration and development system.

The power supply for the ETK11.0 is provided by a switch mode power supply, to minimize power dissipation.

4.2 Microcontroller Interface

The microcontroller interface to the calibration and development system memory has a 16 bit wide data bus and requires separate chip selects for the data emulation memory and the measurement memory. The data emulation memory of the ETK11.0 is accessed by asserting the signal /SGCS of the ETK. The measurement memory is accessed by asserting the signal /SGWCS of the ETK.

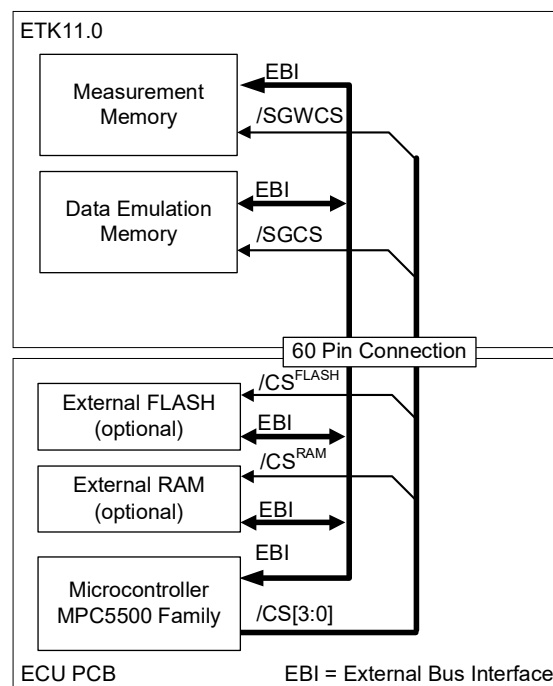


Fig. 4-2 System with internal and external Memory

The processor can read and write its data directly to or from the data emulation and measurement data memory. Fig. 4-2 "System with internal and external Memory" shows an overview of a system with "on chip" flash and RAM, external flash and external RAM memory. It also shows the possibilities to access the different memories with unique chip selects. Any two of the microcontroller chip selects (/CS0, /CS1, /CS2, /CS3) can be connected to the data emulation and measurement data memory of the ETK. For the use case of braindead flashing, the microcontroller chip select /CS0 must be connected to one of the ETK chip select signals (/SGCS or /SGWCS) and the ETK must be the only memory device connected to /CS0.

4.3 Samtec Connector

The Samtec connector is the interface between the ETK11.0 and the ECU. This connector has pins for the data bus, address bus, control signals, chip selects, boot configuration pins, ETK power connection, and grounds. For more detailed information of the 60 pin interface, refer to Chapter 7.10 "Signal Description".

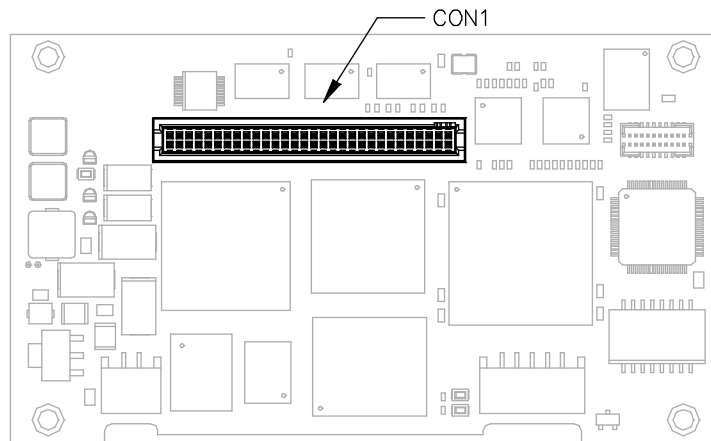


Fig. 4-3 ECU Interface Connector CON1

4.4 Data Emulation and Data Measurement

The complete data emulation and measurement data memory consists of two 1 MByte pages for emulation memory and one 256 KByte page for measurement memory.

4.4.1 Data Emulation Memory

The data emulation memory has a fixed size of 1 MByte and must be defined at a 1 MByte boundary. The data emulation memory used by the microcontroller can have a variable size and offset address inside this fixed 1 MByte address range.

During operation of the ECU, only program data, not program code, can be modified by using the data emulation memory. Modification of program code could lead to a system crash. The program code should be continuously processed out of the internal or external memory, not from one of the ETK memories.

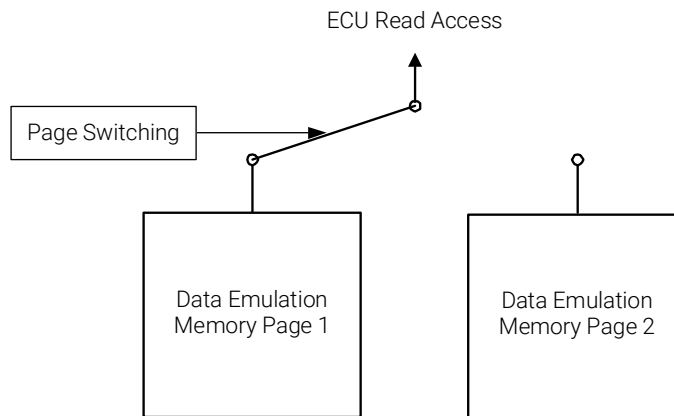


Fig. 4-4 Data Emulation Memory: 2 Pages with 1 MByte each

Reference data can be stored on one page ("Reference page") while the data on the other page ("Working page") can be modified. It is possible to switch between the two pages during operation through the application software.



NOTE

The data emulation memory is write protected by default. This memory can be write enabled by changing the appropriate setting using the ETK Configuration Tool.

4.4.2 Measurement Data Memory

The measurement data memory has a fixed size of 256 KByte and must be defined at a 256 KByte boundary. The measurement data memory used by the microcontroller can have a variable size and offset address inside this fixed 256 KByte address range. This memory is primarily used to store data acquired by the Display Table 13 measurement method. The measured data stored here can be transferred to the calibration and development system via the serial ETK interface. The 128 Byte Trigger Segment, which is described in more detail in the section to follow, must be defined within the measurement data memory. For more information regarding the Display Table 13 process, please contact your local ETAS representative.

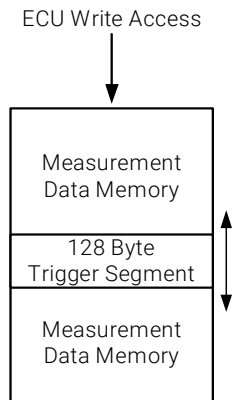


Fig. 4-5 Measurement Data Memory: 1 Page with 256 KByte



NOTE

The measurement data memory is read protected by default. This memory can be read enabled by changing the appropriate setting using the ETK Configuration Tool.

4.4.3 Triggering of Measurement Data Acquisition

The exact procedure for capturing measured data is explained in the documentation Display Table 13; only the hardware-specific features are mentioned here. The ECU microcontroller initiates a data acquisition task by writing an arbitrary value to the trigger address at the so called trigger segment. The software of the ECU is able to start different data acquisition tasks by writing different trigger addresses (trigger 1 to trigger 32).

The ETK11.0 contains a trigger comparator which can be configured to select a segment of 128 Bytes out of the measurement data memory address space (at a 128 Byte boundary). The base address of the chosen 128 Byte segment is known as the trigger segment address. Fig. 4-6 "Division of the 128 Byte Trigger Segment" shows the configuration of the 128 Byte trigger segment.

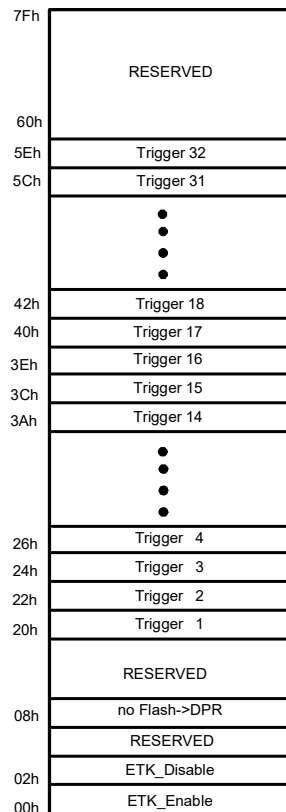



Fig. 4-6 Division of the 128 Byte Trigger Segment

The ETK11.0 provides an extended trigger segment with up to 32 direct 16-bit hardware triggers.

 **NOTE**

The unused address areas within the trigger segment are reserved for future applications and must not be used for other purposes.

For ECU setup and debugging purposes, the ETK11.0 data emulation memory can be disabled by writing an arbitrary value to the appropriate address (ETK_Disable) in the trigger segment. When disabled, the ETK data emulation memory does not respond to read and write accesses. The measurement memory (including the trigger segment) will still respond to write accesses and will respond to read accesses based on the state defined by the "ETK Configuration Tool" (RAM Emulation Memory: Read protected / Read enabled). Writing to ETK_Enable enables the ETK data emulation memory.

The disable/enable state is volatile, i.e. after power up, the ETK will boot in the state defined by the "ETK Configuration Tool" (ETK state after power up).

4.4.4 Data Retention in Data Emulation and Measurement Data Memory

The data emulation memory physically consists of one static Dual Port RAM that is permanently supplied with power from the car battery, to guarantee that data is preserved even when the ignition is switched off. If the ECU with ETK is isolated from the battery, all data will be lost.

4.5 Data Flash Memory

Flash memory is provided on the ETK11.0 for permanent storage of emulation data. Users can copy the contents of the data emulation memory into the flash memory using the application software. It is recommended that an updated data set is always stored in the flash memory.

The ETK11.0 has a circuit which recognizes and stores power failures. If this circuit detects power failures, and therefore a possible inconsistency of the emulation data, the ETK initiates a copying procedure from flash memory to data emulation memory upon restart. The flash memory data is copied to both emulation pages. A green LED on the ETK displays the status. The application software announces the procedure by a message in the status line.

The measurement data memory is not stored into or restored from the flash memory. The content is random after a power failure of the ETK.

If the ETK11.0 is used as a normal RAM, it may be useful that this copying procedure is switched off. This can be done by any of the following:

- Writing to a dedicated address in the trigger segment (trigger segment address + 0x008h, see Fig. 4-6 "Division of the 128 Byte Trigger Segment").
- Setting the configuration parameter **ETK Usage as** with the "ETK Configuration Tool" to the state "RAM adaptor not initialized" or "RAM adaptor initialized" (see chapter "Configuration Features" on page 31).
- Setting the configuration parameter Data Memory with the "ETK Configuration Tool" to the state "Write enabled" (see chapter "Configuration Features" on page 31) and writing to any location within the 1MB of data emulation memory.

The green LED on the ETK will be switched off.



NOTE

The writes to either the trigger segment or the data emulation memory must be generated by the ECU. Writing to either sections using the application software Hex Editor will not provide the desired result.

4.6 Code Flash Memory

The program code is not emulated by the ETK11.0. The program code is stored in the ECU flash memory ("on chip" and/or external) and is not modified by the ETK11.0. Only the accessible emulation data areas are emulated by the ETK11.0. The ECU flash memory can be programmed with the normal flash memory programming tools.

4.7 Power Supply

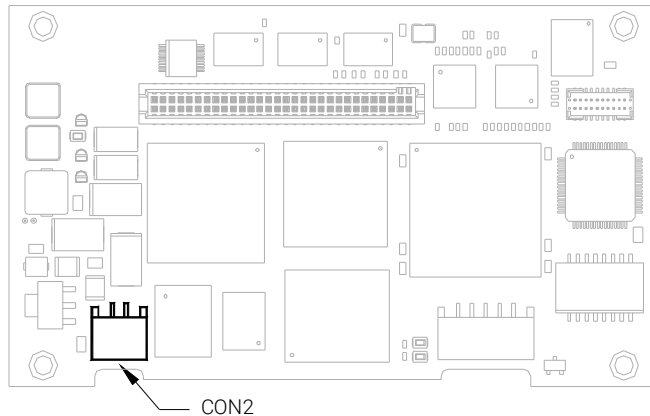


Fig. 4-7 Power Supply Connector CON2

The ETK11.0 requires a permanent power supply to ensure proper ETAS system behavior. The most common approach to meet this requirement is to power the ETK11.0 directly from the car battery. The input voltage of the ETK11.0 may vary between 4.3 V and 18 V. In case of higher input voltages to the ETK, an additional voltage converter is required.

Using the permanent power supply, all voltages required internally to the ETK are generated by its own switching power supplies. The power supply of the ECU is not impacted by the ETK11.0. The ECU voltage (USG) is monitored by the ETK to recognize whether the ECU is switched on or off.

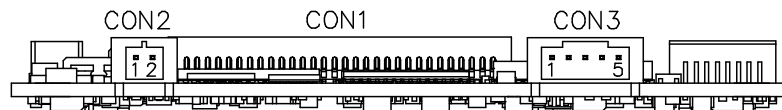


Fig. 4-8 Power Supply Connectors CON1 and CON2

The ETK11.0 can be supplied with power through the 2-pin power supply connector CON2.

Optionally, the ETK11.0 can be supplied with power through the Samtec connector CON1, refer to Chapter 7.10 "Signal Description" for a detailed list and description of each pin.

Pin CON2	Signal	Description
1	U_{Batt}	Battery Supply Voltage for ETK
2	GND	Ground

4.8 Serial ETK Interface

The ETK11.0's 100 Mbit/s serial interface, CON3, is the link to the ETAS calibration and development system. The ES1232-A board for the ES1000 system, the ES690, the ES590, the ES591, and the ES910 will support this 100 Mbit/s interface.

The interface utilizes a 100Base-TX transmission to achieve a transmission performance of 100 Mbit/s. It is not possible to use the old interface cable (for 8 Mbit/s) with the new interface in the 100 Mbit/s mode.

To ensure stable communication, only the 100 Mbit/s cables delivered by ETAS should be used.

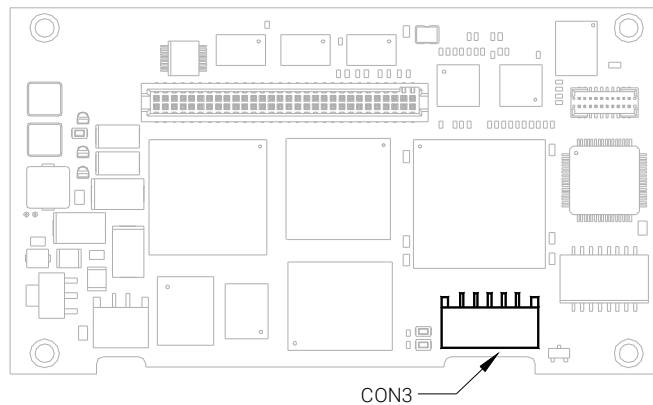


Fig. 4-9 Location of the Serial ETK Interface

4.9 Status LEDs

There are three LEDs displaying the operating status of the ETK11.0 (Fig. 4-10 on page 25).

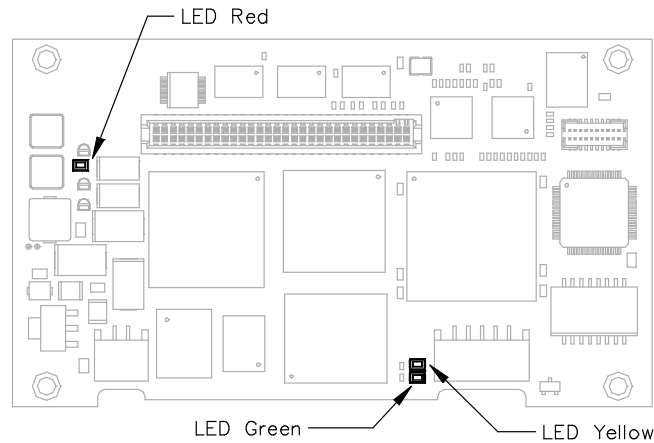


Fig. 4-10 Status LEDs

LED	State	Definition
Red	On	ETK11.0 is supplied with power and active (i.e. the ECU is switched on or the ETAS calibration and development system is connected and ready to communicate with the ETK11.0)
Green	On	When the ETK power supply voltage drops below 3.5 V, the data retention of the DPRs is no longer ensured. When the ETK is switched on again, the content of the ETK-Flash will be copied into the reference and working pages. The green LED stays on until the calibration and development system copies new data into RAM.
	Flashing	ETK11.0 is in RAM adapter mode. Measurement and calibration is not possible (in all "ETK usage as" modes except "ETK mode initialized")
	Off	Working page may be different to reference page. Working page and reference page may be different to the ETK-Flash.
Yellow	On	100 Mbit/s communication to calibration system established

4.10 Braindead Flashing

In order to support braindead flashing the ETK11.0 provides the hardware prerequisites to allow booting the microcontroller from the ETK memory and making the flash accessible to the software while the microcontroller is running from the ETK memory. For braindead flashing it is required that the microcontroller boots from one of the ETK's memories.

NOTE

To allow the possibility of braindead flashing the appropriate signals from the microcontroller must be connected to the following signals of the ETK11.0: /SGRESOUT, SGBOOTCFG[1:0], and /SGRSTCFG. Also, /CS0 of the microcontroller must be connected to either /SGCS or /SGWCS of the ETK11.0 and must not be used by any other memory device on the ECU. The ETK11.0 must also be configured to use /SGRESOUT to monitor the microcontroller's reset status, see "Configuration Features" on page 31.

When braindead flashing is initiated, the first step is to force the ECU's microcontroller into reset. Valid boot programming code will be downloaded into the ETK11.0. The ETK will drive the BOOTCFG[1:0] inputs such that the ECU's microcontroller is configured to external boot. Upon releasing the reset line, the RSTCFG pin is driven low in order to force the microcontroller to accept the external Reset Configuration presented on BOOTCFG[1:0]. The ECU's microcontroller boots from /CS0 (which must be connected to the ETK's signal /SGCS or /SGWCS) and executes the boot programming (recovery) code from the ETK memory. The recovery program accepts data via the ETK mailbox and programs it into the internal microcontroller flash. When flash programming is done, the microcontroller must be forced into reset again and the changes done before must be reverted. When reset is released next time, the microcontroller takes its Reset Configuration from the ECU and boots from the standard boot memory (i.e. internal flash) to execute the recently programmed code.

To avoid bus contentions when the ETK drives the Reset Configuration the BOOTCFG[1:0] bus and the RSTCFG signal of the microcontroller must not be hard-wired to VCC or GND or driven by a strong driver. Instead, the bus must either be driven by a driver that is disabled when the ETK is driving the Reset Configuration or by weak pull-up or pull-down resistors.

NOTE

The microcontroller's FMPLL mode selection signals PLLCFG[1:0] are not driven by the ETK11.0, they must be driven to appropriate voltage levels by the ECU during braindead flashing. Refer to the microcontroller's reference manual for details.

PLLCFG0	PLLCFG1	Clock Mode
0	0	Bypass Mode
0	1	External Reference (Oscillator)
1	0	Crystal Reference
1	1	1:1 Mode

4.11 Reset

The requirement for the ETK reset mechanism is to ensure that the power-up and power-down behavior of ECU is clean and smooth and to prevent corruption of data stored in the ETK.

To accomplish this the ETK11.0 senses the switched power supply of the ECU. This allows it to detect when the ECU is off and forward this information to application software. In addition, it allows the ETK to enter the power save mode when the CAL tool (ES690/ES590/ES591/ES910) is unplugged. In addition, the ETK11.0 senses the status of the microcontroller's reset state to generate a write protect signal for its memories. If the "ETK Configuration Tool" setting "Reset-out signal from ECU is used" is set to "Yes", the ETK11.0 will monitor the microcontroller's reset state on the pin /SGRESOUT. Otherwise, the ETK11.0 will monitor the reset state on the pin /SGRES. Finally, the ETK11.0 generates a reset signal by pulling /SGRES to keep the ECU in reset while the ETK is in power save mode and to prevent the μ C from starting until the ETK is ready to work. The ETK is ready to work when it has finished its initialization after leaving power save mode or after initial power-up. This feature allows it also to reset the ECU under tool control (required for INCA and ProF) and to perform an emergency stop of the ECU in case of ETK failure.

5 Installation

This chapter contains information about the following topics:

- Connection to the ECU 28
- Connecting to the Power Supply 28

5.1 Connection to the ECU

To directly mount the ETK11.0 to the ECU, a 60 pin Samtec socket is required. It is also possible to connect the ETK11.0 to the ECU using the ETAE10 flexible circuit adapter. When using the ETAE10 the same ECU connector is required.

The ECU connector and the ETAE10 adapter need to be ordered separately (refer chapter "Ordering Information" on page 52).

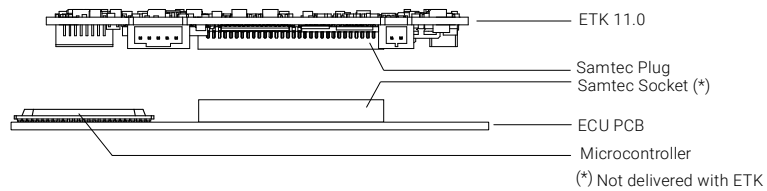


Fig. 5-1 ETK11.0 Connection to the ECU

5.2 Connecting to the Power Supply

The ETK11.0 requires a permanent power supply (refer chapter "Power Supply" on page 23). There are several different connection methods.

5.2.1 Permanent Power Supply inside ECU available, Scenario 1

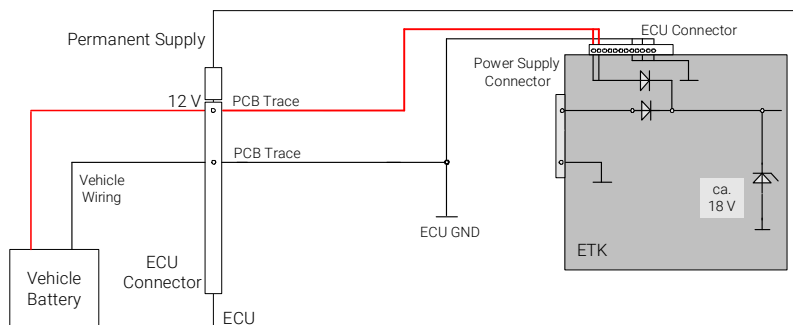


Fig. 5-2 Permanent Power Supply inside ECU available (ECU Connector)

5.2.2 Permanent Power Supply inside ECU available, Scenario 2

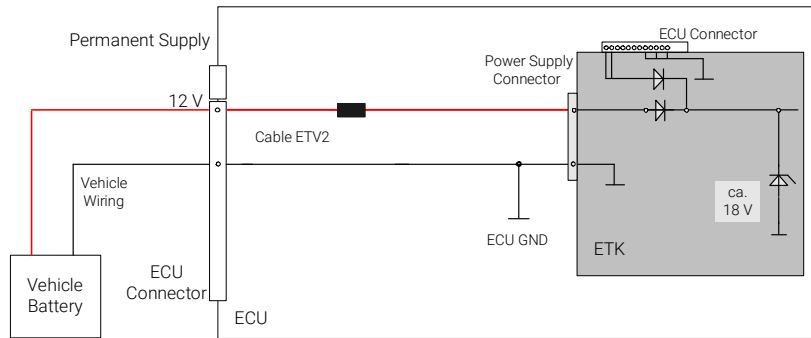


Fig. 5-3 Permanent Power Supply inside ECU available (Power Connector)

5.2.3 Permanent Power Supply inside ECU not available

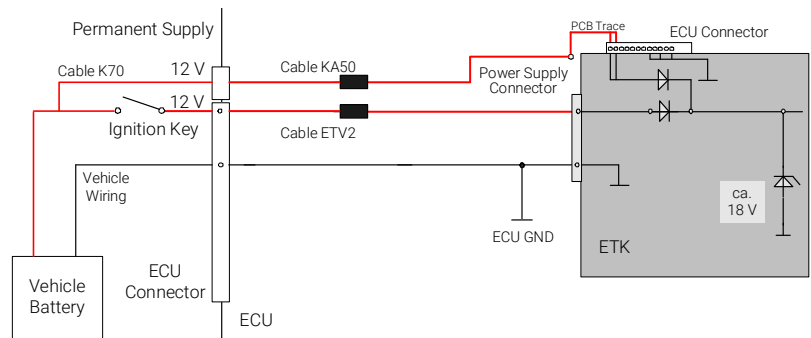


Fig. 5-4 Permanent Power Supply inside ECU not available

5.2.4 Isolated Power Supply inside ECU

The ETK11.0 does not require a galvanically isolated power supply. For special applications ETAS offers the isolated power supply ETP2.

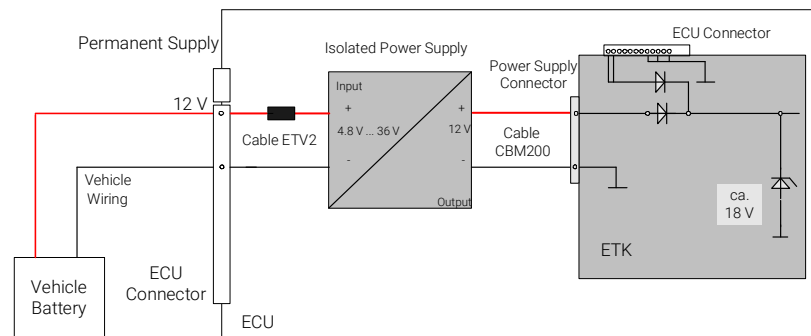


Fig. 5-5 Isolated Power Supply inside ECU

6 ETK Configuration

This chapter contains information about the following topics:

- Overview 30
- ETK Configuration Tool 30
- Configuration Features 31
- Connection List 33

6.1 Overview

As already mentioned in previous chapters, some project-specific adjustments are necessary. Configuration data is stored permanently in a serial E²PROM. Generating a valid configuration data set is supported by the "ETK Configuration Tool". The "ETK Configuration Tool" contains information on all available ETKs. The user is supported through a graphical interface.

6.2 ETK Configuration Tool

Generating a valid configuration data set is supported by the "ETK Configuration Tool". The "ETK Configuration Tool" contains information on all available ETKs. The user is supported through a graphical interface.

The configuration is done in two steps:

- A Generation of the special address offset for the emulation and measurement data memory.

The location of data areas, measured data output areas, trigger segment addresses etc. are familiar to the ECU software developer, or can be generated automatically. If an ECU description database (ASAP, ...) with the corresponding input exists, these inputs can be downloaded from this database. If necessary, a plausibility check is performed.

- B Connection of the ETK to the ECU.

The ECU hardware developer defines the connection of the ETK to the ECU. Items such as the ECU bus voltage and ECU reference voltage usually have to be adjusted for each microcontroller or ECU variant. All inputs are checked for plausibility, to make sure that a valid configuration is generated.

The "ETK Configuration Tool" can create the following output:

- A Direct ETK configuration
- B Storage of the configuration in a data file
- C The corresponding ASAP input

The most important outputs are the entries for the ASAP file. The parameter ETK_CFG is created and contains the complete ETK configuration of the ECU interface in hex code. If this parameter is entered correctly in the corresponding ECU description file, it guarantees that every time the calibration system is started, the ETK is checked for the appropriate configuration. If necessary, the ETK will be configured appropriately to the corresponding project.

6.3 Configuration Features

The configuration of the ETK11.0 is possible with the "ETK Configuration Tool". Not all combinations of parameters are supported. The "ETK Configuration Tool" provides support concerning the configuration features. The following is a list with configuration features:

- **ETK Usage as** (ETK mode initialized, ETK mode not initialized, RAM adaptor not initialized, RAM adaptor initialized, ETK disabled)

This feature allows the ETK11.0 to be used as a RAM extension. The possible states are:

- ETK mode initialized: The ETK is used in the normal way. When using the ETK together with INCA this mode gets set when an ASAM-2MC configuration is written to the ETK.
- ETK mode not initialized: Normal ETK operation, but when a power fail occurs no data gets copied from the backup flash into the data emulation pages.
- RAM adaptor not initialized: The ETK is used as RAM extension.
- RAM adaptor initialized: The ETK is used as RAM extension. If a power fail occurs the memory from the backup flash gets copied into the the data emulation pages used as a RAM extension.

NOTE

RAM extension: The data emulation memory and measurement data memory behave as normal RAM devices. The trigger segment within the measurement data memory is removed. The read and write protection of each memory is still configured by the setting of the configuration features "Data Memory" and "RAM Emulation Memory".

- ETK disabled: The ETK is invisible to the ECU.

The default value is "ETK mode initialized".

In all "ETK usage as" modes except "ETK mode initialized" the ETK11.0 is not in its normal operation mode, i.e. measurement and calibration are not possible.

NOTE

Do not use the ETK11.0 with INCA when the ETK is in any state other than "ETK mode initialized". Always reconfigure the ETK after it was used as RAM adaptor to ensure correct behavior with INCA.

- **Power-On State** (Active/Inactive)
 - Active: The ETK is enabled at ECU power on.
 - Inactive: The ETK is inactive when the ECU power on. The data emulation memory will not respond to read or write accesses. The measurement data memory and trigger segment will be accessible by the microcontroller.

The default value is Active.

- **Reset-out signal from ECU is used** (Yes/No)
 - No: The ETK will monitor the pin /SGRES to determine the ECU's reset state. Use this setting if the microcontroller's Reset-out signal is not connected to the ETK pin /SGRESOUT.
 - Yes: The ETK will monitor the pin /SGRESOUT to determine the ECU's reset state. To use this setting, the microcontroller's Reset-out signal must be connected to the ETK pin /SGRESOUT.

The default value is No.



NOTE

To use the braindead flashing feature, this configuration item must be set to "Yes".

- **Boot mode** (Internal, Serial, External Single Master, External Multi Master, Selected by ECU)

Selects from which memory the ECU boots.

In all boot modes except Selected by ECU, the appropriate signals from the microcontroller must be connected to the following signals of the ETK11.0: SGBOOTCFG[1:0] and /SGRSTCFG.

The default value is Selected by ECU.



NOTE

To select any Boot mode other than "Selected by ECU", the configuration item "Reset-out signal from ECU is used" must be set to "Yes".

- **ECU Power Supply Supervision Nominal Voltage** (2.5 V, 3.3 V, 5V)
 - Selects the voltage level the ETK will use to determine if the the ECU is on.
 - The default value is 5.0V.
- **ECU bus voltage** (2.5 V, 3.3 V)
 - Selects the ECU data bus voltage.
 - The default value is 3.3V.
- **RAM Emulation Memory** (Read protected, Read enabled)
 - Read protected: The microcontroller can write to the measurement data memory, but it is not possible to read from this memory.
 - Read enabled: The microcontroller can read and write to the measurement data memory.
 - The default value is Read protected.
- **Data Memory** (Write protected, Write enabled)
 - Write protected: The microcontroller can read from the data emulation memory, but it is not possible to write to this memory.
 - Write enabled: The microcontroller can read and write to the data emulation memory.
 - The default value is Write protected.

6.4 Connection List

In addition to the configuration features described above, the "ETK Configuration Tool" also provides a connection list which is partially configurable. The connection list should be used to specify which address lines of the MPC5500 microcontroller are connected to the ETK11.0.

NOTE

The connection list should not be used to determine the required pin to pin connections between the microcontroller and the ETK11.0. Please refer to the section "Signal Description" on page 40 as a reference for pin to pin connections between the microcontroller and the ETK11.0.

The external bus interface of the MPC5500 family of microcontrollers provides up to 24 address lines. The address lines A[8:31] are defined such that A8 is the most significant and A31 is the least significant address line. The ETK11.0 only provides 1 MByte of addressable memory, so only address lines SGA[12:31] are defined on the ETK11.0 ECU connector. SGA12 is the most significant and SGA31 is the least significant address line of the ETK.

Each of the most significant 4 address lines of the ETK11.0 are configurable to be either the microcontroller's address line or ground. The configuration of the address lines in the connection list must match the actual connection made at the ETK11.0 ECU connector. When an address line is not connected to the ETK, see scenario's 2 through 5 below, the microcontroller can use it as a general purpose pin to realize other ECU functions. When fewer address lines are connected to the ETK, the total addressable memory size of the ETK decreases. The total addressable memory size of the ETK is directly related to the size of available data emulation memory from the microcontroller's point of view.

The five possible configuration scenarios are shown below. Only the ECU side of the connection list can be edited. The signal names of the ETK side of the connection list should be ignored.

Scenario	ECU	ETK Software Name	ETK Hardware Name*	ETK Addressable Memory Size
1	A15	---->	SGA16	1 MByte
	A14	---->	SGA17	
	A13	---->	SGA18	
	A12	---->	SGA19	
2	A15	---->	SGA16	512 KByte
	A14	---->	SGA17	
	A13	---->	SGA18	
	GND	---->	SGA19	
3	A15	---->	SGA16	256 KByte
	A14	---->	SGA17	
	GND	---->	SGA18	
	GND	---->	SGA19	

Scenario	ECU	ETK Software Name	ETK Hardware Name*	ETK Addressable Memory Size
4	A15 ---->	SGA16	SGA15	128 KByte
	GND ---->	SGA17	SGA14	
	GND ---->	SGA18	SGA13	
	GND ---->	SGA19	SGA12	
5	GND ---->	SGA16	SGA15	64 KByte
	GND ---->	SGA17	SGA14	
	GND ---->	SGA18	SGA13	
	GND ---->	SGA19	SGA12	

*The ETK signal names under the "ETK Software Name" column are only what is shown in the connection list of the ETK Configuration Tool. The ETK signal names under the "ETK Hardware Name" column are the names of the ETK signals that should be used in a hardware design when connecting the ETK to the microcontroller.

7 Technical Data

This chapter contains information about the following topics:

- System Requirements 35
- Supported Microcontrollers..... 36
- Environmental Conditions..... 36
- Configuration..... 37
- Serial ETK Interface 37
- Power Supply..... 37
- ECU Switched Power Monitoring..... 37
- Test Characteristics..... 38
- Electrical Characteristics..... 39
- Signal Description..... 40
- Switching Characteristics..... 42
- Mechanical Dimensions..... 44

7.1 System Requirements

7.1.1 ETAS Hardware

ETAS VME Hardware

ES1000.2/ES1000.3 with ES1120.2/1120.3 and ES1232 (ES1120.1 is not supported)

ETAS Compact Modules

ES590, ES591, ES592, ES593-D, ES595, ES89x, ES910 (ES690 is not supported)

7.1.2 PC with one Ethernet Interface

A PC with one open Ethernet interface (1 Gbit/s) with RJ45 connection is required. Ethernet interfaces that are implemented with an additional network card in the PC must feature a 32-bit data bus.

Requirement to ensure successful Initialization of the Module



NOTE

It is imperative you disable the function which automatically switches to power-saving mode on your PC network adapter when there is no data traffic on the Ethernet interface!

To deactivate the Power saving Mode

Choose in Windows System Control Center / Device Manager / Network Adapter the used network adapter by double-click. Deactivate the "Allow the computer to turn off this device to save power" option in the "Power Management" register. Confirm your configuration.

The manufacturers of network adapter have different names for this function.

Example:

- "Link down Power saving"
- "Allow the computer to turn off this device to save power"

7.1.3 Supported Software

The following software versions (or newer) are required to support the ETK11.0:

Software	Version (or higher)
HSP (Firmware)	5.1
INCA	5.4.1
ASCET-RP	5.5
INTECRIO	2.1

7.2 Supported Microcontrollers

Type	Supported Microcontrollers
ETK11.0	Freescale MPC5554, MPC5553, MPC5565, MPC5566



NOTE

Only Freescale MPC5500 microcontrollers in a package with an external bus interface are supported.

7.3 Environmental Conditions

Item	Characteristics
Temperature range (operation)	- 40 °C to +110 °C/ - 40 °F to +230 °F
Temperature range (storage)	0 °C to +50 °C/ - 18 °F to +122 °F
Relative humidity (non-condensing)	0 to 95%
Operating altitude	max. 5000 m/ 16400 ft
Contamination level	2
Degree of protection	Determined by installation in ECU
Overvoltage category (AC mains supply)	II

7.4 Configuration

Item	Characteristics
Configuration	Project-specific configuration for different voltage and memory configurations stored in EEPROM
Update	Logic devices updated through software

7.5 Serial ETK Interface

Item	Characteristics
Transmission speed	100 Mbit/s
Cable length	max. 30 m / 100 ft.
Serial Interface	DC decoupling

7.6 Power Supply

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Permanent power supply (car battery)	U_{Batt}	Vehicle usage ¹⁾	4.3	12	18	V
			[all values $\pm 0\%$]			
Standby Current	I_{STBY}	$U_{\text{Batt}} = 12 \text{ V};$ ECU off; $T = 20 \text{ }^\circ\text{C}$	0.1	12	20	mA
Operating Current	I_{Batt}	$U_{\text{Batt}} = 12 \text{ V};$ ECU on; $T = 20 \text{ }^\circ\text{C}$	40	70	100	mA

1) The ETK11.0 implements reverse voltage protection in the same range and may be used only with central load dump protection.

7.7 ECU Switched Power Monitoring

Parameter	Symbol	Condition	Min	Typ	Max	Unit
ECU Supply Voltage - Power Detect (5V)	$U_{\text{SG}_5\text{V}}$	ECU on	3.86			V
		ECU off			3.79	V
ECU Supply Voltage - Power Detect (3.3V)	$U_{\text{SG}_3.3\text{V}}$	ECU on	2.73			V
		ECU off			2.67	V
ECU Supply Voltage - Power Detect (2.5V)	$U_{\text{SG}_2.5\text{V}}$	ECU on	2.02			V
		ECU off			1.94	V
ECU Supply Voltage - Sense Current	I_{USG}	$U_{\text{SG}} = 2.5/3.3/5.0 \text{ V}$			0.1	mA

7.8 Test Characteristics

Parameter	Symbol	Condition	Min	Max	Unit
Reset delay 1	t_{Reset1}	$U_{\text{Batt}} = 12 \text{ V}$ $U_{\text{SG}} = 0 \text{ V} \uparrow 5.0\text{V}/ 3.3 \text{ V}/$ 2.5 V without transferring flash	15	35	ms
Reset delay 2	t_{Reset2}	$U_{\text{Batt}} = 12 \text{ V}$ $U_{\text{SG}} = 0 \text{ V} \uparrow 5.0\text{V}/ 3.3 \text{ V}/$ 2.5 V with transferring flash	135	150	ms
Reset delay 3	t_{Reset3}	$U_{\text{Batt}}=0 \text{ V} \uparrow 12 \text{ V}$ transfer FPGA and flash	205	400	ms



NOTE

t_{Reset1} : Delay of ECU reset through ETK without transferring the flash
(U_{Batt} present, U_{SG} will be switched on)

t_{Reset2} : Delay of ECU reset through ETK with transferring the flash
(U_{Batt} present, transfer active, U_{SG} will be switched on)

t_{Reset3} : max. delay of ECU reset through ETK
(U_{Batt} and U_{SG} will be switched on)

7.9 Electrical Characteristics

Signal	Pin Type	V_{OL} (max) [V]	V_{OH} (min) [V]	V_{IL} (max) [V]	V_{IH} (min) [V]	V_{IH} (max) [V]	Leakage current [μ A]	Additional Load by ETK (typ) [pF] ⁹⁾
SGA[12:31]	I	-	-	0.69	1.61	4.6	-5/+5	5
SGD[15:0] ¹⁾	I/O	0.55 ³⁾	1.75 ⁵⁾	0.69	1.61	4.6	-5/+5	10
SGD[15:0] ²⁾	I/O	0.70 ⁴⁾	2.30 ⁶⁾	0.9	2.1	4.6	-5/+5	10
/SGRW, /SGOE, /SGBE[1:0], /SGCS, /SGWCS	I	-	-	0.7	1.6	4.1	-10/+10	5
/SGRESOUT	I	-	-	0.7	1.7	5.5	-25/+25	20
/SGRES	I/ OD ⁷⁾	-	-	0.7	1.7	5.5	-25/+30	50
SGBOOTCFG[1:0], /SGRSTCFG	O	.70	2.4 ⁸⁾	-	-	5.5	-25/+25	20
RES0, RES1	I/O	.70	2.4 ⁸⁾	0.7	1.7	5.5	-25/+25	20

1) ECU Data bus configured for 2.5V

2) ECU Data bus configured for 3.3V

3) at -9 mA load

4) at -12 mA load

5) at 9 mA load

6) at 12 mA load

7) Open Drain FET; $I_{Dmax} = 0.2$ A

8) at -8 mA load

9) Samtec connector not considered; PCB 1pF/cm

7.10 Signal Description

The ETK11.0 signal names and descriptions are defined in the same manner as the Freescale MPC5500 microcontroller family. I.e. MPC5554 signal D15 should be connected to ETK11.0 signal SGD15 and MPC5554 signal A31 should be connected to ETK11.0 signal SGA31.

The direction for each signal is indicated using the following abbreviations:

I - Input Pin; O - Output Pin, I/O - Bidirectional Pin; OD - Open Drain Output;

IP - Input Power; IS - Input Sense.

Signal	Description	Dir	Pins
GND	Ground	-	1, 10, 19, 43, 47, 53, 58
SGD15	Data 15	I/O	2
SGD14	Data 14	I/O	3
SGD13	Data 13	I/O	4
SGD12	Data 12	I/O	5
SGD11	Data 11	I/O	6
SGD10	Data 10	I/O	7
SGD9	Data 9	I/O	8
SGD8	Data 8	I/O	9
SGD7	Data 7	I/O	11
SGD6	Data 6	I/O	12
SGD5	Data 5	I/O	13
SGD4	Data 4	I/O	14
SGD3	Data 3	I/O	15
SGD2	Data 2	I/O	16
SGD1	Data 1	I/O	17
SGD0	Data 0	I/O	18
SGA31	Address 31	I	20
SGA30	Address 30	I	21
SGA29	Address 29	I	22
SGA28	Address 28	I	23
SGA27	Address 27	I	24
SGA26	Address 26	I	25
SGA25	Address 25	I	26
SGA24	Address 24	I	27
SGA23	Address 23	I	28
SGA22	Address 22	I	29
SGA21	Address 21	I	30
SGA20	Address 20	I	31
SGA19	Address 19	I	32
SGA18	Address 18	I	33
SGA17	Address 17	I	34

Signal	Description	Dir	Pins
SGA16	Address 16	I	35
SGA15	Address 15	I	36
SGA14	Address 14	I	37
SGA13	Address 13	I	38
SGA12	Address 12	I	39
/SGBE1	Byte / Write Enable 1, access to SGD[15:8]	I	40
/SGCS	Chip Select: Data Emulation Memory	I	41
/SGWCS	Chip Select: Measurement Data Memory	I	42
SGRW	Read / Write	I	44
/SGOE	Output Enable	I	45
RES0	Reserved Input 0	I	46
/SGBE0	Byte / Write Enable 0, access to SGD[7:0]	I	48
USG	ECU Switched Supply, Sense Voltage	IS	49
/SGRES	Reset: Controls and Monitors ECU reset	OD	50
SGBOOTCFG0	Boot Configuration Pin 0	O	51
SGBOOTCFG1	Boot Configuration Pin 1	O	52
RES1	Reserved Input 1	I	54
/SGRSTCFG	Reset Configuration	O	55
/SGRESOUT	Reset Output Sense (Optionally used when configured, by default /SGRES is used.)	I	56
/ETKCON	ETK Detection - 3.9K Pull Down on ETK	O	57
SGUBATT	Permanent Power Supply to the ETK	IP	59, 60

7.11 Switching Characteristics

The following diagrams show the read timing and write timing the ETK11.0 is capable of meeting.



NOTE

The timing is measured at a reference level of 1.5 V. Output signals are measured with 10 pF to ground and 50 Ω to 1.5 V.

7.11.1 Read Timing: Data Emulation and Measurement Data DPR



Fig. 7-1 Read Cycle: Data Emulation and Measurement Data DPR

Para.	Description	Min	Max	Unit
t ₁	Address access time		19	ns
t ₂	Chip select access time		25	ns
t ₃	Output enable until valid data is driven to bus		25	ns
t ₄	Valid data is driven to bus after output enable inactive	4	10	ns
t ₅	Time after read until other device may drive bus		15	ns
t ₆	Read cycle time		50	ns

7.11.2 Write Timing: Data Emulation and Measurement Data DPR

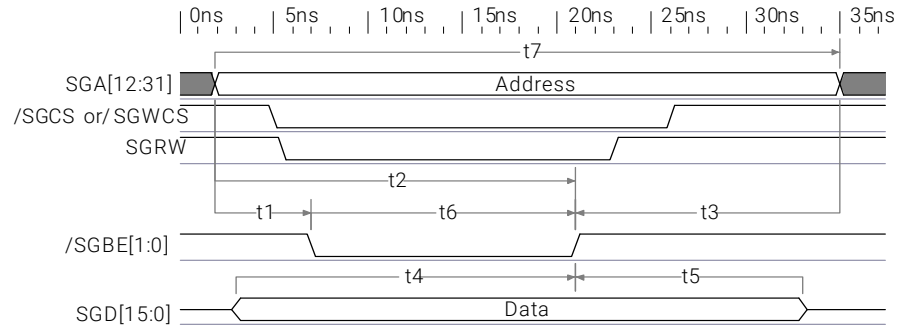


Fig. 7-2 Write Cycle: Data Emulation and Measurement Data DPR

Para.	Description	Min	Max	Unit
t ₁	Address valid before write enable becomes active	0		ns
t ₂	Address valid before end of write	12		ns
t ₃	Address valid after end of write	5		ns
t ₄	Data valid before end of write	12		ns
t ₅	Data valid after end of write	5		ns
t ₆	Write enable pulse width	12		ns
t ₇	Write cycle time	50		ns

7.12 Mechanical Dimensions

The reference measure for all drawings is millimeters.

7.12.1 ETK11.0

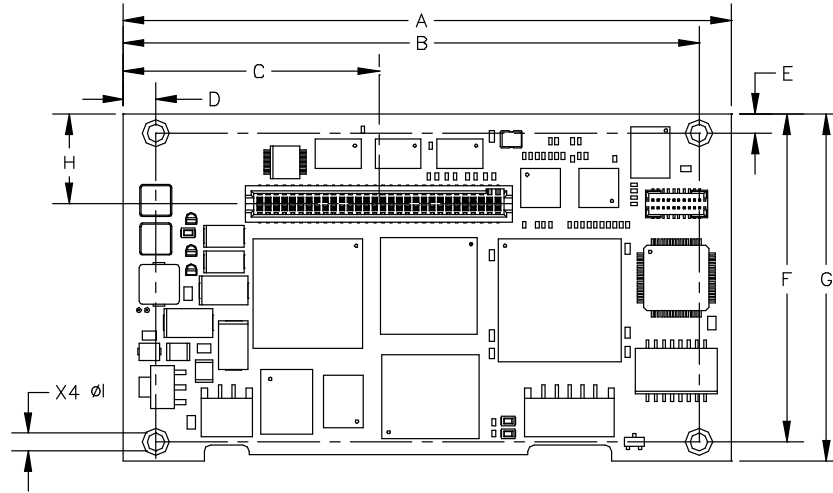


Fig. 7-3 ETK11.0 Dimensions - Top View

Dimension	Millimeters	Inches
A	94.0	3.701
B	89.0	3.504
C	39.5	1.555
D	5.0	.197
E	3.0	.118
F	51.0	2.008
G	54.0	2.126
H	14.0	.551
I	2.7	.106

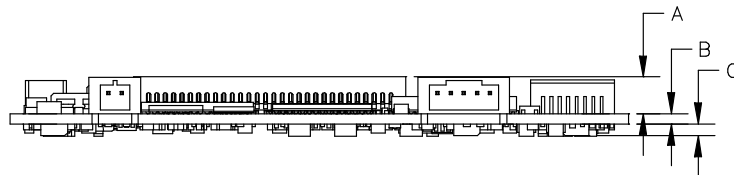


Fig. 7-4 ETK11.0 Dimensions - Side View

Dimension	Millimeters	Inches
A	5.6	.220
B	1.6	.063
C	1.8	.071

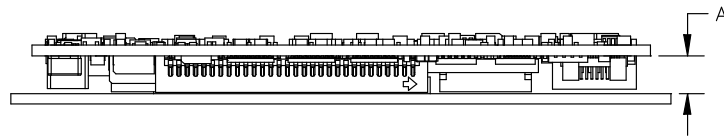


Fig. 7-5 ETK11.0 Dimensions - PCB to PCB

Dimension	Millimeters	Inches
A	5.8	.228




NOTE

The figure directly above displays the PCB to PCB distance when the ETK11.0 is mounted directly to the ECU. This dimension is only accurate when the ECU is using Samtec part number SFM-130-02-S-D .

8 Cables and Accessories

8.1 Interface Cables

8.1.1 Interface Cable KA54 (with PG Cable Gland)

 **NOTE**
 Cable glands are not included in the delivery. Refer to the cable descriptions for manufacturers and part numbers.

8.1.1.1 Interface Cable KA54, Proposal 1

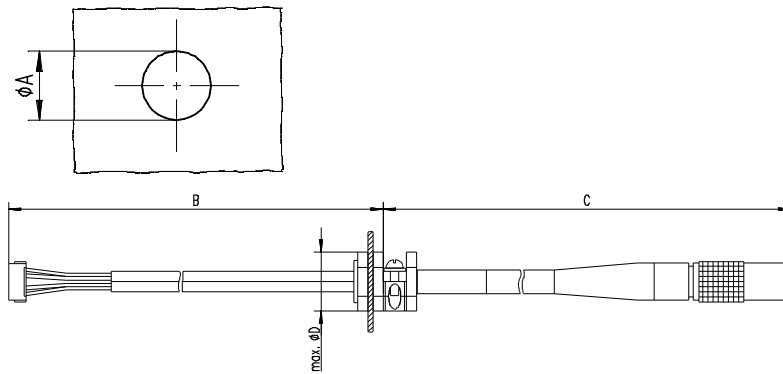



Fig. 8-1 Interface Cable KA54, Proposal 1

Dim	Millimeters	Inches	Dim	Millimeters	Inches
A	12.50	0.492	C	400.00	15.748
B	160.00	6.299	D	19.00	0.748

 **NOTE**
 Shield connected to ECU housing.

SKINDICHT compact screwing; Manufacturer: Lapp; Description: SH7; Order-No.: 5200 0830

Nut for compact screwing; Manufacturer: Lapp; Description: SM7; Order-No.: 5200 3490

8.1.1.2 Interface Cable KA54, Proposal 2

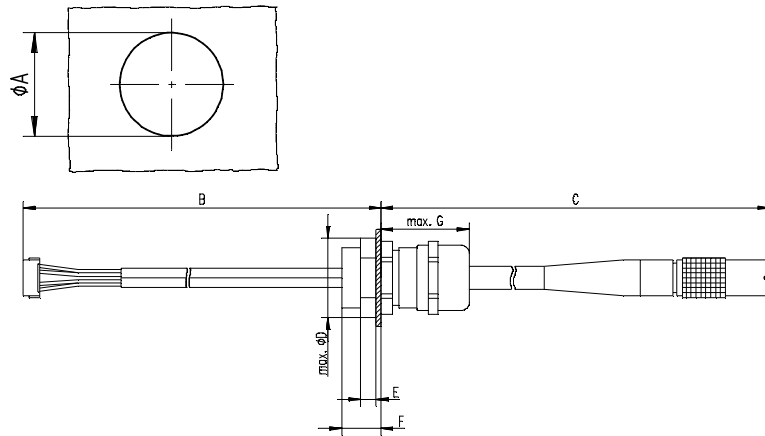


Fig. 8-2 Interface Cable KA54, Proposal 2 (long thread)

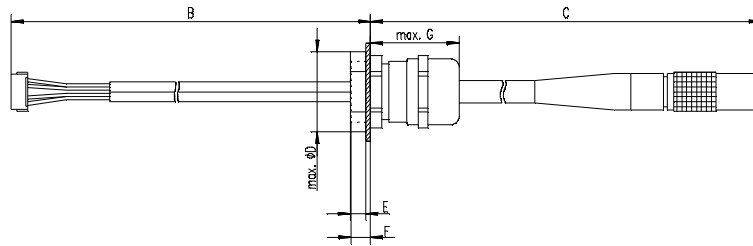


Fig. 8-3 Interface Cable KA54, Proposal 2 (short thread)

Dim	Millimeters	Inches	Dim	Millimeters	Inches
A	18.80	0.740	E	4.70	0.185
B	160.00	6.299	F _{Long}	12.00	0.472
C	400.00	15.748	F _{Short}	6.00	0.263
D	24.25	0.955	G	27.00	1.063

NOTE
 Shield connected to ECU housing.

SKINTOP compact screwing; Manufacturer: Lapp; Description: MS-SC 11 ; Order-No.: 5311 2320 (long thread) or 5311 2220 (short thread)

Nut for compact screwing; Manufacturer: Lapp; Description: SM-PE 11 ; Order-No.: 5210 3220

8.1.2 Interface Cable KA55

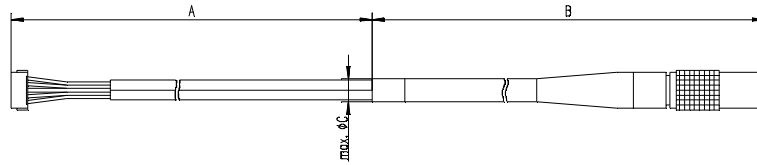


Fig. 8-4 Interface Cable KA55

Dim	Millimeters	Inches
A	160.00	6.299
B	400.00	15.748
C	7.50	0.295



NOTE

Strain relief on ECU cover necessary. Shield not connected to ECU housing.

8.1.3 Interface Cable CBAM200

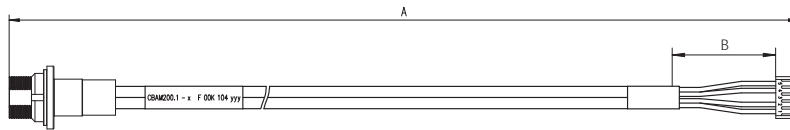


Fig. 8-5 Interface Cable CBAM200-0m38

Dim	Millimeters	Inches
A	380.00	14.96
B	30.00	1.18



NOTE

Shield connected to ECU housing, allows for ECU housing flush mounting.

8.2 Power Supply Cables

8.2.1 Cable ETV

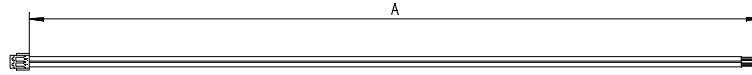


Fig. 8-6 Power Supply Cable ETV

Dim	Millimeters	Inches
A	190.00	7.480

8.2.2 Cable with Filtercoil ETV2

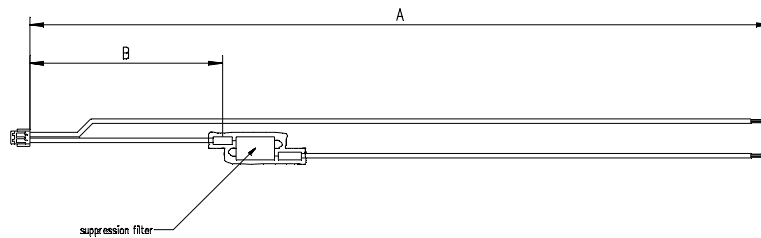


Fig. 8-7 Power Supply Cable with Filtercoil ETV2

Dim	Millimeters	Inches
A	190.00	7.480
B	50.00	1.969

8.2.3 Cable K70

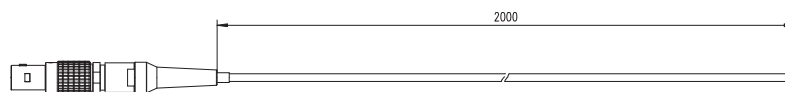


Fig. 8-8 Power Supply Cable K70

Dim	Millimeters	Inches
A	2000	78.74

8.2.4 Cable KA50

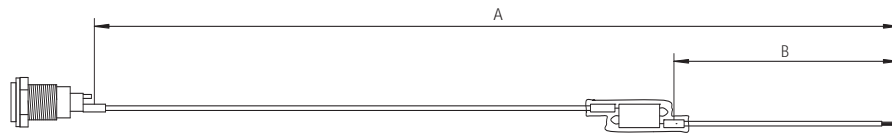


Fig. 8-9 Power Supply Cable KA50

Dim	Millimeters	Inches
A	200	7.87
B	50	1.97

8.2.5 Cable CBM200

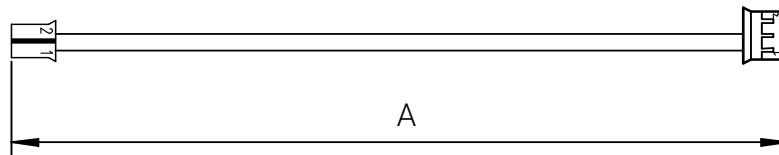


Fig. 8-10 Power Supply Cable CBM200

Dim	Millimeters	Inches
A	100	3.94

8.3 Adapters

8.3.1 ETK - ECU Adapter ETAE10

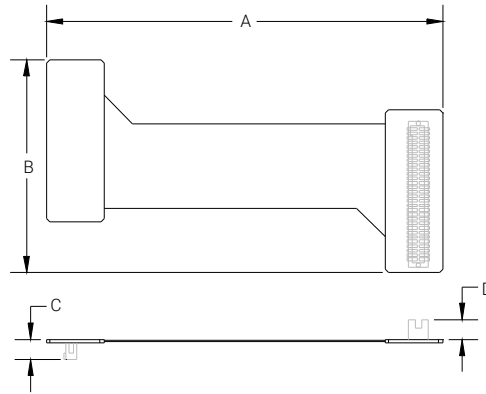


Fig. 8-11 ETAE10 Flex-Foil ETK-ECU Adapter

Dim	Millimeters	Inches
A	113.1	4.451
B	60.2	2.370
C	5.7	.224
D	5.6	.220

NOTE

The read and write timings defined in section 7.11 on page 42 are not guaranteed when the ETAE10 is connected between the ECU and the ETK11.0.

9 Ordering Information

9.1 ETK11.0

Order Name	Short Name	Order Number
ETK11.0 Emulator Probe for Freescale MPC5500 Family	ETK11.0	F 00K 102 632

Package Contents

- ETK11.0 Emulator Probe for Freescale MPC5500 Family
- List "Content of this Package"
- ETK Safety Advice
- China-RoHS-leaflet_Compact_cn

9.2 Connector ECU - ETK

The ETK11.0 incorporates the Samtec connector TFM-130-02-S-D. Several mating connectors are available for the ECU, one of which is listed below. Please contact your local Samtec distributor for information regarding other mating options and ordering information.

Samtec Connector	Note
SFM-130-02-S-D	60 pin Samtec Connector (mates with ETK11.0)

9.3 Adapters

Type	Order-No.	Note
ETAE10	F 00K 102 816	

9.4 Cables

Please contact your local ETAS representative for further cable information.

9.4.1 Interface Cables

Type	Order-No.	Note
KA54	F 00K 001 302	Delivery without PG cable gland (see Chapter 8.1.1 on page 46)
KA55	F 00K 001 303	
CBAM200-0m38	F 00K 104 330	

9.4.2 Power Supply Cables

Type	Order-No.	Note
ETV	Y 261 A24 446	Power supply cable for ETK
ETV2	F 00K 000 593	Power supply cable for ETK with filter coil
K70	Y 261 A24 942	External power supply cable for ETKs (connector)
KA50	F 00K 000 940	External voltage supply cable with jack and filter coil
CBM200-0m1	F 00K 900 052	Cable JST PH - JST PH (2fc-3fc, 0M1)

9.5 Power Supply

Type	Order-No.	Note
ETP1	F 00K 000 624	ETK power supply for 6 - 36 V DC input
ETP2	F 00K 104 010	Power Supply Interface for ETK

10 ETAS Contact Addresses

ETAS HQ

ETAS GmbH

Borsigstraße 24
70469 Stuttgart
Germany

Phone: +49 711 3423-0
Fax: +49 711 3423-2106
WWW: www.etas.com

ETAS Subsidiaries and Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries WWW: www.etas.com/en/contact.php

ETAS technical support WWW: www.etas.com/en/hotlines.php

Figures

Fig. 2-1	Adhesive Label (Example: Label for XETK-S14.0)	12
Fig. 2-2	WEEE-Symbol	13
Fig. 3-1	ETK11.0	15
Fig. 4-1	ETK11.0 Architecture	16
Fig. 4-2	System with internal and external Memory	17
Fig. 4-3	ECU Interface Connector CON1	18
Fig. 4-4	Data Emulation Memory: 2 Pages with 1 MByte each	19
Fig. 4-5	Measurement Data Memory: 1 Page with 256 KByte	20
Fig. 4-6	Division of the 128 Byte Trigger Segment	21
Fig. 4-7	Power Supply Connector CON2	23
Fig. 4-8	Power Supply Connectors CON1 and CON2	23
Fig. 4-9	Location of the Serial ETK Interface	24
Fig. 4-10	Status LEDs	25
Fig. 5-1	ETK11.0 Connection to the ECU	28
Fig. 5-2	Permanent Power Supply inside ECU available (ECU Connector)	28
Fig. 5-3	Permanent Power Supply inside ECU available (Power Connector)	29
Fig. 5-4	Permanent Power Supply inside ECU not available	29
Fig. 5-5	Isolated Power Supply inside ECU	29
Fig. 7-1	Read Cycle: Data Emulation and Measurement Data DPR	42
Fig. 7-2	Write Cycle: Data Emulation and Measurement Data DPR	43
Fig. 7-3	ETK11.0 Dimensions - Top View	44
Fig. 7-4	ETK11.0 Dimensions - Side View	44
Fig. 7-5	ETK11.0 Dimensions - PCB to PCB	45
Fig. 8-1	Interface Cable KA54, Proposal 1	46
Fig. 8-2	Interface Cable KA54, Proposal 2 (long thread)	47
Fig. 8-3	Interface Cable KA54, Proposal 2 (short thread)	47
Fig. 8-4	Interface Cable KA55	48
Fig. 8-5	Interface Cable CBAM200-0m38	48
Fig. 8-6	Power Supply Cable ETV	49
Fig. 8-7	Power Supply Cable with Filtercoil ETV2	49
Fig. 8-8	Power Supply Cable K70	49
Fig. 8-9	Power Supply Cable KA50	50
Fig. 8-10	Power Supply Cable CBM200	50
Fig. 8-11	ETAE10 Flex-Foil ETK-ECU Adapter	51

Index

A	
Accident prevention	8
Acquisition	20
Applications	15
Architecture	15, 16
B	
Blockdiagram	16
Braindead Flash	26
C	
Cable	46
Interface	46
Power Supply	49
Code	
Flash Memory	23
Code Flash Memory	23
Configuration	37
Configuration Parameter	31
D	
Data Emulation Memory	18
Data Flash Memory	22
Data Retention	22
Documentation	8
E	
Electrical Characteristics	39
Environmental Conditions	36
ETAS Contact Addresses	54
ETK Configuration	30
ETK Configuration Tool	30
ETKP20.0-A	44
F	
Features	15
H	
Hardware Description	16
I	
Identifications on the product	12
INCA	31
Interface	
ETK	24
Microcontroller	17
Serial	24
Interface Cable	46
Interface Cables	52
Introduction	15
Isolated Power Supply	29
L	
LED	25
M	
Measurement Data	
Capture	20
Measurement Data Memory	19
Mechanical Dimension	44
Memory	
Code	23
Microcontroller Bus Interface	37
Microcontroller Interface	17
O	
Ordering Information	52
P	
PC network adapter	35
Power Supply	23, 28, 53
Power Supply Cables	53
Power Supply Connector	23
Product	
Exclusion of liability	8
Product Back	13
Program Code	23
Q	
Qualification, required	8
R	
REACH regulation (EU)	14
Read Timing	42
Recycling	13
Reset	27
RoHS conformity	
China	14
European Union	13
S	
Safety at work	8
Safety precautions	8
Serial ETK Interface	24, 37
Sockets	52
Status LED	25
Supported Microcontroller	36
Switching Characteristic	42
System Requirements	35
T	
Testcharacteristics	38
Timing	
Read	42
Write	43
Trigger Segment	21
Triggering	20
U	
UKCA conformity	13
Use, intended	8
W	
Waste Electrical and Electronic Equipment	13
WEEE	13
WEEE take-back system	13
Write Timing	43