Development Board ECUcore-9263

Hardware Manual

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Status / Changes

Date/ Version	Section	Change	Editor
L-1262e_01		initial version	S.Treuheit
L-1262e_02		update after boards redesign	S.Treuheit
L-1262e_03		Review of the manual	K. Becker

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1 Introduction

The ECUcore-9263 Development Board provides a flexible development platform, enabling quick and easy start-up and subsequent programming of the Single Board Computer module. The design of the Development Board allows easy operation of the installed ECUcore in Communication Networks (LAN, USB, CAN) and simple GPIO-Tests by keys and leds. Components for SPI and I²C enable easy testing of these bus-systems. A connection of additional expansion board features for various functions is supported, to allow fast and convenient prototyping and software evaluation.

For the SYS TEC IEC 61131-3 PLC firmware, an additional RUN/STOP/MRES switch is provided on the Development Board as well as one RUN LED and one ERROR LED for indicating the operating mode of the IEC 61131-3 PLC.

This manual describes the functionality of the Development Board. Precise specifications of the installed ECUcore or the controller that is implemented on the ECUcore can be found in the applicable Hardware Manual or the User's Manual and Data Sheet of the controller. The functions or descriptions of the ECUcore and the microcontroller are not included in this Hardware Manual! These documentations are not relevant for the basic functionality of the Development Board.
Please refer to the corresponding manuals and documentations for any other board components you may use (USB host, Ethernet switch, etc.).

Low-active signals are denoted by a „/“ in front of the signal name (i.e. “/RD”). The representation “0” indicates a logical-zero or low-level signal. A “1” is the synonym for a logical one or high-level signal.

2 Ordering Information and Support

Order Number	Version
4002009	Development Board ECUcore-9263

Development Board features:

- Socket for ECUcore-9263 (order number: 4001017)
- 5,7'' 320x240 pixel RGB TFT display with resistive touch and LED backlight using 18bit color
- External power supply from 9-28VDC/24W
- Switching regulator 9-28VDC / 5VDC
- Switching regulator 9-28VDC / 3,3VDC
- 4 keys and 4 led's free usable for development
- 1 8-position dip-switch / 2 16-position rotary-switches
- 1 3-position slider switch and 2 leds for using with PLC firmware
- Boot, reset and "NAND flash disable" key plus reset and shutdown led
- Battery for buffering Real time clock on ECUcore
- SD-card socket
- AC97 audio codec with two 3,5mm jack connectors (head phone and line in / microphone in)
- 1 USB device connector for onboard USB device on ECUcore
- 2 USB2.0 host conectors for onboard USB host on ECUcore
- 1 Ethernet connector for onboard PHY on ECUcore
- 1 CAN interface with D-Sub 9 connector
- 2 RS232 interfaces with 1 D-Sub 9 and 1 three-pin connector (without hardware handshake)
- 1 RS485/RS232 interface
- Matrix keypad 4x4 keys
- Scroll wheel with integrated push button
- 20pin ICE/JTAG interface for Atmel 9263 microcontroller
- All freely usable pins of the ECUcore are brought out to an expansion connector, 2x 120pol pin contact stripes with user-friendly 2,54mm contact spacing (optional)

3 Properties of the Development Board

3.1 Overview

The ECUcore-9263 belongs to SYS TEC's ECUcore family. The ECUcore-9263 integrates all elements of a microcontroller system on one board. The module only needs an external power supply (3,3V) to operate. The Development Board was build for accessing all interfaces of the ECUcore and rapid development of software drivers and applications. Some special drivers or external controllers are helpful to interact with the environment (bus-systems and control elements). All interfaces are brought out on standard connectors (RJ45, D-SUB).

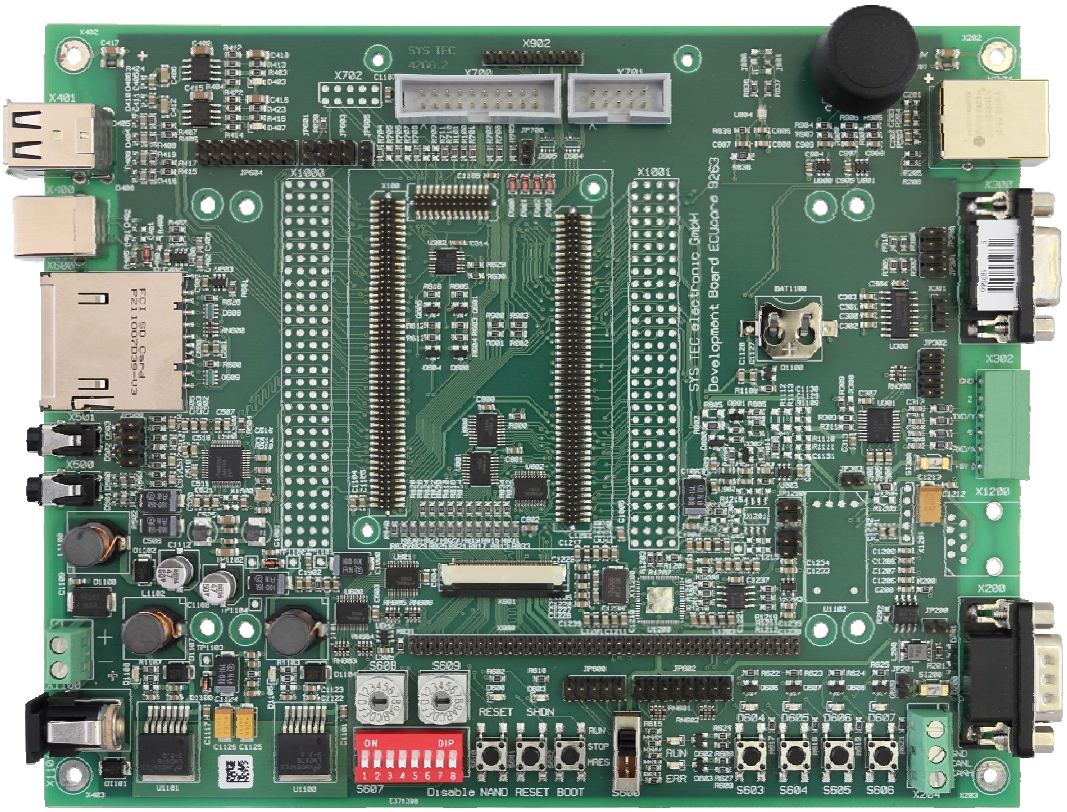


Figure 1: Development Board ECUcore-9263

The dimensions of the board are 200mm x 161mm.

3.2 Block Diagram

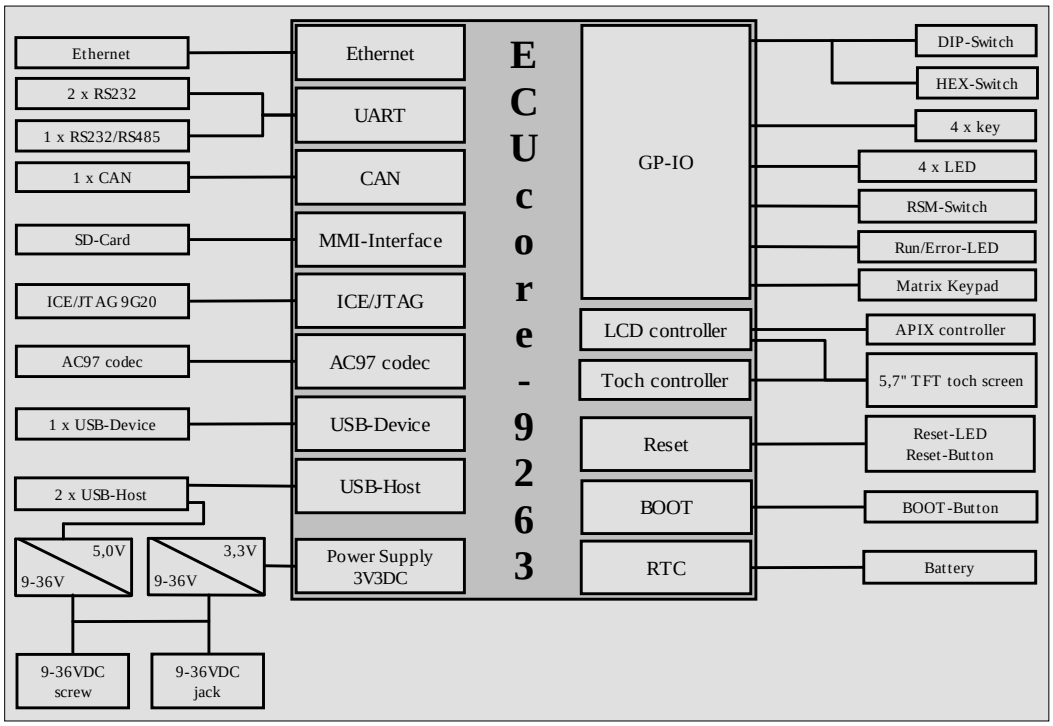


Figure 2: Block Diagram Development Board ECUcore-9263

3.3 Positions of Elements

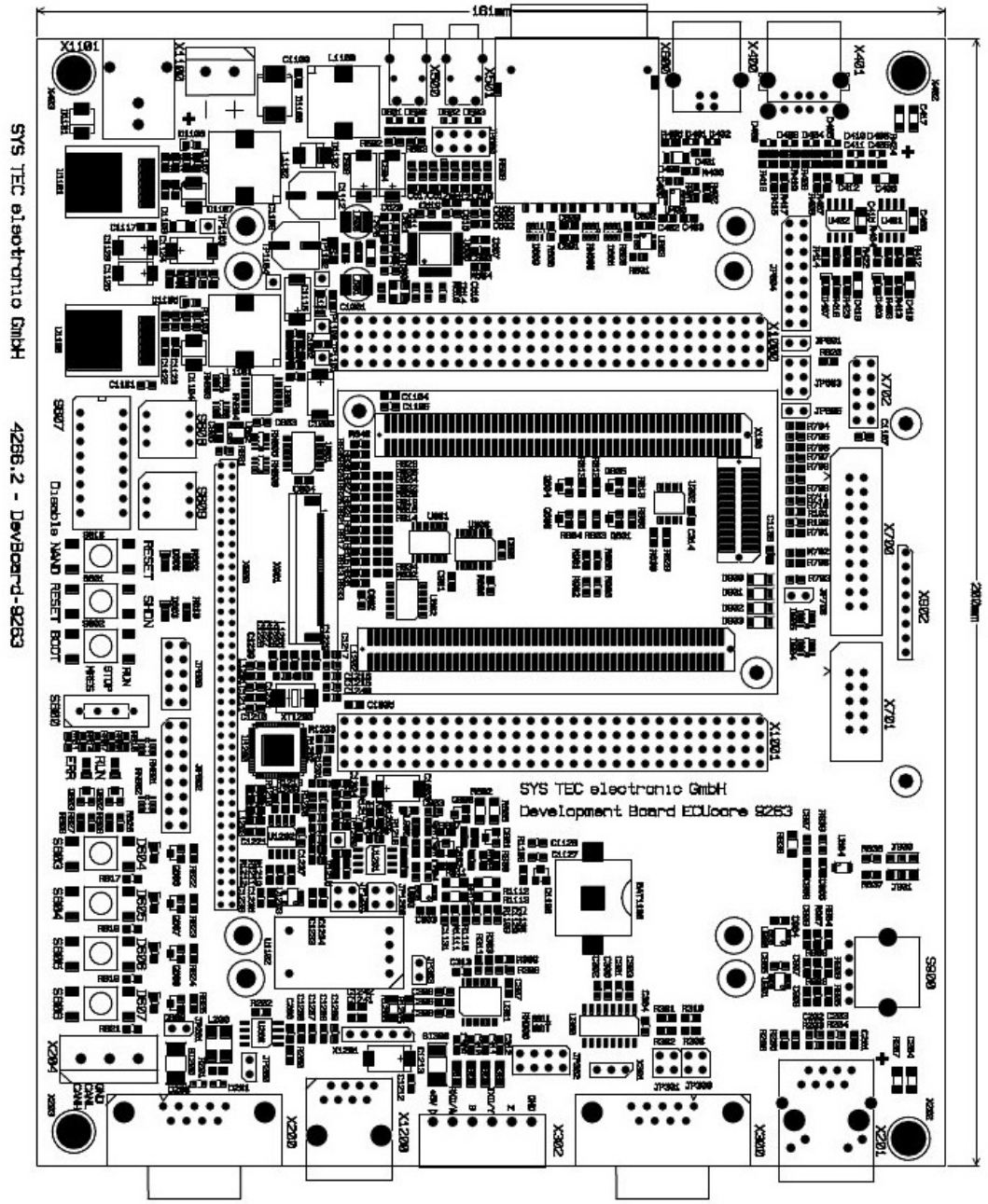


Figure 3: Positions of components

Onboard module	**Connector**
Power Supply	X1100 / X1101
ICE/JTAG Interface	X700 / X701
SD Card Slot	X600
Ethernet Connector	X201
USB Host Interface	X401
USB Device Interface	X400
CAN Interface	X200 / X204
RS232 Interface (UART 0)	X300
RS232 Interface (UART 2)	X301
RS232 / RS485 Interface (UART 1)	X302
Keypad Interface	X902
AC97 Audio Connectors	X500 / X501

Figure 4: Connectors of the development board

3.4 Jumper

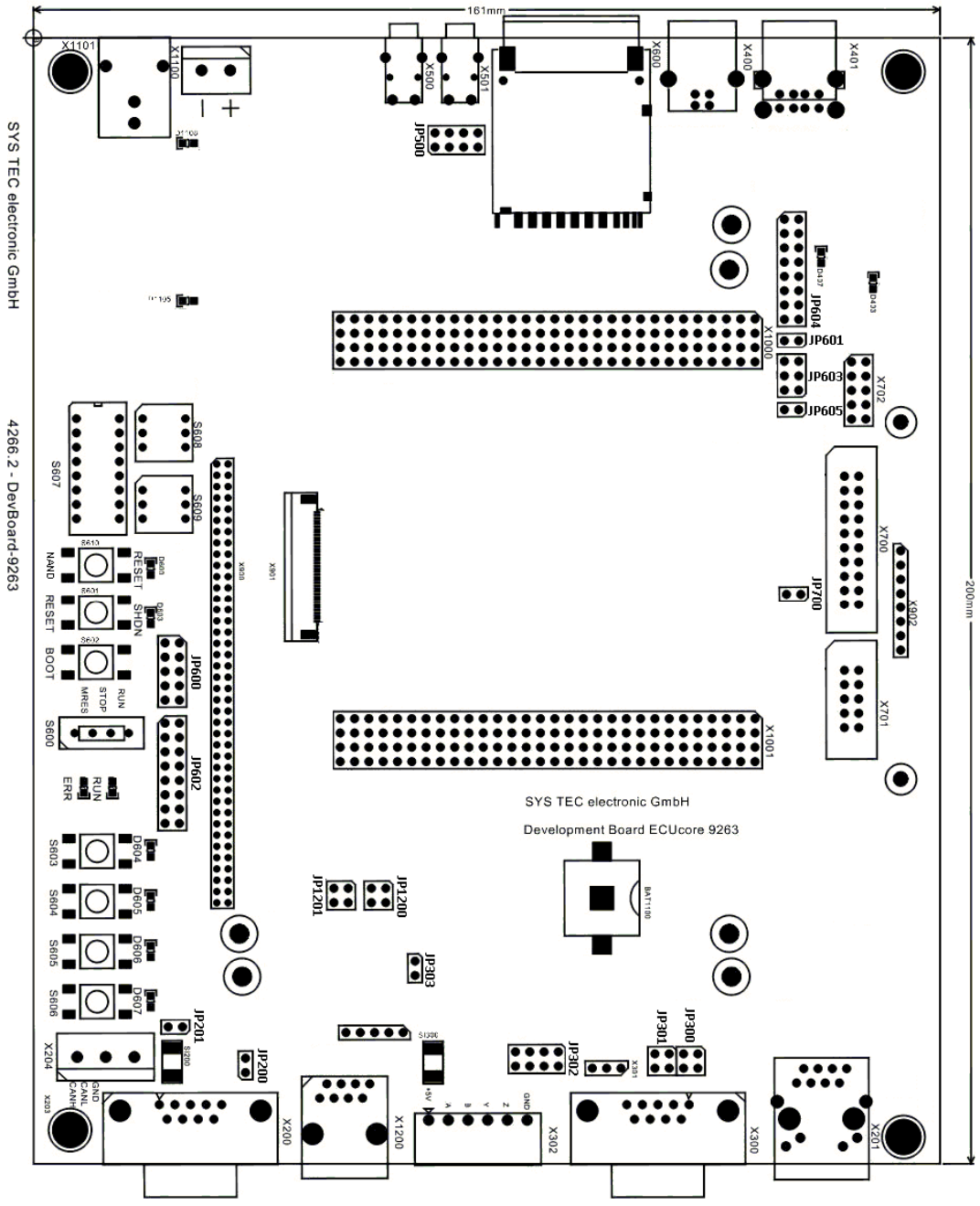


Figure 5: Jumper positions

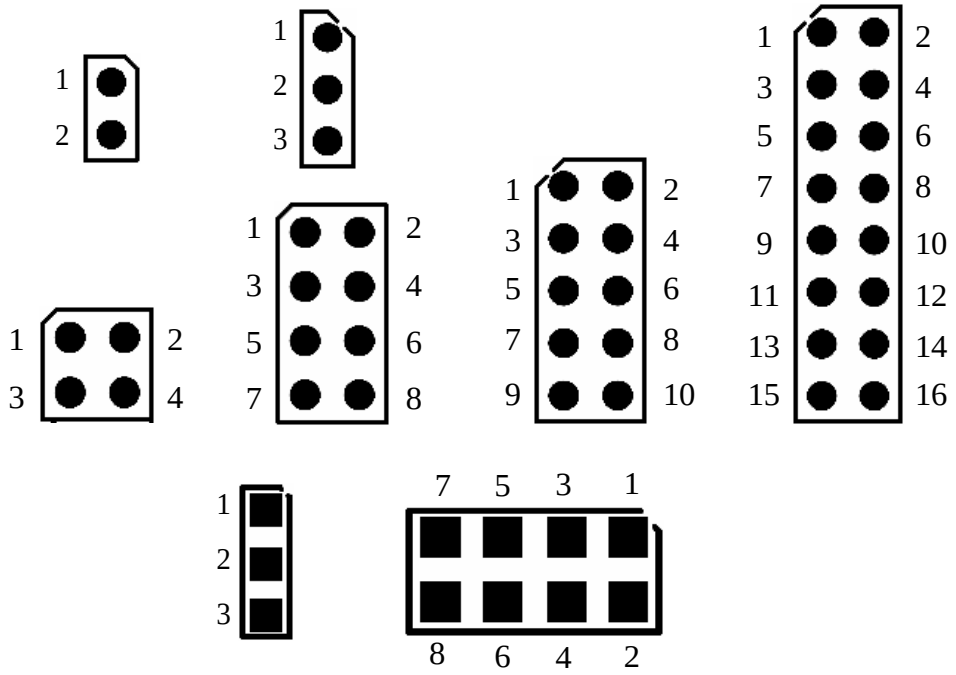


Figure 6: Jumper pincount

Jumper	Signal	Jumper Setting (closed)	Function
JP200	CAN-Termination	1-2	Termination 120R on CAN active
JP201	CAN-VCC	1-2	CAN-VCC (5,0VDC) is on Pin 1 of X303 present (Fuse with 125mA)
JP300	TXD0, DTXD	1-2	Signal TXD0 is on X300 pin2
		3-4 default	Signal DTXD is on X300 pin2
JP301	RXD0, DRXD	1-2	Signal RXD0 is on X300 pin 3
		3-4 default	Signal DRXD is on X300 pin 3
JP302	RS485/RS232, DEN, RXEN, ON	1-2 default	Signal RS485/RS232 pulled to GND (RS232 mode)
		3-4	Signal DEN pulled to GND
		5-6	Signal RXN pulled to GND
		7-8	Signal ON pulled to GND
JP303	5V	1-2	5,0VDC is on Pin 1 of X302 present (Fuse with 125mA)
JP500	LINE_IN_L LINE_IN_R MIC_1 VREF_OUT	1-2	Signal MIC_1 is on X501 pin 1
		3-4	Signal LINE_IN_L is on X501 pin 1
		5-6	Signal VREF_OUT is on X501 pin 3
		7-8	Signal LINE_IN_R is on X501 pin 3

Jumper	Signal	Jumper Setting (closed)	Function
JP600	LED_RUN LED_ERROR SW_MRES SW_STOP SW_RUN	1-2 default	LED D601 is on IO_PB23 (PB23)
		3-4 default	LED D602 is on IO_PB22 (PB22)
		5-6 default	Switch Status MRES is on IO_PB25 (PB25)
		7-8 default	Switch Status Stop is on IO_PB24 (PB24)
		9-10 default	Switch Status Run is on IO_PB26 (PB26)
JP601	BMS	1-2	Signal BMS is set to 1 (high)
JP602	LED_1 LED_2 LED_3 LED_4 BUTTON_1 BUTTON_2 BUTTON_3 BUTTON_4	1-2 default	LED D604 is on RTS2
		3-4 default	LED D605 is on CTS2
		5-6 default	LED D606 is on RTS1
		7-8 default	LED D607 is on CTS1
		9-10 default	Button S603 is on RTS0 (PA28)
		11-12 default	Button S604 is on CTS0 (PA29)
		13-14 default	Button S605 is on IO_PE10 (PE10)
		15-16 default	Button S606 is on IO_PE12 (PE12)
JP603	/BOOT WKUP /DIS_NAND	1-2	Signal /BOOT is set to 0 (low)
		3-4	Signal WKUP is set to 0 (low)
		5-6	Signal /DIS_NAND is set to 0 (low)
JP604	SD_CARD_DET, SD_CARD_PROT, SD_DATA0, SD_DATA1, SD_DATA2, SD_DATA3, SD_CMD, SD_CLK	1-2	SD Card SD_CARD_DET is on SD_SLOT
		3-4	SD card SD_CARD_PROT is on IO_PB30
		5-6	SD Card SD_DATA0 is on MCI1_DA0
		7-8	SD Card SD_DATA1 is on MCI1_DA1
		9-10	SD Card SD_DATA2 is on MCI1_DA2
		11-12	SD Card SD_DATA3 is on MCI1_DA3
		13-14	SD Card SD_CMD is on MCI1_CDA
		15-16	SD Card clock SD_CLK is on MCI1_CK
JP605	WATCHDOG_OUT, WATCHDOG_IN	1-2	IO_PB31 is connected to WDI
JP700	/JTAGSEL	1-2	Signal /JTAGSEL is set to 1 (high) Boundary Scan Mode

Figure 7 Jumper default configuration

3.5 Board Connectors

See Figure 8 for the position of board connetor X100 and its connector rows.

The Development Board ECUcore-9263 has two board connectors. Each of the SMT male header consists of 100 contacts divided into double rows. In total, the board has 200 contacts. For better emc-properties, 20% of pins are GND.
A third connector at the front side is for connecting debug interfaces of the CPU. It is not mounted by default.

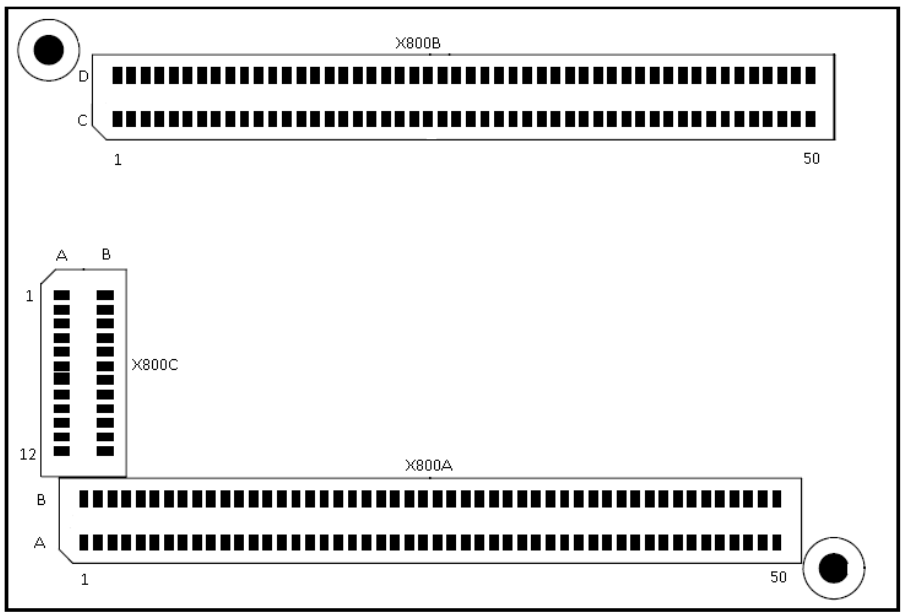


Figure 8: Pinout (top view)

The board connectors are equipped with the common and durable 1,27mm pitch. The type of the male header used on the Development Board is the '7072'-series provided by "W+P PRODUCTS".

Please refer to the datasheet and the electrical specifications.

Connectors:
ECUcore-9263:

- W+P 6060-100-36-00-00-00-PPST (2x50pol. female)
- W+P 6060-024-36-00-00-00-PPST (2x12pol. female)

Development Board:

- W+P 7072-100-10-00-10-PPST (2x50pol. male)

- W+P 7072-024-10-00-10-PPST (2x12pol. male)

The following table defines the pinout.

Signal	Pin	Pin	Signal		Signal	Pin	Pin	Signal
GND	A01	B01	GND		GND	C01	D01	+2V5_EPHY
/BOOT	A02	B02	/MR		ETH_TX-	C02	D02	GND
WKUP	A03	B03	/RESET		ETH_TX+	C03	D03	ETH_SPEED
SHDN	A04	B04	/PFI		ETH_RX+	C04	D04	ETH_LINK/ACT
BMS/AC97RX	A05	B05	WDI		ETH_RX-	C05	D05	GND
GND	A06	B06	PCK0		GND	C06	D06	IO_PE10
DRXD	A07	B07	GND		IO_PD11	C07	D07	IO_PE12
DTXD	A08	B08	RTS0		IO_PD15	C08	D08	IO_PE20
RTS2	A09	B09	CTS0		GND	C09	D09	GND
CTS2	A10	B10	RTS1		MCI1_DA0	C10	D10	IO_PA22
IO_PE13	A11	B11	CTS1		MCI1_DA1	C11	D11	MCI1_DB1
GND	A12	B12	GND		MCI1_DA2	C12	D12	MCI1_DB2
TXD0	A13	B13	TXD1		MCI1_DA3	C13	D13	MCI1_DB3
RXD0	A14	B14	RXD1		MCI1_CK	C14	D14	MCI1_CDA
TXD2	A15	B15	IO_PE15		GND	C15	D15	MCI1_CDB
RXD2	A16	B16	IO_PE17		SCK0	C16	D16	GND
GND	A17	B17	PCK3		SCK1	C17	D17	TIOA1
USB_HDPA	A18	B18	UDP_VBUS		SCK2	C18	D18	TIOB1
USB_HDMA	A19	B19	GND		PCK1	C19	D19	TIO_PB30
USB_HDPB	A20	B20	USB_DDP		IO_PB31	C20	D20	PWM0
USB_HDMB	A21	B21	USB_DDM		PWM1	C21	D21	TIOB0
GND	A22	B22	GND		PWM2	C22	D22	TCLK0
I2C_DATA	A23	B23	CANTX		BACKL 5/12V	C23	D23	GND
I2C_CLK	A24	B24	CANRX		GND	C24	D24	BACKL_EN
GND	A25	B25	IO_PE16		EXT_TEMP_IN	C25	D25	LCD_SEL_3/5V
/SPI1_CS0	A26	B26	GND		PWM3_BACKL	C26	D26	DISP_ON
/SPI1_CS2	A27	B27	/SPI1_CS1		X_LEFT	C27	D27	Y_LOW
SPI1_MOSI	A28	B28	SPI1_MISO		X_RIGHT	C28	D28	GND
/SPI1_CS3	A29	B29	SPI1_SPCK		GND	C29	D29	Y_UP
AC97CK	A30	B30	AC97FS		IN_3	C30	D30	ANALOG_IN
GND	A31	B31	AC97TX		LCD_TXout0+	C31	D31	LCD_TXout0-
/SPI0_CS0	A32	B32	GND		LCD_TXout1+	C32	D32	LCD_TXout1-
/SPI0_CS2	A33	B33	/SPI0_CS1		LCD_TXout2+	C33	D33	GND
SPI0_MOSI	A34	B34	SPI0_MISO		LCD_TXout2-	C34	D34	LCD_TXoutCLK+
/SPI0_CS3	A35	B35	SPI0_SPCK		GND	C35	D35	LCD_TXoutCLK-
IO_PE14	A36	B36	SD_SLOT		LCDD2_R0	C36	D36	LCDD3_R1
GND	A37	B37	MCI0_CK		LCDD4_R2	C37	D37	LCDD5_R3
MCI0_CDB	A38	B38	GND		LCDD6_R4	C38	D38	LCDD6_R5
MCI0_DB0	A39	B39	MCI0_DB1		LCDD10_G0	C39	D39	GND
MCI0_DB2	A40	B40	MCI0_DB3		LCDD11_G1	C40	D40	LCDD12_G2
MATRIX_IO1	A41	B41	MATRIX_IO0		GND	C41	D41	LCDD13_G3
MATRIX_IO3	A42	B42	MATRIX_IO2		LCDD14_G4	C42	D42	LCDD15_G5
GND	A43	B43	MATRIX_IO4		LCDD18_B0	C43	D43	LCDD19_B1
MATRIX_IO5	A44	B44	GND		LCDD20_B2	C44	D44	LCDD21_B3
MATRIX_IO7	A45	B45	MATRIX_IO6		LCDD22_B4	C45	D45	GND

Signal	Pin	Pin	Signal		Signal	Pin	Pin	Signal
IO_PB22	A46	B46	IO_PB23		LCDD23_B5	C46	D46	/LVDS_PWD
IO_PB24	A47	B47	IO_PB25		GND	C47	D47	LCDCC
VBAT	A48	B48	IO_PB26		LCDDEN	C48	D48	LCDDOTCLK
GND	A49	B49	GND		LCDHSYNC	C49	D49	LCDVSYNC
+3V3	A50	B50	+3V3		/TOUCH_INT	C50	D50	GND

Table 1: Pinout high density connectors

Most Signals are brought out of expansion connectors X1000 and X1001 (not mounted by default). These are pin contact stripes with standard 2,54mm contact spacing. So you can easily connect extensions for fast development.

X1000	A	B	C	D
1	/BOOT	GND	/MR	GND
2	WKUP	/RESET	SHDN	/PFI
3	BMS/AC97RX	GND	WDI	GND
4	PCK0	DRXD	DTXD	RTS0
5	RTS2	GND	CTS0	GND
6	CTS2	RTS1	IO_PE13	CTS1
7	TxD0	GND	TxD1	GND
8	RxD0	RxD1	TxD2	IO_PB15
9	RXD2	GND	IO_PE17	GND
10	USB_HDMA	USB_HDPA	UDP_VBUS	PCK3
11	USB_HDMB	USB_HDPB	NC	GND
12	USB_DDM	USB_DDP	I2C_DATA	CANTX
13	I2C_CLK	GND	CANRX	GND
14	IO_PE16	/SPI1_CS0	/SPI1_CS2	/SPI1_CS1
15	SPI1_MOSI	GND	SPI1_MISO	GND
16	/SPI1_CS3	SPI1_SPCK	AC97CK	AC97FS
17	AC97TX	GND	/SPI0_CS0	GND
18	/SPI0_CS2	/SPI0_CS1	SPI0_MOSI	SPI0_MISO
19	/SPI0_CS3	GND	SPI0_SPCK	GND
20	IO_PE14	SD_SLOT	MCI0_CK	MCI0_CDB
21	MCI0_DB0	GND	MCI0_DB1	GND
22	MCI0_BD2	MCI0_DB3	MATRIX_IO1	MATRIX_IO0
23	MATRIX_IO3	GND	MATRIX_IO2	GND
24	MATRIX_IO4	MATRIX_IO5	MATRIX_IO7	MATRIX_IO6
25	IO_PB22	GND	IO_PB23	GND
26	IO_PB24	IO_PB25	VBAT	IO_PB26
27	NC	GND	NC	GND
28	NC	NC	NC	NC
29	NC	GND	NC	GND
30	3V3	NC	3V3	NC

Table 2: Pinout expansion connectors X1000

X1001	A	B	C	D
1	+2V5_EPHY	GND	GND	GND
2	GND	ETH_SPEED	GND	ETH_LINK/ACT

3	GND	GND	IO_PE10	GND
4	EBI0_NCS2	IO_PE12	IO_PD15	IO_PE20
5	MCI1_DA0	GND	IO_PA22	GND
6	MCI1_DA1	MCI1_DB1	MCI1_DA2	MCI1_DB2
7	MCI1_DA3	GND	MCI1_DB3	GND
8	MCI1_CK	MCI1_CDA	MCI1_CDB	SCK0
9	SCK1	GND	TIOA1	GND
10	SCK2	TIOB1	PCK1	IO_PB30
11	IO_PB31	GND	PWM0	GND
12	PWM1	TIOB0	PWM2	TCLK0
13	BACKL_5V/12V	GND	BACKL_EN	GND
14	EXT_TEMP_IN	LCD_SEL_3V/5V	PWM3_BACKL	DISP_ON
15	X_LEFT	GND	Y_LOW	GND
16	X_RIGHT	Y_UP	IN_3	ANALOG_IN
17	LCD_TXout0+	GND	LCD_TXout0-	GND
18	LCD_TXout1+	LCD_TXout1-	LCD_TXout2+	LCD_TXout2-
19	LCD_TXoutCLK+	GND	LCD_TXoutCLK-	GND
20	LCDD2_R0	LCDD3_R1	LCDD4_R2	LCDD5_R3
21	LCDD6_R4	GND	LCDD7_R5	GND
22	LCDD10_G0	LCDD12_G2	LCDD11_G1	LCDD13_G3
23	LCDD14_G4	GND	LCDD15_G5	GND
24	LCDD18_B0	LCDD19_B1	LCDD20_B2	LCDD21_B3
25	LCDD22_B4	GND	/LVDS_PWD	GND
26	LCDD23_B5	LCDCC	LCDDEN	LCDDOTCLK
27	LCDHSYNC	GND	LCDVSYNC	GND
28	/TOUCH_INT	NC	NC	NC
29	NC	GND	NC	GND
30	3V3	NC	3V3	NC

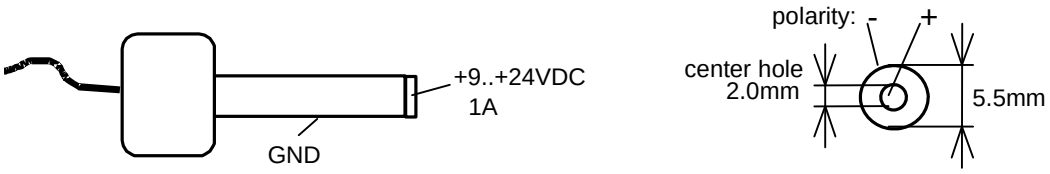
Table 3: Pinout expansion connectors X1001

4 Component Descriptions

4.1 Power Supply

The Development Board needs a power supply of 9VDC to 28VDC unregulated. Power should be 24W minimum to supply the module and any peripheral circuits.

External power supply can be connected via Low Voltage Socket X1100 or Terminal Block X1101.



Please ensure that the correct polarity is applied to the terminal block. This is shown on the silkscreen on the PCB next to the terminal block.

From this voltage two switching regulators produce the onboard voltages (5VDC and 3,3VDC).
5VDC are used for USB, RS485, AC97, LCD-Display and LCD backlight. 3,3VDC supplies the ECUcore and all other peripheral elements.

4.2 ICE Interface

The ICE interface is for programming and debugging the 9263-CPU. It's a pin contact stripes with standard contact spacing 2,54mm.

The connector layout is adjusted for using the ICE adapter from Amontec (www.amontec.com) with USB interface.

The following table shows the ICE/JTAG layout with pin names.

Signal	Pin	Pin	Signal
3V3	1	2	3V3
ARM_/NTRST	3	4	GND
ARM_TDI	5	6	GND
ARM_TMS	7	8	GND
ARM_TCK	9	10	GND
ARM_RTCK	11	12	GND
ARM_TDO	13	14	GND
/RESET	15	16	GND
not connected	17	18	GND
not connected	19	20	GND

Table 4: ICE/JTAG connector X700

Signal	Pin	Pin	Signal
TCK	1	2	GND
TMS	3	4	GND
TDO	5	6	GND
TDI	7	8	GND
not connected	9	10	not connected

Table 5: JTAG connector X701

If jumper JP700 is closed, signal /JTAGSEL on the ECUcore is set to high level and the Boundary Scan mode on the ECUcore-9263 is active. Otherwise, if jumper JP700 is open, programming and debugging in ICE-mode is possible.

4.3 I/O Elements

The Development Board provides a lot of I/O elements for rapid development of software and for configuring and using the supplied software. Additional LEDs are directly connected to onboard periphery such as power supply and LAN and USB.

The next table shows the connection of each element at the µC.

element	connect to	IO on ECUcore
S603	3,3V	RTS0 (PA28)
S604	3,3V	CTS0 (PA29)
S605	3,3V	IO_PE10 (PE10)
S606	3,3V	IO_PE12 (PE12)
D604	3,3V	RTS2 (PD5, active high via FET)
D605	3,3V	CTS2 (PD6, active high via FET)
D606	3,3V	RTS1 (PD7, active high via FET)
D607	3,3V	CTS1 (PD8, active high via FET)
D601 (LED RUN)	3,3V	IO_PB23 (PB23, active high via FET)
D602 (LED ERROR)	3,3V	IO_PB22 (PB22, active high via FET)
S600 (MRES)	GND	IO_PB25 (PB25)
S600 (STOP)	3,3V	IO_PB24 (PB24)
S600 (RUN)	3,3V	IO_PB26 (PB26)
D604 (/SHDN)	3,3V	/SHDN
D600 (/RESET)	3,3V	/RESET
S601 "RESET"	GND	/MR
S602 "BOOT"	GND	/BOOT
S610 "NAND"	GND	/DIS_NAND
X201 LED green	3,3V	Eth0-PHY Speed
X201 LED yellow	3,3V	Eth0-PHY Link/Act
S607 (Dip Switch 1-8)	3,3V	MCI0_CDB(PA16), MCI0_DB0(PA17), MCI0_DB1(PA18), MCI0_DB2(PA19), SCK2(PD9), SCK1(PD10), TIOB1(PE9), PWM0(PB7)
S608/S609 Double rotary switch (hex)	3,3V	MCI0_CDB(PA16), MCI0_DB0(PA17), MCI0_DB1(PA18), MCI0_DB2(PA19), SCK2(PD9), SCK1(PD10), TIOB1(PE9), PWM0(PB7),

Table 6: IO elements connected to the ECUcore

The rotary switches S608/S609 share their input lines with the DIP switch S607. To choose the desired switch for input the DIP/HEX signal connected to MCI0_CK (PA12) of the ECUcore 9263 is used. Pulling that signal to low will enable the rotary switches while holding it high will enable the DIP switches.

LED	connect to	Function
D1105 (yellow)	3,3V	3,3V-Supply
D1108 (yellow)	5V	5V-Supply
D403 (red)	/UUSB_HA_Fault	Overcurrent USB host X401A
D407 (red)	/UUSB_HB_Fault	Overcurrent USB host X401B

Table 7: LEDs connected to onboard ICs

4.4 SD Card

SD card socket X600 provides standard SD cards. It is connected to the ECUcore via MCI-Bus. It shares the MCI interface with onboard microSD interface of the ECUcore 9263.

Pin	ECUcore-Pin	JP604 pins
DET	SD_SLOT	1-2
PROT	IO_PB30	3-4
DATA0	MCI1_DA0	5-6
DATA1	MCI1_DA1	7-8
DATA2	MCI1_DA2	9-10
DATA3	MCI1_DA3	11-12
CMD	MCI1_CDA	13-14
CLK	MCI1_CK	15-16

Table 8: SD card connection

If the SD card socket shall be used, for any of the cards signals the appropriate jumper of JP604 has to be shortened.

4.5 Ethernet

The 9263-CPU has one build-in Ethernet-MAC. One Ethernet-PHY (KS8721BL) is on the ECUcore at Ethernet0. The Delevopment Board features a RJ45-ModularJack X201 for connecting LAN.

Pin	Function
1	TX+
2	TX-
3	RX+
4	TDCT
5	RDCT
6	RX-
7	not connected
8	GND
Shield	connected with PE

Table 9: Pinout of RJ45-connectors

The PHY provides autonegotiation, so that a standard patch cable can be used, a cross-link cable is not necessary.

4.6 USB

4.6.1 USB host

For using USB sticks as memory extension or with additional interfaces (e.g. WLAN), 2 USB host controllers are built in the 9263-CPU. It serves two USB-A connectors (X401A/B).

Each of the USB device connectors is equipped with its own current limiting circuit with overcurrent detection support (realized by MIC2544-2YM). If there is an overcurrent, the voltage of the USB connector will be turnet off. The MIC2544-2YM will try to turn the voltage on again after a time period. The following table shows the connection of the USB host control signals.

Signal	ECUcore-Pin	Description	Onboard LED
/EN_UUSB_HA	MCI1_DB2 (PA24)	Enable USB host X401A	
/UUSB_HA_Fault	MCI1_DB1 (PA23)	Overcurrent detected X401A	D403 (on if overcurrent)
/EN_UUSB_HB	MCI1_CDB (PA21)	Enable USB host X401A	
/UUSB_HB_Fault	MCI0_DB3 (PA20)	Overcurrent detected X401A	D407 (on if overcurrent)

Table 10: USB host control signal connection

4.6.2 USB device

The 9263-CPU has build in an USB device interface. It serves one USB-B connector (X400). The Device interface can be detected by the Development Board by the USB_VBUS signal which is connected to MCI1_DB3 of the ECUcore 9263. That means the signal is available at PA25 of the MCU.

4.7 CAN

The 9263-CPU has one build-in CAN controller on the ECUcore. On the Development Board, there is a 5V- CAN transceiver (SN65HVD231) and a male DSUB9 connector (X200).
The connector pinout is compatible to CANopen standard.

Pin	Function
4,5,8,9	not connected
1	close jumper JP201 5VDC 5V0, open jumper JP201 not connected
2	CANL
3,6	GND
7	CANH
Shield	connected with PE on board holes

Table 11: CAN connector pinout

CAN-bus can be terminated by 120R with Jumper JP200. In addition there is the Terminal Block X204 which can be used to connect the CAN bus.

Pin	Function
1	CANH
2	CANL
3,	GND

Table 12: CAN terminal block pinout

4.8 RS232/RS485

The Atmel 9263 provides 3 full featured UARTs and 1 UART usable as debug interface. UART0 and the debug UART can be used as an RS232 interface via the DSUB connector. To select the interface to be used via the DSUB connector the jumpers JP300 and JP301 have to be set. For communicating with the PC, an extension can be used (no null modem required).

ECUcore-UART	Name on Devboard	connector	gender	communication signals
UART0/UARTD	COM0	X300	female	RxD0, TxD0
UART1/RS495	COM1	X302	Terminal connector	RxD1, TxD1 or A, B (depending on selected mode)
UART2	COM2	X301	socket	RxD2, TxD2

Table 13: RS232/RS484 connector pinout

UART2 can be used as an RS232 interface via the 3-pin-socket X301 on the Development Board. No jumpers are to be set.

RS232-Interface signal onECUcore	Connector	Jumper
TXD0, RXD0	X300	JP300 1-2, JP301 1-2
DTXD, DRXD	X300	JP300 3-4, JP301 3-4
TXD2, RXD2	X301	Always enabled

Table 14: RS232 jumper settings

UART1 can be operated in RS232 or RS485 mode. This is realized by the onboard transceiver ISL81387. The mode to be used for UART 1 is selected either by jumper JP302 or by software. If jumper JP302 is applied it takes precedence over software setting.

Transceiver Pin	ECUcore-Pin	JP302-Pin
ON	IO_PE13	7-8
RXEN	IO_PE15	5-6
DEN	IO_PE17	3-4
RS485/232	IO_PE16	1-2

Table 15: RS232/RS485 connection

The RS232 or RS485 signals from UART1 are available via the X302 terminal. The following table shows the pinout of X302.

Pin	Function RS232 mode	Function RS485 mode
1	JP303 applied +5V, otherwise not connected	
2	RXD1	A
3	Not to be used	B
4	TXD1	Y
5	Not to be used	Z
6	GND	GND

Table 16: RS232/RS485 terminal pinout

If JP303 is applied there is 5V on pin 1 of X302. This voltage is fused by a 125mA fuse on board.

4.9 RGB TFT display with resistive touch and LED backlight

The developmet board is equipped wit a 5,7'' TFT display. The display has a resolution of 320x240 pixels. It is a RGB display which is driven with 18bit colors (6bit each color). The touch panel output of the display is connected to the onboard touch controller of the ECUcore 9263.

There are some signals in addition to the LCD signals that are to be used to control the display operation and the operation of the LED backlight.

Signal	ECUcore 9263 pin	description
/LCDBUS_EN	LCD_SEL_3V/5V (PC13)	Enable LCD bus signals
/LCD_POWER_EN	DISP_ON (PC5)	Enable LCD power supply
LCD_DISP_EN	SCK0 (PA30)	Enable display
BRIGHNESS_CONTR	ANALOG_IN	Illumination intensity of the environment

Table 17: Display control signals

4.10 Matrix keypad

The development board comes wit a 4x4 key matrix keypad. The Keypad is connected via X902 to the bord. The following table shows how the lines and columns are connected to the ECUcore 9263.

X902 Pin	Keypad	ECUcore 9263 pn
1	Column 1	MATRIX_IO0 (PE0)
2	Column 2	MATRIX_IO1 (PE1)
3	Column 3	MATRIX_IO2 (PE2)
4	Column 4	MATRIX_IO3 (PE3)
5	Line 1	MATRIX_IO4 (PE4)
6	Line 2	MATRIX_IO5 (PE5)
7	Line 2	MATRIX_IO6 (PE6)
8	Line 4	MATRIX_IO7 (PE7)

Table 18: Matrix keypad connection

4.11 Scoll Wheel

There is a Scroll wheel mounted on the development board. It is realized using an rotary encoder. The encoder output ist connected to the ECUcore 9263 as described in Table 19.

Encoder signal	ECUcore 9263 pin	description
A	TIOB0 (PE19)	Encoder signal A

B	PCK1 (PB10)	Encoder signal B
S	IO_PD11 (PD11)	Encoder Pushbutton

Table 19: Rotary encoder connection

4.12 AC97 Audio

The ECUcore 9263 Development board includes an AC97 codec. The AC97 codec is connected to the interface of the AC97 controller which is part of the ECUcore 9263. The AC97 codec is a LM4550B.

The board privdes one 3,5 mm audio jack that can be used as a Head Phone output (X500). In addition there is another 3,5 mm audio jack (X501), which can be configured as Line In or Microphone In by jumper JP500. Please refere to the following table for JP500 setting.

AC97 input fuction	**Connector**	**Jumper**
Microphone In connectet to	X501 (Pin 1)	JP500 1-2
VREF_OUT connected to	X501 (Pin 3)	JP500 5-6
Line In connected to	X501 (Pins 1, 3)	JP500 3-4, JP500 7-8

Table 20: AC97 jumper settings

The RESET pin of the LM4550B is connectet to the port pin PC29 (PCK0) of the ECUcore 9263. The LM4550B is reset by pulling this pin low.

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