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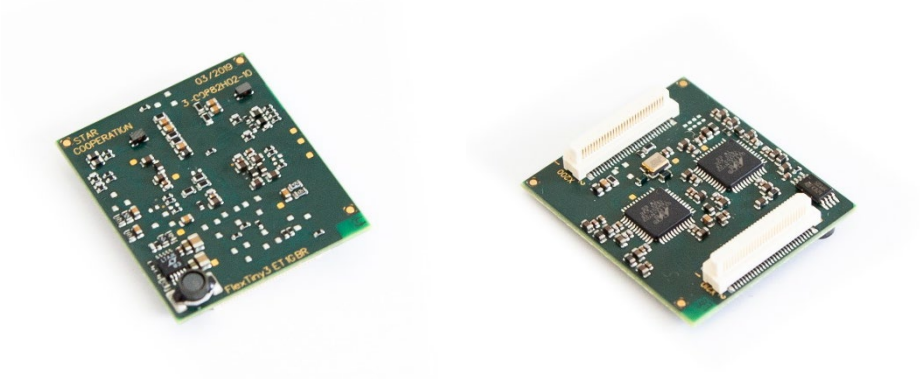
FlexTiny 3 Family

Instructions for Use



	NOTICE
	ESD (Electro Static Discharge) sensitive product. Refer to chapter 1.4 and follow the safety and handling instructions.

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Based on currently state of arts and science it is impossible to develop software that is bug-free in all applications. Therefore, the product is only allowed to be used in the sense of the product use case described herein.

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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 FlexTiny 3 Family modules are only components and **not** finished apparatus (as defined in 2014/30/EU EMC Directive). Therefore, a Declaration of Conformity is provided for each product using a FlexTiny 3 (e.g. FlexDevice-S).

Revision History

Document number: 3-0088-0Z01-D01

Version	Date	Description
D1V0-F	29-Oct-2019	First release
D1V1-F	16-Jun-2020	Added block diagrams
D1V1a-F	20-Oct-2020	Updated description for FlexTiny3 ETH 1G BR. Updated version for FlexTiny3 LIN SENT. Updated ordering information.
D1V2-F	16-Jun-2021	Updated legal information Updated bus termination values for LIN and K-Line
D1V3-F	13-Oct-2021	Updated description for 100BASE-T1 and 1000-BASET1.
D1V3a-F	20-Oct-2021	Added note for FlexTiny3 3-00882D01.
D1V3b-F	18-Nov-2021	Updated description for 100BASE-T1/TX and 1000BASE-T1.

Related Hardware Versions

Product	Reference No.	Version	Remarks
FlexTiny3 FlexRay	3-00880A01	02	
FlexTiny3 CAN-FD	3-00881E01	21	
FlexTiny3 CAN-FDx4	3-00881G01	10	
FlexTiny3 CAN-FDx4 WU	3-00881G02	10	
FlexTiny3 ETH switched	3-00882B01	40	100BASE-TX
FlexTiny3 ETH BR	3-00882C01	31	100BASE-T1
FlexTiny3 ETH BR	3-00882C02	10	PCB is 3-00882C01-40 (100BASE-T1)
FlexTiny3 ETH BR switched	3-00882D01	31	100BASE-T1
FlexTiny3 3 ETH BR switched	3-00882G01	10	special “L-Tiny” (100BASE-T1)
FlexTiny3 ETH 1G BR	3-00882H01	10	88Q2112-A0 PHY (1000BASE-T1)
FlexTiny3 ETH 1G BR	3-00882H02	11	88Q2112-A2 PHY (1000BASE-T1)
FlexTiny3 LIN SENT	3-00884A02	10	PCB is 3-00884A01-30
FlexTiny3 K-Line UART SPI	3-00884B01	20	

Contents

1 General

1.1 Intended User Group

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

Each person involved with setup or operation of the product must

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

NOTICE

If you are unsure of how to use the product as intended or have any questions about the use of the product, please discontinue use of the product immediately and contact the STAR ELECTRONICS GmbH & Co. KG Support.

⚠ WARNING

The product may only be used by expert technicians and/or engineers who are qualified and familiar with electronic components and systems!

The use of the product by non-professionals is not permitted and strictly forbidden!

1.2 Intended Use

The FlexTiny 3 Family is a series of small interface modules (called FlexTiny3) with physical layer drivers for various bus systems.

The FlexTiny3 module is a testing equipment. It was developed to test the communication behavior of automotive bus systems and Ethernet together with Electronics Control Units and sensors in a fully controlled testing and/or laboratory environment.
For this intended use, the FlexTiny3 offers the following options:

- Transmit and receive data (only for the associated bus system).

Any deviation from the intended use and/or installation in a testing vehicle is only permitted with specific **prior written approval** of STAR ELECTRONICS GmbH & Co. KG.

⚠ WARNING

The FlexTiny3 may be used to communicate with networked electronic systems. E.g. FlexRay, CAN or Ethernet.

Any use of the product outside a fully controlled testing and/or laboratory environment may result in death or serious injury due to unpredictable behavior of a vehicle and/or potentially missing, deactivated, or malfunctioning safety devices on a vehicle!

The user is responsible to ensure the safety of the entire system. This includes amongst other things a safety shutdown.

	**NOTICE** The device is not a calibrated measurement device. STAR ELECTRONICS GmbH & Co. KG accepts no liability whatsoever for the correctness of any measurement results.

	**⚠ WARNING** The FlexTiny3 is **NOT** designed, intended, or authorized and may **NOT** be used for or in connection with the following purposes and/or devices: - 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 - any other purposes / devices deviating from the intended use of the product specified by STAR ELECTRONICS GmbH & Co. KG.

	**⚠ WARNING** The product may only be used by expert technicians and/or engineers who are qualified and familiar with electronic components and systems! The use of the product by non-professionals is not permitted and strictly forbidden!

1.3 Used Pictograms

The meaning of used pictograms is shortly described below.

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

	**⚠ WARNING** Used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	**NOTICE** 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.
	**NOTICE** Used to indicate an electrostatic discharge sensitive product. The product is subject to damage by ESD, if no precautions are taken.

	Product marking which shows the compliance of the product with the European Waste Electrical and Electronic Equipment Directive 2012/19/EU.

1.4 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 FlexTiny 3 Family has to be handled as described herein.

Changes or modifications of the FlexTiny 3 Family is not allowed for safety and warranty reasons!

STAR ELECTRONICS GmbH & Co. KG 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:

	**NOTICE** To prevent damage to the FlexTiny 3 Family, or consequential damages: Assemble only on a platform which provides an interface for the respective FlexTiny 3 Family module as described herein. High temperatures can damage the FlexTiny 3 Family. Keep the FlexTiny 3 Family away from heaters, stoves, fireplaces, and other sources of heat. Do not expose the FlexTiny 3 Family to rain or use it near water. Do not use the FlexTiny 3 Family in areas of explosion hazard.

	**NOTICE** **ESD (Electro Static Discharge) sensitive product** *STAR ELECTRONICS GMBH & Co. KG* products lacking protective enclosures are subject to damage by ESD. Take proper ESD precautions to avoid performance degradation or loss of functionality! 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 8.1. Only appropriately trained personnel (such as electricians, technicians and engineers) may handle and/or operate these products.

1.5 Meaning of Text Styles

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

2 Product Description

2.1 FlexTiny 3 Family at a glance

The FlexTiny 3 Family is a series of small interface modules with physical layer drivers. Module information is stored in an EEPROM. The FlexTiny 3 Family modules are connected between protocol devices and the bus cables. They offer bus termination functionality and shielding options depending on the respective module. FlexTiny 3 Family modules are available for following bus systems:

- FlexRay
- CAN-FD (applicable for CAN-HS)
- 100MBit Ethernet (100BASE Tx)
- 100MBit 2 wire Ethernet (100BASE-T1)
- 1GBit 2 wire Ethernet (1000BASE-T1)
- LIN/SENT
- K-Line/UART/SPI

Field of application

The following *STAR ELECTRONICS GmbH & Co. KG* products are using FlexTiny 3 Family modules:

- FlexDevice-S
- FlexDevice-L
- FlexDevice-L²
- FlexDevice-HD-sub
- FlexCard PXIe3
- FlexCard PCIe3

	NOTICE
	Please check the manual of your carrier device which FlexTiny 3 is supported before using a dedicated FlexTiny 3!

2.2 Accessory Parts

For usage of FlexTiny 3 Family, the following parts are necessary:

- FlexDevice-S/L/L²/HD-sub or FlexCard PXIe3/PCIe3 (carrier device)
- Application software, e.g. FlexConfig RBS

For further information about accessories for the FlexTiny 3 Family see chapter 7.2 Accessory Parts.

	NOTICE
	Use only accessories from *STAR ELECTRONICS GMBH & Co. KG* listed in chapter 7.2 with the FlexTiny 3 Family to ensure proper function and for warranty reasons! Other accessories without prior written consent of *STAR ELECTRONICS GMBH & Co. KG* must not be used.

2.3 Physical size, assembly

The FlexTiny 3 Family modules have following physical dimensions (length * width): 35 * 30 mm². The height is about 10 mm.

FlexTiny 3 Family modules are inverse polarity protected by polarized connectors.

	NOTICE
	**EMC** The FlexTiny 3 Family modules contain EMC filter parts. Anyhow, regarding the high bus frequencies the most bus lines on the carrier board need to be symmetrical and as short as possible. Use cable with differential pair technology for 2-wire-buses to provide noise immunity!

3 Technical Data

3.1 Physical Characteristics

Connector	Panasonic AXK6S60547YG
Mounting position	no mechanical limitations
Dimensions approx. L x W x H	35 * 30 * 10 mm³

Table 1: Physical characteristics

3.2 Environmental Conditions

Temperature	Operating: -40°C – +85°C Non-operating: -40°C – +85°C Storage: -40°C – +85°C
Relative Humidity	10% – 80% r. H., non-condensing
Vibration resistance (for FlexTiny relay)	Destruction: 10 – 55 Hz (Double amplitude of 5 mm) Functional: 10 – 55 Hz (Double amplitude of 3.3 mm, detection time: 10 µs)
Shock resistance (for FlexTiny relay)	Destruction: 1,000 m/s² (Half-wave pulse of sine wave: 6 ms.) Functional: 750 m/s² (Half-wave pulse of sine wave: 6 ms; detection time: 10 µs.)

Table 2: Environmental conditions

3.3 Block Diagram

Functional overview of the FlexTiny 3 Family.

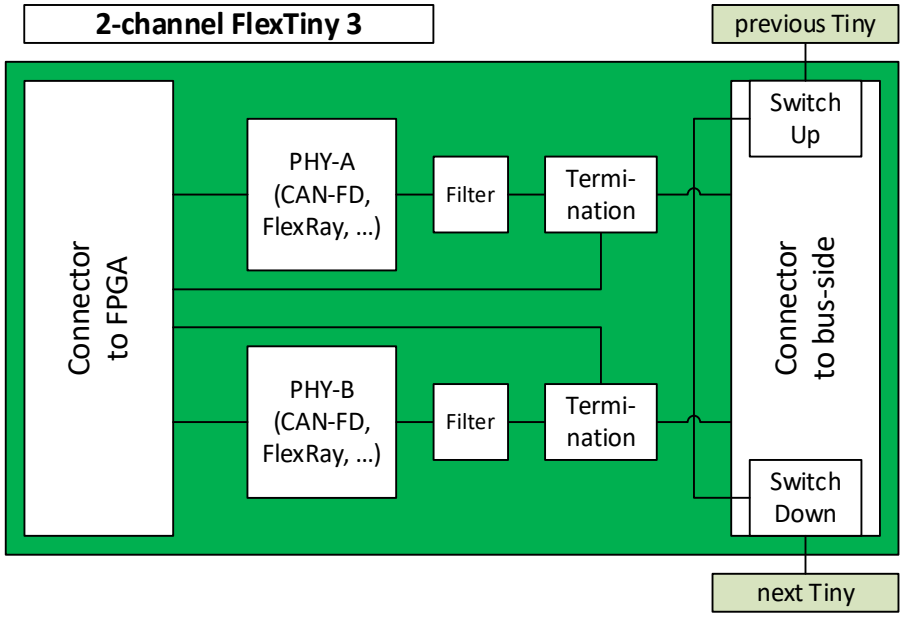

Figure 1: Block diagram for a FlexTiny 3 with 2 channels and bypass switch link

3.3.1 3-00880A01 FlexTiny3 FlexRay & 3-00881E01 FlexTiny3 CAN-FD

The FlexTiny 3 FlexRay is equipped with two TJA1081B transceiver from NXP. A dual pole termination relay per FlexRay channel is also included, which can terminate the buses with 91 ohm per channel, even if the device is not powered. Sleep and wakeup functionality are supported. The bypass for data (Ethernet only) switched between the Tinys is supported by this Tiny.

The FlexTiny 3 CAN-FD is equipped with two TJA1145T/FD transceiver from NXP, which supports CAN-HS and FD signals up to 2 Mbit/s. A dual pole termination relay per CAN channel is also included, which can

terminate the buses with 120 ohm per channel, even if the device is not powered. Sleep and wakeup functionality are supported. The bypass for data switched between the Tinys is supported by this Tiny.

Pin		FlexTiny III FlexRay & CAN-FD to connector pinouts	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	NC	Not connected
2	1	NC	Not connected
3	7	Bus_A-high	FlexRay/CAN-FD bus plus signal connection of bus A
4	2	Bus_A-low	FlexRay/CAN-FD bus minus signal connection of bus A
5	8	Bus_B-high	FlexRay/CAN-FD bus plus signal connection of bus B
6	4	Bus_B-low	FlexRay/CAN-FD bus minus signal connection of bus B
7	9	NC	Not connected
8	5	NC	Not connected
	3	GND	Ground line

Table 3: FlexTiny III FlexRay & CAN-FD to connector pinouts

3.3.2 3-00881G01 FlexTiny3 CAN-FDx4 and 3-00881G02 FlexTiny3 CAN-FDx4 WU

The FlexTiny 3 CAN-FDx4 and FlexTiny 3 CAN-FDx4 WU are equipped with four MCP2562FD transceiver from Microchip, which supports CAN-HS and FD signals up to 8 Mbit/s. A dual pole termination relay per two CAN channels (channel A and C at the same time and channel B and D at the same time) are also included, which can terminate the buses with 120 ohms per channel, even the device is not powered. Sleep and wakeup functionality are supported by the WU version. The bypass for data (Ethernet only) switched between the Tinys is supported by this Tiny.

Pin		FlexTiny III CAN-FDx4 connector pinouts	
Binder	**D-sub**	**Signal Name**	**Description**
1	7	Bus_A-high	CAN-FD bus high signal connection of bus A
2	2	Bus_A-low	CAN-FD bus low signal connection of bus A
3	8	Bus_B-high	CAN-FD bus high signal connection of bus B
4	4	Bus_B-low	CAN-FD bus low signal connection of bus B
5	6	Bus_C-high	CAN-FD bus high signal connection of bus C
6	1	Bus_C-low	CAN-FD bus low signal connection of bus C
7	9	Bus_D-high	CAN-FD bus high signal connection of bus D
8	5	Bus_D-low	CAN-FD bus low signal connection of bus D
	3	GND	GND Line

Table 4: FlexTiny III CAN-FDx4 connector pinouts

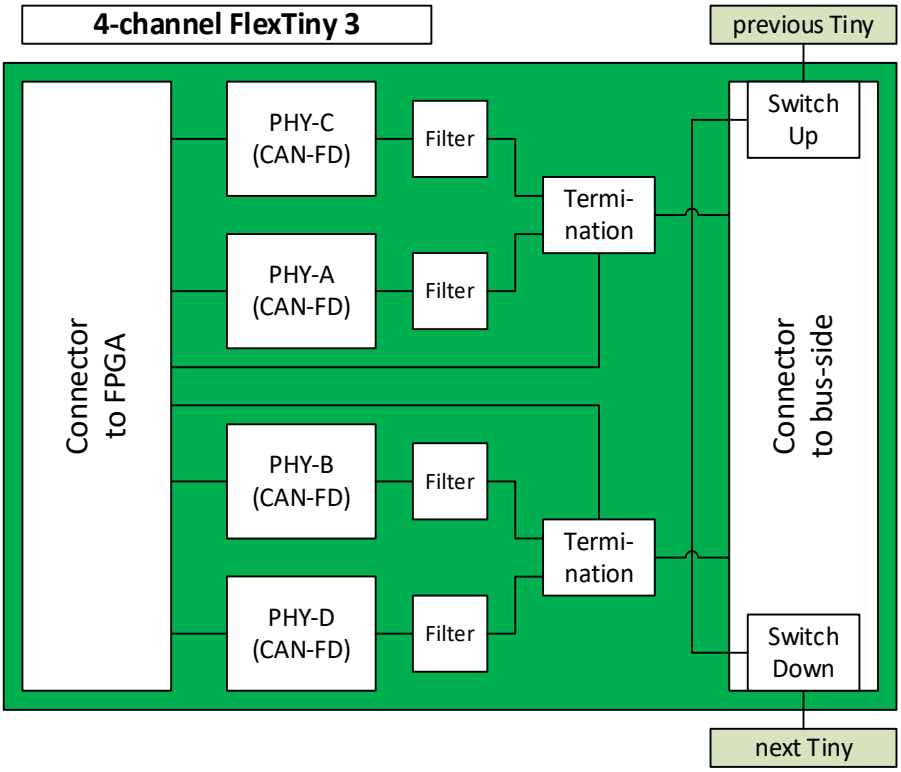

Figure 2: Block diagram for the CAN-FD FlexTiny 3 with 4 channels and bypass switch link

3.3.3 3-00882B01 FlexTiny3 ETH switched (100BASE-TX)

The FlexTiny 3 ETH switched is equipped with one 88E6350RA1 transceiver (PHY) from Broadcom, which supports two "PC" 100 MBit Ethernet signals (100BASE-TX). This PHY is a switch, was means the data is switched between the ports. The data is switched to the next Tiny if this is supported by the next Tiny.

Pin		FlexTiny III ETH-switched connector pinout (100BASE-TX)	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	ETH_B_TX+	Ethernet (100BASE-TX) TX bus plus signal connection of bus B
2	1	ETH_B_TX-	Ethernet (100BASE-TX) TX bus minus signal connection of bus B
3	7	ETH_A_TX+	Ethernet (100BASE-TX) TX bus plus signal connection of bus A
4	2	ETH_A_TX-	Ethernet (100BASE-TX) TX bus minus signal connection of bus A
5	8	ETH_A_RX+	Ethernet (100BASE-TX) RX bus plus signal connection of bus A
6	4	ETH_A_RX-	Ethernet (100BASE-TX) RX bus minus signal connection of bus A
7	9	ETH_B_RX+	Ethernet (100BASE-TX) RX bus plus signal connection of bus B
8	5	ETH_B_RX-	Ethernet (100BASE-TX) RX bus minus signal connection of bus B
	3	GND	GND Line

Table 5: FlexTiny III ETH-switched connector pinout (100BASE-TX)

3.3.4 3-00882C01/C02 FlexTiny3 ETH BR (100BASE-T1)

The FlexTiny 3 ETH BR is equipped with two BCM89810A2 transceiver (PHY) from Broadcom, which supports two "100BASE-T1" 2-wire 100 MBit Ethernet signals. The bypass for data switched between the Tinys is **not** supported by this Tiny.

Pin		FlexTiny III ETH BR connector pinout (100BASE-T1)	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	ETH_B_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus B
2	1	ETH_B_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus B
3	7	ETH_A_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus A

Pin		FlexTiny III ETH BR connector pinout (100BASE-T1)	
Binder	**D-sub**	**Signal Name**	**Description**
4	2	ETH_A_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus A
5	8	NC	Not connected
6	4	NC	Not connected
7	9	NC	Not connected
8	5	NC	Not connected
	3	GND	GND Line

Table 6: FlexTiny III ETH BR connector pinout (100BASE-T1)

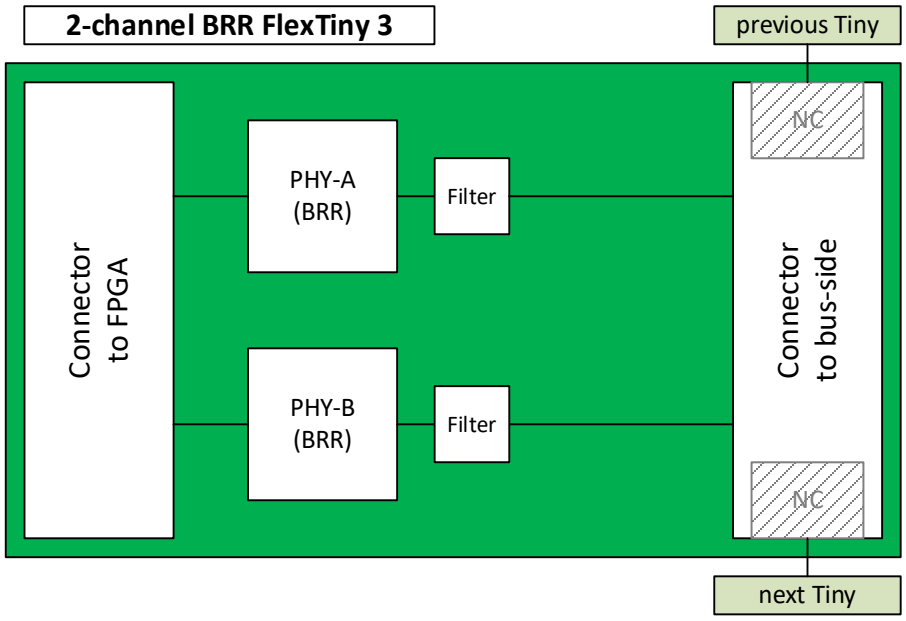

Figure 3: Block diagram for the 100BASE-T1 (BRR) FlexTiny 3 with 2 channels and **no** bypass switch link

3.3.5 3-00882D01 FlexTiny3 ETH BR switch (100BASE-T1)

The FlexTiny 3 ETH BR switched is equipped with one BCM89500BQLEG transceiver (PHY) from Broadcom, which supports three “100BASE-T1” 2-wire 100 MBit Ethernet signals. This PHY is a switch, was means the data is switched between the ports. The data is switched to the next Tiny if this is supported by the next Tiny.

NOTICE

A maximum of three FlexTiny3 3-00882D01 can be used at the same time per device.

Pin		FlexTiny III ETH BR switch connector pinout (100BASE-T1)	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	ETH_B_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus B
2	1	ETH_B_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus B
3	7	ETH_A_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus A
4	2	ETH_A_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus A
5	8	ETH_C_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus C
6	4	ETH_C_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus C
7	9	NC	Not connected
8	5	NC	Not connected

Pin		FlexTiny III ETH BR switch connector pinout (100BASE-T1)	
Binder	**D-sub**	**Signal Name**	**Description**
	3	GND	GND Line

Table 7: FlexTiny III ETH BR switch connector pinout (100BASE-T1)

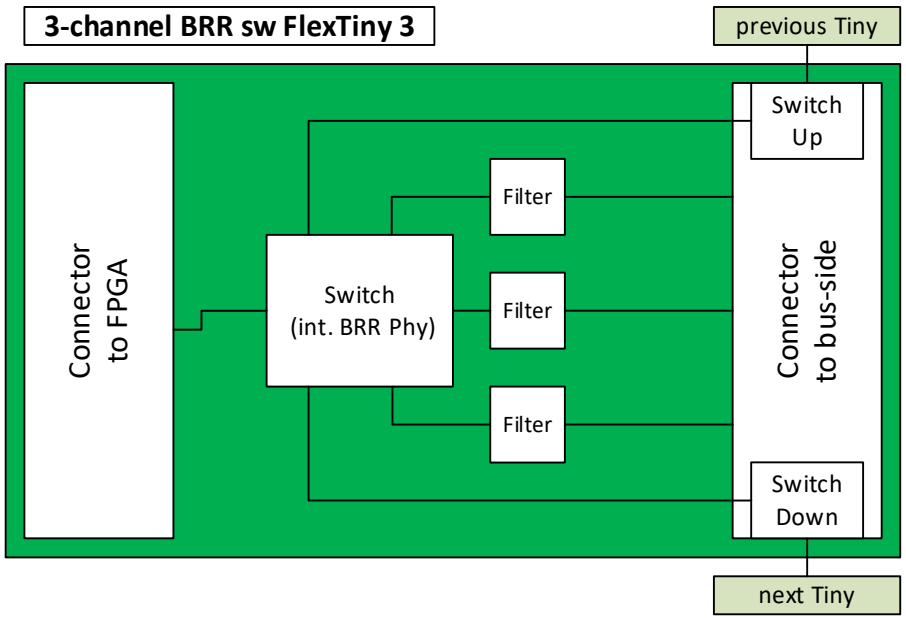

Figure 4: Block diagram for the 100BASE-T1 (BRR) switch FlexTiny 3 with 3 channels and switch link

3.3.6 3-00882G01 FlexTiny3 3 ETH BR switch (100BASE-T1)

The FlexTiny 3 3 ETH BR switched is a special Tiny formed as a “L” which uses 3 Tiny slots. The Tiny is equipped with three BCM89500BQLEG transceiver (PHY) from Broadcom, which each of them supports three “100BASE-T1” 2-wire 100 Mbit Ethernet signals. The PHYs are switches, which means the data is switched between the ports and themselves. The data is switched to the next Tiny is supported by this Tiny.

NOTICE

This FlexTiny3 cannot be used with the FlexDevice-S.

Pin		FlexTiny III 3 ETH BR switch connector pinout (three times)	
Binder	**D-sub**	**Signal Name**	**Description**
1	-	ETH_B_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus B
2	-	ETH_B_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus B
3	-	ETH_A_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus A
4	-	ETH_A_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus A
5	-	ETH_C_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus C
6	-	ETH_C_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus C
7	-	ETH_D_TRD+	Ethernet (100BASE-T1) TRD bus plus signal connection of bus D
8	-	ETH_D_TRD-	Ethernet (100BASE-T1) TRD bus minus signal connection of bus D
	-	-	-

Table 8: FlexTiny III 3 ETH BR switch connector pinout (three times 100BASE-T1)

3.3.7 3-00882H01/02 FlexTiny3 ETH 1G BR (1000BASE-T1)

The FlexTiny 3 ETH 1G BR is equipped with two 88Q2112-A0 (H01) or A2 (H02) transceiver (PHY) from Marvell, which supports "100/1000BASE-T1" 2 wire 100/1000 Mbit Ethernet signals. The bypass for data switched between the Tinys is **not** supported by this Tiny.

Pin		FlexTiny III ETH 1G BR connector pinout (1000BASE-T1)	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	ETH_B_TRD+	Ethernet (1000BASE-T1) TRD bus plus signal connection of bus B
2	1	ETH_B_TRD-	Ethernet (1000BASE-T1) TRD bus minus signal connection of bus B
3	7	ETH_A_TRD+	Ethernet (1000BASE-T1) TRD bus plus signal connection of bus A
4	2	ETH_A_TRD-	Ethernet (1000BASE-T1) TRD bus minus signal connection of bus A
5	8	NC	Not connected
6	4	NC	Not connected
7	9	NC	Not connected
8	5	NC	Not connected
	3	GND	GND Line

Table 9: FlexTiny III ETH 1G BR connector pinout (1000BASE-T1)

3.3.8 3-00884A02 FlexTiny3 LIN SENT

The FlexTiny 3 LIN SENT is equipped with four TJA1021T transceivers from NXP for LIN and two discrete SENT transceivers. A dual pole pull-up relay per two LIN channels (A with B and C with D) are also included, which can pull the buses up to 10V with 1k ohm (Master). Pull-Up setting is saved even if the device is not powered. Sleep and wakeup functionality are supported for LIN (where LIN_A shares the wakeup signal with LIN_B and LIN_C shares it with LIN_D). The bypass for data (Ethernet only) switched between the Tinys is supported by this Tiny.

Pin		FlexTiny III LIN/SENT connector pinouts	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	SENT_E	SENT bus signal connection of bus E
2	1	SENT_F	SENT bus signal connection of bus F
3	7	LIN_A	LIN bus signal connection of bus A
4	2	LIN_B	LIN bus signal connection of bus B
5	8	LIN_C	LIN bus signal connection of bus C
6	4	LIN_D	LIN bus signal connection of bus D
7	9	+5V	+5V (200 mA) output for SENT
8	5	GND	Ground signal
	3	GND	Ground signal

Table 10: FlexTiny III LIN/SENT connector pinouts

3.3.9 3-00884B01 FlexTiny3 K-Line UART SPI

The FlexTiny 3 K-Line UART SPI is equipped with one L9637D transceiver from STM for K-Line, one discrete UART-TTL transceiver and one discrete SPI-TTL transceiver. A dual pole termination relay for K-Line channel is also included, which can terminate the bus with 500 Ohm (Master), even if the device is not powered. The SPI interface is compatible for master or slave functionality. The bypass for data (Ethernet only) switched between the Tinys is supported by this Tiny.

Pin		FlexTiny III K-Line/UART/SPI connector pinouts	
Binder	**D-sub**	**Signal Name**	**Description**
1	6	SPI_A_OUT	SPI data out signal connection of bus A
2	1	SPI_A_IN	SPI data in signal connection of bus A
3	7	SPI_A_CLK	SPI clock out/in signal connection of bus A
4	2	SPI_A_SEL	SPI select out/in signal connection of bus A
5	8	UART_B_TxD	UART TXD out signal connection of bus B
6	4	UART_B_RxD	UART RXD in signal connection of bus B

Pin		FlexTiny III K-Line/UART/SPI connector pinouts	
Binder	**D-sub**	**Signal Name**	**Description**
7	9	K-Line_C	K-Line signal connection of bus C
8	5	GND	Ground signal
	3	GND	Ground signal

Table 11: FlexTiny III K-Line/UART/SPI connector pinouts

3.3.10 Short overview for pinout

The following tables gives a short overview for the pinout for the D-sub and Binder connector.

FD-L	**FD-S**		**0A01**	**1E01**	**1G01**	**2B01**	**2C01/02**	**2D01**
Binder	D-sub		FlexRay 2xCH	CAN 2xCH	CAN 4xCH	100BASE-TX sw 2xCH	100BASE-T1 2xCH	100BASE-T1 3xCH
1	6	p (+)	-	-	CAN A	100BASE-TX B	100BASE-T1 B	100BASE-T1 B
2	1	n (-)						
3	7	p (+)	FR A	CAN A	CAN B	100BASE-TX A	100BASE-T1 A	100BASE-T1 A
4	2	n (-)						
5	8	p (+)	FR B	CAN B	CAN C	100BASE-TX A	-	100BASE-T1 C
6	4	n (-)						
7	9	p (+)	-	-	CAN D	100BASE-TX B	-	-
8	5	n (-)						
	3	GND	GND	GND	GND	GND	GND	GND

Table 12: Overview 1/2 for D-sub and Binder connector pinouts (per device)

Part two of the overview.

FD-L	**FD-S**		**2G01**	**2H01/02**	**4A01**	**4B01**
Binder	D-sub		3x100BASE-T1 3xCH	1000BASE-T1 2xCH	LIN 4xCH/ SENT 2xCH	K-Line/ UART/SPI
1	6	p (+)	100BASE-T1 B	1000BASE-T1 B	SENT E SENT F	SOUT A SIN A
2	1	n (-)				
3	7	p (+)	100BASE-T1 A	1000BASE-T1 A	LIN A LIN B	SCLK A SSEL A
4	2	n (-)				
5	8	p (+)	100BASE-T1 C	-	LIN C LIN D	TXD B RXD B
6	4	n (-)				
7	9	p (+)	-	-	+5V0 GND	K-Line C GND
8	5	n (-)				
	3	GND	GND		GND	GND

Table 13: Overview 2/2 for D-sub and Binder connector pinouts (per device)

For FlexCard PCIe3 and FlexCard PXIe3 – see pinout for “FD-L”.

4 Getting Started

4.1 Assembly and Line-up

Read the instructions of the carrier device for more information (see chapter 7.3).

4.2 Configuration and Operation

4.2.1 Termination

Some modules of the FlexTiny 3 Family can terminate the connected network. Be sure that the total network termination is within the network specification.

4.2.2 Termination Matrix

This matrix shows how the terminations would be set.
There are 2 Pins for termination control, so there are just 2 commands (*SetTerminationConfigReq Bus A* and *SetTerminationConfigReq Bus B*) to set terminations. For this reason, some Busses/Channels just can be set in combination.
The column "I" makes the reference to chapter 3.3.x
The column "FD with D-sub" means for example the Con 2 from the FlexDevice-S

I	Product	Command *SetTermination-ConfigReq Bus X*	Termination bus ... with value						Terminated pins	
			A	B	C	D	E	F	FD with Binder	FD with D-sub
1a	FlexTiny3 FlexRay	SeTeCoRe Bus A	91	-	n/a	n/a	n/a	n/a	3-4	2-7
		SeTeCoRe Bus B	-	91	n/a	n/a	n/a	n/a	5-6	4-8
1b	FlexTiny3 CAN-FD	SeTeCoRe Bus A	120	-	n/a	n/a	n/a	n/a	3-4	2-7
		SeTeCoRe Bus B	-	120	n/a	n/a	n/a	n/a	5-6	4-8
2a	FlexTiny3 CAN-FDx4	SeTeCoRe Bus A	120	120	-	-	n/a	n/a	1-2 & 3-4	2-7 & 4-8
		SeTeCoRe Bus B	-	-	120	120	n/a	n/a	5-6 & 7-8	1-6 & 5-9
2b	FlexTiny3 CAN-FDx4 WU	SeTeCoRe Bus A	120	120	-	-	n/a	n/a	1-2 & 3-4	2-7 & 4-8
		SeTeCoRe Bus B	-	-	120	120	n/a	n/a	5-6 & 7-8	1-6 & 5-9
3	FlexTiny3 ETH switched (100BASE-TX)	No Termination	n/a	n/a	n/a	n/a	n/a	n/a	-	-
4	FlexTiny3 ETH BR (100BASE-T1)	No Termination	n/a	n/a	n/a	n/a	n/a	n/a	-	-
5	FlexTiny3 ETH BR switched (100BASE-T1)	No Termination	n/a	n/a	n/a	n/a	n/a	n/a	-	-
6	FlexTiny3 3 ETH BR switched (100BASE-T1)	No Termination	n/a	n/a	n/a	n/a	n/a	n/a	-	-
7	FlexTiny3 ETH 1G BR (1000BASE-T1)	No Termination	n/a	n/a	n/a	n/a	n/a	n/a	-	-
8	FlexTiny3 LIN SENT	SeTeCoRe Bus A	1k1	1k1	-	-	n/a	n/a	3 & 4	2 & 7
		SeTeCoRe Bus B	-	-	1k1	1k1	n/a	n/a	5 & 6	4 & 8
9	FlexTiny3 K-Line UART SPI	SeTeCoRe Bus A	n/a	n/a	500	n/a	n/a	n/a	7	9
		SeTeCoRe Bus B	n/a	n/a	n/a	n/a	n/a	n/a	-	-

Table 14: FlexTiny 3 – bus termination pins

For FlexCard PCIe3 and FlexCard PXIe3 – see "FD with Bindera".

5 Shipping, Maintenance and Disposal

Keep the package in which the FlexTiny 3 Family were shipped.

Store and transport the FlexTiny 3 Family in a cool, dry, dark environment. Don't store or transport it near sources of magnetic fields.

	**NOTICE** If you want to customize the components of the device, please contact *STAR ELECTRONICS GMBH & Co. KG*.

It is not necessary to clean the FlexTiny 3 Family. Do not use rubber dissolving chemicals or equivalent cleansing materials.

FlexTiny 3 Family have no parts that require servicing.

	Dispose of properly per regulations of the country where end-of-life occurs.

6 Troubleshooting

This chapter contains some frequently asked questions about the FlexTiny 3 Family.

1	Effect	The Tiny is not functional
	Solution	For FlexDevices or FlexCards where the Tiny may be changed, check if the FlexTiny is properly connected.

7 Ordering Information

7.1 FlexTiny 3 Family

Product	Description	Ordering number
FlexTiny3 FlexRay	2x FlexRay interfaces	3-00880A01-01
FlexTiny3 CAN-FD	2x CAN-FD (HS comp.) interface	3-00881E01-01
FlexTiny3 CAN-FDx4	4x CAN-FD (HS comp.) interface	3-00881G01-01
FlexTiny3 CAN-FDx4 WU	4x CAN-FD (HS comp.) with WakeUp interface	3-00881G02-01
FlexTiny3 ETH switched	2x 100Mbit Ethernet (100BASE-TX) switch interface	3-00882B01-01
FlexTiny3 ETH BR	2x 100Mbit Ethernet (100BASE-T1) interface	3-00882C02-01
FlexTiny3 ETH BR switched	3x 100Mbit Ethernet (100BASE-T1) switch interface	3-00882D01-01
FlexTiny3 3 ETH BR switched	12x 100Mbit Ethernet (100BASE-T1) switch interface. **-> Needs 3x FlexTiny slots!**	3-00882G01-01
FlexTiny3 ETH 1G BR	2x 1Gbit Ethernet (1000BASE-T1)	3-00882H02-01
FlexTiny3 LIN SENT	4x LIN, 2x SENT interface	3-00884A02-01
FlexTiny3 K-Line UART SPI	1x K-Line, 1x UART (TTL), 1x SPI interface	3-00884B01-01
Other interfaces	Contact *STAR ELECTRONICS GMBH & Co. KG*	

7.2 Accessory Parts

Product	Description	Ordering number
Other	Contact *STAR ELECTRONICS GMBH & Co. KG*	

7.3 Related Documents

Document	Description	Ordering number
[1] FlexDevice-S IfU	FlexDevice-S Instruction for Use	3-00860A01-D09
[2] FlexDevice-L/L² IfU	FlexDevice-L/L² Instruction for Use	3-00870A02-D19
[3] FlexCard-PXIe3 IfU	FlexCard-PXIe3 Instruction for Use	3-00940A01-D10
[4] FlexCard-PCIe3 IfU	FlexCard-PCIe3 Instruction for Use	Contact *STAR ELECTRONICS GMBH & Co. KG*

8 Appendix

8.1 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 0.5 MΩ/cm²), grounded through a ground cable (conductive cable from protected equipment to ground isolated through a 1 MΩ 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 0.9 MΩ and 1.5 MΩ) 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.

8.2 Appendix B:

8.2.1 Acronyms and Abbreviations

Item	Definition
BP	Bus plus
BM	Bus minus
CAN	Controller Area Network
EMC	Electromagnetic Compatibility
ESD	Electro Static Discharge
FR	FlexRay
ETH	Ethernet
BRR	BroadR-Reach
NC	Not Connected

8.2.3 List of Tables

8.2.4 List of Figures

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