ETAS XETK-S23.0

JTAG Emulator Probe for TI C2000 Microcontrollers

User Guide

www.etas.com

XETK-S23.0 | User Guide R02 EN - 03.2023

Contents

1 Basic Safety Notices

This chapter contains information about the following topics:

1.1 General Safety Information

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.

1.2 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. Incorrect operation or operation by users without sufficient qualification may lead to injuries or death or property damages.

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.

1.3 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.

1.4 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.

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 user 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 workplace 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.

1.5 Identifications on the Product

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!
	Symbol for WEEE, see chapter 1.6 on page 11
	Marking for CE conformity, see chapter 1.7 on page 11
	Marking for UKCA conformity, see chapter 1.8 on page 11
	Symbol for China RoHS, see chapter 1.9 on page 11
	Symbol for China RoHS, see chapter 1.9 on page 11
	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

NOTE

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

1.6 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. 1-1 WEEE-Symbol

The WEEE symbol (see Fig. 1-1 on page 11) 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.

1.7 CE Conformity

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable directives of the European Union.

The CE Declaration of Conformity for the product is available upon request.

1.8 UKCA Conformity

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.

1.9 RoHS Conformity

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 7C-I in Annex III of this Directive.

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

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.

1.10 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.

1.11 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.

2 Introduction

This chapter contains information about the following topics:

2.1 Applications

The XETK-S23.0 is a JTAG Emulator Probe for TI C2000 Microcontrollers.

> **NOTE**
>
> For supported TI microcontrollers, refer to chapter 6.1.3 on page 35.

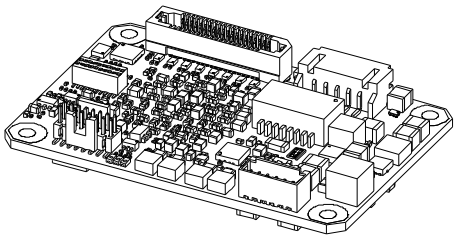

Fig. 2-1 XETK-S23.0

	XETK-S23.0
XETK ECU interface connectors	40 pin Samtec plus 6 pin Molex
Power supply for FCC devices (VDDSTBY)	Configurable 1.09 V or 1.25 V
SBRAM sense	Yes, on board or external sense
Pinless triggering	Yes
Timer triggering	Yes

The XETK-S23.0 supports the standard full duplex 100Base-T Ethernet interface and can be connected directly or via ES59x/ES600/ES89x/ES910 modules to the PC. No additional ETAS modules are required for the access to the ECU. The XETK-S23.0 can be used for rapid prototyping applications (bypass) as well as for measurement and calibration applications.

2.2 Features

2.2.1 General

- 100 Mbit/s Ethernet Interface:
  - Direct connection to PC
  - Open XCP on Ethernet Protocol supporting a variety of standard applications
- XETK-S23.0 JTAG Interface:
  - Configurable JTAG output levels: 3.3 V or 5.0V
  - Configurable JTAG interface clock speed: 10 MHz, 15 MHz
  - JTAG Signals available on the 40 Pin Samtec connector
  - Pinless startup protocol for XETK recognition and data acquisition triggering
  - Measurement raster down to 100 µs
- "ETK Drivers and Tools" update to support ETAS software tools (INCA, XCT)
- Firmware update (programming of the logic device) through HSP software service packs; removal of XETK or ECU is not necessary
- Mounting possibilities inside or on top of ECU
- ECU flashing via XETK
  - Braindead flashing under ProF control
- Permanent storage of configuration in EEPROM
- Temperature range suitable for automotive application

> **NOTE**
>
> Flashing not supported in initial release, but will be released with the December 2022 INCA release.

2.2.2 Calibration

- Concurrent use of calibration and measurement performed via microcontroller
- Working Page & Reference Page (2 page concept) realized by software pointer mechanism
- Supports special coldstart mechanism ("Calibration Wake Up"):
  - Calibration Wake Up: Wake up mechanism to wake up the power supply of the ECU via the Calibration Wake up pin
  - Pull CalWakeUp until Startup Handshake: duration of the Wake up mechanism is configurable

3 Hardware Description

This chapter contains information about the following topics:

3.1 Architecture

Fig. 3-1 shows the block diagram of the XETK-S23.0.

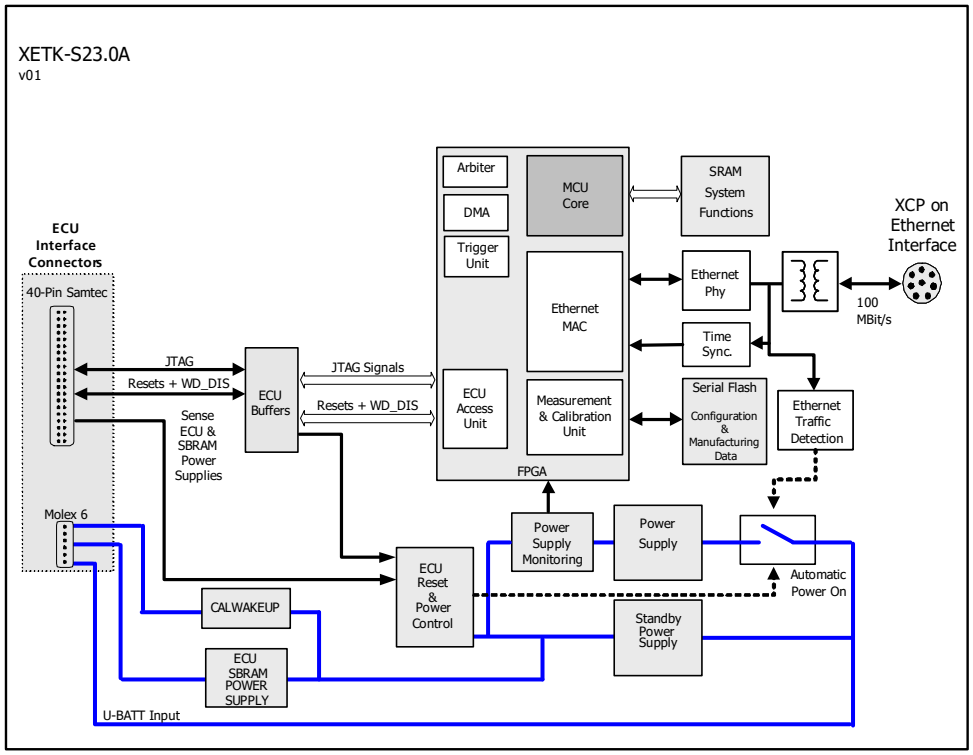

Fig. 3-1 XETK-S23.0 Architecture

While the microcontroller accesses the program data (not the program code) out of the data emulation memory provided by the microcontroller, the content of the data emulation memory can simultaneously be modified by the calibration and

development system through the XETK Ethernet 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 provide data to the calibration and development system by buffering the data (DISTAB) and triggering the XETK to read the data via JTAG. The XETK then reads, buffers, processes and sends this measured data to the PC.

The 100 Mbit/s XETK Ethernet interface provides communication with the PC.

The power supply for the XETK-S23.0 is provided by a switch mode power supply, to minimize power dissipation.

3.2 ECU Interface

The XETK-S23.0 is connected via connectors CON1 and CON4 to the ECU with two adapter cables (refer to Fig. 3-2 on page 16). The pin definition depends on the application and the microcontroller type. In general, the ECU interface consists of

- 1 ECU voltage line, which is not used for XETK power supply, but only for detection of the ECU status, therefore the power consumption on this line is negligible (refer to chapter 3.4 on page 17)
- 1 Reset line which allows the XETK to control the system reset of the ECU
- 1 Reset line which allows the XETK to monitor the system reset of the ECU
- 5 JTAG Debug line interfaces for the communication between the XETK-S23.0 and the microcontroller
- 1 Watchdog timer disable line
- 7 ground lines for proper shielding of the ECU interface lines

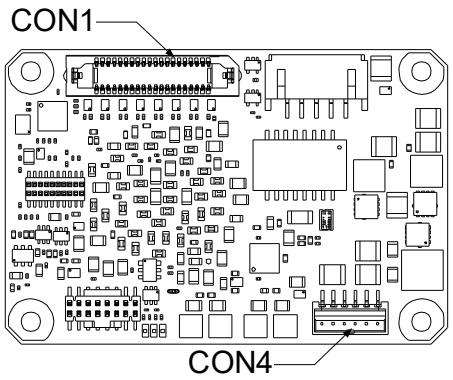

Fig. 3-2 Location of the ECU Interface connectors

3.3 XETK Ethernet Interface

The XETK Ethernet interface can be directly connected to the PC via CON2 (refer to Fig. 3-3). No additional ETAS module is required for the access to the ECU.

The interface is a standard full duplex 100Base-TX Ethernet interface using the XCP protocol. The XETK Ethernet interface is integrated in the ETAS IP world with automatic IP management and supports the open automotive "Universal Measurement and Calibration" standard "XCP on Ethernet" (TCP/IP, UDP/IP). The open XCP on Ethernet interface allows for connecting to the XETK-S23.0 with third party application software.

> **NOTE**
>
> The XETK Ethernet interface is not compatible with the ETK interfaces in modules like e.g., ES591, ES592, ES593-D, ES595, ES1232-A. The XETK Ethernet interface is compatible with the ECU interface of the ES910 module and the Ethernet interfaces of the ES592/ ES593-D/ ES595/ ES600/ES88x/ES89x modules.

> **NOTE**
>
> Please see chapter 6.1.2 on page 34 for additional information regarding PC requirements for the Ethernet interface.

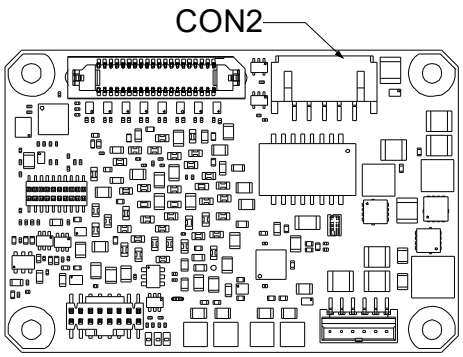

Fig. 3-3 Location of the XETK Ethernet Interface connector (CON2)

3.4 Power Supply

The XETK-S23.0 requires a permanent power supply. It is typically powered directly from the car battery. The input voltage may vary between 6 V and 36 V. In case of higher input voltages to the XETK, additional voltage protection is required. The XETK-S23.0 will also accept voltage dips down to 3V (for additional details of low voltage operation, see ISO standard 16750).

From the input battery voltage, the XETK-S23.0 creates all necessary voltages through switching power supplies on the XETK-S23.0. The power supply of the ECU is not affected by the XETK-S23.0. An automatic switch ensures that the power supply of the XETK-S23.0 is automatically switched on and off when the XETK enters and leaves its standby (sleep) mode.

The XETK-S23.0 can be supplied with power through the six-pin connector, CON4.

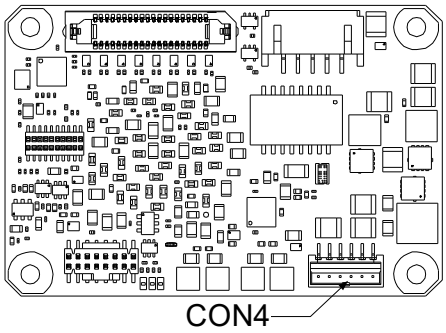

Fig. 3-4 Location of the XETK-S23.0 Power Supply Connector CON4

3.5 ECU Voltage Supervisor

The ECU voltage (VDD) is monitored by the XETK to recognize whether the ECU is switched on or off. Additionally, the ECU RAM standby voltage (VDDSTBY) is monitored to determine if the standby RAM content is still valid. These two signals are only used for monitoring therefore the load current is negligible.

> **NOTE**
>
> The XETK-S23.0 only allows switching between reference page and working page if there is a valid voltage at the sense pin and the working page has been initialized by the calibration and development system.

The XETK-S23.0 provides two opportunities to supply and supervise the ECU RAM standby voltage:

- The XETK-S23.0 monitors the VDDSTBY supply on board the XETK. The microcontroller's standby power supply pin must be connected to the XETK pin VDDSTBY.
- The XETK-S23.0 monitors the VSTBY pin, provided by the ECU connection. The microcontroller's standby power supply pin must be connected to the XETK pin VSTBY. The microcontroller's standby power supply may be provided by the ECU or by the XETK.

3.6 Status LEDs

There are three LEDs (Green, Red, Yellow) displaying the operating status of the XETK-S23.0 (Fig. 3-5 on page 19).

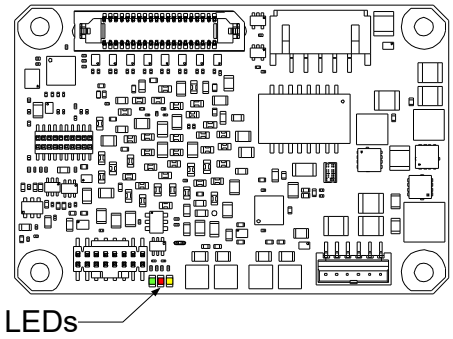

Fig. 3-5 Status LEDs of the XETK-S23.0

LED	State	Definition
Red	On	XETK-S23.0 is supplied with power and active (i.e., the ECU is switched on or the 100 Mbit/s link to the calibration system is established)
Green	Off	Working page may be different from reference page. Calibration and development system has downloaded data since the last power failure. Switching between the Reference Page and Working Page is possible.
	On	Power supply has dropped under selected threshold: - data retention of the calibration data manager in the ECU is no longer ensured - as soon as the XETK-S23.0 switches on again, the ECU switches to the Reference Page. Green LED stays on until the calibration and development system downloads data into the calibration data memory. Otherwise switching to the Working Page is not possible.
Yellow	Flashing	Communication active
	On	100 Mbit/s link to calibration system established

3.7 Data Emulation and Data Measurement

The XETK-S23.0 is a serial XETK using JTAG as the primary microcontroller interface. Typical for all serial (X)ETKs, the RAM used for data emulation and data measurement is not accessible by the XETK until the microcontroller is powered up and the startup handshake is performed.

Serial XETKs use the ETAS two-page concept, consisting of both a Reference and a Working page.

The Reference Page is located in the ECU flash and cannot be modified by a simple write access. All changes to the Reference Page must be done via Flash programming.

The Working Page is located within the microcontroller's EMU RAM. The Working Page may be a portion of or the entire size of the EMU RAM. The EMU RAM used for the emulation of calibration data must not be used by the ECU software directly as general-purpose RAM. It is recommended that the EMU RAM is permanently powered by the XETK or ECU. The XETK/INCA has the complete control over the RAM used as Working Page and it's contents. When enabling data emulation, the XETK establishes a basic startup configuration of the data in the Working Page by copying the corresponding data in the Flash to the emulation space.

To enable calibration, the Working Page must be activated. The process of switching from the Reference Page to the Working Page and vice versa is known as page switching.

The XETK-S23.0 supports Protocol Based page switching for all supported microcontrollers. Page switching is done in microcontroller software by switching the overlay memory on (Working Page) and off (Reference Page) using microcontroller overlay registers. The XETK-S23.0 does not directly control the microcontroller overlay registers. Instead, the XETK-S23.0 and microcontroller software use a simple communication method with a shared mailbox in RAM. The XETK uses this mailbox to request and monitor page switching; the microcontroller software is responsible to service this mailbox and perform the page switches. Using an overlay modification description, also in RAM, the XETK provides the necessary information of how the overlay registers need to be modified to realize the page switch which is requested.

The XETK-S23.0 can access both the Reference Page and the Working Page, regardless of which is active from the microcontroller's point of view.

Another important restriction is that no access to the memory is possible, while the ECU is not running. To enable a coldstart measurement in spite of this restriction, the coldstart measurement procedure is defined to give the user the feeling of a parallel XETK.

3.8 XETK-S23.0 JTAG Interface

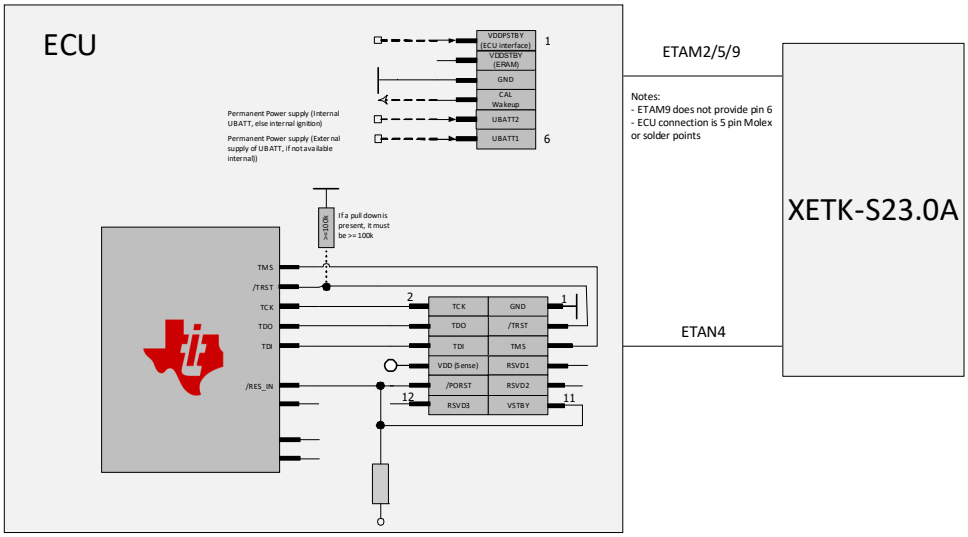

Fig. 3-6 Equivalent Circuitry of the ECU JTAG Interface (ECU)

The ECU part of the JTAG XETK interface is depicted in Fig. 3-6.

The XETK-S23.0 incorporates 22 Ohm series resistors for the TMS, TCK, TDI and /TRST lines on the ECU interface. Hence, no additional termination resistors are required on the ECU for these signals.

Additional Design Recommendations:

- Debug connector should be placed as close to the microcontroller as possible
- If a pull-down resistor is present on the line /TRST, the ECU must use a value no smaller than 100k Ohm as shown in Fig. 3-6 on page 21.
- PCB trace lengths should be as short as possible for the TMS, TRST, TCK, TDI & TDO signals
- If any JTAG signals are also routed to a 2nd connector (Forked/Split or T'd), It is recommended to add zero Ohm jumpers in line so the signal T can be broken
- The ETAN4A cables are 50 Ohm impedance for all signals, it is recommended to match the PCB impedance to the cable impedance

> **NOTE**
>
> Please consult with your local ETK support regarding connections to the XETK-S23.0 including watchdog timer disable, voltage and or reset monitoring, calibration wake-up, etc... ETAS ETK support can review adaptations to the circuit/connections between the ECU interface and the XETK-S23.0 as shown in Fig. 3-6 on page 21.

3.9 Trigger Modes: Overview

The XETK-S23.0 supports the following trigger modes:

- Pinless triggering
- Timer triggering

The trigger mode "Pinless Triggering" uses the microcontroller's RAM addresses for triggering. See chapter “Pinless Triggering” on page 22 for further details.

The trigger mode "Timer Triggering" uses four internal timers of the XETK for triggering. See chapter “Timer Triggering” on page 22 for further details.

3.10 Pinless Triggering

3.10.1 Startup Handshake

Microcontroller RAM addresses are used for XETK startup handshake. During this handshake, ECU software detects the connected XETK by reading and writing to specific RAM location and performing basic initializations based on the handshake values. When these initializations are done, the handshake is finished with success acknowledgment to the XETK. Thereafter, if a success acknowledgment is received by the XETK, it starts additional initialization processes (e.g., coldstart, checksum, downloads, etc.).

After the startup handshake and measure enabled, the XETK waits for triggers from ECU software.

3.10.2 XETK Trigger Generation

To generate triggers, the ECU software toggles bits of specific RAM address (next to handshake address) and each bit corresponds to an XETK hardware trigger.

The XETK periodically polls (reads) the trigger registers via JTAG. The polling rate is configurable, with 50 µs default. The XETK then starts acquisition of appropriate measurement data based on which bits of the registers are set.

3.11 Timer Triggering

The trigger mode "Timer Triggering" uses four internal timers of the XETK-S23.0 for triggering. A configurable period is used for triggering.

The time intervals between trigger events are in accordance with the configured timer values. This values and their resolution have to be defined in the XETK's configuration and/or A2L file. Available settings are:

- Minimum time interval 100 µs
- Maximum period duration 1 s
- Timer resolution 1 µs

The timers trigger the XETK in an asynchronous manner to the microcontroller software. Variables assigned to a measurement raster using a timer trigger are acquired from their original locations in RAM via JTAG.

3.12 Reset

The requirement for XETK reset mechanism is to ensure that power-up and power-down behavior of ECU is clean and smooth. The XETK-S23.0 drives /PORESET low during XETK power up or upon INCA request.

The XETK-S23.0 senses the status of the /PORESET line to detect when the ECU is in reset. If configured, and the microcontroller has /RESETOUT, the XETK-S23.0 can also be used to sense the status for the ECU reset.

The XETK-S23.0 senses the switched ECU power supply, VDDP. This allows the XETK to detect when the ECU is off and forward the information to INCA. In addition, it allows the XETK to enter the power save mode when the calibration system is unplugged.

3.13 Pull CalWakeUp until Startup Handshake

The XETK has the ability to wake up the ECU by applying voltage to the CalWakeUp pin of the ECU connector. This allows the XETK to configure a measurement while the ECU is off.

When waking up the ECU via the CalWakeUp pin, it can be configured if the pin is driven high until the microcontroller core voltage (VDD) is high or if the pin should be driven high until the startup handshake between ECU and XETK is complete.

4 Installation

This chapter contains information about the following topics:

CAUTION

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

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

4.1 Mounting the XETK-S23.0 to the ECU

CAUTION

Risk of short circuiting the internal signals of the XETK-S23.0!

When you mount the XETK-S23.0 to the ECU, you must ensure that any screws and washers used will not penetrate the XETK printed circuit board.

CAUTION

Risk of thermal damage to the XETK!

For all mounting methods of the XETK-S23.0 to the ECU housing, the thermal gap pad must be used when the operating temperature range of the ECU exceeds 85 °C (185 °F).

4.1.1 Mechanical connection of the XETK-S23.0 to the ECU Housing

To ensure proper operation of the XETK-S23.0 over the specified temperature range (refer to chapter “Environmental Conditions” on page 36), the XETK-S23.0 must be mounted to the ECU metal housing using the enclosed Gap Pad. This enables thermal dissipation of the electronic components used on the XETK-S23.0 to the ECU housing. This chapter describes an example for proper mounting of the XETK-S23.0 to the ECU housing with the included Gap Pad.

NOTE

If the temperature range for the ECU application is significantly less than the specified temperature range for the XETK-S23.0 (e.g., - 40 °C to +85 °C/ - 40 °F to +185 °F), use of the gap pad and the thermal connection to the ECU housing is not mandatory.

4.1.1.1 Mounting Materials

For mounting the XETK-S23.0 to the ECU housing, the following parts are suggested:

- 4x screws M2.5
- XETK-S23.0
- Gap Pad, as supplied with the XETK-S23.0 or available as a spare part.
- 4x 3.0 mm height spacer, M2.5
- ECU metal housing with machined holes aligning with XETK-S23.0 hole pattern (see “Mechanical Dimensions” on page 45)
- 4x nuts M2.5

See figure “XETK-S23.0 mounting materials” on page 26.

4.1.1.2 Placing the Gap Pad on the XETK-S23.0

1. On the Gap Pad, remove the blue colored adhesive backing. This will expose adhesive on the Gap Pad that will allow the Gap Pad to adhere to the XETK-S23.0.
2. Place the Gap Pad (adhesive side down) onto the XETK-S23.0 as depicted in the figures “XETK-S23.0 bottom side view” on page 25 and “XETK-S23.0 with properly positioned Gap Pad” on page 25.

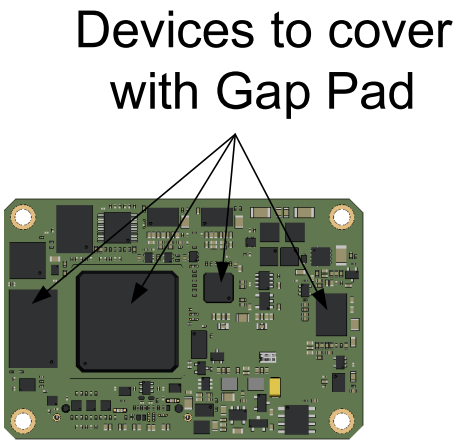

Fig. 4-1 XETK-S23.0 bottom side view

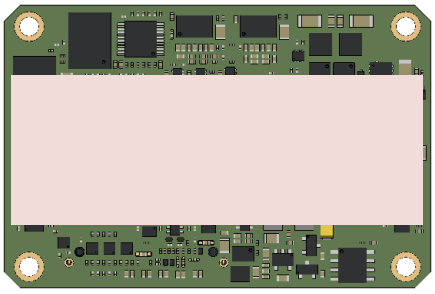

Fig. 4-2 XETK-S23.0 with properly positioned Gap Pad

> **NOTE**
>
> To ensure good thermal transfer between the XETK-S23.0 and the ECU housing, during the installation process, always use a new Gap Pad. Re-use of the Gap Pad during a re-installation or ETK recycling is not recommended. Additional Gap Pads are available as a stand-alone item. See “Mounting Material” on page 57 for ordering information.

4.1.2 Mounting the XETK-S23.0 to the ECU metal Housing

Mount the XETK-S23.0 to the ECU housing as depicted in figures “XETK-S23.0 mounting materials” on page 26 and “XETK-S23.0 mounted” on page 26.

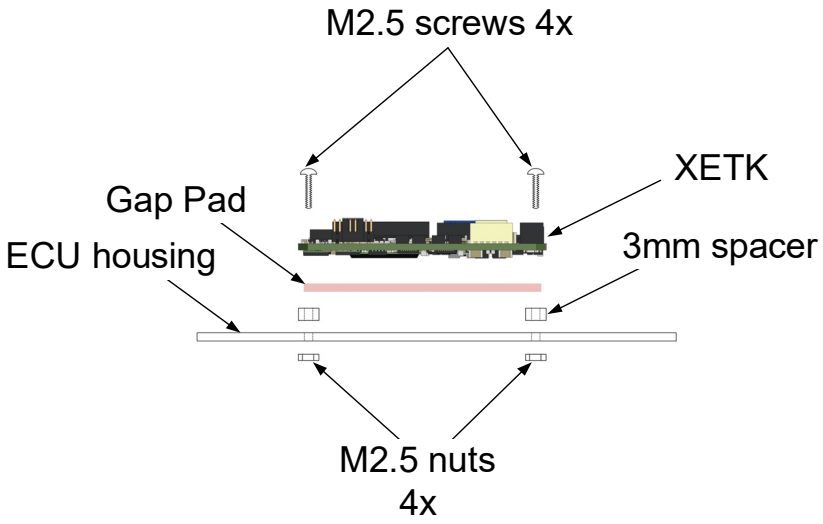

Fig. 4-3 XETK-S23.0 mounting materials

> **CAUTION**
>
> **Thermal transfer from the XETK to the ECU housing!**
>
> When you mount the XETK to the ECU, you must ensure that a constant gap of 3 mm is maintained between the XETK-S23.0 PCB and the flat surface of the ECU housing.

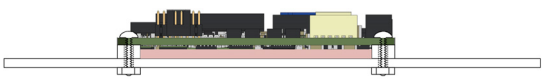

Fig. 4-4 XETK-S23.0 mounted

4.2 Electrical Connection to the ECU

CAUTION

Risk of short circuiting the internal signals of the XETK!

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

For connecting the XETK-S23.0 to the ECU, two XETK adapter cables are required:

- at CON1 adapter ETAN4A or ETAN20A
- at CON4 adapter ETAM2 or ETAM5 or ETAM9

The adapter cables are to be ordered separately (refer chapter “Ordering Information” on page 57).

The suitable connectors Samtec-12/20 and Molex 5 (or solder positions for ETAM2)) (see Fig. 4-6 for additional connector details) should be populated onto the ECU PCB for adapters ETAN4A/ETAN20A and ETAM2/ ETAM5/ ETAM9.

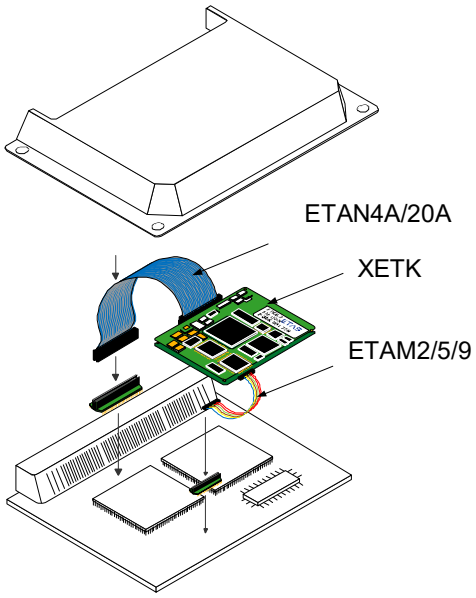

Fig. 4-5 XETK-S23.0 Connection to the ECU

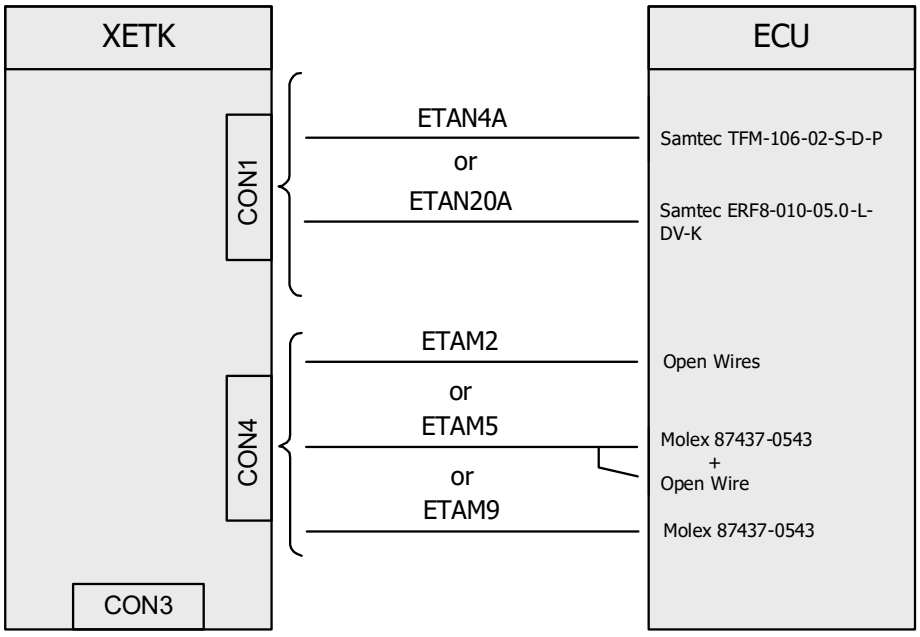

Fig. 4-6 XETK-S23.0 Connection to the ECU

4.3 Wiring

4.3.1 XETK Ethernet Interface

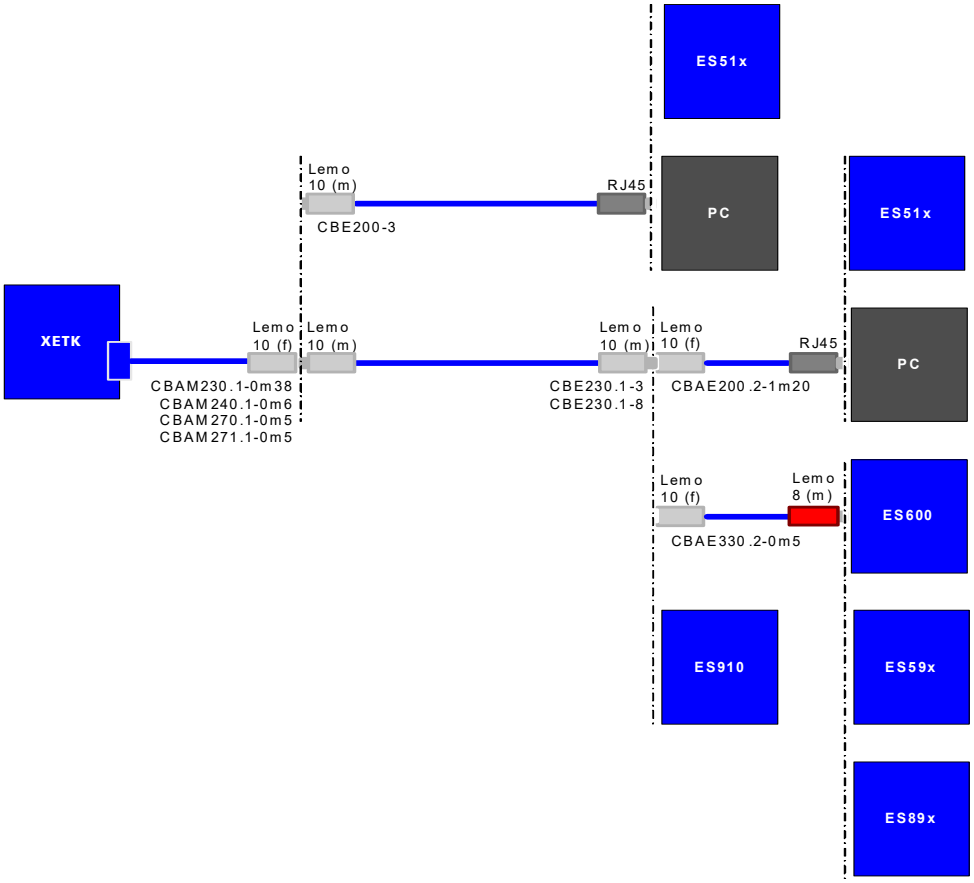

Fig. 4-7 Wiring - XETK Ethernet Interface

The XETK Ethernet interface can be directly connected to the PC. No additional ETAS module is required for the access to the ECU.

4.3.2 Power Supply

The XETK-S23.0 needs a permanent power supply (refer chapter “Power Supply” on page 17). Refer to figures Fig. 4-8, Fig. 4-9, or Fig. 4-10 for recommendations on permanent power supply connection to XETK-S23.0. For the fuse details, refer to chapter “Power Supply” on page 37.

Permanent Power Supply inside ECU available

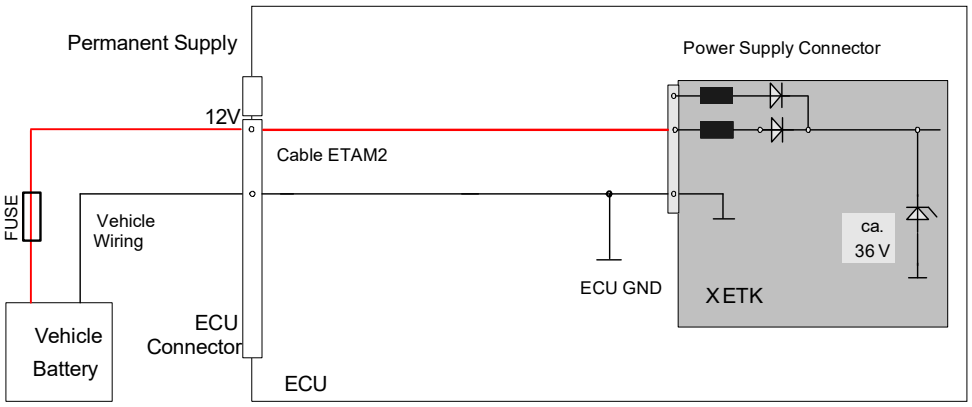

Fig. 4-8 Permanent Power Supply inside ECU available

Permanent Power Supply inside ECU not available

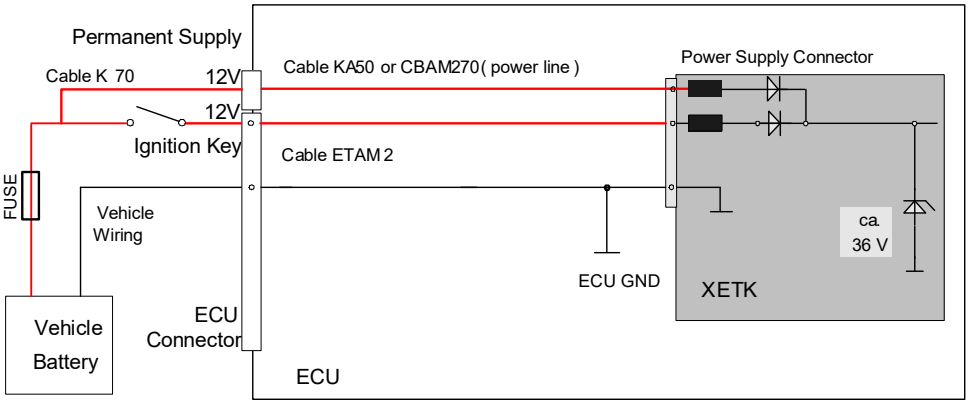

Fig. 4-9 Permanent Power Supply inside ECU not available

Isolated Power Supply inside ECU

The XETK-S23.0 does not require a galvanically isolated power supply. For special applications ETAS offers the isolated power supply ETP2.

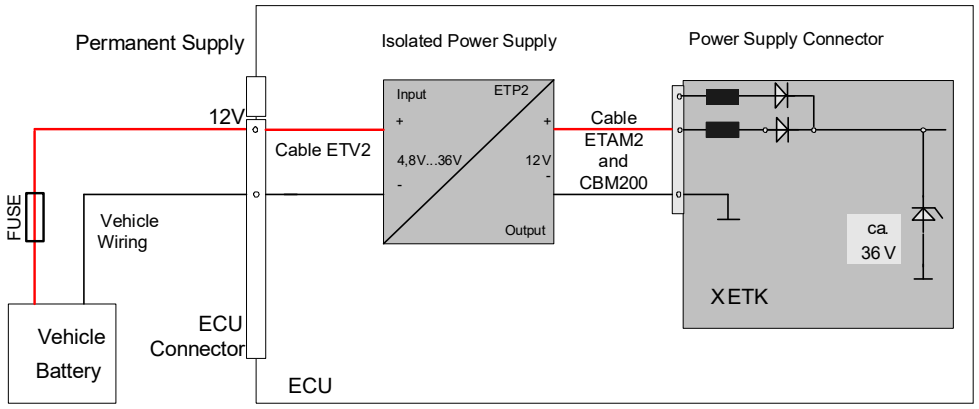

Fig. 4-10 Isolated Power Supply inside ECU

5 XETK Configuration

This chapter contains information about the following topics:

5.1 Overview

As already mentioned in previous chapters, some project-specific adjustments are necessary. Configuration data is stored permanently in a serial Flash.

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

The configuration is done in two steps:

1. 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.

2. Connection of the XETK to the ECU.

   The ECU hardware developer defines the connection of the XETK to the ECU. The corresponding signals usually have to be adjusted for each microcontroller. All inputs are checked for plausibility, to make sure that a valid configuration is generated.

The "(X)ETK Configuration Tool" can create the following output:

- Direct XETK configuration
- Storage of the configuration in a data file
- The corresponding ASAP2 input

The most important outputs are the entries for the ASAP2 file. All A2L definitions necessary for configuring an XETK will be created. These are:

- Overlay Region definitions
- Memory Segment definitions
- XETK configuration features
- Raster definitions

If these parameters are entered correctly in the corresponding ECU description file, it guarantees that every time the calibration system is started, the XETK is checked for the appropriate configuration. If necessary, the XETK will be configured appropriately to the corresponding project.

5.2 Configuration Parameter

The XCT Tool provides support concerning hardware configuration parameters and their possible values.

The configuration parameters are described for the different (X)ETK types in the help menu of the "(X)ETK Configuration Tool".

Starting the "XCT Tool" help

1. Start the XCT Tool.

   The main window of the XCT tool opens.
2. Select in the menu bar **? > Contents.**

   The XCT Tool help window opens.
3. Choose **Reference to User Interface > (X)ETK Hardware Configuration Parameters.**
4. Choose the topic **XETK-S23.0**.

   The topic **XETK-S23.0** contains information about the XETK-S23.0 hardware configuration parameters and their possible values.

6 Technical Data

This chapter contains information about the following topics:

6.1 System Requirements

6.1.1 ETAS Compatible Hardware

ES592, ES593-D, ES595, ES600, ES88x, ES89x, ES910 (INCA)

6.1.2 PC with one Ethernet Interface

A PC with one open Ethernet interface (1 Gbit/s or 100 Mbit/s, full duplex) 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.

> **NOTE**
>
> Half Duplex mode and Half Duplex Ethernet interfaces are not supported.

Requirement to ensure successful Initialization of the Module

> **NOTE**
>
> It is imperative to 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"

6.1.3 XETK-S23.0 Software Support

You need following software versions to support the XETK-S23.0:

6.1.3.1 Use case: Measurement & Calibration, ECU Flash Programming

Microcontroller	INCA	INCA-MCE	HSP	ETK Tools
TI F2838x	V7.4.3	V2.0	V13.3	V4.3.3
TI F28004x	V7.4.3	V2.0	V13.3	V4.3.3

6.1.3.2 Use case: Rapid Prototyping

Microcontroller	INTECRIO	ASCET	HSP	Method
TI F2838x	V4.6	V6.4	V13.3	SBB V2.1 HBB (DISTAB)
TI F28004x	V4.6	V6.4	V13.3	SBB V2.1 HBB (DISTAB)

> **NOTE**
>
> Operating the XETK-S23.0 with older software versions is not possible.

6.2 Data Emulation and Measurement Memory

6.2.1 Data Emulation Memory and Microcontroller Support

The XETK-S23.0 can use any available RAM to emulate data in internal flash. The following table lists the supported microcontrollers, and the available emulation RAM, and states if the EMU RAM is capable of being powered using a standby supply.

Microcontroller	Available emulation RAM (Mbytes)	Standby powered
TI F2838x	Internal RAM	No
TI F28004x	Internal RAM	No

6.2.2 Measurement Data Memory

Item	Characteristics
Location	Typically located within the emulation memory when using DISTAB hooks. Measurement data memory can be located in internal RAM if the entire EMU RAM is needed for calibration.

6.3 Configuration

Item	Characteristics
Configuration	Project-specific configuration for - different microcontrollers or - memory configurations stored in EEPROM
Update	Logic devices updated using HSP software

6.4 XETK Ethernet Interface

Item	Characteristics
Connection	- 100 Mbit/s Ethernet, Full Duplex - PC Card 32 bit
Protocol	XCP on TCP/IP or UDP/IP
IP address	Dynamic (standard, for INCA) or static (e.g., for Rapid Prototyping) by using the XETK Configuration Tool (default IP address: 192.168.40.16)
Cable length	max. 30 m / 100 ft
Ethernet Interface	DC decoupling

> **NOTE**
>
> To ensure successful initialization of the network card of your PC, refer to chapter 6.1.2 on page 34

6.5 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/ +32 °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

6.6 Power Supply

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Permanent power supply (car battery)	U_{Batt}	Vehicle usage [1)]	6.0 [all values +/-0%]	12	36	V
Standby current	I_{STBY}	U_{Batt} = 12 V; ECU off; I = 0 mA at pin VDDSTBY; I = 0 mA at pin VDDPSTBY; T = 20 °C		70	95	mA
Operating current	I_{Batt}	U_{Batt} = 12 V; I = 0 mA at pin VDDSTBY; I = 0 mA at pin VDDPSTBY; T = 20 °C		165	215	mA
Operating current	I_{Batt}	U_{Batt} = 12 V; I = 500 mA at pin VDDSTBY; I = 80 mA at pin VDDP-STBY; T = 20 °C		215	315	mA
Power dissipation	P_{Batt}	U_{Batt} = 12 V; I = 0 mA at pin VDDSTBY; I = 0 mA at pin VDDPSTBY; T = 20 °C		1.98		W
Power dissipation	P_{Batt}	U_{Batt} = 12 V; I = 500 mA at pin VDDSTBY; I = 80 mA at pin VDDP-STBY; T = 20 °C		2.58		W
Fuse in the ETK Ubatt supply line. Only required if the power supply or ECU is not protected accordingly.			MINI, 2 A 58 V DC (Littelfuse 0997002.WXN)			

[1)] The XETK-S23.0 implements reverse voltage protection in the same range and may be used only with central load dump protection.
24 V vehicles require U_{Batt} disturbing pulse reduction to 12 V vehicle system.
12 V vehicles don't require special disturbing pulse reductions.

NOTE

The XETK-S23.0 will accept permanent power supply voltage dips (for additional details of 3 V low voltage operation, see ISO standard 16750).

6.7 Test Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reset delay 1 [1)]	t_{Reset1}	U_{Batt} = 12 V VDDP = 0 V ↑ 3.3 V/5.0 V without transferring FPGA	26		50	ms
Reset delay 2 [2)]	t_{Reset2}	U_{Batt} = 0 V ↑ 12 V transfer FPGA	100		300	ms

[1)] Delay of ECU reset through the XETK without transferring the FPGA (U_{Batt} present, VDDP will be switched on)
[2)] max. delay of ECU reset through the XETK (U_{Batt} and VDDP will be switched on)

6.8 JTAG Timing Characteristics

The following diagrams show the timings the XETK-S23.0 can process.

> **NOTE**
>
> JTAG timing parameters in this chapter refer to the JTAG interface (CON1) of the XETK-S23.0. The JTAG wiring to the ECU (ETANx) must be taken into account additionally.
> All timings are measured at a reference level of 1.5 V. Output signals are measured with 20 pF to ground and 50 Ω to 1.5 V.

6.8.1 JTAG Timing Diagram

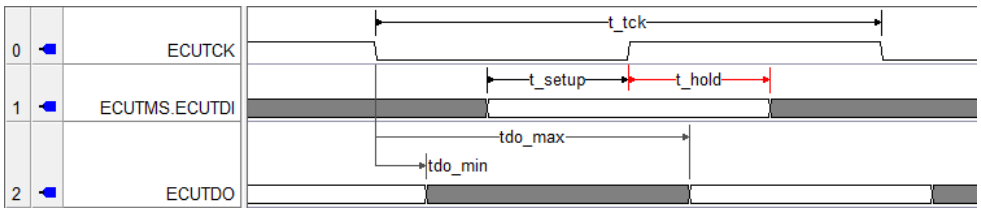

Fig. 6-1 JTAG Timing Diagram

6.8.2 JTAG Timing Parameters

Parameter	Symbol	Value [ns]	Comment
JTAG Clock Period (ETK --> Target)	t_{tck}	100	10 MHz Nexus JTAG Clock Frequency
		66.67	15 MHz JTAG Clock Frequency
TMS/TDI Set-Up Time (ETK --> Target)	t_{setup}	14 (min.)	Minimum 12 ns required for microcontroller
TMS/TDI Hold Time (ETK --> Target)	t_{hold}	26 (min.)	Minimum 12 ns required for microcontroller
TDO clock-to-out time (Target --> ETK)	t_{do_min}	3.5 (min.)	Minimum 2.25 ns required by microcontroller specification
	t_{do_max}	30 (max)	Maximum 30 ns by microcontroller specification

6.9 Electrical Characteristics

6.9.1 ECU Interface Characteristics

Parameter	Symbol	Condition [1]	Min	Typ	Max	Unit
CalWakeUp Output Voltage	CALWAKEUP	U_{Batt} = 6.6 - 32 V; load 0 - 50 mA	U_{Batt} - 1 V		U_{Batt}	V
ECU Power Supply Supervision Voltage (3.3 V selected)	VDD	VDD ↑	2.55	2.58	2.60	V
		VDD ↓	2.41	2.43	2.45	V
	I_{VDD}	VDD = 3.3 V			200	µA
ECU Power Supply Supervision Voltage (5.0 V selected)	VDD	VDD ↑	4.02	4.06	4.09	V
		VDD ↓	3.88	3.91	3.94	V
	I_{VDD}	VDD = 5.0 V			300	µA
ECU Standby RAM Supervision Voltage (1.25 V selected)	VSTBY (Sense)	VSTBY ↑	1.13	1.14	1.15	V
		VSTBY ↓	1.11	1.12	1.13	V
	I_{VSTBY}	VSTBY = 1.25 V			73	µA
ECU Standby RAM Output Voltage (1.09V) [2]	VDDSBRAM	max. 500 mA load	1.03	1.09	1.14	V
ECU Standby RAM Output Voltage (1.25V) [2]	VDDSBRAM	max. 500 mA load	1.20	1.25	1.29	V
Power to supply ECU Interface (optional)	VDDPSBRAM	max. 80 mA load	3.20	3.30	3.40	V

[1]: VDDP ↑: ECU Power Supply off → ECU Power Supply on; VDDP ↓: ECU Power Supply on → ECU Power Supply off
VDDSBRAM ↑: ECU Standby RAM Power off → ECU Standby RAM Power on
VDDSBRAM ↓: ECU Standby RAM Power on → ECU Standby RAM Power off
[2]: Current drawn from XETK VDDSBRAM supply must not exceed 500 mA

6.9.2 ECU Interface Connector CON1 (5.0 V Interface selected)

Signal	Pin Type	V_{OL} (max) [V]	V_{OH} (min) [V]	V_{OH} (max) [V]	V_{IL} (max) [V]	V_{IH} (min) [V]	V_{IH} (max) [V]	Leakage current [µA]	Add. Load by XETK (typ) [pF] [1)]
TDI	O	0.7	3.8	5.2	-	-	-	+/-10	8
/TRST	O	0.7	3.8	5.2	-	-	-	+/-10	12
TMS	O	0.7	3.8	5.2	-	-	-	+5200/+3830	8
TCK	O	0.7	3.8	5.2	-	-	-	+1135/+840	12
TDO	I	-	-	-	0.8	2	6.5	+/-30	12
/PORST	XIOD [2)]	0.7	-	-	0.8	2	6.5	+25/-20	16
RSVD3	I	0.7	-	-	0.8	2	6.5	+25/-20	16
RSVD2	I	-	-	-	0.8	2	6.5	+/-13	12
RSVD1	O [3)]	0.7	3.8	5.2	-	-	-	+/-10	20

Pin Type: I: Input, X: Tristate, O: Output, OD: Open Drain

[1)] Adapter cable and Samtec connector not considered; PCB 1 pF/cm
[2)] Open Drain FET; I_{Dmax} = 0.2 A
[3)] Signals not connected to logic on XETK, pass through to debugger

6.9.3 ECU Interface Connector CON1 (3.3 V Interface selected)

Signal	Pin Type	V_{OL} (max) [V]	V_{OH} (min) [V]	V_{OH} (max) [V]	V_{IL} (max) [V]	V_{IH} (min) [V]	V_{IH} (max) [V]	Leakage current [µA]	Add. Load by XETK (typ) [pF] 1)
TDI	O	0.55	2.4	3.45	-	-	-	+/-10	8
/TRST	O	0.55	2.4	3.45	-	-	-	+/-10	8
TMS	O	0.55	2.4	3.45	-	-	-	+3460/+2010	8
TCK	O	0.55	2.4	3.45	-	-	-	+704/+411	12
TDO	I	-	-	-	0.8	2	6.5	+/-30	12
/PORST	XIOD 2)	0.7	-	-	0.8	2	6.5	+25/-20	16
RSVD3	I	0.7	-	-	0.8	2	6.5	+25/-20	16
RSVD2	I	-	-	-	0.8	2	6.5	+/-13	12
RSVD1	O 3)	0.55	2.4	3.45	-	-	-	+/-13	20

Pin Type: I: Input, X: Tristate, O: Output, OD: Open Drain

1) Adapter cable and Samtec connector not considered; PCB 1 pF/cm
2) Open Drain FET; I_{Dmax} = 0.2 A
3) Signals not connected to logic on XETK, pass through to debugger

6.10 Pin Assignment

6.10.1 ECU Interface Connector CON1 (XETK-S23.0 Side)

Pin	Signal	Direction	Comment
1	TX0_P		Not used on XETK-S23.0
2	VDD (Sense)	In	Sense for Switched power supply of ECU (ignition)
3	TX0_N		Not used on XETK-S23.0
4	TCK	Out	JTAG Clock signal
5	GND		Signal Ground
6	GND		Signal Ground
7	TX1_P	Out	Not used on XETK-S23.0
8	TMS	Out	JTAG Mode Select signal
9	TX1_N		Not used on XETK-S23.0
10	TDO	In	JTAG Data Out signal
11	GND		Signal Ground
12	GND		Signal Ground
13	TX2_P		Not used on XETK-S23.0
14	TDI	Out	JTAG Data In signal
15	TX2_N		Not used on XETK-S23.0
16	/RDY		Not used on XETK-S23.0
17	GND		Signal Ground
18	/EVTO	In	Not used on XETK-S23.0
19	TX3_P		Not used on XETK-S23.0
20	/TRST	Out	JTAG Reset signal
21	TX3_N		Not used on XETK-S23.0
22	WDGDIS	Out	Watchdog disable signal
23	GND		Signal Ground
24	CABLE_RST_CNTL		Not used on XETK-S23.0
25	ClockN		Not used on XETK-S23.0
26	ETK_DETECT		
27	ClockP		Not used on XETK-S23.0
28	/PORESET	BiDir	ECU Reset signal (open drain) for Reset assertion and supervision
29	GND		Signal Ground
30	/RESETOUT		ECU Internal Reset Status (sense)
31	FSI_TXCLK		FSI Transmit Clock
32	VSTBY (Sense)		Sense the supply of the standby (WP) RAM
33	AURORA_RST		Not used on XETK-S23.0
34	FSI_TX0		FSI Transmit Data 0
35	RSVD		Not used on XETK-S23.0
36	FSI_TX1		FSI Transmit Data 1
37	RSVD		Not used on XETK-S23.0

Pin	Signal	Direction	Comment
38	RSVD		Not used on XETK-S23.0
39	RSVD		Not used on XETK-S23.0
40	RSVD		Not used on XETK-S23.0

6.10.2 Interface and Power Supply Connector CON4

Pin	Signal	Direction	Comment
1	VDDPSTBY	Out	Permanent power to supply ECU Interface (3.3V)
2	VDDSTBY	Out	Permanent power to supply ECU EMU-RAM [2)]
3	GND	-	Power Ground
4	CALWakeUp	Out	Wakeup functionality (12 V output) [1)]
5	UBATT2	In	Vehicle Battery
6	UBATT1	In	Vehicle Battery

[1)] if not implemented, do not connect
[2)] XETK can be configured to monitor it's supply of VDDSTBY; voltage is sensed on board XETK.

6.11 Mechanical Dimensions

The reference measure for all drawings is millimeters

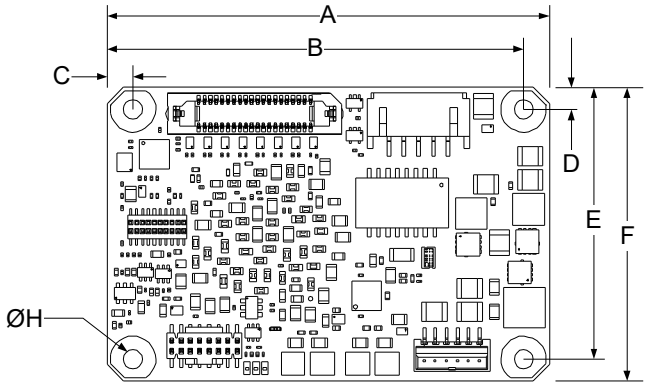

Fig. 6-2 XETK-S23.0 Dimensions - Top View

Item	**Dimension** [mm]	Tolerance [mm]	**Dimension** [in]	Tolerance [in]
A	60.00	+/- 0.20	2.362	+/- 0.008
B	56.50	+/- 0.20	2.224	+/- 0.008
C	3.50	+/- 0.10	0.138	+/- 0.004
D	3.00	+/- 0.10	0.118	+/- 0.004
E	37.00	+/- 0.20	1.457	+/- 0.008
F	40.00	+/- 0.20	1.575	+/- 0.008
H	2.50	+/- 0.20	0.098	+/- 0.008

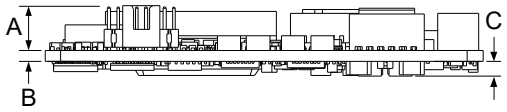

Fig. 6-3 XETK-S23.0 Dimensions - Side View

Item	**Dimension** [mm]	Tolerance [mm]	**Dimension** [in]	Tolerance [in]
A	6.121	+/- 0.20	0.241	+/- 0.008
B	1.57	+/- 0.16	0.062	+/- 0.006
C	2.0	+/- 0.10	0.079	+/- 0.004

7 Cables and Accessories

This chapter contains information about the following topics:

7.1 ECU Adapter Cable

7.1.1 CBAM230 Adapter Cable

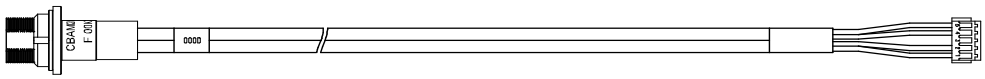

Fig. 7-1 CBAM230 Adapter Cable

XETK ECU Adapter Cable, 100 Mbit/s, suitable for ECU flush mounting (M12), 0.38 m length, shield connected to socket. Usable for ECUs with shielded housing.

Product	Length
CBAM230-0m38	0.38 m

7.1.2 CBAM240 Adapter Cable

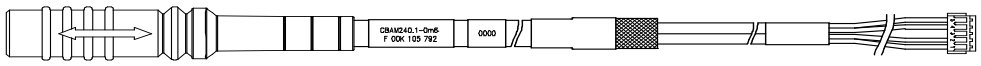

Fig. 7-2 CBAM240 Adapter Cable

XETK ECU Adapter Cable, 100 Mbit/s, shield connected to ECU-Housing (lead-through diameter for cable: 10 mm), 0.6 m length, shield bare for cable gland, isolated to the XETK. Usable for ECUs with shielded housing.

> **NOTE**
>
> The hardware for mounting ECU adapter cables is not included in the cable delivery, they need to be ordered separately. For detailed information on mounting accessories contact ETAS technical support.

Product	Length
CBAM230-0m38	0.6 m

7.1.3 CBAM271 Adapter Cable

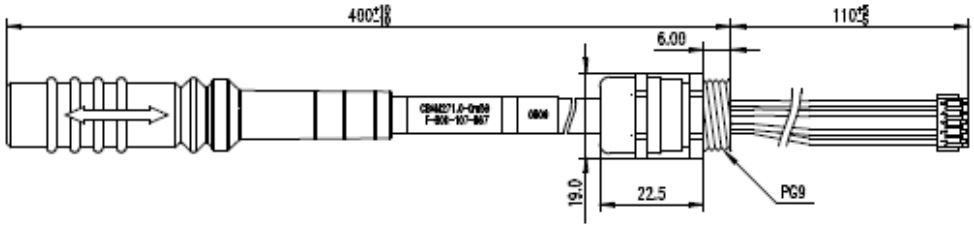

Fig. 7-3 CBAM271 Adapter Cable

XETK ECU Adapter Cable, 100 Mbit/s, pre-assembled into PG9 screwing, shield on ECU- housing, Lemo 1B PHE - JST PHR (10fc-5fc), 0.5 m length. Fits for ETKS_C3 case.

> **NOTE**
>
> For mounting the cable, cut a PG9 thread into the ECU housing. For thin-walled housings use a nut SM-PE 9. Available from Lapp, Order number: 52103210.

Product	Length
CBAM271-0m5	0.5 m

7.2 Combined Interface and Power Supply Cable CBAM270

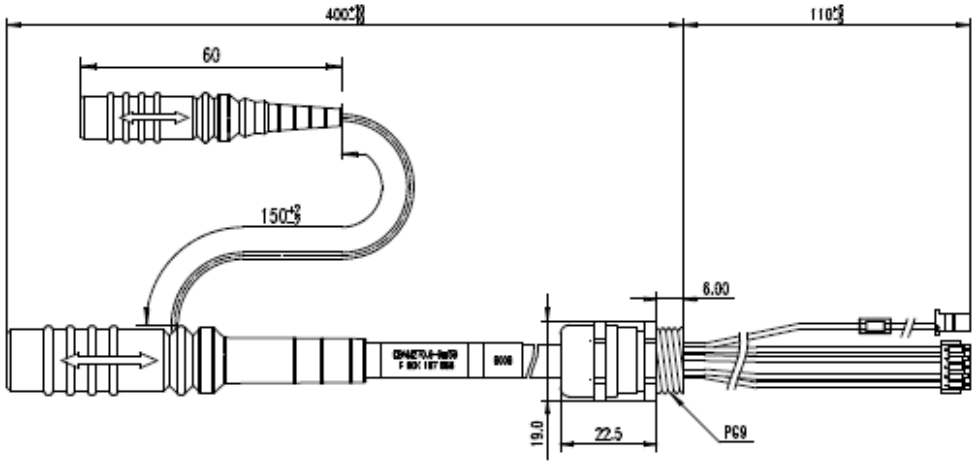

Fig. 7-4 CBAM270 Cable (0.5 m length)

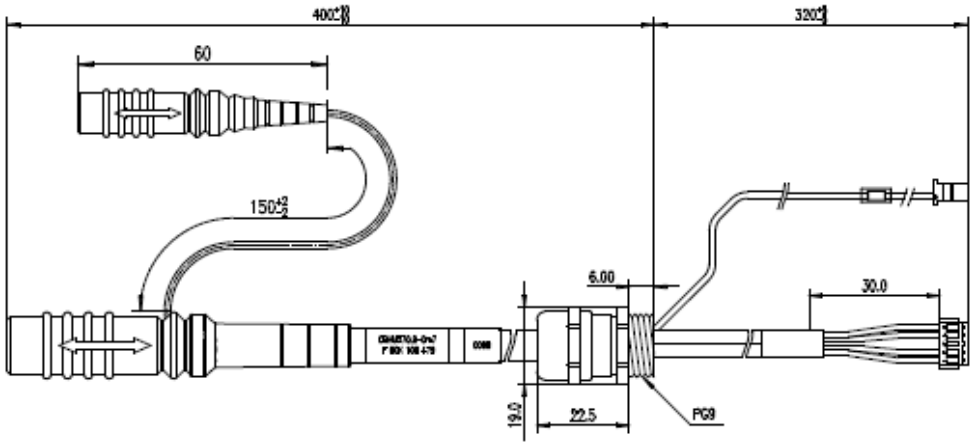

Fig. 7-5 CBAM270 Cable (0.7 m length)

XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0.5 m and 0.7 m length.

> **NOTE**
>
> For using the cable with an ETK with solder pad, cut the plug and solder the wire direct to the solder pad.

> **NOTE**
>
> It is recommended for safety reasons to connect the external permanent voltage and the switched voltage inside the ECU!

> **NOTE**
>
> For mounting the cable, cut a PG9 thread into the ECU housing. For thin-walled housings use a nut SM-PE 9. Available from Lapp, Order number: 52103210.

Product	Length
CBAM270-0m5	0.5 m
CBAM270-0m7	0.7 m

7.3 PC Interface Cable

7.3.1 CBE200-3 Cable

Fig. 7-6 CBE200-3 Cable

Product	Length
CBE200-3	3 m

7.3.2 CBAE200 Adapter Cable

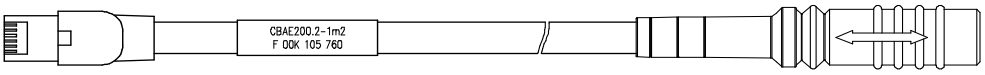

Fig. 7-7 CBAE200 Adapter Cable

Cable adapter to connect CBE230 cable to the PC over an RJ45 connector. The CBAE200-1m2 supports Gigabit Ethernet.

Product	Length
CBAE200-1m2	1.20 m

7.4 ETAS Module Interface Adapter Cable

7.4.1 CBE230 Cable

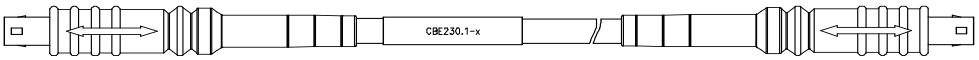

Fig. 7-8 CBE230 Cable

Gigabit Ethernet connection cable for ETAS devices. IP67 rated Lemo connectors on both sides. Gigabit Ethernet cable with power supply.

Product	Length
CBE230-3	3 m
CBE230-8	8 m

7.4.2 CBAE330 Adapter Cable

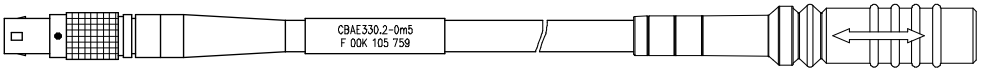

Fig. 7-9 CBAE330 Adapter Cable

Gigabit to 100 Mbit/s Ethernet Adapter for connection of CBE230 to ES600.

Cable adapter to connect CBE230 cable with the ES600. Power supply over the CBAE330.2 cable adapter is not supported.

Product	Length
CBAE330-0m5	0.5 m

7.5 Power Supply Cables

7.5.1 Cable K70.1

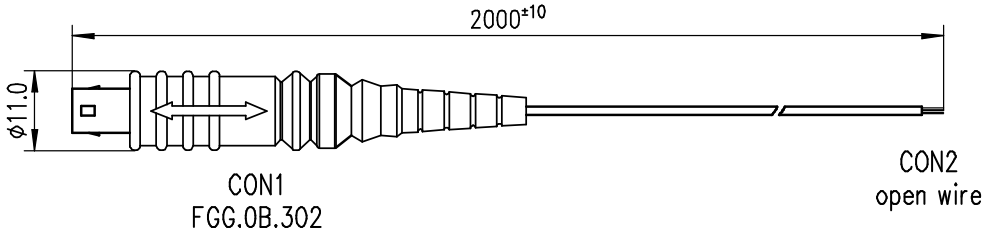

Fig. 7-10 Power Supply Cable K70.1

Dim	Millimeters	Inches
A	2000	78.74

7.5.2 Power Supply Cable KA50

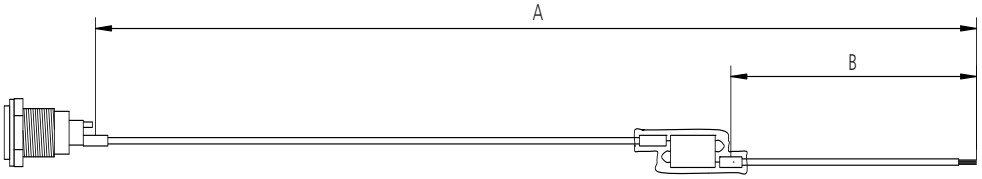

Fig. 7-11 Power Supply Cable KA50

Dim	Millimeters	Inches
A	200	7.87
B	50	1.97

7.6 ECU Interface Adapters

7.6.1 XETK - ECU Adapter ETAM2

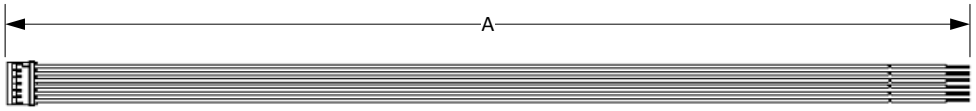

Fig. 7-12 XETK - ECU Adapter ETAM2

Dim	Millimeters	Inches
A	250.00	9.84

7.6.2 XETK - ECU Adapter ETAM5

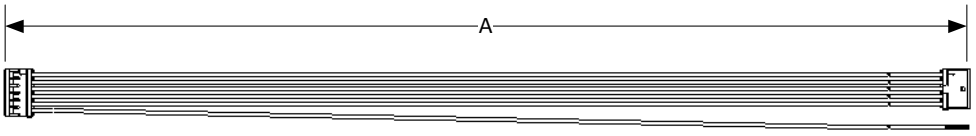

Fig. 7-13 XETK - ECU Adapter ETAM5

Dim	Millimeters	Inches
A	136.0	5.35

NOTE

See Fig. 4-6 on page 28 for details on mating connector to the ETAM5.

7.6.3 XETK - ECU Adapter ETAM9

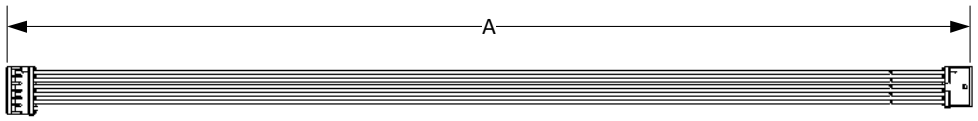

Fig. 7-14 XETK - ECU Adapter ETAM9

Dim	Millimeters	Inches
A	136	5.35

> **NOTE**
>
> See Fig. 4-6 on page 28 for details on mating connector to the ETAM9.

7.6.4 XETK - ECU Adapter ETAN4A

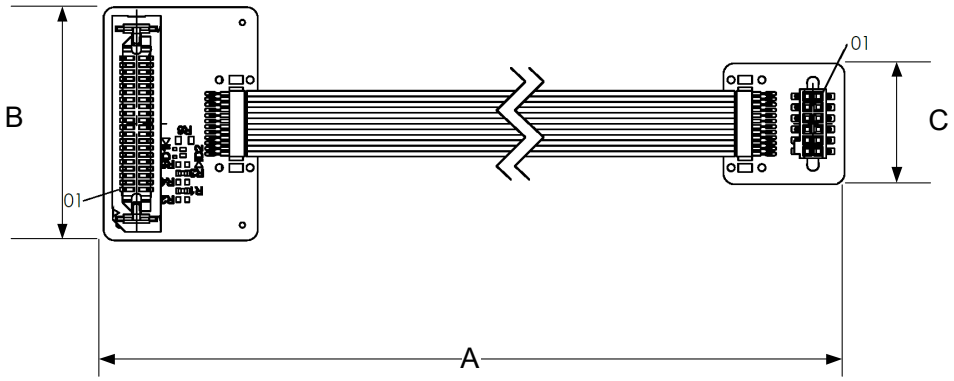

Fig. 7-15 XETK - ECU Adapter ETAN4A

Dim	Millimeters	Inches
A	150	5.91
B	27	1.06
C	14	0.55

> **NOTE**
>
> See Fig. 4-6 on page 28 for details on mating connector to the ETAN4A.

ETAN4A Pin Assignment

Pin	Signal	Description
1	GND	Signal Ground
2	TCK	JTAG TCK signal
3	/TRST	JTAG /TRST signal
4	TDO	JTAG TDO signal
5	TMS	JTAG TMS signal
6	TDI	JTAG TDI signal
7	FLMD0	Flash Mode 0 (WDGDIS)
8	VDD (Sense)	Sense for Switched power supply of ECU (ignition)
9	/RDY	JTAG Ready signal
10	/PORESET	ECU reset signal (open drain) for reset assertion and supervision
11	VSTBY (Sense)	Sense the supply of the standby (WP) RAM
12	/RESETOUT	ECU Internal Reset Status (sense)

NOTE

For additional details on the ETAN4A cable, please request the ETAN4A User Guide.

7.6.5 XETK - ECU Adapter ETAN20A with FSI

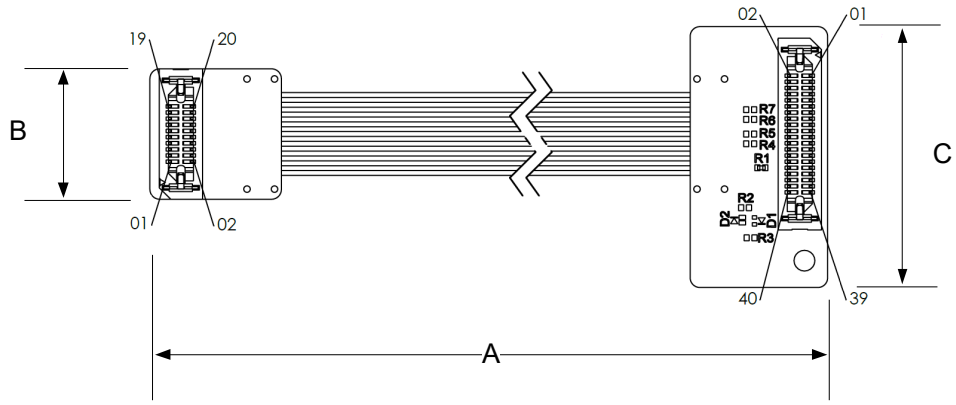

Fig. 7-16 XETK - ECU Adapter ETAN20A

Dim	Millimeters	Inches
A	135	5.31
B	17	0.67
C	34	1.34

NOTE

See Fig. 4-6 on page 28 for details on mating connector to the ETAN20A.

ETAN20A Pin Assignment

Pin	Signal	Description
1	RSVD	Reserved
2	VDD (Sense)	Sense for Switched power supply of ECU (ignition)
3	GND	Signal Ground
4	TCK	JTAG TCK signal
5	FSI_TX0	FSI Transmit Data 0
6	TMS	JTAG TMS signal
7	FSI_TX1	FSI Transmit Data 1
8	TDI	JTAG TDI signal
9	GND	Signal Ground
10	TDO	JTAG TDO signal
11	RSVD	Reserved
12	/TRST	JTAG /TRST signal
13	RSVD	Reserved
14	/PORESET	ECU reset signal (open drain) for reset assertion and supervision
15	GND	Signal Ground
16	/RESETOUT	ECU Internal Reset Status (sense)
17	FSI_TXCLK	FSI Transmit Clock
18	WDGDIS	Watchdog Disable signal
19	VSTBY (Sense)	Sense the supply of the standby (WP) RAM
20	RSVD	Reserved
L1	GND	Signal Ground
L2	GND	Signal Ground

NOTE

For additional details on the ETAN20A cable, please request the ETAN20A User Guide.

7.7 Waterproof Case ETKS_C3

For mounting the XETK-S23.0 on top of ECUs, an external case is available. It is small, robust and waterproof (IP65).

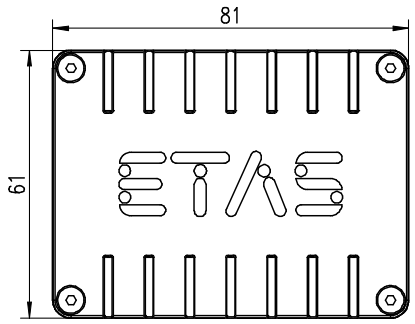

Fig. 7-17 ETKS_C3 Top View

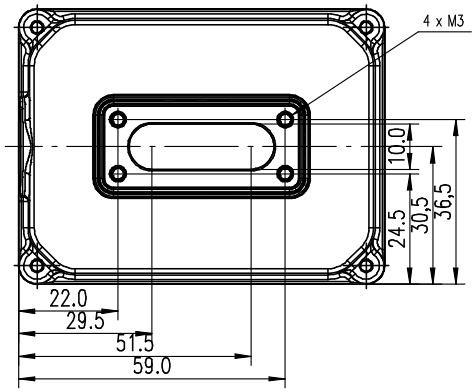

Fig. 7-18 ETKS_C3 Bottom View

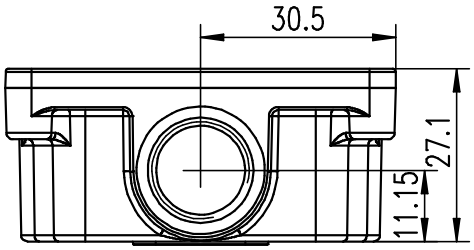

Fig. 7-19 ETKS_C3 Side View

8 Ordering Information

8.1 XETK-S23.0

Order Name	Short Name	Order Number
XETK-S23.0A Emulator Probe for ARM micro-controllers	XETK-S23.0	F 00K 114 164
Package Contents		
- XETK-S23.0 Emulator Probe for ARM micro-controllers including gap pad, - List "Content of this Package", - ETK Safety Advice, - China-RoHS-leaflet		

8.2 XETK - ECU Adapter

Order Name	Short Name	Order Number
ETAN4A XETK ECU adapter for mounting in external housing, SAMTEC - SAMTEC (40fc - 12fc), 0m136	ETAN4A	F 00K 111 423
ETAN20A XETK ECU adapter for JTAG and FSI, SAMTEC - SAMTEC (40mc - 20mc), 0m1	ETAN20A	F 00K 112 870
ETAM2 XETK/FETK ECU Adapter, Molex - open wires (6fc - 6c), 0m25	ETAM2	F 00K 109 306
ETAM5 XETK/FETK ECU Adapter, Molex - Molex (6fc - 5fc+1c), 0m136	ETAM5	F 00K 110 101
ETAM9 XETK/FETK ECU Adapter, Molex - Molex (6fc - 5fc), 0m136	ETAM9	F 00K 111 043
ETV5 XETK/FETK ECU Adapter, Molex - open wires (6fc - 2c), 0m25	ETV5	F 00K 111 701

8.3 Power Supply

Order Name	Short Name	Order Number
Isolated Power Supply Interface for XETK	ETP2	F 00K 104 010

8.4 Mounting Material

Order Name	Short Name	Order Number
Gap Pad as spare part for XETK-S23.0	XETK-S22_GP	F 00K 111 041

8.5 Cables

Please contact your local ETAS representative for further cable information.

> **NOTE**
>
> The cables showed in chapter “Cables and Accessories” on page 46 are not included in the XETK-S23.0 delivery.

8.5.1 ECU Adapter Cables

> **NOTE**
>
> The hardware for mounting ECU adapter cable CBAM240.1 is not included in the cable delivery; they need to be ordered separately. For detailed information on mounting accessories contact ETAS technical support.

Order Name	Short Name	Order Number
XETK ECU Adapter Cable, 100 Mbit/s, Shield on ECU-Housing, Lemo 1B HME - JST PHE (10fc-5fc), 0m38	CBAM230-0m38	F 00K 105 791
XETK ECU Adapter cable, 100 Mbit/s, Lemo 1B HME - JST PHE (10fc-5fc), 0m6	CBAM230-0m38	F 00K 105 792
XETK ECU Adapter Cable, pre-assembled into PG9 screwing, shield on ECU- Housing, Lemo 1B PHE - JST PHR (10fc-5fc), 0m50	CBAM271-0m5	F 00K 107 867

8.5.2 Combined ECU Adapter and Power Supply Cables

Order Name	Short Name	Order Number
XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0m50	CBAM270-0m5	F 00K 107 866
XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0m70	CBAM270-0m7	F 00K 108 479

8.5.3 Ethernet Cables

8.5.3.1 PC Interface Cable

Order Name	Short Name	Order Number
Ethernet PC Connection Cable 1GBit/s, Lemo 1B FGE - RJ45 (10mc-8mc), 3 m	CBE200-3	F 00K 104 373
Ethernet Connection Adapter Cable 1 GBit/s, Lemo 1B PHE - RJ45 (10fc- 8mc), 1m2	CBAE200-1m2	F 00K 105 760

8.5.3.2 ES600 / ES910 Interface Cable

Order Name	Short Name	Order Number
Ethernet Connection Cable 1 GBit/s, Lemo 1B FGE - Lemo 1B FGE (10mc- 10mc), 3 m	CBE230-3	F 00K 105 757
Ethernet Connection Cable 1 GBit/s, Lemo 1B FGE - Lemo 1B FGE (10mc- 10mc), 8 m	CBE230-8	F 00K 105 758

8.5.3.3 ES600 Interface Adapter Cable

Order Name	Short Name	Order Number
Ethernet Connection Adapter Cable 1 GBit/s to 100 MBit/s, Lemo 1B PHE - Lemo 1B FGF (10fc-8mc), 0m5	CBAE330-0m5	F 00K 105 759

8.5.4 Power Supply Cables

Order Name	Short Name	Order Number
External Power Supply Cable for ETKs, Lemo 0B FGG - open wire (2mc-1c), 2m	K70.1	F 00K 109 270
XETK Power Supply Cable for External Supply, with Filter Coil, Lemo 0B EGG - open wire (2fc-1c), 0m2	KA50	F 00K 000 940

8.6 Waterproof Case

Order Name	Short Name	Order Number
waterproof case, designed for XETK-S4.x, ETK-S6.x and XETK-S2x	ETKS_C3	F 00K 107 683

9 Contact Information

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:

www.etas.com/en/hotlines.php

ETAS Headquarters

ETAS GmbH

Borsigstraße 24
70469 Stuttgart
Germany

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

Figures

Index