FETK-T1.0
Emulator Probe for Infineon AURIX MCU Family
User's Guide

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FETK-T1.0 - User's Guide R10 EN - 01.2019

Contents

1 About this Manual

This chapter contains information about the following topics:

1.1 Identification of Safety Notices

The safety notices contained in this manual are identified with the danger symbol shown below:

The safety notices shown below are used for this purpose. They provide notes to extremely important information. Please read this information carefully.

DANGER!

indicates an immediate danger with a high risk of death or serious injury, if not avoided.

WARNING!

indicates a possible danger with moderate risk of death or (serious) injury, if not avoided.

CAUTION!

identifies a hazard with low risk that could result in minor or medium physical injuries or property damages if not avoided.

1.2 Presentation of Information

All activities to be performed by the user are presented in a "Use Case" format. That is, the goal to be accomplished is briefly defined in the heading, and the respective steps required for reaching this goal are then presented in a list. The presentation looks as follows:

Goal definition:

---

any advance information...

- Step 1

  Any explanation for step 1...
- Step 2

  Any explanation for step 2...
- Step 3

  Any explanation for step 3...

Any concluding comments...

Typographical Conventions

The following typographical conventions are used:

Bold	Labels of the device
Italic	Particularly important text passages

Important notes for the user are presented as follows:

Note

Important note for the user.

1.3 Scope of Supply

Prior to the initial commissioning of the module, please check whether the product was delivered with all required components and cables (see chapter "Ordering Information").

Additional cables and adapters can be obtained separately from ETAS. A list of accessories and their order designation is available in this manual and at the ETAS Home Page.

1.4 Additional Information

The configuration instructions for the product can be found in the corresponding software documentation.

2 Basic Safety Notices

This chapter contains information about the following topics:

2.1 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's 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. 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.

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's 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 work place that is protected against static discharge.

CAUTION!

During installation and removal, ECU and ETK must be in a de-eenergized 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's 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's Guide must be read prior to the startup of the product!
	Symbol for WEEE, see chapter 2.5 on page 12
	Symbol for CE conformity, see chapter 2.6 on page 12
	Symbol for China RoHS, see chapter 2.7.2 on page 12
	Symbol for China RoHS, see chapter 2.7.2 on page 12
	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 12) 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 CE marking

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.

2.7 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 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 section contains information about the basic features and applications of the FETK-T1.0 Interface Board (FETK = Emulator Test Probe for the ETAS ES89x ECU and Bus Interface Modules), hints to system requirements for operating the FETK-T1.0, and other details.

3.1 Applications

The FETK-T1.0 is an emulator probe for the Infineon AURIX microcontroller family. It is a serial FETK designed for use with the DAP interface (IEEE/ISTO 5001) and Aurora Trace interface.

Note

For supported Infineon AURIX microcontrollers, refer to chapter 7.1.3 on page 33.

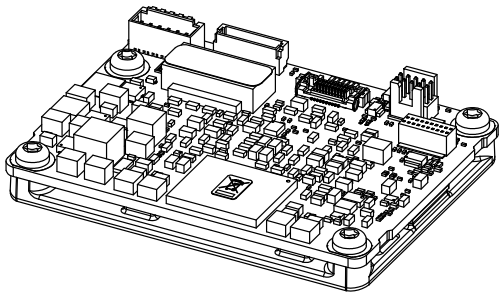


Fig. 3-1 FETK-T1.0

	FETK-T1.0
ECU DAP interface connector	10 pin SAMTEC
ECU Aurora interface connector	20 pin SAMTEC
Power supply connector	6 pin MOLEX
Power supply for ED devices (VDDS-BRAM)	min. 1.3 V
SBRAM sense	Yes
Pinless triggering	Yes
Timer triggering	Yes
Trace Trigger By Value	Yes
Trace Trigger By Reference	No

To access the ECU the FETK-T1.0 has to be connected via ES89x modules.

The system can be used for high speed Measurement, Calibration and ECU flash programming. Support of high speed and high band width applications e.g. functional prototyping - bypass depends on the functionality of the connected modules.

3.2 Features

General

- Enables highest possible data throughput by utilizing the microcontroller "TRACE" interface e.g. AURORA for measurement purposes and the debug interface for configuration and prototyping
- Gigabit Ethernet Interface:
  - Connection to PC via ES89x modules
  - Latency optimized proprietary Ethernet protocol for FETKs to ES89x,
  - Supports a variety of standard applications
- Calibration tool access performed via the microcontroller DAP interface
  - 3.3 V DAP signal level
  - Configurable DAP interface mode and clock speed:

    2-pin DAP mode (50 MHz, 100 MHz)

    3-pin DAP mode, wide mode (100 MHz)
- Permanent storage of configuration
- Third party MC-tool support via ES89x module possible

Measurement

- Fast measurements: ECU raster not faster than 15 µs
- Supports "turnkey mechanism" - measurement start immediately after "Ignition on" and proceed measurement after ECU reset (only if serial debug interface is using for measurement)
- Pin-less ECU handshake and trigger mechanism
- Hook-based (DISTAB) and hook-less measurement approaches

Calibration

- Concurrent use of calibration and measurement performed via microcontroller
- Working Page & Reference Page (2 page concept) realized by microcontroller overlay mechanism
- Direct access to parameters, curves, and maps in internal RAM
- Microcontroller capability of internal Flash emulation can be used
- FETK powers Emulation RAM (for calibration purpose)
- Supports "Start on Any Page"
- 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

ECU Flash Programming via FETK

- Using microcontroller debug interface, ECU software support not necessary
- Braindead flashing under ProF control

Further characteristics

- "ETK Tools" update to support ETAS software tools (INCA, XCT)
- Firmware update (programming of the logic device) through HSP software service packs; removal of FETK or ECU is not necessary
- Mounting the FETK-T1 via heat spreader directly to the ECU housing is recommended
- Heat distribution
- Temperature range suitable for automotive application

For more technical data on the FETK-T1.0 consult the chapter "Technical Data" on page 33.

4 Hardware Description

In this chapter, the function blocks of the FETK-T1.0 are explained in detail.

4.1 Architecture

Fig. 4-1 shows the block diagram of the FETK-T1.0.

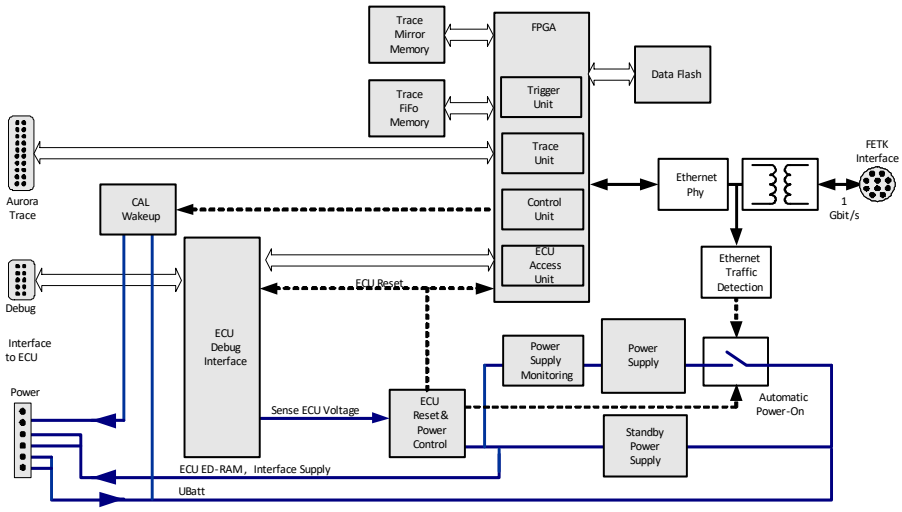


Fig. 4-1 FETK-T1.0 Architecture

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 FETK-T1.0 interface. This process enables adjustments of parameters, characteristic lines and maps through the calibration and development system.

Using a trace interface, the FETK-T1.0 can aquire measurement data and send the measured data to the PC.

The 100/1000 Mbit/s Ethernet interface provides communication with the ES89x module.

FETK Connector	Description
CON1	ECU interface (DAP)
CON2	ECU interface (Trace)
CON3	Ethernet interface (ES89x module)
CON4	Power supply

4.2 ECU Interface

The FETK-T1.0 is connected via connectors CON1, CON2 and CON4 to the ECU with three adapter cables (refer to Fig. 4-2 on page 18). 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 FETK power supply, but only for detection of the ECU status, therefore the power consumption on this line is negligible (refer to chapter 4.4 on page 20)
- 1 Reset line which allows the FETK to control the system reset of the ECU
- 1 Reset line which allows the FETK to monitor the system reset of the ECU
- 5 Debug line interfaces for the communication between the FETK-T1.0 and the microcontroller
- 1 differential clock line (100 MHz)
- 1 differential Trace lane
- 1 Watchdog disable line
- 1 ground line.

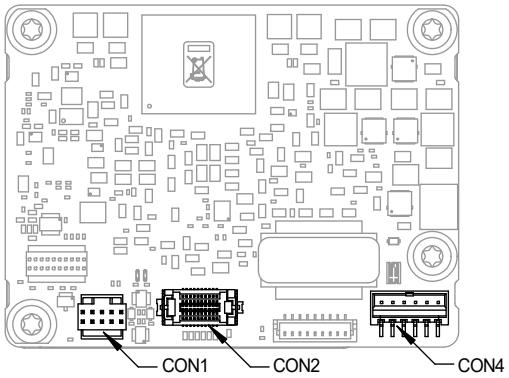


Fig. 4-2 Location of the ECU Interfaces DAP (CON1) and Trace (CON2)

4.3 FETK Ethernet Interface

The FETK Ethernet interface utilizes a proprietary protocol. It has to be connected to the PC via a ES89x ECU Interface Module at CON3 (refer to Fig. 4-3).

Note

The FETK Ethernet interface utilizes a proprietary Ethernet protocol and is compatible only with the Gigabit Ethernet interfaces of the ES89x ECU Interface Module.

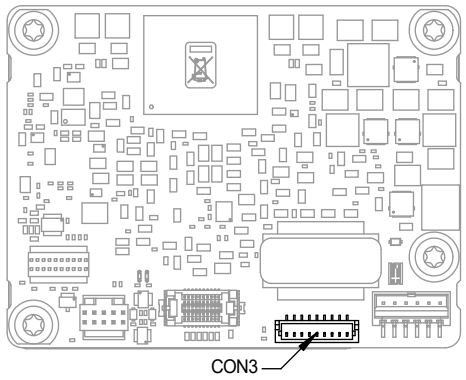


Fig. 4-3 Location of the FETK Ethernet Interface connector (CON3)

4.4 Power Supply

The FETK-T1.0 requires a permanent power supply. It is typically powered directly from the car battery. The input voltage may vary between 6.0 V and 36 V. In case of higher input voltages to the FETK, additional voltage protection is required.

The FETK is suitable for 12 V and 24 V systems. In 24 V systems the low dump capability is reduced.

The FETK-T1.0 will also accept voltage drops down to 3 V, for a maximum duration of 15 ms (for additional details of low voltage operation, see ISO standard 16750).

From the input battery voltage, switch-mode power supplies provide all necessary voltages on the FETK-T1.0. The power supply of the ECU is not affected by the FETK-T1.0. An automatic switch ensures that the power supply of the FETK-T1.0 is automatically switched on and off when the FETK enters and leaves its standby (sleep) mode.

The FETK-T1.0 is supplied with power through the connector CON4.

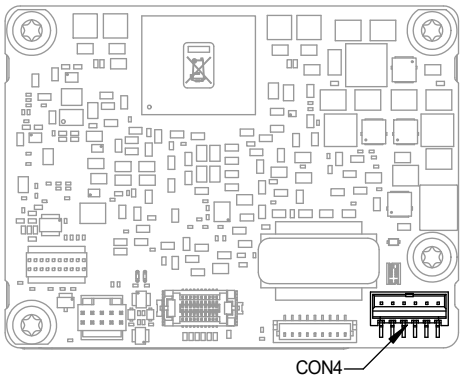


Fig. 4-4 Location of the FETK-T1.0 Power Supply Connector

4.5 ECU Voltage Supervisor

The ECU voltage (VDDP) is monitored by the FETK to recognize whether the ECU is switched on or off. The Pin "VDDSBRAM" is used to provide the standby voltage and to monitor it. It's not possible to monitor VDDSBFRAM, only.

Note

The FETK-T1.0 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 FETK-T1.0 monitors the VDDSBRAM supply on board the FETK. The microcontroller's standby power supply pin must be connected to the FETK pin VDDSBRAM.

4.6 Status LEDs

There are three LEDs displaying the operating status of the FETK-T1.0 (Fig. 4-5 on page 21).

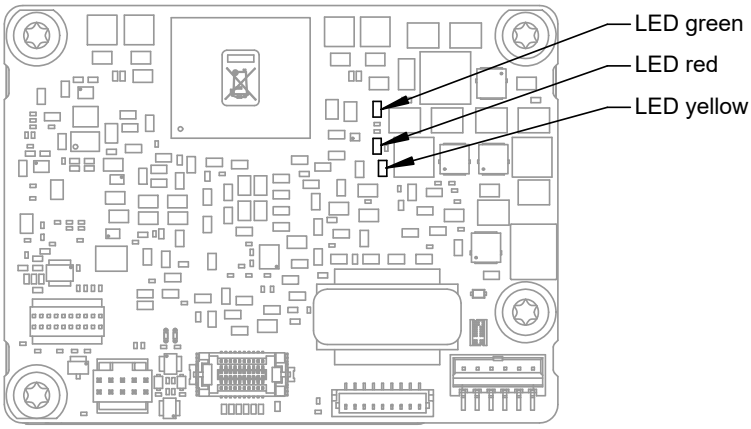


Fig. 4-5 Status LEDs (FETK-T1.0)

LED	State	Definition
Red	On	FETK-T1.0 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 FETK-T1.0)
Green	Off	Working Page contains data and is accessible from INCA
	Flashing	FETK-T1.0 is in boot configuration mode: - measurement and calibration are not possible, - FETK-T1.0 update with HSP is required
	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 FETK-T1.0 switches on again, the ECU switches to the Reference Page. Green LED stays lit until the calibration and development system downloads data into the calibration data memory. Otherwise switching to the Working Page is not possible.
Yellow	Off	FETK-T1.0: no link to calibration system established
	On	1000 Mbit/s communication to calibration system established

4.7 Data Access

4.7.1 Calibration Data Access

The FETK-T1.0 is a serial FETK using DAP and a trace interface as the primary microcontroller interface. Typical of all serial ETKs, XETKs and FETKs, the RAM used for data emulation and data measurement is not accessible by the FETK until the microcontroller is powered up and the startup handshake is performed.

Serial FETKs 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 can not 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 ED RAM. The Working Page may be a portion of or the entire size of the ED RAM. The ED 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 ED RAM is permanently powered by the FETK or ECU and shall not be reseted by the ECU, if the FETk-T signals a permanently powering of the ED RAM during handshake.

The FETK / INCA has the complete control over the RAM used as Working Page and it's contents. When enabling data emulation, the FETK establishes a basic start-up 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 FETK-T1.0 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 FETK-T1.0 does not directly control the microcontroller overlay registers. Instead the FETK-T1.0 and microcontroller software use a simple communication method with a shared mailbox in RAM. The FETK 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 FETK provides the necessary information.

The FETK-T1.0 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 cold start measurement in spite of this restriction, the cold start measurement procedure is defined to give the user the feeling of a parallel FETK.

4.7.2 Measurement Data Access

The FETK-T1.0 is a serial FETK, so all data to be measured is located in the ECU memory. It can be read out by the FETK-T1.0 using the DAP interface in two ways:

- Trace measurement using the Aurora trace interface
- Read accesses using the DAP interface

Trace Measurement

The microcontroller ability to send trace messages over the Aurora interface is used to forward any write access to measurement data to the FETK-T1.0. The FETK-T1.0 combines the processing of this data trace messages with an initial direct read of the configured measurement data to an always up to date mirror of the measurement data in the ECU.

The current values will be sent from the FETK to INCA every time the ECU software issues the corresponding trace trigger. For details on trace trigger (refer to chapter 4.10.2 on page 25). The FETK-T1.0 does the complete configuration of the microcontroller for trace based measurement. No ECU software is required for the configuration.

Direct measurement

The FETK-T1.0 reads the measurement data through the DAP interface.

The read action will be executed by the FETK-T1.0, when it is invoked by a hardware trigger (refer chapter 4.10.4 on page 26).

Due to the throughput limitations of the DAP interface, this method is not as suitable for high speed measurement as the Trace Measurement.

4.8 DAP Interface

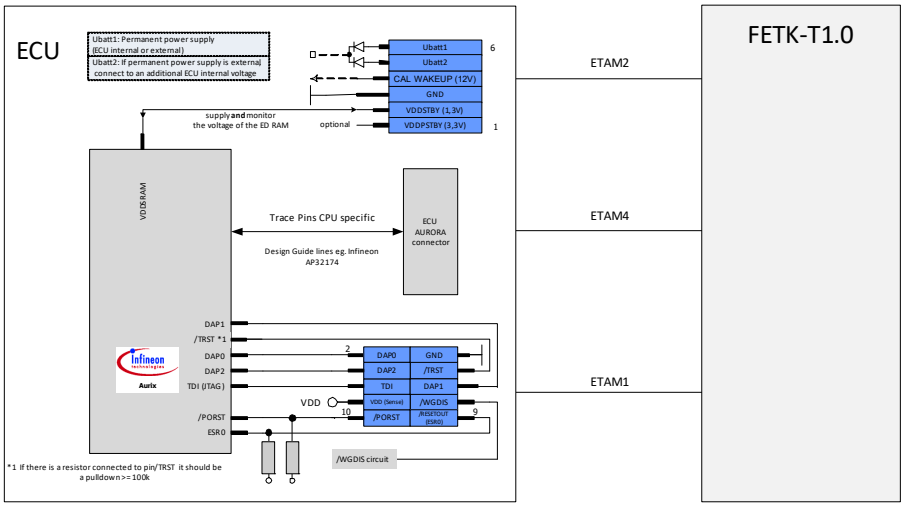


Fig. 4-6 Equivalent Circuitry of the ECU DAP Interface (ECU)

The FETK-T1.0 Device Access Port (DAP) interface is configurable and operates in the 2-pin or in the 3-pin mode (wide mode).

Supported DAP modes:

- 2-pin DAP mode: one data pin (direction via protocol), one clock pin
- 3-pin DAP mode: two data pins (bidirectional, direction via protocol), one clock pin

The 2-pin DAP mode is the FETK-T1.0 DAP interface default mode.

4.9 Trace Interface

To transfer all data and address information of all microcontroller CPUs traditional trace based measurement requires for the device a high speed trace interface. The Infineon TC2xxED reduces the net data rate at the trace port into the range of Mbyte/s by collecting only relevant data at given points of time from mirrored RAMs of the device internal RAMs.

The FETK-T1.0 supports the IFX AURIX Aurora Trace Interface. Support of Trace interface is only suitable for the microcontroller ED devices.

4.10 Trigger Modes

4.10.1 Overview

The FETK-T1.0 supports the following trigger modes:

- Trace triggering by value

  The trigger mode "Trace Triggering" uses defined values written into a defined Trace-address for triggering (see also chapter 4.10.2 on page 25).

- Pinless triggering

  The trigger mode "Pinless Triggering" uses the microcontroller's internal TRIG register for triggering (see also chapter 4.10.3 on page 25).

- Timer triggering

  The trigger mode "Timer Triggering" uses four internal timers of the FETK for triggering (see also chapter "Timer Triggering" on page 26).

4.10.2 Triggering via Trace Interface

The FETK-T1.0 provides support for up to 255 data trace triggers. The trace triggers are defined within a section of RAM covered by a trace window. Both the trace window and trace triggers are defined in the FETK's configuration and/or A2L file. A write by the microcontroller software to a trace trigger location causes a trace trigger.

The trace trigger events to the FETK-T1.0 are synchronous to the microcontroller software. Variables assigned to a measurement raster using a trace trigger are acquired using the trace interface, not via DAP.

The FETK-T1.0 supports value based data trace trigger:

- triggers for different rasters/events have same address, but use different values
- up to 255 value based trace trigger are supported.

Note

It is not possible to use the FETK-T1.0 configured with trace triggers and a debugger with program / data trace simultaneously.

4.10.3 Pinless Triggering

Startup Handshake

The COMDATA trigger register is used to generate an FETK startup handshake. The ECU must ensure that all memory ECC initializations have been completed prior to the start-up handshake.

FETK Trigger Generation

Initialization: After the startup handshake and measurement is enabled, the FETK is waiting for triggers from the ECU software.

Application running: To generate triggers, the ECU software sets bits in the trigger register "CBS_TRIG" by writing the associated bits in the trigger setting register "CBS_TRIGS".

Each bit of the trigger setting register "CBS_TRIGS" corresponds to a bit in the same position in the trigger register "CBS_TRIG", each of them corresponding to an FETK hardware trigger.

The FETK periodically polls the trigger register "CBS_TRIG" via IO_READ_TRIG for detecting triggers. The polling rate is determined by the fastest measurement raster and is configurable with a 50 µs default.

Active bits in trigger register "CBS_TRIG" are automatically cleared by the CPU when the register is read by the FETK-T1.0 via IO_READ_TRIG. For generating triggers, the ECU software sets bits in the trigger register "CBS_TRIG" by writing the associated bits in the trigger setting register "CBS_TRIGS".

4.10.4 Timer Triggering

The trigger mode "Timer Triggering" uses four internal timers of the FETK-T1.0 for triggering. A fixed 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 A2L file. Available settings are:

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

The timers work in an asynchronous manner to the ECU.

4.11 Reset

The requirement for the FETK-T1.0 reset mechanism is to ensure that power-up and power-down behavior of ECU is clean and smooth. The FETK-T1.0 generates a /PORST on user request, only.

The signals /PORST and /ESR0 of the microcontroller are used by the FETK-T1.0 to detect when the ECU is in reset.

The FETK-T1.0 senses the switched ECU power supply. This allows it to detect when the ECU is off and forward this information to INCA. In addition, it allows the FETK to enter the power save mode with the calibration system unplugged.

4.12 Pull CalWakeUp until Startup Handshake

The FETK has the ability to wake up the ECU by applying voltage to the CalWakeUp pin of the ECU connector. This allows the FETK 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 (VDDP) is high or if the pin should be driven high until the start-up handshake between ECU and FETK is complete.

5 Installation

In this chapter, the hardware installation of the FETK-T1.0 is described.

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 work place that is protected against static discharge.

5.1 Connection to the ECU

CAUTION!

Risk of short circuiting the internal signals of the FETK!
When you mount the FETK to the ECU, you must ensure that the screws and washers used will not penetrate the FETK printed circuit board.

For connecting the FETK-T1.0 to the ECU three FETK adapter cables are recommended:

- at CON1 adapter cable ETAM1,
- at CON2 adapter cable ETAM4 and
- at CON4 adapter cable ETAM2 or ETAM5.

For additional details to connect the FETK-T1.0 to the ECU with adapter cables see Fig. 5-2.

The adapter cables are to be ordered separately (refer chapter "Ordering Information" on page 51).

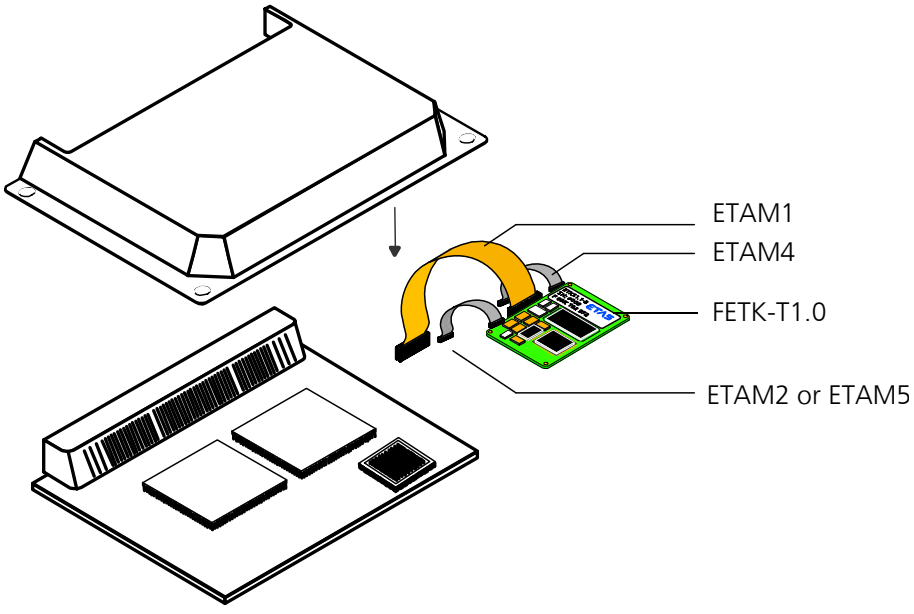


Fig. 5-1 FETK-T1.0 Connection to the ECU

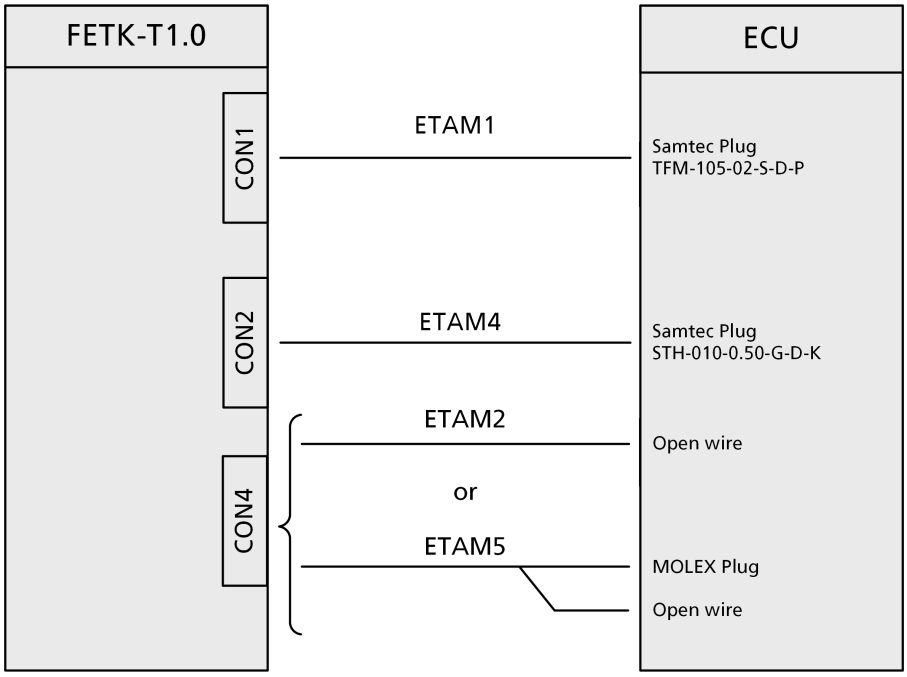


Fig. 5-2 FETK-T1.0 Connection to the ECU

5.2 Thermal Connection

The ECU housing should be of a size and material, which gives a thermal conductivity of 2.5 W/ (m · K) at the FETK-T1.0 mounting position.

If this value cannot be achieved, additional cooling structures, e.g. heat sinks, should be applied.

CAUTION!

The use of heat conductive paste with a thermal conductivity > 0.75 W/(m · K) between heat spreader and housing is strongly recommended.

5.3 Wiring

5.3.1 FETK Ethernet Interface

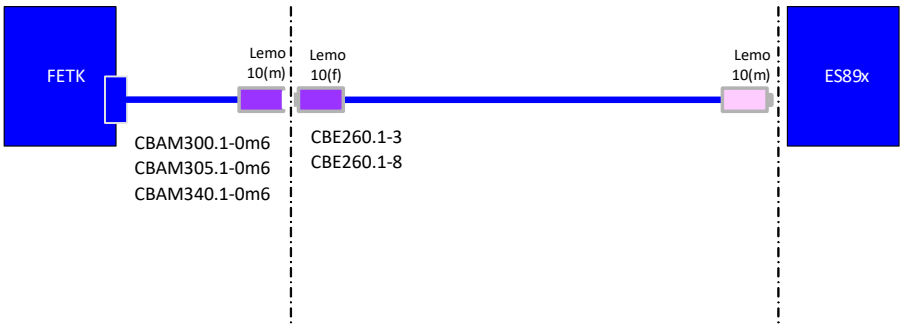


Fig. 5-3 Wiring - FETK Ethernet Interface

The FETK Ethernet interface can be connected to the ES89x ECU and Interface Module.

Note

The FETK Ethernet interface utilizes a proprietary Ethernet protocol and is compatible only with the Gigabit Ethernet interfaces of the ES89x ECU Interface Module.

5.3.2 Power Supply

The FETK-T1.0 needs a permanent power supply (refer chapter "Power Supply" on page 20). Refer to figures Fig. 5-4, Fig. 5-5, or Fig. 5-6 for recommendations on permanent power supply connection.

Permanent Power Supply inside ECU available

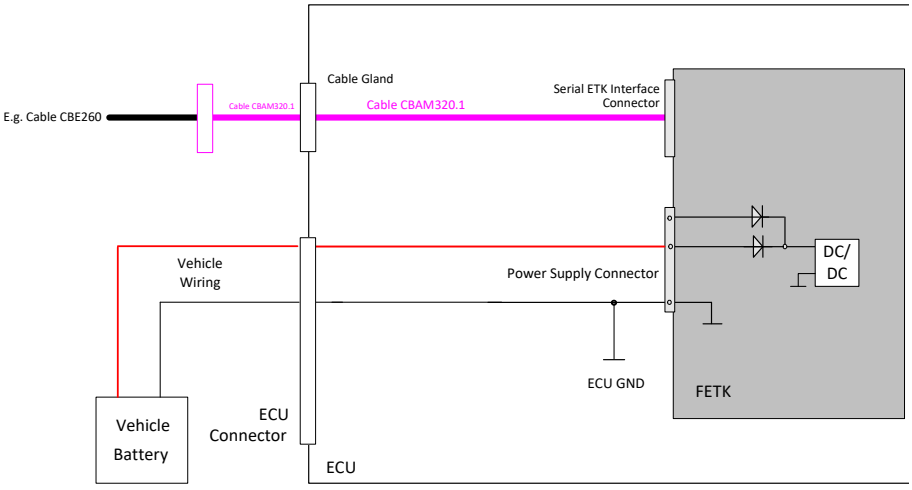


Fig. 5-4 Permanent Power Supply inside ECU available

Permanent Power Supply inside ECU not available

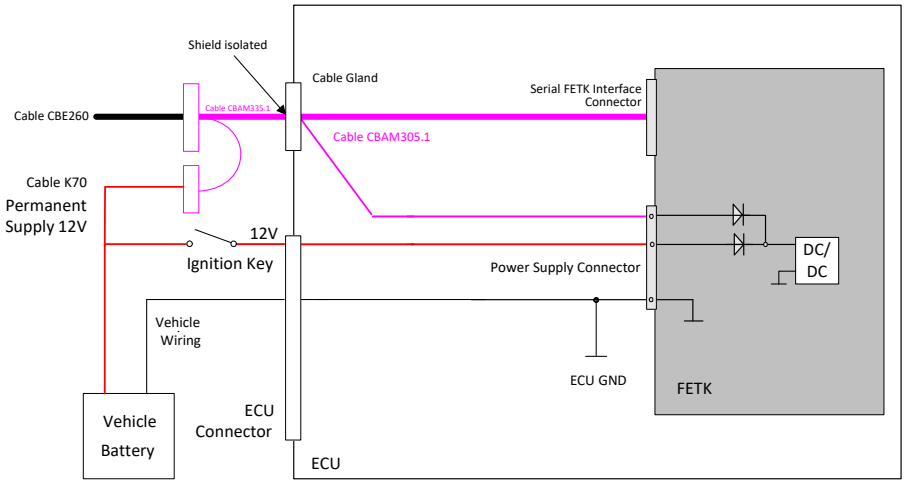


Fig. 5-5 Permanent Power Supply inside ECU not available

Isolated Power Supply inside ECU

The FETK-T1.0 does not require a galvanically isolated power supply. For special applications ETAS can offer a isolated power supply unit.

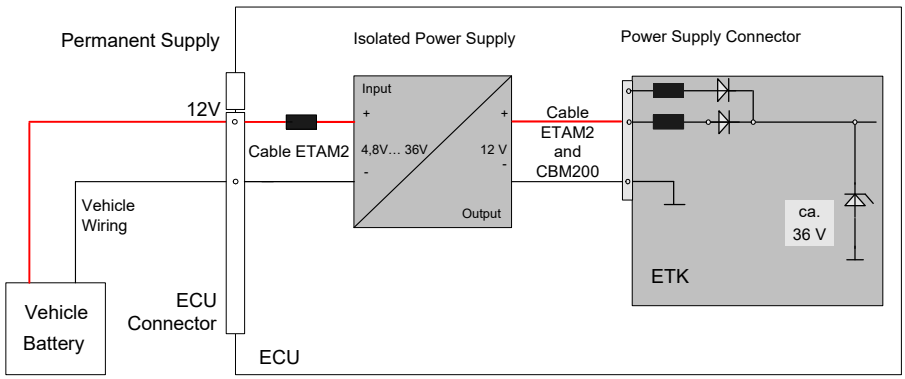


Fig. 5-6 Isolated Power Supply inside ECU

6 ETK / XETK / FETK Configuration

The "ETK / XETK / FETK Configuration" chapter describes the FETK-T1.0 hardware configuration.

6.1 Overview

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

Generating a valid configuration data set is supported by the XETK Configuration Tool (XCT). The XCT contains information on all available ETKs, XETKs, and FETKs. The user is supported through a graphical 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 ETK / XETK / FETK to the ECU.

   The ECU hardware developer defines the connection of the ETK / XETK / FETK 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 XCT can create the following output:

1. Direct ETK / XETK / FETK configuration
2. Storage of the configuration in a data file
3. The corresponding ASAP2 input

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

- Overlay Region definitions
- Memory Segment definitions
- ETK / XETK / FETK 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 ETK / XETK / FETK is checked for the appropriate configuration.

If necessary, the ETK / XETK / FETK will be configured appropriately to the corresponding project.

6.2 Configuration Parameter

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

They are described for the different ETK / XETK / FETK types in the help document of the XCT.

Starting the XCT help

- Start XCT.

  The main window of XCT opens.
- Select in the menu bar **?** → **Contents**.

  The XCT help window opens.
- Choose **Reference to User Interface** → **(X)ETK Hardware Configuration Parameters**.
- Choose the topic **FETK-T1.0**.

  The topic **FETK-T1.0** contains information about the FETK-T1.0 hardware configuration parameters and their possible values.

7 Technical Data

7.1 System Requirements

7.1.1 ETAS Compatible Hardware

ETAS Hardware: ES89x ECU Interface Modules

7.1.2 PC with one Ethernet interface

A PC with one open Ethernet interface (1 Gbit/s) with RJ-45 connection is required to connect the ES89x module.

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 Software Support

You need following software versions to support the FETK-T1.0:

Microcontroller	HSP	INCA	ETK Tools	ASCET-RP	INTECRIO
TC27xT-ED C-Step [1)]	V11.0.0	V7.2.0	V4.1.0	V6.4.1	V4.6.1
TC29xT-ED	V11.0.0	V7.2.0	V4.1.0	V6.4.1	V4.6.1

and higher versions (microcontroller steps) if they support the C-Step specifications

Operating the FETK-T1.0 with older software versions is not possible.

The configuration instructions for the FETK-T1.0 under INCA and HSP are described in the relevant software documentation.

7.2 Data Emulation and Measurement Memory

7.2.1 Data Emulation Memory and Microcontroller Support

The FETK-T1.0 uses a portion of or up to the entire size of the ED RAM, to emulate data in internal flash. The following table lists the supported microcontrollers, the size of the ED RAM, and states if the ED RAM is capable of being powered using a standby supply.

Microcontroller	Max. ED RAM	Standby powered
TC27xT-ED	1024 KB	Yes
TC29xT-ED	2064 KB	Yes

7.2.2 Measurement Data Memory

Item	Characteristics
Location	Typically located within the emulation memory when using DISTAB17 hooks. Measurement data memory can be located in internal RAM if the entire ED RAM is needed for calibration.
Update	Logic devices updated using HSP software

7.2.3 Trace Memory

Item	Characteristics
Trace mirror size	4 MByte (phys.)

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

Inside the ECU housing the max. temperature is specified with 110 °C, still air. Outside of the ECU the max. ambient temperature is assumed to be 105 °C at 1 m/s airflow. The power dissipation of the FETK-T1.0 will be max. 5.2 Watt.

Note

It is recommended to mount the FETK-T1.0 via the heat spreader directly to the ECU housing.

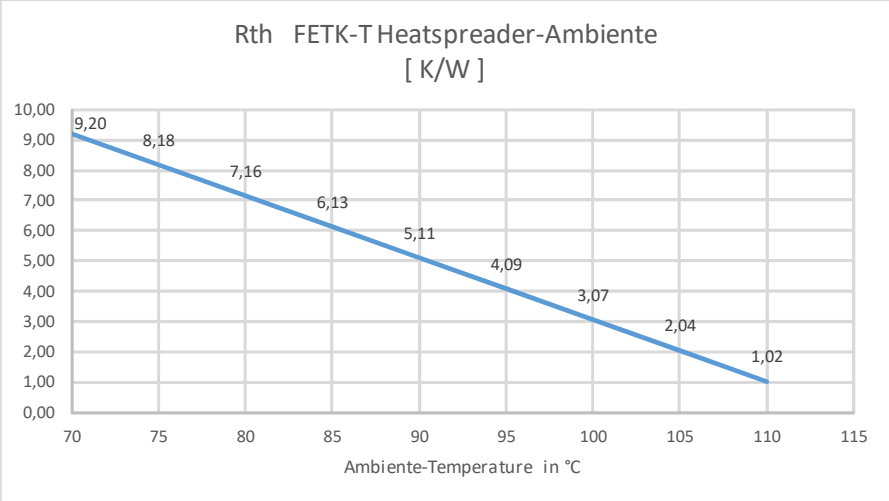


Fig. 7-1 Max. Thermal Resistance from FETK-T1.0 Heatspreader-Surface to Ambiente

$T_{Ambiente}$ [°C]	R_{th} FETK-T Heatspreader-Ambiente [K/W]
70	9.20
75	8.18
80	7.16
85	6.13
90	5.11
95	4.09
100	3.07
105	2.04
110	1.02

$R_{th} = (125 - 10 - | T_{amb} |) / 4.89$ K/W

$T_{jmax} = 125$ °C

7.4 FETK Ethernet Interface

Item	Characteristics
Connection	1 Gbit/s Ethernet
Cable length	max. 30 m / 100 ft
Ethernet Interface	DC decoupling

Note

The FETK Ethernet interface utilizes a proprietary Ethernet protocol and is compatible only with the Gigabit Ethernet interfaces of the ES89x ECU Interface Module.

7.5 Power Supply

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Permanent power supply	U_{Batt}	Vehicle usage [1)]	6.0	12	36	V
			[all values ±0%]			
Cranking voltage	U_{Batt}	< 3 seconds	3			V
Deep standby current	I_{STBY1}	U_{Batt} = 12 V; ECU off; no load from ECU; T = 20 °C	1	3	5	mA
Standby current	I_{STBY2}	U_{Batt} = 12 V; ECU off; no load from ECU; T = 20 °C	70	106	130	mA
Operating current	I_{Batt}	U_{Batt} = 12 V; no load from ECU; T = 20 °C	180	240	340	mA
Power dissipation	P_{Batt}	U_{Batt} = 12 V; I = 0 mA at pin ECU_SBRAM; T = 20 °C	2.16	2.88	4.08	W
Power consumption on FETK-T1.0	P_{Batt}	U_{Batt} = 12 V; I = 500 mA at pin VDDSTBY [1.25 V]; I = 80 mA at pin VDDPSTBY; T = 20 °C	2.41	3.13	4.33	W

[1)] The FETK-T1.0 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 values above are not including the power dissipation of the microcontroller ED-RAM part.

Note

The FETK-T1.0 will accept permanent power supply voltage dips (for additional details of 3 V low voltage operation, see ISO standard 16750).

7.6 Microcontroller Interface

	Symbol	Condition	Min	Typ	Max	Unit
ECU Standby RAM Output Voltage	VDDSTBY	max. 500 mA load	1.27	1.32	1.36	V
VDDPSTBY Output Voltage	VDDPSTBY	max. 80 mA load	3.14	3.3	3.46	V
Cal_Wakeup Output Voltage	CAL_WAKEUP	U_{Batt} = 6 - 36 V; load = 0 - 50 mA	U_{Batt}-1 V		U_{Batt}	V
ECU Power Supply Supervision Voltage (3.3 V selected)	VDDP	ECU on	2.67	2.77	2.89	V
		ECU off	2.44	2.56	2.68	V
	IDDP	VDDP 3.3 V			800	µA
ECU Standby RAM Supervision Voltage (1.25 V selected)	VDDSTBY / VDDSTBY_SENSE	VDDSTBY ↑	1.03	1.07	1.1	V
		VDDSTBY ↓	1.02	1.06	1.08	V
	IDDSTBY	VDDSTBY 1.30 V			50	µA

7.7 Test Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Start Up Time 1 [1)]	$t_{startup1}$	U_{Batt} = 12 V Standby cofigured ECU_VDDP goes high	0	6	10	ms
Start Up Time 1 [1)]	$t_{startup1}$	U_{Batt} = 12 V Deep Standby configured ECU_VDDP goes high	100	160	275	ms
Start Up Time 2 [1)]	$t_{startup2}$	U_{Batt} goes high	100	160	275	ms

[1)] /PORST is not pulled low until FETK start up time

7.8 ECU Interface Timing Characteristics

7.8.1 DAP Timing Characteristics

The following diagrams show the timings the FETK-T1.0 can process.

Note

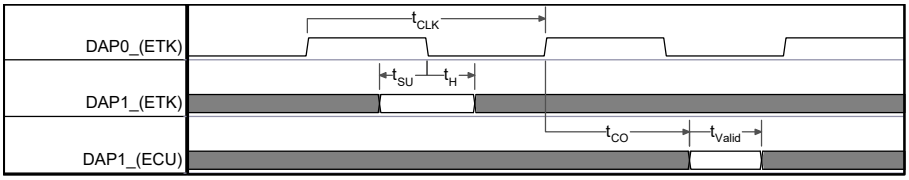
DAP timing parameters in this chapter refer to the DAP interface (CON1) of the FETK-T1.0. The DAP wiring to the ECU (ETAM1) must be taken account additionally.
All timings are measured at a reference level of 1.5 V. Output signals are measured with 20 pF to ground and 50 Ω to 1.5 V.

Supported DAP modes:

- 2-pin DAP mode: one data pin (direction via protocol), one clock pin
- 3-pin DAP mode: two data pins (bidirectional, direction via protocol), one clock pin

The 2-pin DAP mode is the FETK-T1.0 DAP interface default mode.

DAP Timing Diagram



DAP Timing Parameter

Parameter	Symbol	Value [ns]	Comment
DAP0 Clock Period (ETK --> Target)	t_{CLK}	10	100 MHz DAP Clock Frequency
		20	50 MHz DAP Clock Frequency
DAP1 Set-Up Time (ETK --> Target)	t_{SU}	4	
DAP1 Hold Time (ETK --> Target)	t_{H}	2	
DAP1 Clock-to-Out Time (Target --> ETK)	t_{CO}	~	Undetermined, ETK automatically determines optimum sampling point
DAP1 Valid Window (Target --> ETK)	t_{Valid}	8	

7.8.2 Aurora Trace Timing Parameter

Parameter	Value	Unit	Signal Impedance [Ohm]
Clock	100	MHz	100 (differential)
Data rate DATA[3...0] (max)	2500	Mbit/s	100 (differential)

7.9 Electrical Characteristics

7.9.1 ECU Interface Connector DAP

Signal	**Pin Type**	**V_{OL} (min) [V]**	**V_{OH} (min) [V]**	**V_{OH} (max) [V]**	**V_{IL} (max) [V]**	**V_{IH} (min) [V]**	**V_{IH} (max) [V]**	**Leakage current [µA]**	**Additional load by ETK (typ) [pF]**[1]
DAP0	XO [2]	0.7	2.4	3.1	-	-	3.8	+745 [3]/ +475 [4]	11
DAP1	IXO [2]	0.7	2.4	3.1	0.8	1.7	3.8	+3350 [3]/ -2370 [4]	11
DAP2	IXO [2]	0.7	2.4	3.1	0.8	1.7	3.8	+3350 [3]/ -2370 [4]	11
Reserved	XO [2]	0.7	2.4	3.45	-	-	6.5	+10 [3]/ -10 [4]	9
/TRST	XO [2]	0.7	2.4	3.45	-	-	6.5	+705 [3]/ -485 [4]	7
/ESR0	IXOD [5]	0.7	-	-	0.8	2	6.5	+25 [3]/ -20 [4]	14
/PORST	IXOD [5]	0.7	-	-	0.8	2	6.5	+25 [3]/ -20 [4]	14
WGDIS	XO [2]	0.7	2.4	3.45	-	-	6.5	+10 [3]/ -10 [4]	7

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

[1] Adapter cable and Samtec connector not considered; PCB 1 pF/cm
[2] max 12 mA
[3] max
[4] min
[5] max 0.2 A

7.9.2 ECU Interface Connector Aurora Trace

Signal	**Pin Type**	**V_{OL} (min) [V]**	**V_{OH} (min) [V]**	**V_{OH} (max) [V]**	**V_{IL} (max) [V]**	**V_{IH} (min) [V]**	**V_{IH} (max) [V]**	**Leakage current [µA]**	**Additional load by ETK (typ) [pF]**[1)]
TRACETRIG	I	-	-	-	0.8	1.7	3.6	-144 [3)]/ -58 [4)]	8
CRC_ERROR	XO [2)]	0.6	2.4	3.1	-	-	-	+30 [3)]/ -30 [4)]	9

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

[1)] Adapter cable and Samtec connector not considered; PCB 1 pF/cm
[2)] max 4 mA
[3)] max
[4)] min
[5)] max 0.2 A

Signal	**Pin Type**	**V_{ID} (min) [mV]**	**V_{ID} (max) [mV]**	**V_{OD} (max) [mV]**
CLOCK	XO	-	-	1100
DATA[3...0]	I	110	2200	-

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

7.10 Pin Assignment

Note

The tables describes the pin assignment at the ETK side.

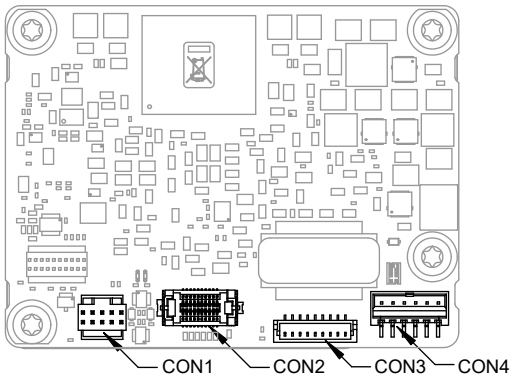


Fig. 7-2 Location of the FETK-T1.0 Interfaces

7.10.1 ECU Interface Connector CON1

Pin	Signal	Direction	Comment
1	DAP0	Bidir	DAP signal
7	Reserved	Output	Reserved
6	DAP1	Bidir	DAP signal
4	DAP2	Bidir	DAP signal
3	/TRST	Output	DAP signal
9	/ESR0	Bidir	ECU Reset signal (open drain) for Reset assertion and supervision
10	/PORST	Bidir	ECU Power On Reset signal (open drain) for Reset assertion and supervision
5	WDGDIS	Output	Watchdog disable Signal
8	VDDP (Sense)	Input	Sense for Switched power supply of ECU (ignition)
2	GND	Power	Signal Ground

7.10.2 ECU Aurora Trace Connector CON2

Pin	Signal	Direction	Comment
14	ClockP	Output	Aurora Clock
12	ClockN	Output	
4	TX0P	Input	Aurora Data
6	TX0N	Input	
5	TX1P	Input	Reserved Data
3	TX1N	Input	
9	TX2P	Input	Reserved Data
11	TX2N	Input	
17	TX3P	Input	Reserved Data
15	TX3N	Input	
18	TraceTrigger	Input	Reserved Input
20	ERR_CRC	Output	Aurora CRC-Error
1, 2, 7, 8, 10, 13, 16, 19	GND		GND Signal

7.10.3 Power Supply Connector CON4

Pin	Signal	Direction	Comment
1	VDDPSTBY (3.3 V supply)	Output	Permanent power supply of ECU DAP Interface, 3.3 V
2	VDDSTBY (1.30 V supply)	Output	Permanent power supply of ECU EDRAM, 1.30 V
3	GND	Input	Power GND
4	CalWakeup	Output	Switch to Ubatt. ECU wake-up signal (for measurement preparation)
5	Ubatt2	Input	Vehicle battery
6	Ubatt1	Input	Vehicle Battery

7.11 Mechanical Dimensions

The reference measure for all drawings is millimeters.

Item	Dimension [Millimeters]	Dimension [Inches]
Length	60	2.362
Width	45.25	1.781
Height [1)]	12	0.472
Height [2)]	14.9	0.587

[1)]: without adapter connectors
[2)]: ETAM2 mounted at CON2

Top View

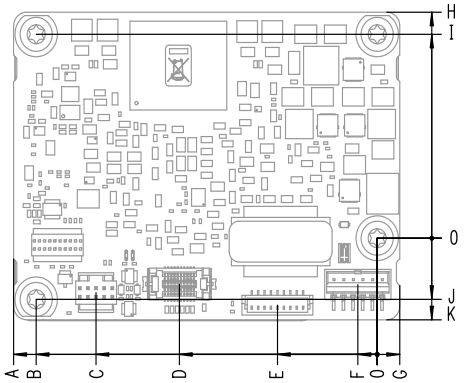


Fig. 7-3 FETK-T1.0 Dimensions - Top View

Item	Dimension [Millimeters]	Tolerance [Millimeters]	Dimension [Inches]	Tolerance [Inches]
A	56.50	+/- 0.2	2.224	+/- 0.008
B	53.00	+/- 0.2	2.087	+/- 0.008
C	43.70	+/- 0.2	1.720	+/- 0.008
D	15.50	+/- 0.2	0.610	+/- 0.008
E	20.90	+/- 0.2	0.823	+/- 0.008
F	3.00	+/- 0.2	0.118	+/- 0.008
G	3.50	+/- 0.1	0.138	+/- 0.004
H	33.25	+/- 0.2	1.309	+/- 0.008
I	30.00	+/- 0.2	1.181	+/- 0.008
J	9.00	+/- 0.2	0.354	+/- 0.008
K	12.00	+/- 0.2	0.472	+/- 0.008

Side View

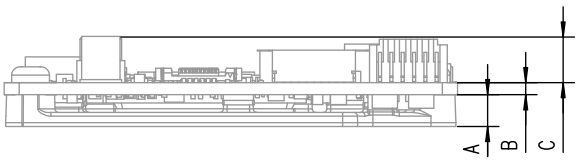


Fig. 7-4 FETK-T1.0 Dimensions - Side View

Item	Dimension [Millimeters]	Tolerance [Millimeters]	Dimension [Inches]	Tolerance [Inches]
A	4.20	+/- 0.10	0.165	+/- 0.004
B	1.60	+/- 0.16	0.063	+/- 0.006
C	6.12	+0.0 -0.2	0.241	+0.000 -0.008

8 Cables and Accessories

The "Cables and Accessories" chapter contains an overview of the available cables and accessories.

8.1 ECU Adapter Cable

8.1.1 CBAM300 Adapter Cable

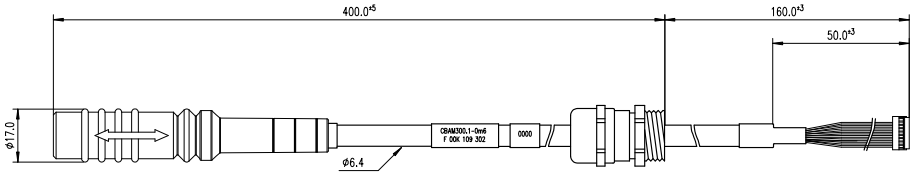


Fig. 8-1 CBAM300 Adapter Cable

FETK ECU Adapter Cable. Cable is pre-assembled into PG9 screwing, with a connected shield on screwing.

Product	Length	Order Number
CBAM300.1-0m6	0.6 m	F 00K 110 411

8.1.2 CBAM340 Adapter Cable

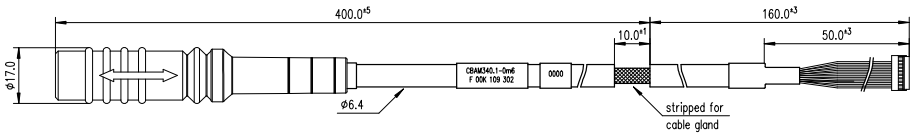


Fig. 8-2 CBAM340 Adapter Cable

FETK ECU Adapter Cable, shield on ECU-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	Order Number
CBAM340.1-0m6	0.6 m	F 00K 109 302

8.2 Combined Interface and Power Supply Cable

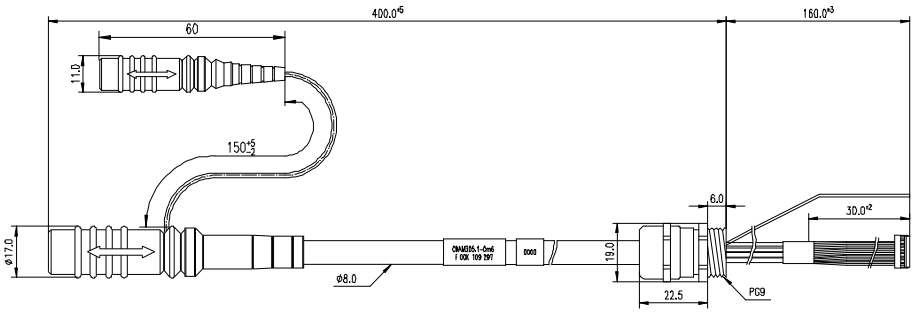


Fig. 8-3 CBAM305 Cable

FETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHM - JST SHR (10fc-9fc) / Lemo 0B PHG - open wire (2fc-1c), 0m60

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	Order Number
CBAM305.1-0m6	0.6 m	F 00K 109 297

8.3 ETAS Module Interface Adapter Cable

8.3.1 CBE260 Cable

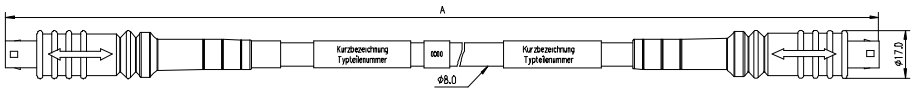


Fig. 8-4 CBE260 Cable

Gigabit Ethernet and Power Connection cable for FETK. Lemo connectors on both sides compliant to IP65. 3 m length.

Product	Length	Order Number
CBE260.1-3	3 m	F 00K 109 446
CBE260.1-5	5 m	F 00K 111 001
CBE260.1-8	8 m	F 00K 109 447

8.4 Power Supply Cables

8.4.1 Cable K70.1

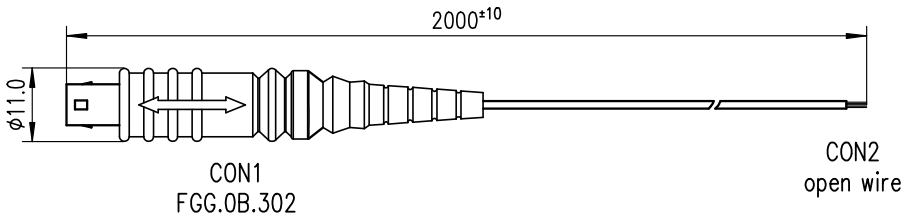


Fig. 8-5 Power Supply Cable K70.1

Dim	Millimeters	Inches
A	2000	78.74

8.4.2 Cable KA50

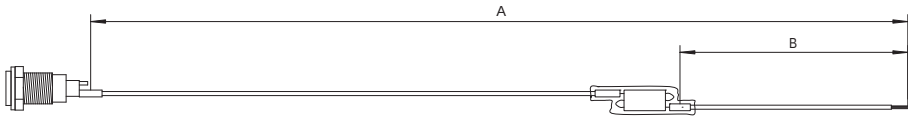


Fig. 8-6 Power Supply Cable KA50

Dim	Millimeters	Inches
A	200	7.87
B	50	1.97

8.5 ECU Interface Adapters

8.5.1 FETK - ECU Adapter ETAM1

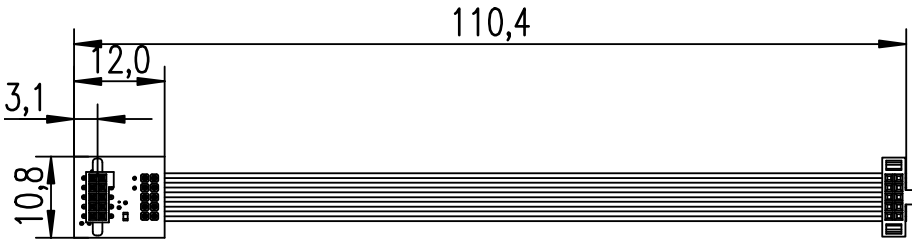


Fig. 8-7 FETK - ECU Adapter ETAM1 (bottom view)

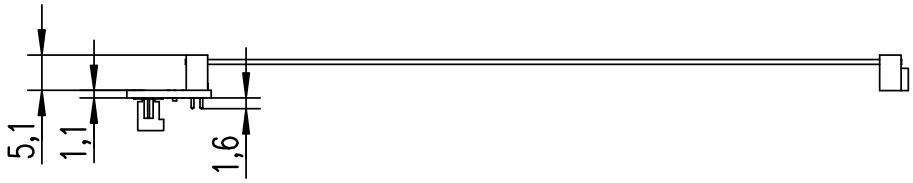


Fig. 8-8 FETK - ECU Adapter ETAM1 (side view)

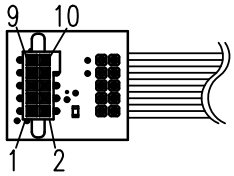


Fig. 8-9 FETK - ECU Adapter ETAM1 (pin numbering)

Note

See Fig. 5-2 on page 28 for details on mating connector to the ETAM1.

8.5.2 FETK - ECU Adapter ETAM2

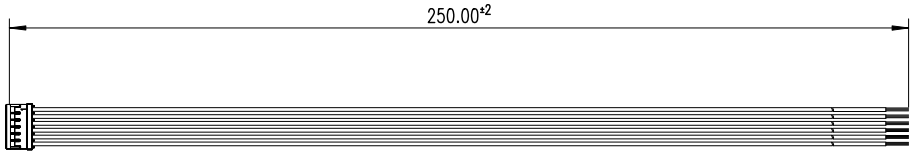


Fig. 8-10 FETK - ECU Adapter ETAM2

Note

See Fig. 5-2 on page 28 for details on mating connector to the ETAM2.

8.5.3 FETK - ECU Adapter ETAM4

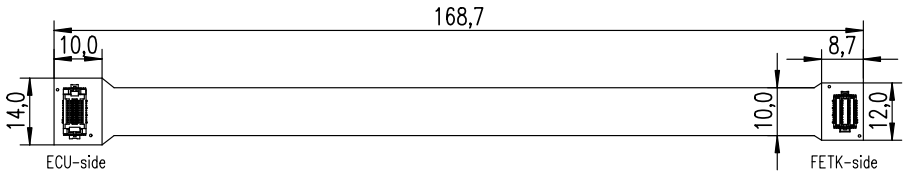


Fig. 8-11 FETK - Trace ECU Adapter ETAM4 (bottom view)

Fig. 8-12 FETK - Trace ECU Adapter ETAM4 (side view)

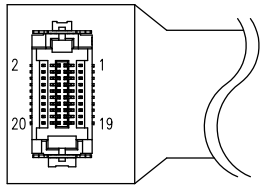


Fig. 8-13 FETK - Trace ECU Adapter ETAM4 (pin numbering)

ETAM4 adapts the ECU Microcontroller Aurora Trace Signals to an FETK. It is a 1:1 adapter without active components. The ETAM4 adapter covers only the trace specific signals. All other signals a covered by ETAM1 and ETAM2 adapter.

In order to be able to use the ETK adapter ETAM4 in the ECU, a 20 pin SAMTEC connector (e.g. STH-010-0.50-G-D-K-TR) must be available on the ECU.

Note

See Fig. 5-2 on page 28 for details on mating connector to the ETAM4.

8.5.4 FETK - ECU Adapter ETAM5

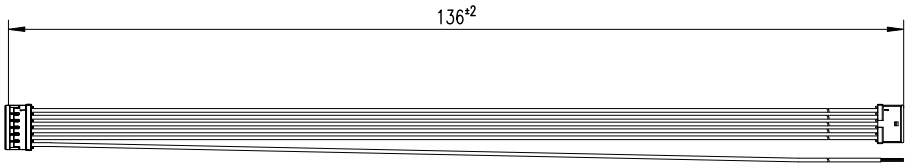


Fig. 8-14 FETK - ECU Adapter ETAM5

Note

See Fig. 5-2 on page 28 for details on mating connector to the ETAM5.

9 Ordering Information

9.1 FETK-T1.0

Type	Order Number	Note
FETK-T1.0A	F 00K 109 977	Emulator Probe for the Infineon AURIX microcontroller family

9.2 FETK - ECU Adapter

Order Name	Short Name	Order Number
ETAM1 XETK/FETK ECU Adapter, SAMTEC FFSD - SAMTEC SFM (10fc - 10fc), 0m11	ETAM1	F 00K 109 305
ETAM2 XETK/FETK ECU Adapter, MOLEX - open wires (6fc - 6c), 0m25	ETAM2	F 00K 109 306
ETAM4 FETK Trace ECU Adapter, SAMTEC SSH - SAMTEC STH (20fc - 20mc), 0m17	ETAM4	F 00K 109 979
ETAM5 FETK ECU Adapter, MOLEX - MOLEX (6fc - 5fc+1c), 0m136	ETAM5	F 00K 110 101

9.3 Cables

Please contact your local ETAS representative for further cable information.

Note

The cables shown in chapter "Cables and Accessories" on page 46 are not included in the FETK-T1.0 delivery.

9.3.1 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
FETK ECU Adapter Cable, pre-assembled into PG9 screwing, shield on ECU- Housing, Lemo 1B PHM - JST SHR (10fc-9fc), 0m60	CBAM300.2-0m6	F 00K 110 411
FETK ECU Adapter Cable, shield on ECU-Housing, Lemo 1B PHM - JST SHR (10fc-9fc), 0m60	CBAM340.1-0m6	F 00K 109 302

9.3.2 Combined ECU Adapter and Power Supply Cables

Order Name	Short Name	Order Number
FETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHM - JST SHR (10fc-9fc) / Lemo 0B PHG - open wire (2fc-1c), 0m60	CBAM305.1-0m6	F 00K 109 297

9.3.3 Ethernet Cables

ES89x Interface Cable

Order Name	Short Name	Order Number
GBit Ethernet and Power Connection Cable for FETK, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 3 m	CBE260.1-3	F 00K 109 446
GBit Ethernet and Power Connection Cable for FETK, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 5 m	CBE260.1-5	F 00K 111 001
GBit Ethernet and Power Connection Cable for FETK, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 8 m	CBE260.1-8	F 00K 109 447

9.3.4 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

9.4 Power Supply

For special applications ETAS can offer a isolated power supply unit. For detailed information contact ETAS technical support.

10 ETAS Contact Addresses

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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

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