ETAS ES166.1

10Base-T1S Automotive Ethernet Device

User Guide

www.etas.com

ES166.1 I User Guide R01 EN I 12.2025

Contents

1 Introduction

1.1 About ES166.1 - 10Base-T1S Automotive Ethernet Device

The ES166.1 works as either a gateway or a media converter for a 10Base-T1s network. The gateway mode supports multi-drop 10Base-T1S networks and can either send or receive frames in the network. In the media converter mode, the device acts as a transperant media converter, converting ethernet frames from the 10Base-T1S into Standard Ethernet format (IEEE 802.3). The communication speed of the ES166.1-FE on the host side is limited to a maximum of 100Mbit/s.

1.1.1 Scope of Application

The ES166.1 can be used for the following tasks:

- Recording and capturing of communication data as well as calibration of ECUs
- ECU diagnostics

1.1.2 Properties

The most important properties of the ES166.1 Media Converter:

- Active participation (Tx and Rx) of 10Base-T1S frames in a multi-drop network in gateway mode
- Conversion of 10Base-T1S into standard ethernet in media converter mode
- Automotive-capable product that is suitable for use in the development environment and in the vehicle on test courses
  - Adaptable to ambient conditions (temperature, EMC)
  - Wide supply voltage range
  - High level of mechanical stability and robustness
- Display of the operating state and fault state
- Fast ethernet port to connect to existing ETAS devices
- Standby operation
- Firmware updates via Hardware Service Pack (HSP)
- No additional drivers required

1.2 Target audience and intended use

Target audience

For the safe and efficient use of the product, the user is expected to have comprehensive expertise and practical experience in the following automotive domains:

- Electrical and electronic system architectures in motor vehicles
- Sensor technology and control engineering
- Bus systems and communication protocols
- Electronic control unit (ECU) development and calibration
- Safety guidelines and regulatory requirements for the development and validation of vehicle systems

Intended use

The product was developed and approved for applications in the automotive sector. Only operate the product as per its specifications. If the product is used in any other way, product safety is no longer ensured.

The interface modules are designed for the following applications:

- Detecting signals from ETK and ECU interfaces, as well as from vehicle buses
- Flash programming of ECUs

Application Areas

- The product is approved for use in the following areas:
  - Interior
  - Passenger compartment
  - Trunk
- Do not operate the product in a wet or damp environment.
- Do not operate the product in potentially explosive atmospheres.

Technical Condition

The product is designed in accordance with state-of-the-art technology. Only operate the product and its accessories if they are in perfect working order. Shut down a damaged product immediately. Do not open or alter the product. Only ETAS may make changes to the product.

1.3 Safety instructions and classification

Refer to the following safety instructions and the technical documentation available to download from the ETAS website www.etas.com. Keep the information provided in a safe place.

Failure to comply with the safety instructions may lead to the risk of damage to life and limb or property. The ETAS Group and its representatives shall not be liable for any damage or injury caused by improper operation or use of the product.

Only use the product if you have read and understood the information concerning safe operation and have the required qualifications and training for this product. If you have questions about safe operation, contact ETAS:

- Technical Support: www.etas.com/hotlines
- Regional ETAS Contact Partner: www.etas.com/contact

The product is only approved for the applications described in the technical documentation. When using and operating this product, all applicable regulations and laws must be observed.

ETAS products, made available as beta versions or prototypes of firmware, hardware and/or software, are to be used exclusively for testing and evaluation purposes. These products may not have sufficient technical documentation and not fulfill all requirements regarding quality and accuracy for market-released series products. The product performance may therefore differ from the product description. Only use the product under controlled testing and evaluation conditions. Do not use data and results from beta versions without prior and separate verification and validation and do not share them with third parties.

Before commissioning, check whether a Known Issue Report (KIR) is available for the current product version: www.etas.com/kir (Password: KETASIR). Note the information given in the report.

Program codes or program control sequences that are created or changed via ETAS products, as well as all types of data obtained through the use of ETAS products, must be checked for their reliability and suitability prior to use or distribution. Only use these codes or sequences in public areas (e.g. in road traffic) if you have ensured that the application and product settings are safe through testing in self-contained and designated testing environments and circuits.

This ETAS product allows you to influence safety-relevant systems or data (e.g. in motor vehicles, vehicle components and test benches). In the event of a malfunction or a hazardous situation, it must be possible to put the system into a safe state (e.g. emergency stop or emergency operation).

1.3.1 Classification of Safety Messages

Safety messages warn of dangers that can lead to personal injury or damage to property:

DANGER

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation that, if not avoided, could result in damage to property.

1.3.2 Assembly

Only install, connect, disconnect and cable ETAS products and components when they are de-energized.

1.3.2.1 Assembly location

CAUTION

Class A product

This product is not intended for use in residential environments and might not provide adequate protection to radio reception in such environments.

NOTICE

Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield.
Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

1.3.2.2 Securing the Product

The housing must not be damaged while securing the product.

WARNING

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

1.3.2.3 Ventilation

- Protect the product against direct solar radiation and other sources of heat.
- Ensure that there is sufficient air circulation for efficient heat exchange.

1.3.3 Operation

Only operate the product with the latest firmware. You can find information about updating the firmware in the chapter "Firmware and software update".

If the firmware update is not completed successfully, try it again. If a new firmware update is not possible and the product is not functional, send the product to ETAS.

WARNING

Risk due to undefined vehicle behavior during an ECU reset

If you operate the product in combination with ETKs, the ECU must not be reset in an uncontrolled manner.

– Only make changes when the vehicle is stationary (e.g. changes to the test setup, changes to the ETK configuration, software updates).

1.3.4 Electrical connection

Electrical Safety and Power Supply

– Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
– Observe the connection and setting values.
– 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.
– Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)).
– The power supply must be suitable for use according to the ambient conditions for the product.
– It is possible to discharge the vehicle battery in regular operation and long standby operation.
– Central load-dump protection is required for operation.

Connection to the Power Supply

The product is powered via an ETAS module in the test setup.

To de-energize the Product

1. Disconnect the product from the power supply in one of the following ways:
– Switch off the laboratory power supply for the test setup.
– Disconnect the test setup's connection to the vehicle battery.
– Disconnect the product from the ETAS module supplying the power.
2. Disconnect the product from all interfaces.

1.3.5 Cables and accessories

Cables

- Only use ETAS cables, cables recommended by ETAS or other cables certified for the application.
- Route the cables such that they are protected against abrasion, damage, deformation and kinking.
- Do not place any objects on the cables.
- Do not use any damaged cables.
- The connector and connection must not be dirty.
- The connector and connection must be compatible.
- Correctly align the connector with the connection.
- Do not connect the connector and connection by force.

Accessories

Use ETAS accessories, accessories recommended by ETAS or other accessories certified for the application.

1.4 Unpacking

1. Prepare Workspace

   Unpack in a clean, dry, well-lit area with enough space for the equipment and avoid static damage or physical harm.
2. Open Package

   Use appropriate tools to carefully open the box without damaging the contents.
3. Verify Contents

   Compare the items with the packing list "Contents of Package" to ensure all components are present.
4. Inspect for Damage

   Visually check each item for physical damage. If found, document and report it to customer support.

2 Product overview

2.1 Graphical overview of elements

Fig.	Connection	Description
1	LEMO 1B	Combined connection for power supply and 10/100 BASE-T Ethernet (IEEE 802.3) via connected ETAS module (e.g. ES5xx, ES600.2 and ES8xx)
2	LEMO 1B	10Base-T1S automotive ethernet connection

2.2 Compatibility

2.2.1 System requirements

For the configuration of the product as well as the control and data acquisition, you need ETAS software in the following versions:

INCA	starting with Version 7.5.7
HSP	starting with Version 14.7.0

2.2.2 Compatible products

The Media Converter ES166.1 can be connected to modules with Lemo-Fast-Ethernet connection and integrated power supply, e.g.:

- ES523.1
- ES600.2
- ES8xx

3 Hardware setup

3.1 Transportation and packaging

Transport

- Only transport the product individually.
- Remove all connected cables before transportation.
- Do not transport the product by the connected cables.

3.2 Mounting and placement

WARNING

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

CAUTION

Class A product

This product is not intended for use in residential environments and might not provide adequate protection to radio reception in such environments.

3.3 Connection to the power supply

The ES166.1 is powered by a connected ETAS product.

3.4 Connection with other products

NOTICE

Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield.
Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

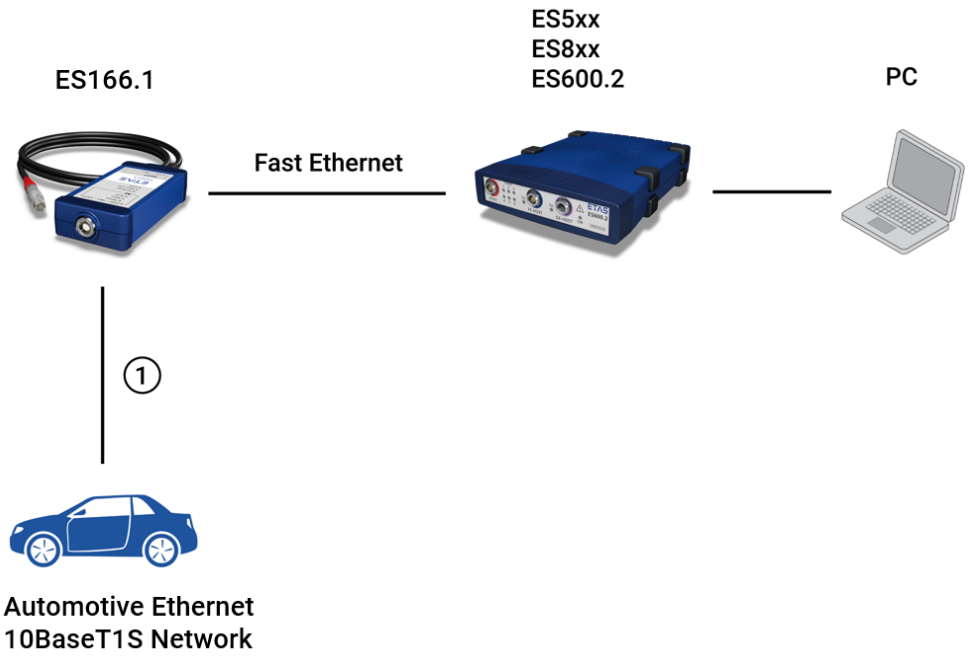
Note

Ensure that the test setup is EMC-compliant. A test setup that uses shielded and unshielded components at the same time can lead to impairment of the signal quality and is not recommended by ETAS.

Note

Please ensure that the device is installed and operated as described in the user manual to maintain the specified EMC properties in the respective application. Deviation from the specified installation and operation instructions or connecting the device with other devices may result in a deviation from the specified EMC properties.

The ES166.1 is designed to connect to an Automotive Ethernet Network and the ES600.2 or an ES5xx/ES8xx module.



Cables in Fig.	Function	Short name
1	Cables for connection to the 10Base-T1S Ethernet Network	CBE600.1-3 (shielded, open end cable)

4 Basic operation

4.1 Status indicator

The ES166.1 displays the device status and the connection speed to the host with colored LEDs.

4.1.1 Connection Status of Automotive Ethernet (AE)

Default connection mode and connection speed after a restart: Auto

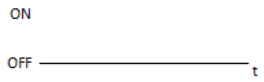
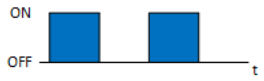
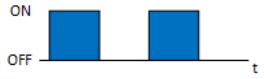
Device Power state information

On

LED code	Display	State
	Off	Power off
	Flashing green	Standby
	Lit green	Power on

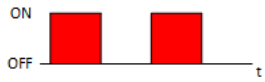
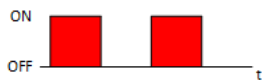
Time synchronization

Sync

LED code	Display	State
	Off	No synchronization
	Flashing blue	Module is synchronisation master
	Lit blue	Module receives external synchronisation
	Flashing blue	Functionality check ongoing. Flashing in combination with following LEDS: Error/Busy, Mode, Injection, PLCA

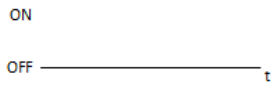
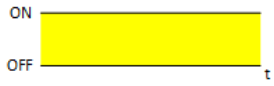
Error LED

Error/Busy

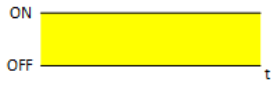
LED code	Display	State
	Off	Operational
	Lit red	Functional error
	Flashing red	Device is busy e. g. updated
	Flashing red	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

HOST area

1000 Mbit

LED code	Display	State
	Off	No link established
	Lit yellow	Link established (1000M)
	Irregular flashing yellow	Traffic on (1000M)

100 Mbit

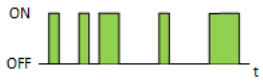
LED code	Display	State
	Off	No link established
	Lit yellow	Link established (100M)
	Irregular flashing yellow	Traffic on (100M)

Mode

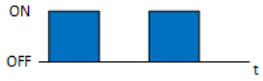
Media Converter

LED code	Display	State
	Off	Device off or gateway mode selected
	Lit green	Media converter mode selected
	Flashing green	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

Gateway

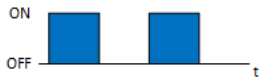
LED code	Display	State
	Off	Device Off or media converter mode selected
	Lit green	Gateway mode selected
	Irregular flashing green	Traffic on T1S bus
	Flashing green	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

Injection

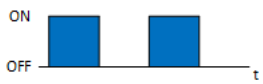
LED code	Display	State
	Irregular flashing blue	Transmit to T1S bus
	Flashing blue	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

PLCA

PLCA Coordinator

LED code	Display	State
	Off	PLCA disabled or device configured as PLCA Follower
	Lit blue	Device configured as Coordinator
	Flashing blue	Invalid PLCA configuration
	Flashing blue	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

PLCA Follower

LED code	Display	State
	Off	No activity or PLCA disabled or device configured as PLCA Coordinator
	Lit blue	Device configured as Follower
	Flashing blue	Invalid PLCA configuration
	Flashing blue	Functionality check ongoing. Flashing in combination with following LEDS: Sync, Error/Busy, Mode, Injection, PLCA

5 Commissioning

WARNING

Risk due to undefined vehicle behavior during an ECU reset

If you operate the product in combination with ETKs, the ECU must not be reset in an uncontrolled manner.

– Only make changes when the vehicle is stationary (e.g. changes to the test setup, changes to the ETK configuration, software updates).

Note

In the INCA hardware configurator, only one active session is supported for the ES166.1 module.
If a device is configured for Ethernet monitoring, it cannot be configured simultaneously for other purposes, such as calibration via XCP.

5.1 Web interface

The device behaviour (gateway/media converter) and the properties of the device such as the PLCA parameters can be configured via a web interface

Note

When the module is disconnected from the power supply, the last configuration in the web interface is saved and will be available after reboot.

5.1.1 Determining IP Address

You can determine the IP address of the module with the HSP Update Tool. You can find the tool in the Download Center on the ETAS web page.

1. Start the HSP Update Tool.
2. Search for the hardware with <CTRL> + <H>.
3. In the Hardware window, mark the desired module.
4. Open the Properties window with <ALT> + <ENTER>.

⇨ In the Properties window under **Communication** > **Communication Parameters**, you will find the IP address of the module.

6 Technical specification

6.1 Hardware specifications

6.1.1 Ambient conditions

Operating temperature range	-40°C to +70°C -40°F to +158°F
Storage temperature range (without packaging)	-40°C to +85°C -40°F to +185°F
Max. relative humidity (non-condensing)	95%
Max. altitude	5000m / 16400ft.
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (IEC 60529) (when closed)	IP42

6.1.2 Electrical data

Operating voltage range	6 V to 32 V DC
Max. current consumption	1 A
Typical current consumption (standby)	approx. 0.5 mA (at 12 V DC)
Maximum voltage to ground or to all accessible parts (e.g. ECU housing, vehicle chassis)	60 V DC / 30 V AC
Fuse	Max. 20 A
Overvoltage category (mains supply, IEC 60664-1)	II

6.1.3 Mechanical data

Dimensions (H x W x D)	128 x 60 x 27 mm 5.02 x 2.36 x 1.06 in
Dimensions (H x W x D) with cable	3128 x 60 x 27 mm 123.13 x 2.36 x 1.06 in
Weight	0.27 kg / 0.60 lb

6.2 Product markings

Symbol	Description
	Please read the user manual before starting up the product.
SN: xxxxxxx	Serial number
F 00K xxxxxxx	Order number
x-xx V⎓	Operating voltage range DC
xxx mA	Max. current consumption
	**China RoHS** With the China RoHS identification attached to the product or its packaging, ETAS confirms that the product meets the guidelines of the “China RoHS” (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in the People's Republic of China.

Symbol	Description
CE	**CE Conformity** With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable, product-specific Directives of the European Union. The EU Declaration of Conformity for the product is available upon request. **European Union** The EU Directive 2011/65/EU limits the use of certain dangerous materials for electric and electronic devices (RoHS conformity). This product does not contain any of the prohibited substances listed in EU Directive 2011/65/EU and does not exceed the maximum authorized concentrations specified. There are currently no equivalent alternative substances for individual electronic components used in our products. We are therefore making use of exemptions 7.a-I, 7.c-I and 6.c (for accessory cables) in Annex III of this Directive. ETAS confirms that the product meets this directive applicable in the European Union.
KC	**KCC Conformity** With the KC mark attached to the product or its packaging, ETAS confirms that the product has been registered in accordance with the applicable, product-specific KCC guidelines of the Republic of Korea.
CMIM	**CMIM Conformity** With the CMIM mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable directives of the Kingdom of Morocco. The CMIM Declaration of Conformity for the product is available upon request.

Symbol	Description
UK CA	**UKCA Conformity** With the UKCA mark attached to the product or its packaging, ETAS confirms that the product meets the applicable, product-specific British standards and directives. The UKCA Declaration of Conformity for the product is available upon request.
CAN ICES / NMB	**CAN ICES Conformity** This product complies with the Canadian standard: CAN ICES-003(*) / NMB-003(*) * The applicable class of the device is labeled on the product.
	Product return and recycling The European Union (EU) released the Directive for Waste Electrical and Electronic Equipment - WEEE to ensure the setup of systems for collecting, treating and recycling electronic waste in all countries of the EU. This ensures that the devices are recycled in a resource-friendly way that does not represent any risk to personal health and the environment. The WEEE symbol (see Fig.4-2) on the product or its packaging identifies that the product may not be disposed of together with the remaining trash. The user is obligated to separately collect old devices and provide them to the WEEE return system for recycling. The WEEE Directive applies to all ETAS devices, but not to external cables or batteries. Additional information about the recycling program of ETAS GmbH is available from the ETAS sales and service locations.

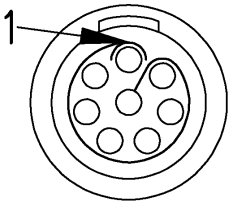
6.3 Connectors

Note

All connections are shown with view of the module interfaces.

6.3.1 Terminal assignment of cables

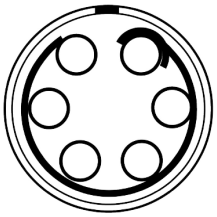
LEMO connector (male)



Pin	Signal
1	UBATTP1
2	UBATTP2
3	UBATTM
4	RX_D2+
5	TX_D1-
6	RX_D2-
7	UBATTM
8	TX_D1+
Housing	GND

6.3.2 Terminal assignment of sockets

LEMO Socket



Pin	Signal
1	MDI+
2	GNDCASE[1)]
3	NC
4	NC
5	GNDCASE[1)]
6	MDI -

[1)] Connected with socket housing. In the case of shielded cables (e.g. CBE600) connected to the cable shield.

7 Maintenance

7.1 Cleaning

- Only clean the product when it is de-energized.
- Do not use cleaning agents that could harm the product.
- Do not apply cleaning agents directly onto the product.
- Use a dry or slightly dampened, soft, lint-free cloth.
- Make sure that no moisture enters the product.

7.2 Firmware and software update

7.2.1 Updating the Firmware

The firmware for the product can be updated using the ETAS "Hardware Service Pack" (HSP) service software. You can find the software in the Download Center on the ETAS website: www.etas.com

7.3 Repair service

If repairs are required, send the product to ETAS.

8 Accessories and order information

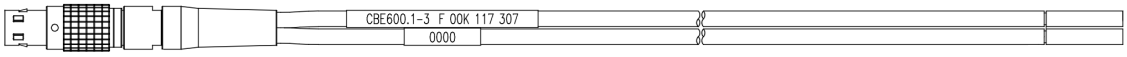
8.1 Module

Order name	Short name	Order number
ES166.1-FE 10BASE-T1S Automotive Ethernet Media Converter / Gateway with LEMO 1B FGC (8mc) Ethernet connection	ES166.1	F 00K 117 229

8.2 Cables

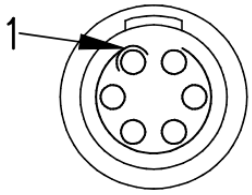
8.2.0.1 CBE600.1-3 (shielded)

> **Note**
>
> The CBE6001-3 has open ends. If one of the ends is not connected to the vehicle network, the termination requires a 100-Ω resistor at this end.



Shielded Automotive Ethernet connection cable with open cable end to connect the ES166.1 to a Automotive Ethernet 10Base-T1S network.

Pin assignment Lemo Connector



Pin	Signal
1	MDI+
2	not connected
3	not connected

Pin	Signal
4	not connected
5	not connected
6	MDI-

Order name	Length	Order number
CBE600.1-3	3 m	F 00K 117 307

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/hotlines

ETAS offers trainings for its products:

www.etas.com/academy

ETAS Headquarters

ETAS GmbH		
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Germany	Internet:	www.etas.com

10 Return form

You can find the return form and information about this process on the ETAS website:www.etas.com/en/support/hw_return_form.php.

11 Legal information

11.1 Use of Open Source Software

The product might use Open Source Software (OSS). This software is installed on the product at shipment and does not need to be installed or updated by the user. If OSS is used, see the accompanying "OSS Attributions Document" for more information.

11.2 Certification and conformity

11.2.1 Declarable Substances

European Union

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with materials that are subject to declaration in accordance with the REACH regulation (EC) no.1907/2006. The REACH Declaration is available online at www.etas.com/reach and is continuously updated.

11.3 Standards and norms

The ES166.1 complies with the following standards and norms:

Standards	Title	Further Information
IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements	
IEC 61326-1:2020	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	Electromagnetic Environment: Industrial
CISPR 11:2015, CISPR 11:2015/AMD1:2016, CISPR 11:2015/AMD2:2019	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Class of the equipment: Class A Group of the equipment: 1

11.3.1 EMC Class A

Republic of Korea

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.
This equipment is in Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

USA

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Responsible Party – U.S. Contact Information
ETAS Inc.
15800 N. Hagerty Road
Plymouth, MI
48170
www.etas.com/ww/en/contact/etas-in-the-united-states/

11.3.2 Failsafe Automotive Ethernet Operation

For failsafe operation of the Automotive Ethernet communication channel, all customer specific installations - including cables, connectors and board adaptations - have be compliant to:

- IEEE Std. 802.3bwTM-2015, “Amendment 1: Physical Layer Specifications and Management Parameters for 100 Mb/s Operation over a Single Balanced Twisted Pair Cable (100BASE-T1)”, chapters 96.7 - 96.9
- Open Alliance, “BroadR-Reach® Definitions for Communication Channel, Version 2.0”

Note

To achieve an appropriate Automotive Ethernet channel performance all PCB board and cable segments have to be optimized with regard to line impedance matching, length matching within the differential net routing or twisted pair cabling and on the reduction of untwisted regions. Stub segments must be avoided for the Point-to-Point cable connection in favor of inline connectors and shielding measures shall be considered depending on the operation environment.

Note

Please contact your ETAS partner if you need to use Automotive Ethernet cables in areas with severe interference.

11 Appendix

Errata	Impact	Suggested Workaround	Recommended solution on ES166
RMII CSMA/CD operation in mixed PLCA segments	The LAN8670/1 RMII cannot be operated with PLCA disabled on a network with other PLCA-enabled nodes. When the device is configured for CSMA/CD operation (i.e., PLCA is disabled), then the reception of PLCA BEACON and COMMIT symbols from the network will be improperly transferred via the RMII to the MAC resulting in undefined behavior including dropped packets.	The RMII may only be used with PLCA disabled when all other nodes on the mixing segment are also configured for pure CSMA/CD operation	The actual ES166 HW uses LAN8670 PHY with MII connection and thereby the errata is not applicable for ES166. Note: ES166 PoC still contains LAN8670 connected via RMII and hence the PoC are not qualified to be used in such environments
Multi-coordinator PLCA action	When operating as a PLCA Coordinator, if the PHY receives an unexpected BEACON from an additional coordinator on the segment, it will set the Unexpected BEACON Received (UNEXPB) bit in the Status 1 (STS1) register. The PHY will then enter a recovery state in which it can receive packets but will transmit neither packets nor BEACONs for the next two PLCA bus cycles. Should the duplicate Coordinator continue sending periodic BEACONs, then the PHY will remain in the recovery state unable to transmit to avoid collisions with the duplicate Coordinator in Transmit Opportunity 0. Clause 148 of the IEEE 802.3cg-2019™ specification describes that when this condition occurs, the PHY should avoid transmitting in its transmit opportunity until the end of the current bus cycle when the PHY will	The station management entity should monitor the Unexpected BEACON Received bit and configure the PHY as a PLCA Follower.	To configure automatically as a PLCA follower in such erroneous bus would not be recommended since the Node ID cannot be assumed. Therrefore, no transmission (packet or BEACON) will be possible by ES166 in such condition and would remain in recovery state receiving packets. The user is expected to reconfigure the bus on receiving error event UNEXPB
Transmission of collision fragments with PLCA and RMII	Clause 4 of the IEEE Std 802.3-2018™ specifies the MAC shall implement an Inter-Packet Gap (IPG) delay of 96 bit times (BT) between packets. This IPG is split into two parts. The first part, IPG part 1, requires that no carrier be sensed. If carrier is sensed during IPG part 1, then the timer is restarted. Once IPG part 1 is complete, the MAC may transmit following IPG part 2. The IPG part 1 is nominally 64 BT, but may be less, including zero. The IPG part 2 timing is nominally 32 BT, but is always equal to the full IPG duration minus the IPG part 1. Some MACs implement an IPG part 1 of very small duration. If the IPG part 1 time is too small, then the MAC may attempt to transmit after the PHY has asserted carrier indication with CRSDV. The result is that the MAC will quickly detect a collision and send a collision fragment to the PHY. When PLCA is enabled, the PHY, not expecting the MAC to transmit after carrier was	While the transmission of the collision fragments to the network are benign, they may be eliminated by reducing the size of the PLCA delay line buffer with the register configuration provided below. This will cause the PHY to detect a normal logical collision preventing the transmission of the collision fragment. Additionally, the PHY will capture the next transmit opportunity guaranteeing the MAC the ability to transmit according to the PLCA algorithm. **Access** **MMD** **Address** **Data** **Mask** RMW 0x1F 0x008F 0x00E0 0x07F0	IPG is guaranteed to be 12 Bytes according to the specification. However, the register shall be configured as suggested in the workaround in order to avoid any undefined behavior
SLPCAL field of SLPCTL0 register may deliver invalid result on read	When reading the SLPCTL0 register, the SLPCAL field returns 0x0001. This bitfield must always be written as 0x0000	When writing to the SLPCTL0, including when performing read-modify-write sequences, ensure that the SLPCAL bitfield is always written as 0x0000.	Workaround as-is
When configured as a PLCA coordinator, the device does not stop transmitting beacons immediately upon entering sleep mode	The device does not stop transmitting beacons immediately upon entering sleep mode when configured as a PLCA coordinator. The coordinator node, NODE_ID = 0, transmits a beacon at the start of each PLCA bus cycle. When sleep mode begins, the transmitter is not disabled until VDDA drops below its valid level. When configured to sleep on the inactivity timeout, the coordinator node will recognize the beacon as bus activity and wake itself back up. The coordinator mode will not reliably remain in sleep mode when configured to sleep on an inactivity timeout, as it will interpret its own beacon as network activity. Continued presence of beacons will cause other devices on the mixing segment to detect signal activity, so any other devices that are configured to sleep on inactivity will not sleep.	The coordinator node (NODE_ID = 0) must never be configured to sleep on inactivity timers. It must be put into sleep mode by its station controller. In addition, immediately before entering sleep, the coordinator must have PLCA disabled to stop the beacon. 1. Clear the EN bit of the PLCA_CTRL0 to disable the beacon. 2. Enter sleep mode and configure a non-zero delay by writing to the following bitfields of SLPCTL0: • Set SLPEN to 1 • Set WKINEN and MDIWKEN to configure desired wake source(s) • SLPCAL must be written as 0x0. • Set SLPINHDLY to 1 or greater.	Workaround as-is
A trade-off exists between noise immunity and carrier sense latency	EMI/EMC tests, it is necessary to use additional filtering, which increases carrier sense latency. The recommended default configuration, which is required to pass these tests, results in a longer carrier assertion time, which imposes a limitation on the usable range of the PLCA Transmit Opportunity Timer. As a reminder, this value must be configured equally among all nodes in the mixing segment. Values below the default can, theoretically, provide insignificant increases in throughput at the cost of system robustness. • The default value, in the specification and for this device, is 3.2us (TO_TMR=32). Using this value is strongly recommended except when collisions are detected on a PLCA enabled multidrop mixing segment containing third party devices.	The Transmit Opportunity timer (TO_TMR) should be configured with the default value of 32. In the event that a smaller value is used, it must always be 29 or greater. If collisions are detected during operation with devices from third-party vendors on the mixing segment, the Transmit Opportunity Timer may need to be increased to greater than 32. As the necessary value will be dependent upon various latency characteristics of other devices on the mixing segment, as well as the propagation delay on the physical medium, contact Microchip support.	ES166 shall not allow TO_TMR < 32