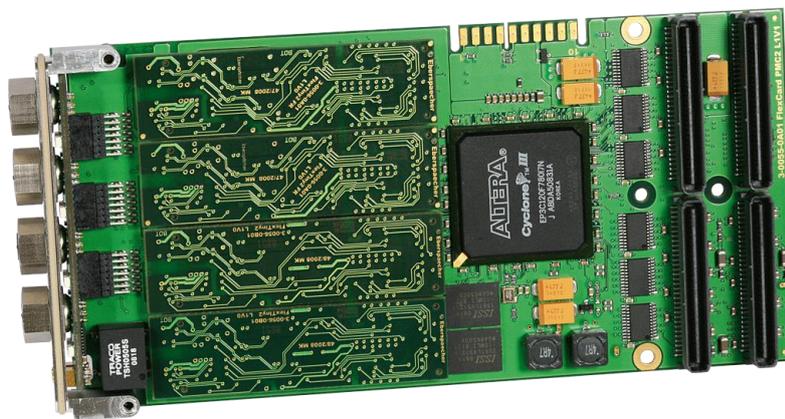


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FlexCard PMC-II

Instructions for Use





NOTICE

ESD (Electro Static Discharge) sensitive product.
Refer to chapter 1.3 and follow the safety and handling instructions.

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Any semiconductor devices have an inherent chance of failure. You have to protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions. The safety and handling instructions in this document have to be followed strictly.

EC Conformity

The *FlexCard PMC-II* complies with the essential requirements of the following applicable European Community Directive(s) including current amendments, and carries the CE marking accordingly:

- 2014/30/EU EMC Directive

The following standard(s) have been used to assess the product:

- EN 55022:2010 (Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement)
- EN 55024:2010 (Information technology equipment - Immunity characteristics - Limits and methods of measurement)

The *FlexCard PMC-II* is designed, intended and authorized for industrial use only. Using the product in domestic environment may lead to electromagnetic disturbances.

This product is compliant with the European Community Directive 2011/65/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

Revision History

Version	Date	Description
D1V0-F	27-Feb-2009	Initial release.
D1V1-F	16-Apr-2009	Added FlexTiny II chapter and Linux driver support.
D1V2-F	10-Jul-2009	Updated firmware update chapter and added Xenomai driver support.

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Version	Date	Description
D1V3-F	30-Jul-2009	Added user card id chapter. Changed interface description.
D1V4-F	11-Dec-2009	Updates for driver version S6V2-F.
D1V5-F	28-May-2010	Updates for driver version S6V3-F.
D1V6-F	05-Oct-2010	Updates for Linux/Xenomai driver version S5V3-F.
D1V7-F	06-Jul-2012	Updates for Windows driver version S6V4-F.
D2V0-F	16-Nov-2015	Layout updated to STAR COOPERATION.
D2V1b-F	22-Jun-2016	Added CAN FD, driver version S6V6-F
D2V2-F	16-Sep-2016	Update for Windows 10

Related Hardware / Software Versions

Product	Reference No.	Version (Major and Minor)	Remarks
FlexCard PMC-II Hardware	3-0055-0A01	H1V1	PMC II card with 2 triggers and FlexRay and CAN support depending on the available <i>FlexTiny II</i>
FlexCard PMC-II Firmware	3-0055-0C01	S6V6 (6.5.0.33)	Maximum 4 FlexRay or 8 CAN channels with DMA support.
FlexCard PMC-II Firmware	3-0055-0C01	S5V3	Maximum 2 FlexRay or 8 CAN channels without DMA support.
FlexTiny II FR	3-0056-0A01	H1V0	Physical layer board for FlexRay
FlexTiny II CAN-HS	3-0056-0B01	H1V0	Physical layer board for CAN
fcBase API (Windows)	3-0009-0K03	S6V6	API to build your own application
fcBase API (Linux)	3-0009-0U01	S5V3	API to build your own application
fcBase API (Xenomai)	3-0009-0V01	S5V3	API to build your own application
Caromee	3-0051-0P01	S3V0	Analyzing software that can be easily extended and supports the FlexCard product family.

Further related hardware and software can be found in chapter 2.2.

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1 General

1.1 Intended use

The *FlexCard PMC-II* is a PCI Mezzanine Card for use in 32bit/33MHz capable PMC carriers which are available for several host system architectures.

The *FlexCard PMC-II* is solely used to access automotive bus systems. Appropriate installed *FlexTiny II* with the according firmware, license and software are required to read from or write to multiple FlexRay, CAN or Ethernet buses. For FlexRay, channel A and B is supported for each communication controller.

Only the herein described accessory parts are allowed to be used together with the *FlexCard PMC-II*.

The *FlexCard PMC-II* is designed, intended and authorized exclusively for

- a) EU: laboratory applications
- b) US: industrial test equipment

Any other use without the prior written consent of *STAR COOPERATION* is prohibited.

The *FlexCard PMC-II* is NOT designed, intended, or authorized for

- use as part of medical systems,
- life support applications,
- aviation, space, nuclear, or military applications,
- use in areas where combustible or explosive gas mixtures are likely to occur,
- other applications in which a mistake or malfunction may result in death, personal injury, or severe physical damage.

The product described in this document is an industrial device, i.e. is designed, intended, or authorized for professional use. It is not designed, intended, or authorized for home applications or consumers. For this reason use by non-professionals is forbidden.

1.2 Used Pictograms

The meaning of used pictograms is shortly described below.

Follow the specific instructions in the document where these pictograms are placed.

	<p style="text-align: center;">⚠ WARNING</p> <p>Used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
	<p style="text-align: center;">⚠ CAUTION</p> <p>Used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.</p>
	<p style="text-align: center;">NOTICE</p> <p>Used to indicate a situation which may result in an operating failure. Damage of the product may occur, but there is no hazard of injury if not avoided.</p>
	<p style="text-align: center;">NOTICE</p> <p>Used to indicate an electrostatic discharge sensitive product. The product is subject to damage by ESD, if no precautions are taken.</p>
	<p style="text-align: center;">Information</p> <p>Used to indicate information provided only for purposes of clarification, illustration, and general information.</p>
	<p style="text-align: center;">Reference</p> <p>References to other documents.</p>
	<p>Product marking which shows the compliance of the product with the European Waste Electrical and Electronic Equipment Directive 2012/19/EC.</p>

1.3 Safety and Handling Instructions

Please read the instructions for use carefully. To protect the device or the application against damage or to avoid personal injury the *FlexCard PMC-II* has to be handled as described herein.

Changes or modifications of the *FlexCard PMC-II* are not allowed for safety and warranty reasons!

STAR COOPERATION is not liable for any damages arising from non-observance of the product information.

Follow the

- a) specific safety and handling instructions placed at dedicated document positions
- b) general safety and handling instructions below:

	⚠ WARNING
	<p>MAINS VOLTAGE UP TO 110 / 230 VAC AT THE COMPUTER CHASSIS</p> <p>ELECTRICAL SHOCK HAZARD!</p> <p>TO PREVENT DEATH, PERSONAL INJURY OR DAMAGE: DISCONNECT THE POWER CABLE OF THE COMPUTER BEFORE OPENING THE CHASSIS.</p>

	⚠ CAUTION
	<p>TO PREVENT PERSONAL INJURY, TO PREVENT DAMAGE TO THE <i>FlexCard PMC-II</i> OR TO PREVENT CONSEQUENTIAL DAMAGES:</p> <ul style="list-style-type: none"> ➤ PLEASE OBSERVE THE ESD-PROTECTION INSTRUCTIONS BEFORE GETTING IN CONTACT WITH THE CONNECTORS. OTHERWISE THE <i>FLEXCARD PMC-II</i> MAY GET DAMAGED. SEE CHAPTER 9.1. ➤ DO NOT CONNECT ANY OTHER SIGNALS TO THE INTERFACES AS DESCRIBED IN THE CHAPTER "INTERFACES AND CONNECTORS". ➤ ENSURE THAT ALL SIGNALS ARE WITHIN THE SPECIFIED RANGE. ➤ IT IS RECOMMENDED TO ONLY USE PRODUCTS FROM STAR COOPERATION LISTED IN CHAPTER 8.2 ACCESSORY PARTS TO ENSURE PROPER FUNCTION! ➤ HIGH TEMPERATURES CAN DAMAGE THE <i>FLEXCARD PMC-II</i>. KEEP THE <i>FLEXCARD PMC-II</i> AWAY FROM HEATERS, STOVES, FIREPLACES, AND OTHER SOURCES OF HEAT. ➤ DO NOT EXPOSE THE <i>FLEXCARD PMC-II</i> TO RAIN OR USE IT NEAR WATER. ➤ DO NOT USE THE <i>FLEXCARD PMC-II</i> IN AREAS OF EXPLOSION HAZARD.

	NOTICE
	<p>The <i>FlexCard PMC-II</i> may not work correctly or communication problems may occur if:</p> <p>The <i>FlexCard PMC-II</i> is used in existing passive networks, i.e. when changing the topology structure.</p> <p>The coded 8-pole FlexRay connectors are inserted wrong (i.e. due to forced insertion).</p> <p>The bus termination of the <i>FlexCard PMC-II</i> is not adapted to the connected bus topology.</p> <p>The <i>FlexCard PMC-II</i> is configured wrong.</p>

	NOTICE
	<p>By sending messages over the <i>FlexCard PMC-II</i> to an automotive bus system it is possible to trigger actions resulting in malfunction and/or damage.</p> <p>The <i>FlexCard PMC-II</i> must be used by expert technicians familiar with the corresponding systems.</p>

NOTICE	
	<p>ESD (Electro Static Discharge) sensitive product</p> <p><i>STAR COOPERATION</i> products lacking protective enclosures are subject to damage by ESD.</p> <p>Take proper ESD precautions to avoid performance degradation or loss of functionality!</p> <p>Unpack, handle or operate these products only in environments where sufficient precautionary measures have been taken in respect to ESD hazards. A guideline is available in chapter 9.1.</p> <p>Only appropriately trained personnel (such as electricians, technicians and engineers) may handle and/or operate these products.</p>

1.4 User Group

This document is written for expert technicians who are familiar with electronic components and systems.

Each person involved with assembly, line-up, operation, maintenance, or disposal of the FlexCard PMC-II has to

- be a qualified technician, or electrician, or engineer
- strictly adhere to this manual
- receive a briefing by an authorized person

1.5 Meaning of Text Styles

In this document *filenames* are marked with a different text format.

2 Product Description

2.1 FlexCard PMC-II at a glance

The *FlexCard PMC-II* is a flexible multi-bus instrument for monitoring, testing, simulation and basic gateway applications. It is intended to be used with the FlexRay and CAN bus systems. The number of interfaces may easily be varied by mounting up to four *FlexTiny II* modules. This ensures a free and future-oriented field of application.

Several features like switchable bus terminations, two trigger lines as well as the easily updateable firmware are integrated on the device. Using different monitoring modes, the card can be used as pure monitoring tool and as real communication node for FlexRay, CAN and Ethernet. Additionally, if the firmware image with one FlexRay CC is used, the *FlexCard PMC-II* supports Self-Synchronization through a second sync frame.

The *FlexCard PMC-II* can be inserted in a 32bit/33MHz capable PMC chassis or carrier module. Such carrier modules are available for several platforms like PCI, PCIe, CompactPCI, or PXI.

The bus systems are connected via four Binder Series 712 jacks. Each Binder jack connects either channel A and B for FlexRay or two bus channels for CAN or one channel for Ethernet. For each channel two LED indicators are provided on the front panel signaling different states of the bus channels.

Up to API- and FW-Version S5V2-F, all incoming data is temporarily stored into the 2 MB onboard buffer of the device. 1 MB is used for data buffering, 1 MB for internal processes. From API- and FW-Version S6V1-F, all incoming data is transferred over DMA from device to the system RAM and temporarily stored into a 2 MB receive buffer. From API- and FW-Version S6V3-F, all incoming data is temporarily stored into the 2 MB onboard buffer of the device, too. This prevents data losses and flexible data collection cycles become possible. Transmit data will be written directly into the Communication Controller in order to ensure a maximum of performance.

FEATURES

- 32bit/33MHz PCI Mezzanine Card device
- 4 slots for *FlexTiny II* modules, allows maximum 4 channels FlexRay (A+B), 8 channels CAN, 1 channel Ethernet or a combination
- 2 TTL compatible trigger lines
- Firmware updateable



Reference

Further information about how to program applications for the *FlexCard PMC-II* can be found in the *FlexCard API Documentation*.

Information	
	<p>The currently supported FlexRay Communication Controller type on the <i>FlexCard PMC-II</i> is:</p> <p style="text-align: center;">BOSCH E-Ray FlexRay IP-Module, Release 1.3 (Referring to the FlexRay protocol specification v2.1a)</p> <p>The currently supported CAN Communication Controller types (depending on the firmware image) on the <i>FlexCard PMC-II</i> are:</p> <p style="text-align: center;">BOSCH D_CAN CAN IP-Module Release 1.1.1 (Referring to the CAN protocol specification v2.0 part A, B)</p> <p style="text-align: center;">BOSCH M_CAN CAN IP-Module Release 3.2.1 (Referring to the CAN protocol specification “ISO 11898-1:2015” and “Bosch CAN FD specification 1.0”)</p>
	<p>Other versions are not supported up to now. Please contact <i>STAR COOPERATION</i> if other versions need to be supported.</p>
	<p>The firmware can be exchanged using the update tool <i>FlexUpdate.exe</i>.</p>

Applications

- Usage with STAR COOPERATION *Caromee* (Demo available)
- Usage with STAR COOPERATION *FlexAnalyzerV2* (See chapter 2.2)
- Further commercial applications will support *FlexCard PMC-II* soon
- Usage with customer specific software. The FlexCard driver has a C-API, see [1].
- Usage with customer LabVIEW VIs, see [6]

2.2 Scope of Supply

The *FlexCard PMC-II* is delivered with

Product	Reference No.	Version (Major and Minor)	Remarks
<i>FlexCard PMC-II</i> Firmware	3-0055-0C01	S6V6 (6.5.0.33), S6V5 and S5V3	Maximum 4 FlexRay, 8 CAN channels or a combination.
<i>FlexCard SYS</i>	3-0009-0E04	S6V6	Required low level driver for the <i>FlexCard</i> .
<i>FlexCard DLL</i>	3-0009-0K03	S6V6	Required high level driver for the <i>FlexCard</i> .
<i>FlexCard Linux driver</i>	3-0009-0U01	S5V3	Linux driver for the <i>FlexCard</i> .
<i>FlexCard Xenomai driver</i>	3-0009-0V01	S5V3	Xenomai driver for the <i>FlexCard</i> .
<i>FlexAnalyzerV2</i>	3-0038-0B01	S1V4	<i>FlexCard</i> monitoring tool. Supports FlexRay/CAN monitoring and sending data, triggers, filters and data logging.
Instructions for Use	3-0055-0P01-D05	D2V0	This document.
API Documentation	3-0009-0S01-D03	D2V1	API programming manual as PDF file.
Getting Started Manual	3-0055-0P01-D07	D2V0	Example how to build a small FlexRay/CAN-communication.
Demo	-	S1V6	Demo explaining the programming of the <i>FlexCard</i> .

Product	Reference No.	Version (Major and Minor)	Remarks
DemoPMC	-	S1V5	Demo explaining the programming of the <i>FlexCard</i> with multiple FlexRay CCs.
DemoCAN	-	S1V5	Console application explaining the communication over CAN.
DemoCANFD	-	S1V0	Console application explaining the communication over CAN FD.
CanBaudRateCalculator	-	S1V7	Helps with the calculation of CAN bus parameters.
FlexUpdate	-	S1V11	Tool for updating firmware and licenses.
Tracer Control	-	S1V3	Activates debug information.

Table 1: Scope of supply of the FlexCard PMC-II

A list of available accessory parts can be found in chapter 8.2.

2.3 Accessory Parts

For further information about accessories for the FlexCard PMC-II see chapter 8.2 Accessory Parts.

NOTICE	
	<p>Use only accessories from <i>STAR COOPERATION</i> listed in chapter 8.2 Accessory Parts to ensure proper function and for warranty reasons! Other accessories without prior written consent of <i>STAR COOPERATION</i> must not be used.</p>

2.4 Updates

Information	
	<p>Updates regarding the FlexCard drivers and firmware are possible via web-downloads from the <i>STAR COOPERATION</i> homepage.</p> <p>The firmware on the <i>FlexCard PMC-II</i> can be updated with an appropriate software tool, see chapter 4.3.2.</p> <p>If you mount an additional or different <i>FlexTiny II</i> module, a license update could be necessary. See chapter 4.5 on how to update your license.</p>

3 Technical Data

3.1 Electrical Characteristics

3.1.1 Power consumption

The necessary power is directly provided by the PCI bus through the PMC interface. The typical power consumption when operating the *FlexCard PMC-II* is 1.6 W. The *FlexCard PMC-II* requires both the +3.3 V and +5 V power rail, so in the following table the total power consumption is the sum of the power consumption of each power rail.

Supply voltage	+3.3 VDC	+5.0 VDC
Supply current (typical)	100 mA	250 mA

Table 2: Power consumption

3.1.2 Signal range

Maximum voltage input on a FlexRay BP/BM (FlexTiny II FR)	+60.0 V
Minimum voltage input on a FlexRay BP/BM (FlexTiny II FR)	-60.0 V
Maximum voltage input on a CAN high/low (FlexTiny II CAN-HS)	+40.0 V
Minimum voltage input on a CAN high/low (FlexTiny II CAN-HS)	-27.0 V
Maximum voltage input on a CAN high/low (FlexTiny II CAN FD)	+40.0 V
Minimum voltage input on a CAN high/low (FlexTiny II CAN FD)	-40.0 V

Table 3: Signal range

3.2 Physical Characteristics

CPU of <i>FlexCard PMC-II</i>	Altera Cyclone III
Bus Interfaces Bus Drivers on FlexTiny II	8 bus channels provided on the front panel FlexRay: NXP TJA1080 Transceivers CAN: NXP TJA1041 CAN HS Transceivers CAN FD: NXP TJA1044GT CAN FD Transceivers Ethernet: Texas Instruments DP83640
Bus Termination	The bus termination can be switched by software. CAN/ CAN FD is terminated with 120Ω, FlexRay with 90Ω
Bus state LEDs	Two LED-indicators per channel
Synchronization Interfaces on the front panel	2x 5V TTL trigger connectors provided on the front panel
Weight	100 g
Dimensions L x W x H without connectors approx.	157 x 74 x 14 mm ³

Table 4: Physical characteristics of the FlexCard PMC-II

3.3 Environmental Conditions

Temperature	Operating: -40 to +70°C Storage: -40 to +85°C
Relative Humidity	Operating: 10% to 90% rH, non-condensing Storage: 10% to 90% rH, non-condensing

Table 5: Environmental conditions for the FlexCard PMC-II

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3.4 Block Diagram

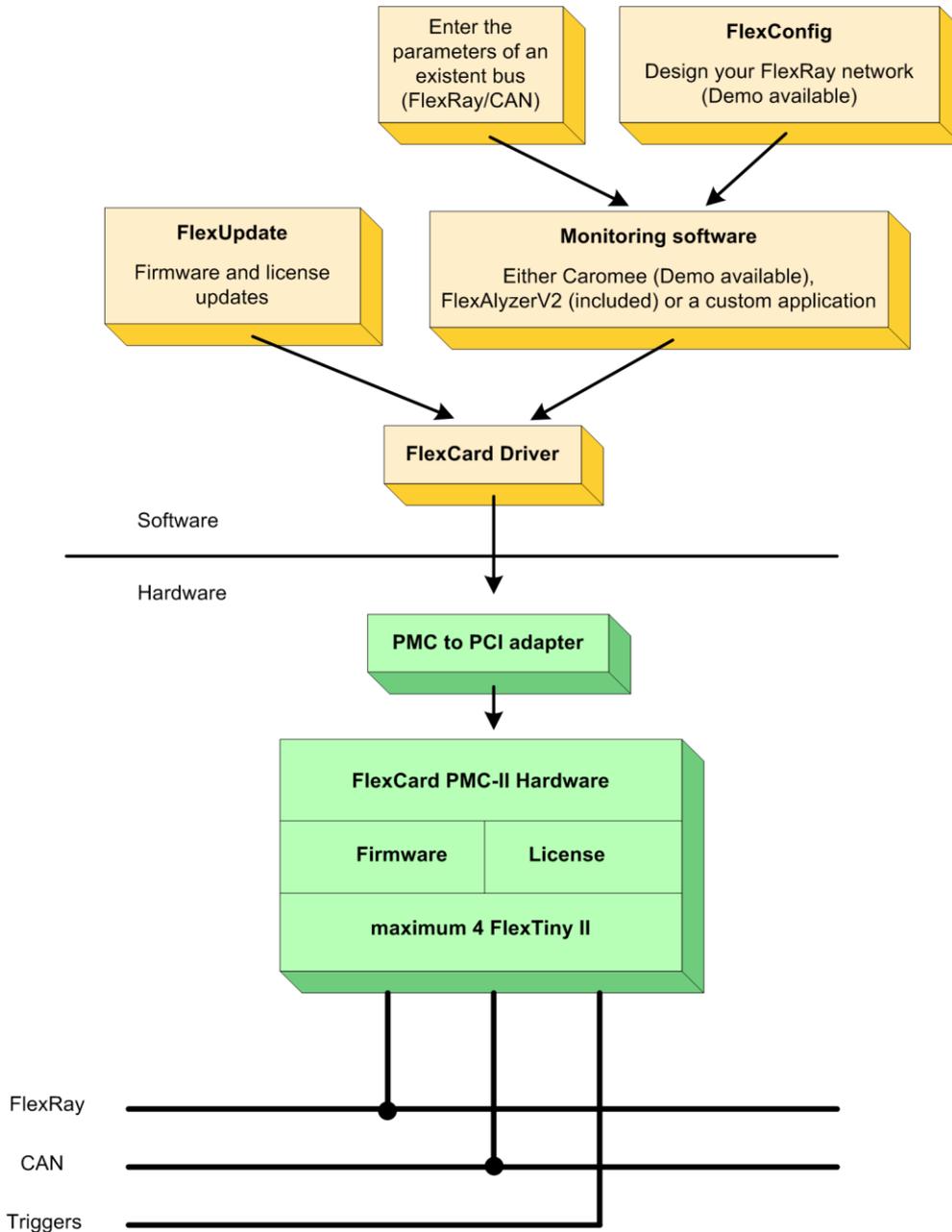


Figure 1: The *FlexCard PMC-II* in a functional environment

	Reference
	Further information about the usage of <i>FlexAnalyzerV2</i> , <i>Caromee</i> and <i>FlexConfig</i> can be found in [3], [4], [5].

3.5 Interfaces and Connectors

Read and follow these instructions when connecting and using the *FlexCard PMC-II*:

NOTICE	
	<p>Ensure that all signal lines connected to the <i>FlexCard PMC-II</i> are in the allowed range.</p> <p style="text-align: center;">Be sure to connect all cables as described in this manual.</p> <p style="text-align: center;">It is recommended to only use cables from <i>STAR COOPERATION</i>. See Chapter 8.2 Accessory Parts.</p> <p style="text-align: center;">The cables for the bus channels should always be fixated by screwing the plug into the jack.</p> <p style="text-align: center;">Ensure to grasp the plug and not the cable when disconnecting the <i>FlexCard PMC-II</i>.</p>

3.5.1 PMC Interface

The *FlexCard PMC-II* can be used in PCI slots with 3.3V signaling and slots with 5V signaling. The *FlexCard PMC-II* is running on 32 Bit PCI. Figure 2 describes how to identify a PCI slot with 3.3V signaling and a slot with 5V signaling.

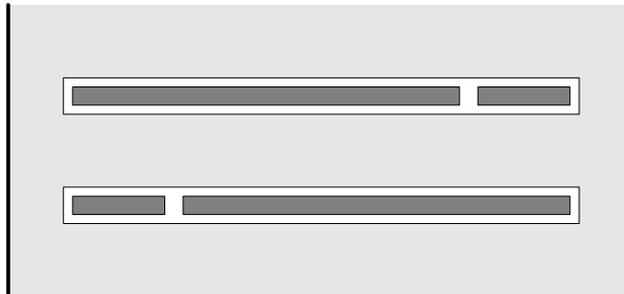


Figure 2: Top view of a motherboard. Connectors of the PCI card are at the left side. At the top is a PCI slot with 5V signaling; below is a PCI slot with 3.3V signaling.

3.5.2 Bus Interfaces on the Front Panel

On the front panel, four Binder series 712 jacks are provided for the bus connections.

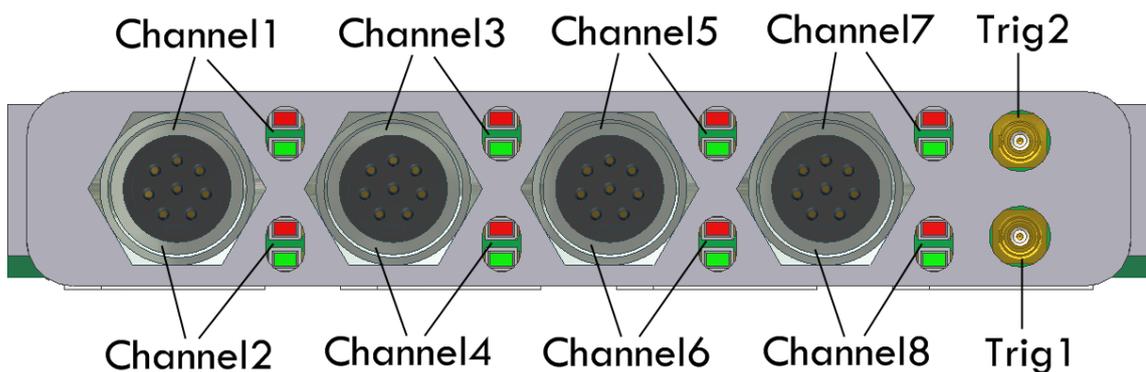


Figure 3: Front panel

One bus connector may contain either FlexRay channel A and B, two CAN channels or one Ethernet channel.

For both bus types (FlexRay and CAN), the same pin assignment and the same cables are used. Physically, the differentiation between the bus systems is only done by the FlexTiny II modules.

The pin assignment of the *FlexCard PMC-II* connectors is shown in Figure 3 and is listed in Table 5. Whether FlexRay, CAN or CAN FD is connected depends on the mounted FlexTiny II module. When using isolated FlexTiny II modules both pin 2 and pin 8 are isolated grounds.

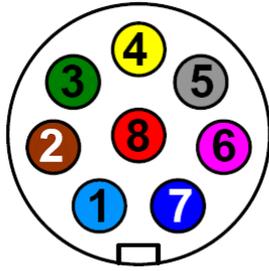


Figure 4: Front panel jack pin assignment, front view of the 8 pin Binder 712 female connector

Pin number Binder 712 female	Signal	Color
1	Shield	Blue
2	GND	Brown
3	Interface 1: FlexRay BusPlus or CAN high	Green
4	Interface 1: FlexRay BusMinus or CAN low	Yellow
5	Interface 2: FlexRay BusPlus or CAN high	Grey
6	Interface 2: FlexRay BusMinus or CAN low	Magenta
7	Not connected	Blue
8	GND	Red

Table 6: FlexCard PMC-II Binder connector assignment

The FXC *FCL8-2 Cable* (Ref. No. 3-0034-1L01) has a female Binder 722 connector (See Figure 4) and two female SubD connectors (See Figure 5). One connector is labeled as Channel A, it carries FlexRay channel A or CAN interface 1, 3, 5 or 7. The second connector is labeled as Channel B and it carries FlexRay channel B or CAN interface 2, 4, 6 or 8, depending on the Binder 722 jack it is connected to.

This cable is suitable for connecting a FlexTiny II FR, FlexTiny II CAN-HS, or FlexTiny II CAN FD.

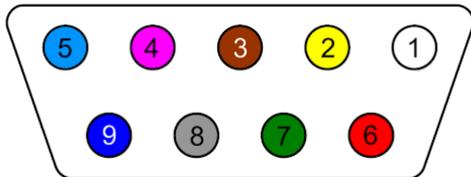


Figure 5: SubD9 pin assignment, front view

Pin number SubD9 female	Signal	Color
1	Not connected	White
2	Interface 1: FlexRay BusMinus or CAN low	Yellow
3	GND	Brown
4	Not connected	Magenta
5	Shield	Blue
6	Not connected	Red
7	Interface 1: FlexRay BusPlus or CAN high	Green
8	Not connected	Grey
9	Not connected	Blue

Table 7: FXC FCL8-2 Cable (Ref. No. 3-0034-1L01) SubD9 cable assignment, first male connector

Pin number SubD9 female	Signal	Color
1	Not connected	
2	Interface 2: FlexRay BusMinus or CAN low	Yellow
3	GND	Brown
4	Not connected	Magenta
5	Shield	Blue
6	Not connected	Red
7	Interface 2: FlexRay BusPlus or CAN high	Green
8	Not connected	Grey
9	Not connected	Blue

Table 8: FXC FCL8-2 Cable (Ref. No. 3-0034-1L01) SubD9 cable assignment, second male connector

Information	
	The <i>FC Daisy Chain FR 2 Cable</i> is available for the <i>FlexCard PMC-II</i> . It connects 4 Sub-D jacks to the <i>FlexCard</i> . Therefore four bus nodes may be connected. See Chapter 8.2 for ordering information.

3.5.3 Bidirectional Trigger Connectors on the Front Panel

For synchronization purposes, the *FlexCard PMC-II* provides two 5V tolerant TTL-compatible trigger connectors (Trig1 and Trig2, see Figure 2) on the front panel. The device has the ability to receive and generate trigger events on both trigger connectors. This feature allows e.g. a synchronization of different bus analyzing devices.

Physically, the triggers are MMCX-male-connector for coax-cables. The electrical characteristic of this output is described in Table 9. The values are the same for a PCI slot with 3.3 V signaling and for a slot with 5 V signaling.

Parameter	Min	Typ	Max	Units
Input High Voltage	2.4	-	5	V
Input High Current	4	-	12	mA
Input Low Voltage	-	-	0.8	V
Output High Voltage	4	4.5	5	V
Output High Current	-	4	10	mA
Output Low Voltage	0	0.5	0.8	V

Table 9: Electrical characteristic of trigger connections

Both trigger connectors can freely be configured by software to act as input or as output. The input trigger can be programmed to work with rising or falling edges, while the output trigger of the *FlexCard PMC-II* is always low-active.

Reference	
	Detailed information about how the trigger events are used with the <i>FlexCard PMC-II</i> can be found in the <i>FlexCard API Documentation</i> .

	Information
To connect the trigger output to a BNC-connector, the trigger line cable can be ordered at <i>STAR COOPERATION</i> , see chapter 8.2 Accessory Parts.	

3.5.4 LED Indicators on the Front Panel

Each bus channel on the front panel has two LED indicators for signaling different monitoring states: Red and green. The information signaled by the LED depends on the mounted *FlexTiny II* at the corresponding slot. When no LED is glowing, no *FlexTiny II* is mounted or no bus activity is detected. The LED states are explained in the following table:

Signaling	Mounted FlexTiny II	Description
Permanent red lighting of all LEDs	Any	Signals a buffer overflow on the internal RAM.
Red flashing	FlexRay	Signals an error in the FlexRay communication controller (e.g. clock correction errors).
Red and green lighting at the same time	FlexRay	FlexRay communication controller is not synchronized, but connected to an actively working network. Bus traffic is detected. This LED combination is active when monitoring in asynchronous mode. The intensity of the LEDs is dependent on the traffic on the bus.
	CAN	Bus traffic is detected. The intensity of the LEDs is dependent on the traffic on the bus.
Green lighting	FlexRay	FlexRay communication controller is synchronized. The intensity of the LED is dependent on the traffic on the bus.
	Ethernet	The Ethernet link is active.
Green flashing	FlexRay	Signals the FlexRay communication controller is in a startup state (that means that the FlexRay communication controller is ready for synchronization). This can be seen when monitoring in normal mode and the FlexRay configuration is incorrect or no cable connected.
	Ethernet	Bus traffic is detected.

Table 10: Description of indicating LEDs

3.5.5 FlexTiny II Modules

The *FlexCard PMC-II* hardware provides four *FlexTiny II* connectors.

Currently there are following *FlexTiny II* modules available for the *FlexCard PMC-II*:

3.5.5.1 FlexTiny II FR

The module allows access to a FlexRay bus. It supports channel A and channel B.

3.5.5.2 FlexTiny II CAN-HS

The module allows access to a CAN bus. Two channels are supported.

3.5.5.3 FlexTiny II CAN FD

The module allows access to a CAN/ CAN FD bus. Two channels are supported.

Following limitations exist for this module:

- CAN partial networking is not supported.
- The power management modes of the transceiver are not supported.

3.5.5.4 FlexTiny II Ethernet

The module allows isolated access to an Ethernet bus.

	Information
	The isolation of the FlexRay/CAN bus from the <i>FlexCard PMC-II</i> works only when all mounted <i>FlexTiny II</i> modules are isolated modules.

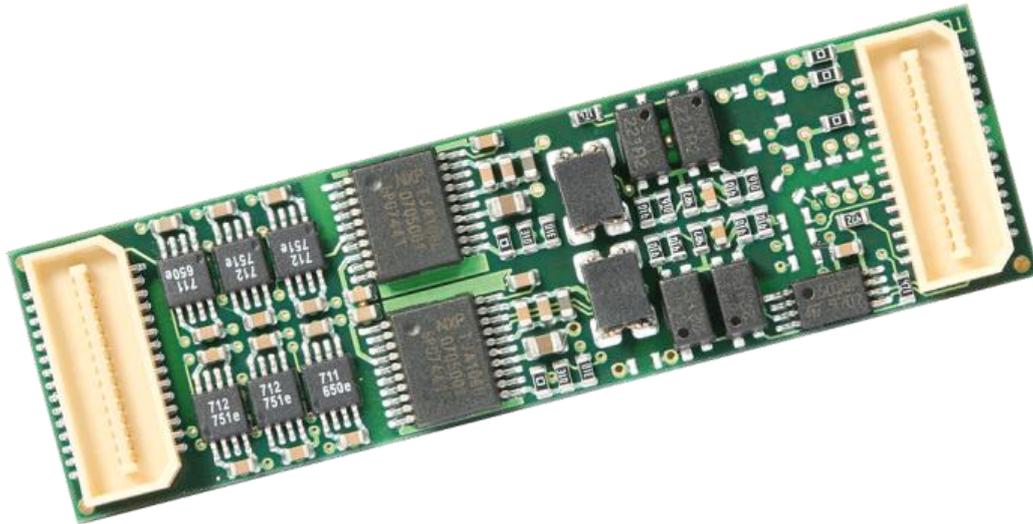


Figure 6: Isolated FlexTiny II module with physical layer chips to access different bus systems.

3.5.6 Mounting the FlexTiny II Modules

The *FlexCard PMC-II* supports a multitude of configurations.

The following figure shows the assignment of the *FlexTiny II* modules with the *FlexCard PMC-II* hardware.

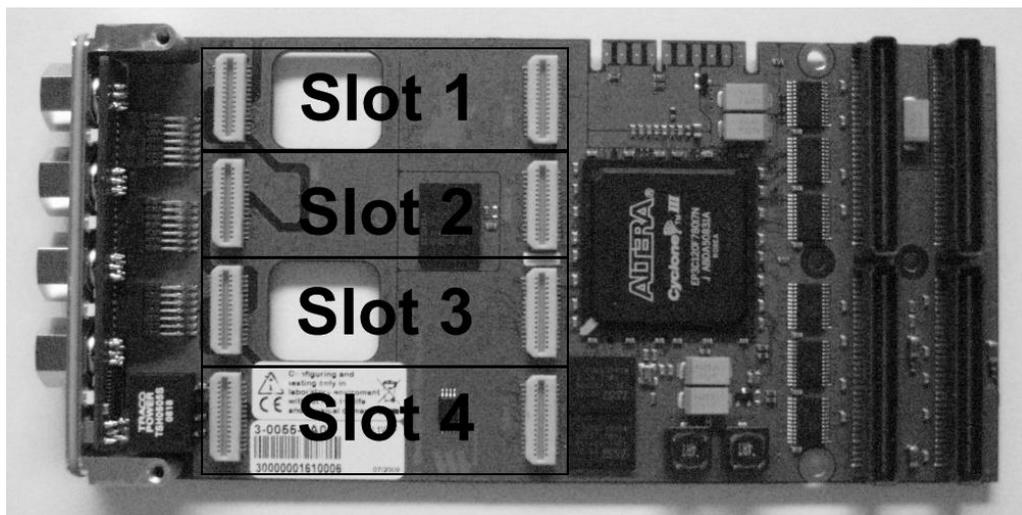


Figure 7: assignment of FlexTiny II modules

To mount the correct *FlexTiny II* modules on the *FlexCard PMC-II*, put the FlexRay modules on slot 1, slot 2 and so forth. Then mount the CAN modules on the following slots. Please refer to Table 11.

Used Firmware	FlexTiny II assignment			
	Slot 1	Slot 2	Slot 3	Slot 4
8 CAN	CAN	CAN	CAN	CAN
1 FlexRay and 6 CAN	FlexRay	CAN	CAN	CAN
2 FlexRay and 4 CAN	FlexRay	FlexRay	CAN	CAN
3 FlexRay and 2 CAN	FlexRay	FlexRay	FlexRay	CAN
4 FlexRay	FlexRay	FlexRay	FlexRay	FlexRay
1 Ethernet, 1 FlexRay and 2 CAN	Ethernet	FlexRay	-	CAN
1 FlexRay and 4 CAN FD	FlexRay	CAN FD	CAN FD	-

Table 11: FlexTiny II assignment in dependency of the used FlexCard PMC-II firmware

NOTICE	
	<p>Ensure that all <i>FlexTiny II</i> modules are mounted correctly!</p> <p>To avoid <i>FlexCard PMC-II</i> hardware damage ensures that the “front panel” writing on the <i>FlexTiny II</i> modules are pointing towards the front panel and not to the Cyclone III chip.</p>

Push the *FlexTiny II* module softly into the slot you wish to use. It clicks into place. The shape of the connector prevents a wrong orientation. The slot number is printed on the board. Slot 1 connects interface 1 and 2, slot 2 connects interface 3 and 4 etc.

Be careful when you want to take off the *FlexTiny II*. Push the module of slot 1 and 3 out through the two holes in the board. For the other two, place the fingertips of your index finger and thumb of both hands under the module and use them as lever.

Information	
	<p>When a new <i>FlexTiny II</i> is mounted, make sure that you have the correct license. Refer to chapter 4.8.</p>

4 Getting Started

4.1 Assembly and Line-up

Read and follow these instructions when connecting and using the *FlexCard PMC-II*:

	NOTICE
	<p>Ensure that all signal lines connected to the <i>FlexCard PMC-II</i> are in the allowed range.</p> <p style="text-align: center;">Be sure to connect all cables as described in this manual.</p> <p style="text-align: center;">Never insert anything metallic into the openings of the <i>FlexCard PMC-II</i>.</p> <p style="text-align: center;">Ensure to grasp the plug and not the cable when disconnecting the <i>FlexCard PMC-II</i>.</p>

4.2 Hardware Installation and Maintenance

	NOTICE
	<p>Be aware that the <i>FlexCard PMC-II</i> and the <i>FlexTiny II</i> are electrostatic discharge sensitive devices. Please refer to Appendix A: Guideline for handling ESD sensitive Products.</p> <p style="text-align: center;">Do not touch the components on the board or the pin connectors.</p>

First, the *FlexTiny II* modules you want to use are mounted onto the *FlexCard*. Refer to chapter 3.5 Interfaces and Connectors.

	NOTICE
	<p style="text-align: center;">Use only <i>FlexTiny II</i> modules from <i>STAR COOPERATION</i> listed in chapter 8.2 Accessory Parts to ensure proper function and for warranty reasons!</p>

Then the *FlexCard PMC-II* is mounted onto a PMC-to-PCI-adapter. *STAR COOPERATION* recommends using one of the following PMC to PCI adapters:

- TPCI270 PCI-to-PMC adapter from TEWS
- ramix CP236
- NAT NPCI-PMC

For the PCI-Express adapter, we recommend using the following products:

- Xalyo XS-PCIE
- General Standards PCIe1 to PMC Adapter

For ordering information, please refer to chapter 8.2 Accessory Parts.

Follow these steps to install the *FlexCard PMC-II* in your PCI system:

1. Turn your host system off and unplug the power cable.
2. Ensure that you fulfill the EMC conformity and safety requirements. The technician should be grounded.
3. Insertion and removal of the *FlexCard PMC-II* should be done with care.
4. Insert the *FlexCard PMC-II* into a free module slot of your PCI host / carrier module.
5. Fixate the *FlexCard PMC-II* with the screws to the host / carrier module.

4.2.1 Customize the Bus Driver Terminating Resistor Values

For each bus channel, a bus termination can be switched on or off, so that different bus topologies are supported for FlexRay and CAN-HS bus. For FlexRay the *FlexCard PMC-II* provides 90Ω split termination, and for CAN-HS and CAN FD 120Ω split termination. The settings for the bus termination can be done via software. Therefore, please read the *FlexCard* API Documentation how the termination can be adapted to the specific needs.

4.3 Software Installation and Update

4.3.1 Preconditions

	Information
	On all operating systems administrator access rights are required to install the device driver.

The minimum system requirements for installing and running the *FlexCard PMC-II* hardware and software are:

Microsoft Windows XP (32 bit)

- Computer/processor: 1 GHz or faster AMD/Pentium-compatible processor
- 256 MB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC-, PCI- or PCIe-slot
- Microsoft Visual C++ 2010 Redistributable Package (x86)

Microsoft Windows Vista (32 bit)

- Computer/Processor: 1.5 GHz or faster AMD/Pentium-compatible processor
- 1 GB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC-, PCI- or PCIe-slot
- Microsoft Visual C++ 2010 Redistributable Package (x86)

Microsoft Windows 7 (32/64 bit)

- Computer/Processor: 2 GHz or faster AMD/Pentium-compatible processor
- 1 GB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC-, PCI- or PCIe-slot
- Microsoft Visual C++ 2010 Redistributable Package (x86)
- On Windows 7 64 Bit additionally: Microsoft Visual C++ 2010 Redistributable Package (x64)

Microsoft Windows 10 (32/64 bit, without Secure Boot)

- Computer/Processor: 2 GHz or faster AMD/Pentium-compatible processor
- 2 GB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC-, PCI- or PCIe-slot
- Microsoft Visual C++ 2010 Redistributable Package (x86)
- On Windows 10 64 Bit additionally: Microsoft Visual C++ 2010 Redistributable Package (x64)

LabVIEW 8.6 or later

- Computer/Processor: 2 GHz or faster AMD/Pentium-compatible processor
- 512 MB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC-, PCI- or PCIe-slot
- Microsoft Visual C++ 2010 Redistributable Package (x86)

Linux (with/without Xenomai)

- Computer/Processor: 1 GHz or faster AMD/Pentium-compatible processor
- 256 MB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC- or PCI-slot
- Supported Linux kernel version: 2.6.25 to 2.6.35
- Optional supported Xenomai version: 2.5

The minimum system requirements for installing and running the *FlexCard PMC-II* Ethernet hardware and software are:

- Microsoft Windows 7 64 bit
- Computer/Processor: 2 GHz or faster AMD/Pentium-compatible processor
- 256 MB of RAM
- Display: VGA or higher-resolution monitor
- Peripheral keyboard and mouse or compatible pointing device
- Free PMC- or PCI-slot
- FlexCard Ethernet Setup
- Microsoft Visual C++ 2010 Redistributable Package (x86)

4.3.2 Installation on Microsoft Windows Operating Systems

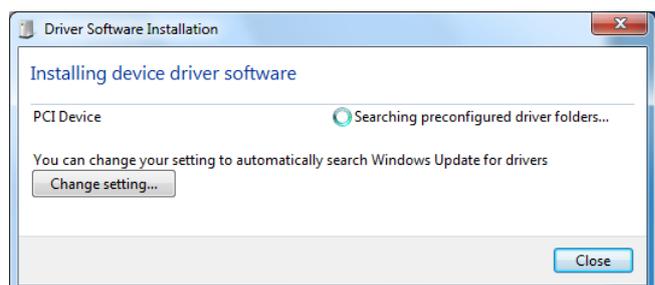
	Reference
	Ethernet installation can be found in the documentation “FlexCard PMC-II Ethernet User Manual”.

To install the *FlexCard PMC-II* device driver and dynamic link library, please follow the steps below. Before you install the *FlexCard PMC-II*, uninstall the old version first (Refer to chapter 4.3.3 Uninstallation on Microsoft Windows Operating Systems).

Step 1

Insert the *FlexCard PMC-II* hardware in the PCI-slot. Switch the power on and boot your computer. Windows will show this dialog.

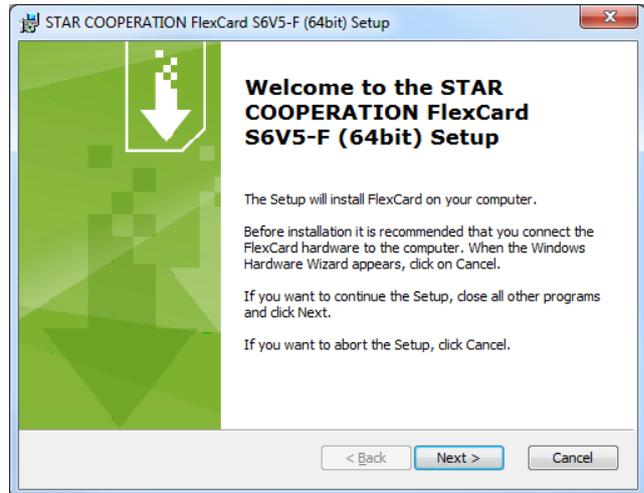
As the device driver will not be installed using the “Device Software Installation”, click on the “Close” button to abort the wizard.



Step 2

To start the installation, double click the FlexCard setup. The installation wizard will start immediately and guide you through the installation.

Click on the “Next” button.

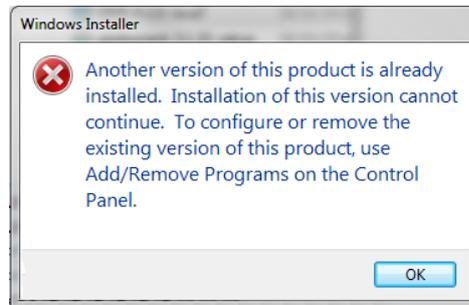


Step 2 (b)

If you installed a *FlexCard* driver package before, the setup will return this error message. For installing the new driver you have to **remove** the previous package first.

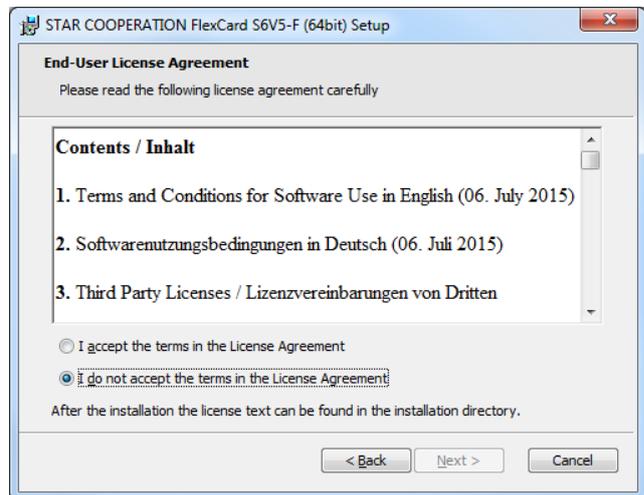
Follow the instructions in chapter 4.3.3.

Restart your computer and go to **Step 1** again.



Step 3

Read the license agreement and if you accept the agreement, click “I accept the terms...” and the “Next” button to continue the installation. Otherwise click “Cancel” to abort the installation.



Step 4

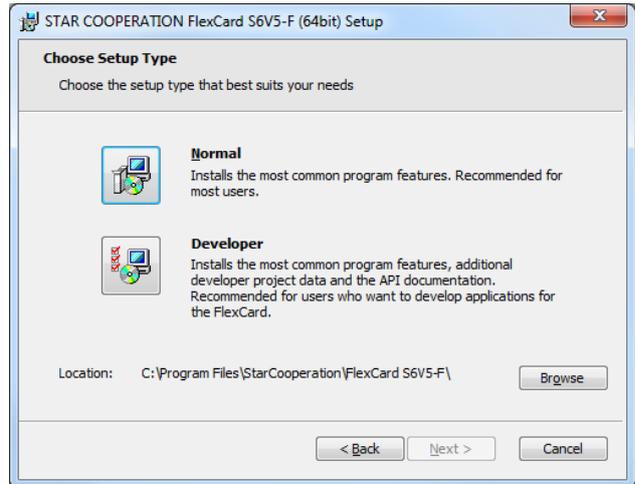
Select the installation folder for the *FlexCard* files.

There are two setup types:

- **Normal** setup for using FlexCard PMC-II with commercial applications.
- **Developer** setup for developing applications for the FlexCard PMC-II. This will install the C header files and libraries you need, to access the API in your own applications. Also the FlexCard API Documentation is installed.

Choose your setup type by clicking the corresponding icon.

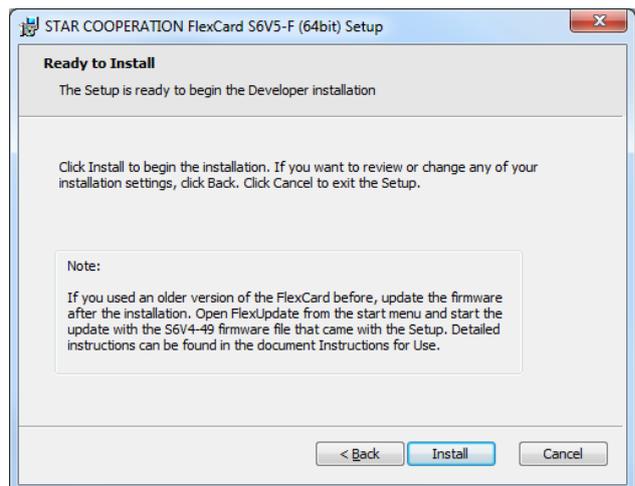
Note: The device driver and dynamic link library will be installed to the Windows system directory.



Step 5

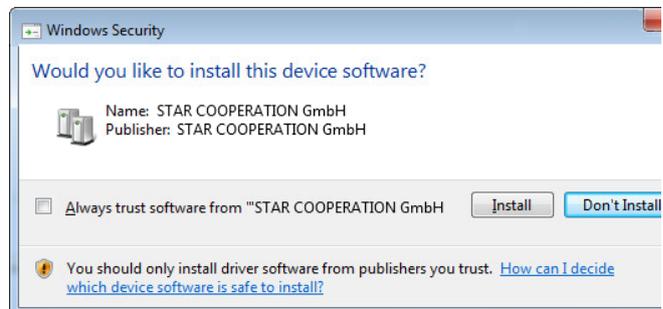
Please note that the *FlexCard PMC-II* only works when the firmware and the driver match. If you update the *FlexCard PMC-II* from an earlier version, update the firmware too. After the installation, look for the firmware file that came with the new setup. Refer to chapter 4.4 “Firmware Update” on how to update the firmware.

Click “*Install*” to start the installation.



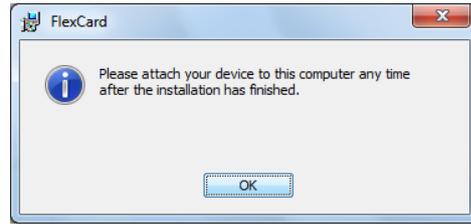
Step 6

On a Windows system the following warning dialog may appear, as the *FlexCard* device driver is not certificated by the Microsoft Hardware Quality Labs. Click on “*Continue Anyway*” to proceed with the installation.



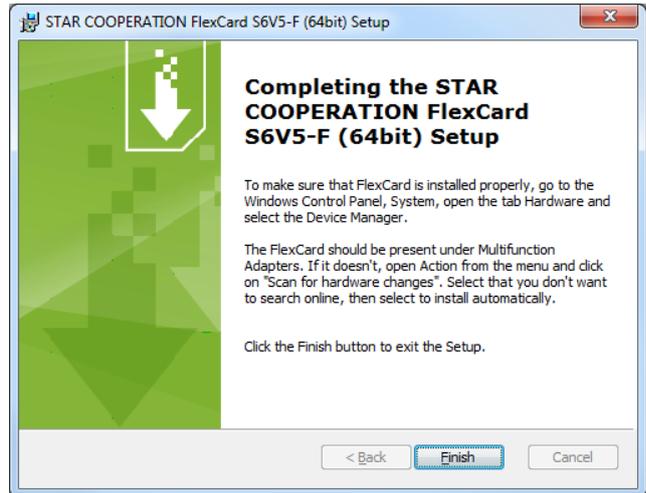
Step 7

A dialog box may appear. Click on “OK”.



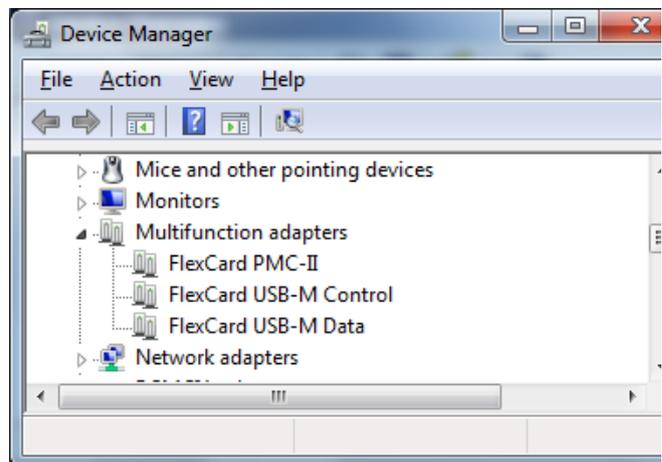
Step 8

Click “Finish” to complete the installation.



Step 9

After the installation of the device driver you will find the *FlexCard PMC-II* entry in the *Device Manager* in the folder *Multifunction adapters*



Information

It is recommended to install the *FlexCard PMC-II* Windows driver via setup.msi and not via INF-file. In case the installation via INF-file is necessary, always install it from the hard drive and not from USB stick or network drive.

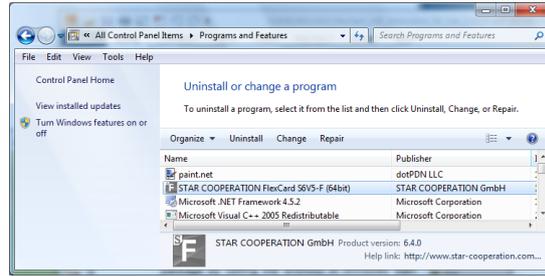
4.3.3 Uninstallation on Microsoft Windows Operating Systems

To uninstall *FlexCard PMC-II* please follow these steps.

Uninstall the *FlexCard* driver via the Windows Control Panel:

**Start->Settings->Control Panel
->Add/Remove Programs**

Click “Remove” to uninstall the package.



4.3.4 Installation on Linux Operating System

To install the *FlexCard PMC-II* Linux or Xenomai driver software, please refer to the *Read_Me.txt* file, which can be found in the delivered *FlexCard.zip* file. Before you install the *FlexCard PMC-II*, uninstall the old version first.

4.3.5 Installation/Uninstallation of the FlexCard LabVIEW Driver

Before installing the FlexCard LabVIEW driver, install the FlexCard Windows driver. The further process is described in the FlexCard Family LabVIEW Driver Documentation [6].

4.4 Firmware Update

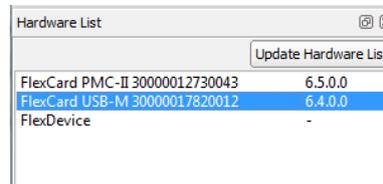
	Information
	When starting FlexUpdate, the Windows User Account Control may prompt you for elevated rights.

In order to update the firmware of a *FlexCard PMC-II*, it is necessary to follow these steps.

Step 1

Start the update software FlexUpdate included in the *FlexCard PMC-II* install package.

In this window, you can check the current hardware and software version of installed FlexCard components.



Select the *FlexCard PMC-II* whose firmware you want to update from the Hardware List.

	Information																																													
	The upper right shows details about the selected hardware.																																													
	<table border="1"> <tr> <td colspan="2">FlexCard PMC-II</td> <td>FlexRay</td> <td>Useable</td> <td>Possible</td> </tr> <tr> <td>Serial</td> <td>S30000012730043</td> <td>CC count</td> <td>0</td> <td>1</td> </tr> <tr> <td>Versions:</td> <td></td> <td>CC type</td> <td colspan="2">Bosch E-Ray</td> </tr> <tr> <td>Firmware</td> <td>6.5.0.0</td> <td>Protocol</td> <td colspan="2">---</td> </tr> <tr> <td>Hardware</td> <td>1.1.0.0</td> <td>BusGuardian</td> <td colspan="2">---</td> </tr> <tr> <td>BaseDLL</td> <td>6.4.0.0</td> <td>CAN</td> <td>Useable</td> <td>Possible</td> </tr> <tr> <td>DeviceDriver</td> <td>6.4.0.0</td> <td>CC count</td> <td>2</td> <td>6</td> </tr> <tr> <td>UserCardID (hex)</td> <td>c8</td> <td>CC type</td> <td colspan="2">Bosch D-CAN</td> </tr> <tr> <td></td> <td></td> <td>Protocol</td> <td colspan="2">2.0.0.0</td> </tr> </table>	FlexCard PMC-II		FlexRay	Useable	Possible	Serial	S30000012730043	CC count	0	1	Versions:		CC type	Bosch E-Ray		Firmware	6.5.0.0	Protocol	---		Hardware	1.1.0.0	BusGuardian	---		BaseDLL	6.4.0.0	CAN	Useable	Possible	DeviceDriver	6.4.0.0	CC count	2	6	UserCardID (hex)	c8	CC type	Bosch D-CAN				Protocol	2.0.0.0	
FlexCard PMC-II		FlexRay	Useable	Possible																																										
Serial	S30000012730043	CC count	0	1																																										
Versions:		CC type	Bosch E-Ray																																											
Firmware	6.5.0.0	Protocol	---																																											
Hardware	1.1.0.0	BusGuardian	---																																											
BaseDLL	6.4.0.0	CAN	Useable	Possible																																										
DeviceDriver	6.4.0.0	CC count	2	6																																										
UserCardID (hex)	c8	CC type	Bosch D-CAN																																											
		Protocol	2.0.0.0																																											

Step 2

Open the tab “Firmware Image List”. The *FlexCard PMC-II* may store 8 firmware images. You can see on this tab, what images are stored on the *FlexCard PMC-II*. For example, when a row contains the values 2, YES, 5.2.0.0, 1, 6, this means: Firmware slot 2 is active at the moment and holds a firmware with 1 FlexRay and 6 CAN CCs and has the version 5.2.0.0. Only one firmware may be active at a time.

Click on a row and then on the button to activate this image. Changes will take effect after a complete computer shut down.

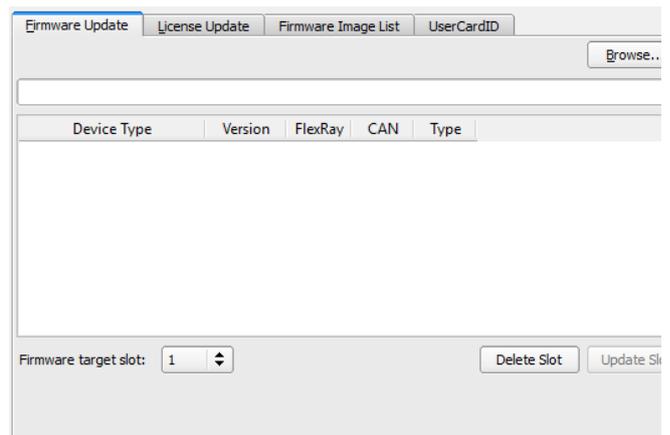
	Index	Activated	Version	FlexRay	CAN
X	1	YES	6.5.0.0	1	6
	2	NO	6.5.0.0	2	4
	3	NO	6.4.0.59	1	2
	4	NO	6.5.0.0	4	0
	5	NO	6.5.0.0	0	8
	6	NO	6.3.0.0	3	2
	7	NO	5.3.0.0	2	4
	8	NO	5.3.0.0	0	8

NOTICE

If an empty firmware slot is selected, after a shut down and a system start, the *FlexCard PMC-II* will blink with all LEDs on the front panel. Open FlexUpdate and activate a different slot, shut down and start the system again.

Step 3

You may also put different firmware images into the list. Therefore, open the “Firmware Update” tab and click the “Browse” button to select a firmware container file (*.fwf).



Step 4

The firmware files contained in the firmware container are displayed.

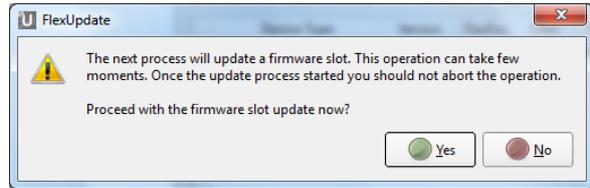
Select the firmware you like to write to the *FlexCard* image list, choose a firmware target slot and click the “Update Slot” button.

You also may delete images from the hardware. To do so, select a target slot and click on the “Delete Slot” button.

	Device Type	Version	FlexRay	CAN	Type
X	FlexCard PMC-II	6.4.0.0	4	0	rbf
	FlexCard PMC-II	6.4.0.0	3	2	rbf
	FlexCard PMC-II	6.4.0.0	2	4	rbf
	FlexCard PMC-II	6.4.0.0	1	6	rbf
	FlexCard PMC-II	6.4.0.0	0	8	rbf

Step 5

Read the warning messages before starting the update process. The process is composed of three phases: **Reset**, **Write** and **Check**.

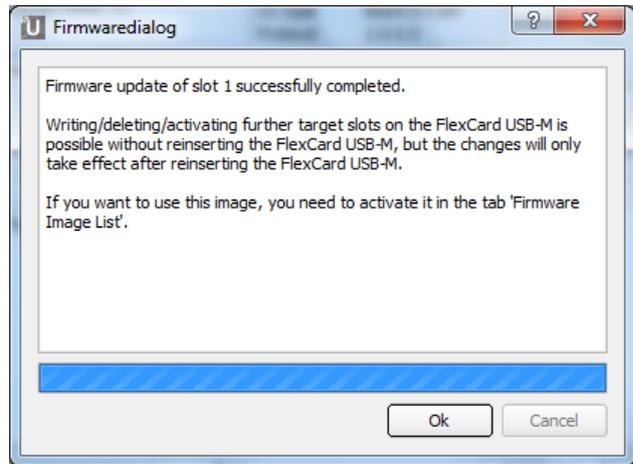


	NOTICE
If the firmware update process is disturbed or aborted, the firmware slot will not be able to load.	

Step 6

Once the message “**Firmware update of slot X successfully completed.**” appears, close the firmware-update software and shut down the computer or activate a firmware image (see chapter 4.6). A restart is not sufficient.

After a firmware update stand-by is prevented by the FlexCard driver until the next start of the computer.



4.5 License Update

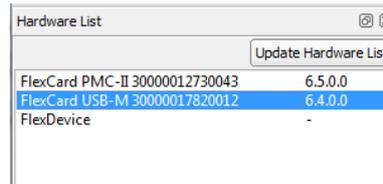
To update the *FlexCard PMC-II* with a new license file you need to follow these steps:

Step 1

Insert the *FlexCard PMC-II* hardware in the PCI-Slot and start the update software FlexUpdate included in the *FlexCard PMC-II* install package.

In this window, you can check the current hardware and software version of *FlexCard PMC-II* components installed.

Select the *FlexCard PMC-II* you want to update from the Hardware List.





Information

The upper right shows details about the selected hardware and its currently available features.

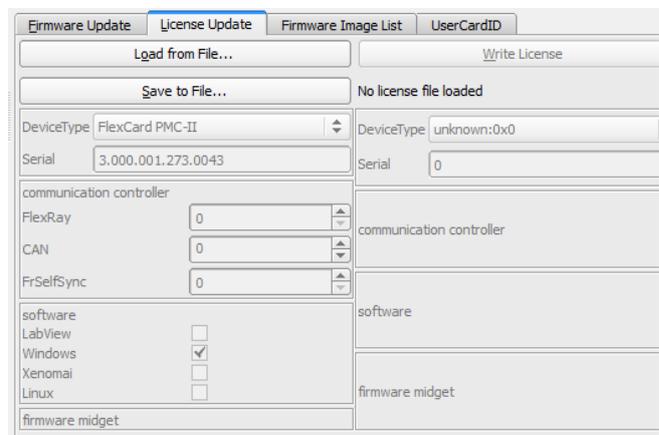
FlexCard PMC-II		FlexRay	Useable	Possible
Serial	530000012730043	CC count	0	1
Versions:		CC type	Bosch E-Ray	
Firmware	6.5.0.0	Protocol	---	
Hardware	1.1.0.0	BusGuardian	---	
BaseDLL	6.4.0.0	CAN	Useable	Possible
DeviceDriver	6.4.0.0	CC count	2	6
UserCardID (hex)	c8	CC type	Bosch D-CAN	
		Protocol	2.0.0.0	

The column “Possible” lists the number of CCs in the firmware. The column “Useable” displays the CCs that are available for the application.

Step 2

Open the “License Update” tab. On the left side the currently licensed features are displayed.

Click the “Load from File” button to select a license file (*.lic).

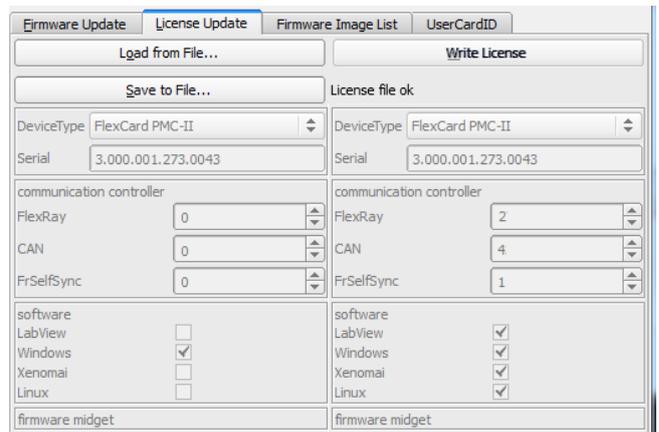


Step 3

Once you choose the file, the text on the right side will inform you about the state of the file. The number of licensed FlexRay, FlexRay SelfSync and CAN CCs and the licenses for the LabVIEW, Linux, Windows and Xenomai FlexCard driver are displayed.

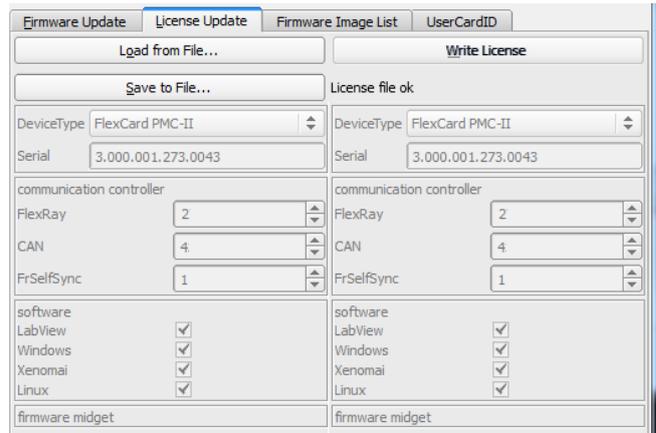
If the text “License file ok” appears, you can use “Write License” to apply the license to the hardware.

If not, you need to choose another license file.



Step 4

After the license was written, the current licenses on the *FlexCard PMC-II* are displayed on the left side.

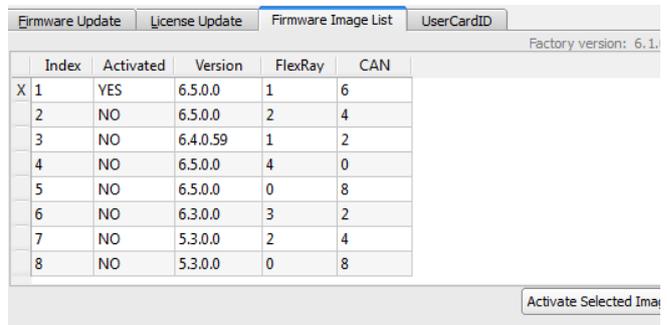


4.6 Activate an Application Image

Step 1

To activate a valid application image open the “Firmware Image List” tab and click the application image index, which will be used after the next system start.

Click the “*Activate Selected Image*” button.



Step 2

Once the message “**A FlexCard FW-Image was activated.**” appears, close the FlexUpdate and shut down the computer. A restart is not sufficient.

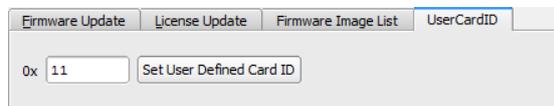


4.7 UserCardID

Step 1

The UserCardID stays the same even after a computer restart. The purpose is to differentiate between several FlexCards.

Open the UserCardID tab. Enter the new ID and click on the button “*Set User Defined Card ID*”.



Step 2

An entry in the message log states whether the action was successful. The ID is updated in the info list.

FlexCard PMC-II	Serial	530000012730043	FlexRay	Useable	Possible
Versions:	Firmware	6.5.0.0	CC count	0	1
Hardware	1.1.0.0		CC type	Bosch E-Ray	
BaseDLL	6.4.0.0		Protocol	---	
DeviceDriver	6.4.0.0		BusGuardian	---	
UserCardID (hex)	11		CAN	Useable	Possible
			CC count	2	6
			CC type	Bosch D-CAN	
			Protocol	2.0.0.0	

4.8 Licensing

STAR COOPERATION licenses the number of Communication Controllers that may be used. Currently maximum 4 FlexRay CCs and 8 CAN CCs are possible. The firmware, the collection of *FlexTiny II* modules and the license are necessary for a functional device. If there are more communication controllers available than that are licensed, only the licensed CCs will be accessible.

Also the usage of the *FlexCard PMC-II* on Linux, Xenomai and with the LabVIEW driver requires a license. Please contact STAR COOPERATION if you want to obtain a license file and refer to chapter 4.5 on how to update the FlexCard.

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5 Configuration and Operation

Operation of the *FlexCard PMC-II* is described in the user manual of your software vendor. For a description of *Caromee*, refer to [5]. All operation modes as well as information about the programming of a *FlexCard* application are described in the *FlexCard* API Documentation [1].

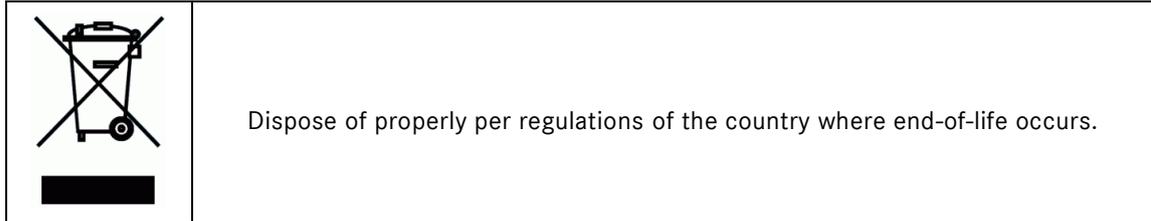
Created by	STAR ELECTRONICS GmbH & Co. KG		
Date created	2017-07-21	Date modified	2017-07-21
			Page 34 of 43

6 Shipping, Maintenance and Disposal

Keep the package in which the *FlexCard PMC-II* was shipped. Store and transport the *FlexCard PMC-II* in the ESD foil bag.

Store and transport the *FlexCard PMC-II* in a cool, dry, dark environment. Don't store or transport it near sources of magnetic fields.

Void warranty if tried to manipulate/repair the *FlexCard PMC-II*. Please contact *STAR COOPERATION* for maintenance.



7 Troubleshooting

This chapter contains some frequently asked questions about the *FlexCard PMC-II*.

1	Effect	The <i>FlexCard PMC-II</i> is not recognized. On Windows, the <i>FlexCard PMC-II</i> is not displayed under “Multifunction adapters” in the device manager or it is displayed with a warning symbol in the device manager.
	Cause	<i>FlexCard PMC-II</i> is not correctly plugged in. The drivers (respective the INF-file), required by the system to recognize the <i>FlexCard PMC-II</i> , are not installed properly.
	Solution	Check if the <i>FlexCard PMC-II</i> is inserted correctly. Reinstall the driver for the <i>FlexCard PMC-II</i> or update the firmware. Check whether the DLL, SYS and firmware are compatible. The major version numbers must be identical. Use the <i>FlexCard API</i> function “fcbCheckVersion” to test whether DLL, SYS and firmware match. See “ <i>FlexCard API Documentation</i> ”.

2	Effect	No FlexRay frames are received. The <i>FlexCard PMC-II</i> could not synchronize with the FlexRay bus (Green LED is blinking).
	Cause	Wrong configuration of the communication controller → the hardware could not synchronize on the FlexRay bus Wrong firmware of the <i>FlexCard PMC-II</i> (wrong bus systems chosen). Buses are not correctly terminated. The cable of FlexRay channel A is inserted in plug B and/or vice versa. The FlexTiny II module is missing or the mounted FlexTiny II does not fit to the firmware of the <i>FlexCard PMC-II</i> .
	Solution	Check all parameters in the configuration; be sure to use the same configuration as the other FlexRay nodes Ensure that you chose the correct firmware which fits to your needs (regarding FlexRay connections). Terminate your bus systems correctly, for example using the onboard termination. Insert the cables to the correct connectors of the <i>FlexCard PMC-II</i> . Mount the correct FlexTiny II module and/or change the firmware. For example if the firmware supports 2 FlexRay channels and 4 CAN channels, install 2 FlexTiny II FR on the first two slots and 2 FlexTiny II CAN-HS on the last two slots.

3	Effect	No FlexRay frames are received. The <i>FlexCard PMC-II</i> is synchronized with the FlexRay bus (Green LED is on).
	Cause	Maybe a filter is activated.
	Solution	Deactivate the message filter and channel filter in the software.

4	Effect	No CAN frames are received.
	Cause	Wrong configuration of the communication controller Wrong firmware of the <i>FlexCard PMC-II</i> (wrong bus systems chosen). Bus is not correctly terminated. The FlexTiny II module is missing or the mounted FlexTiny II does not fit to the firmware of the <i>FlexCard PMC-II</i> . Maybe a filter is activated.
	Solution	Check the CAN bus parameters on the <i>FlexCard PMC-II</i> . Ensure that you chose the correct firmware which fits to your needs (regarding CAN connections). Terminate your bus systems correctly, for example using the onboard termination. Mount the correct FlexTiny II module and/or change the firmware. For example if the firmware supports 2 FlexRay channels and 4 CAN channels, install 2 FlexTiny II FR on the first two slots and 2 FlexTiny II CAN-HS on the last two slots. Deactivate the message filter and channel filter in the software.

5	Effect	The FlexCard API returns with the error "The CC index is not valid".
	Cause	Maybe the license is missing or the wrong firmware is on the FlexCard.
	Solution	Open FlexUpdate and check whether license and firmware are Ok. If the license is missing, please contact STAR COOPERATION to obtain a license for the bus interfaces.

6	Effect	The FlexCard API returns with the error "Invalid hardware license".
	Cause	The license for using the <i>FlexCard PMC-II</i> on this operating system is missing.
	Solution	Please contact STAR COOPERATION to obtain a license.

7	Effect	All LEDs of the FlexCard PMC-II glow red, no messages can be received.
	Cause	The buffer on the FlexCard is full. The data on the FlexCard is collected too slowly by the software.
	Solution	Use a faster PC or filter messages to reduce the workload.

8	Effect	All LEDs on the <i>FlexCard PMC-II</i> front panel are blinking.
	Cause	No firmware image could be loaded.
	Solution	Please refer to chapter 4.4 on how to write a firmware image into a slot and activate it.

9	Effect	If you start a FlexCard application an error message appears that says <i>fcBase.dll</i> is missing.
	Cause	The FlexCard driver was not installed properly.
	Solution	If the FlexCard setup was not installed yet, follow the instructions in this document on how to install the FlexCard. If the FlexCard setup is already installed: Insert the FlexCard. When the Windows Hardware Wizard appears, select that you don't want to look online on the Windows Update homepage for the software. Then, select that the software should be installed automatically. The problem should be solved now.

10	Effect	When the FlexCard is connected to a CAN FD network and configured with TimeSegment2 = 1 for the nominal (arbitration) bit rate, error frames and/or data loss appear.
	Cause	The FlexCard does not support the CAN FD setting TimeSegment2 = 1 for the nominal (arbitration) bit rate.
	Solution	Do not use this CAN FD setting.

8 Ordering Information

8.1 FlexCard PMC-II

Product	Description	Ordering number
<i>FlexCard PMC-II</i>	The <i>FlexCard PMC-II</i> is a very flexible hardware solution that offers access to automotive bus systems (FlexRay, CAN). It may be equipped with maximum 4 <i>FlexTiny II</i> modules so that maximum 4 FlexRay interfaces (A+B), maximum 8 CAN interfaces or a combination are possible.	3-0055-0P01 (Win OS) 3-0055-0P02 (Linux) 3-0055-0P03 (Xenomai)

8.2 Accessory Parts

Product	Description	Ordering number
<i>FlexTiny II FR iso</i>	The isolated <i>FlexTiny II</i> module allows access to a FlexRay bus. It supports channel A and channel B.	Please contact STAR COOPERATION
<i>FlexTiny II CAN-HS iso</i>	Allows isolated access to a CAN bus. Two channels are supported.	Please contact STAR COOPERATION
<i>FlexTiny II FR</i>	The <i>FlexTiny II</i> module allows access to a FlexRay bus. It supports channel A and channel B.	3-0056-0A01
<i>FlexTiny II CAN-HS</i>	Allows access to a CAN bus. Two channels are supported.	3-0056-0B01
<i>FlexTiny II CAN FD</i>	Allows access to a CAN FD bus. Two channels are supported.	3-0056-0G01
<i>FlexTiny II Ethernet</i>	Allows access to 100Mbit/s Ethernet.	Please contact STAR COOPERATION
FXC FCL8 Cable, 2m length, black	Bus adapter cable between <i>FlexCard PMC-II</i> and Sub-D-connector female. This cable is suitable for connecting a <i>FlexTiny II FR</i> , <i>FlexTiny II CAN-HS</i> , or <i>FlexTiny II CAN FD</i> .	3-0034-1J02
FXC FCL8-2 Cable, 2m length, black	Bus adapter cable for the <i>FlexCard PMC-II</i> . Binder 712 to 2 female Sub-D-connectors. This cable is suitable for connecting a <i>FlexTiny II FR</i> , <i>FlexTiny II CAN-HS</i> , or <i>FlexTiny II CAN FD</i> .	3-0034-1L02
FC Daisy Chain FR 2 Cable, 2m	Connects one male Sub-D and one female Sub-D to the <i>FlexCard PMC-II</i> interface 1 and one male and one female Sub-D to interface 2. This cable is suitable for connecting a <i>FlexTiny II FR</i> , <i>FlexTiny II CAN-HS</i> , or <i>FlexTiny II CAN FD</i> .	3-0034-1Y02
FC Trigger cable BNC, 1m	Trigger cable for <i>FlexCard</i> trigger connector to BNC-plug.	3-0034-0H01
FC Sync cable, 1m	Trigger cable for <i>FlexCard</i> trigger connector to Binder 3-pole.	3-0034-0G01

Product	Description	Ordering number
PMC-to-PCI-adapter	Passive adapter to use a <i>FlexCard PMC-II</i> in a standard PC environment.	3-0033-0C01
FlexTerm	SubD9 connector that terminates an interface on the pins used by the <i>FlexCard</i> . It terminates FlexRay A+B or two CAN channels or two CAN FD channels.	3-0034-0I01
Customer specific parts		Please contact <i>STAR COOPERATION</i>

8.3 Related Documents

Document	Description	Ordering number
[1] API Documentation	Describes how to write own applications for the <i>FlexCard</i> family.	3-0009-0S01-D03
[2] <i>FlexCard PMC/PMC-II</i> Getting Started	Describes how to use the demo applications contained in the Windows <i>FlexCard</i> Installer.	3-0055-0P01-D03
[3] <i>FlexAnalyzerV2</i> Instructions for Use	Explains how to use the monitoring software that is contained in the Windows <i>FlexCard</i> Installer.	3-0038-0B01-D01
[4] <i>FlexConfig</i> User Manual	Manual for the configuration software for FlexRay networks. <i>FlexConfig</i> generates the CHI configuration files used by the <i>FlexCards</i> , <i>FlexDevices</i> and <i>FlexEntry</i> .	3-0016-0C01-D06
[5] <i>Caromee</i> User Manual	Analyzing software that can be easily extended and supports the <i>FlexCard</i> product family.	3-0051-0P01-D03
[6] <i>FlexCard</i> Family LabVIEW Driver Documentation	This document describes how to use the LabVIEW driver with the <i>FlexCard</i> .	3-0072-0A01-D01

9 Appendix

9.1 Appendix A: Guideline for handling ESD sensitive Products

- Any tester, equipment, or tool used at any production step or for any manipulation of semi-conductor devices must have its shield connected to ground.
- The product itself and the carrier system of the product respectively must be placed on a conductive table top or covered by an antistatic surface (superficial resistivity equal to or higher than $0.5M\Omega/cm^2$), grounded through a ground cable (conductive cable from protected equipment to ground isolated through a $1M\Omega$ resistor placed in series).
- All manipulation of finished goods has to be made at such a grounded worktable.
- The worktable must be free of all non-antistatic objects.
- An antistatic floor covering grounded through a conductive ground cable (with serial resistor between $0.9M\Omega$ and $1.5M\Omega$) should be used.
- It is recommended that you wear an antistatic wrist or ankle strap, connected to the antistatic floor covering or to the grounded equipment.
- If no antistatic wrist or ankle strap is worn, touch the surface of the grounded worktable before each manipulation of the ESD sensitive product.
- It is recommended that antistatic gloves or finger coats be worn.
- It is recommended that nylon clothing be avoided while performing any manipulation of parts.

9.2 Appendix B:

9.2.1 Acronyms and Abbreviations

Item	Definition
BD	Bus driver
BG	Bus guardian
BP	Bus plus
BM	Bus minus
CAN	Controller Area Network
CC	Communication Controller
DLL	Dynamic Linked Library
DMA	Direct Memory Access
ECU	Electronic Control Unit
EMC	Electromagnetic Compatibility
ESD	Electro Static Discharge
FR	FlexRay
FW	Firmware
NC	Not Connected
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PCIe	Peripheral Component Interconnect Express
PL	Physical Layer
PMC	PCI Mezzanine Card
PXI	PCI eXtension for Instrumentation
SYS	System (Windows low level driver extension)

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