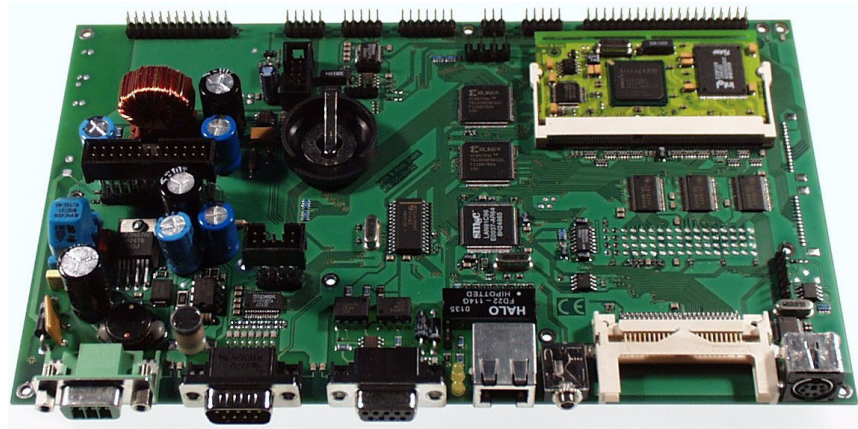# MT6N (MT606)

Documentation 6.0

1.0 Introduction

The MT6N is an industrial terminal based on the Keith & Koep "Trizeps[1]" module.

The board offers the following features:

- CompactFlash slot / PCMCIA adaption connector
- 2 x RS232 interface (1 x DB9 male, 1 x 10-pin header)
- CAN interface (Philips SJA1000)
- Ethernet interface (SMSC LAN91C96)
- PS/2 connector (keyboard or mouse)
- Uninterruptible Power Supply (optional)
- USB target (external clamping diode, VCC necessary)
- LCD-Connector (40-pin header, included touch interface) to connect with B/W or color DSTN, TFT; direct connection to Sharp LM8V31 (VGA DSTN)
- Audio interface (Microphone and speaker)
- 2 x 8 TTL inputs, 2 x 8 TTL outputs, which can be electrically isolated on an optional circuit board
- Connector for additional UART or IrDA
- Battery buffered Real Time Clock (RTC)
- Single power supply (24V)

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1. Keith & Koep GmbH offers two kinds of Trizeps modules. First one, in the following called „Trizeps I", based on the Intel StrongARM SA-1110 Microprocessor. The second one, called „Trizeps II", based on the PXA250 Microprocessor. Both processors work very fast (270 Dhrystone 2.1 MIPS @ 206MHz for Trizeps I and 480 Dhrystone 2.1 MIPS @ 400MHz for Trizeps II) and need very low power. Both Trizeps modules include also the Philips UCB 1x00 (a single chip, integrated mixed signal audio and telecom codec). The single channel audio codec is designed for direct connection of a microphone and a speaker. The incorporated analog to digital converter and the touch screen interface provides complete control and read-out of an 4 wire resistive touch screen. The Trizeps offers up to 16MByte Flash memory and up to 64MByte SDRAM.

2.0 Preface

2.1 Getting started

The MT6N board is designed as a motherboard for Trizeps I and Trizeps II. The first part of this chapter gives a physical description of the board and the second part describes:

1. How to unpack the board and how to make a visual inspection.
2. How to power up the board for the first time.
3. How to connect the board to a host system

2.1.1 Physical description

The physical layout of the board is shown in figure 6 on page 23 (You'll find details on the last page). The dimensions of the board are 223 x 134 mm (LxW). You can find all measures at figure 8 on page 49.

There are a number of header blocks on the board that accept 2-pin jumpers, allowing the board to be configured in different ways. Due to further header blocks it is possible to connect an LCD-display with touch screen. A serial connection to a host system is possible by using one of the RS232 interfaces. Furthermore the board contains an JTAG-interface for programming the Trizeps.

2.1.2 Unpacking the board

The MT6N contains electronic components that are susceptible to electrostatic discharge (static electricity). To avoid electrostatic damage the board is supplied in an antistatic bag. When handling the card, risk of damage can be diminished by taking a few simple precautions:

1. Do not remove the card from the bag unless you are working on an antistatic, grounded surface and wearing an grounded antistatic wrist strap.
2. Keep the antistatic bag the card was supplied in; if you remove the card from a system, store it in the bag.

Normally MT6N is supplied with a Trizeps in the SODIMM-socket. If the SODIMM is not fitted with Trizeps when you receive your board, follow the next instructions:

1. Slide the Trizeps into the socket taking account of the polarity mark. Do not touch the gold contacts. You can see that there is a polarization mark cut in the Trizeps; this ensures that the Trizeps is adjusted correctly. Put the Trizeps modul carefully at an angle of about 30 degrees into the socket.
2. Support the underside of the board and push the Trizeps down into the socket. It should click into its place with a gentle click.

Before you install and power up your MT6, you should perform a short visual inspection:

1. Inspect the card for physical damage.
2. Ensure that each of the 2-pin jumpers is pushed down firmly onto its mounting posts. If you move any of the jumpers, refer to Appendix A to ensure they are replaced correctly.

2.1.3 Powering up the first time

Use Appendix A to ensure the jumpers are set appropriately. If you need more details on how to install the card or attach power supply, refer to Appendix A, too.

2.1.4 How to connect the board to host system

Use an RS232 null-modem cable to attach the serial interface on the board to an RS232 port on a terminal or terminal emulator. For example, you could connect it to a PC running Windows and use the Windows Terminal or Hyperterminal application. Configure the terminal to operate at 38 kbaud, 8-bit data, 1 stop bit, no parity, no flow control. If you need more details on choosing an appropriate cable, refer to appendix A.

3.0 Functional specification

This chapter describes each functional element on the MT6N board. In the next chapters you can find more detailed information about the board and some important hints for programming it. The block diagram on figure 1 on page 4 shows the interconnections of the major elements.

Components of MT6:

1. Trizeps module
2. Serial EEPROM (optional)
3. CompactFlash / PCMCIA
4. Board Control Register BCR
5. Real Time Clock
6. JTAG interface
7. Reset
8. Power Supply
9. Power generation on board
10. GPIO
11. Ethernet
12. Serial ports
13. CAN interface
14. TTL I/O
15. Audio in/out
16. Display connectors and 4 wire Touch Panel
17. MultiMediaCard
18. PS/2 interface
19. Powerfail - Interrupt
20. Uninterruptible Power Supply (UPS)

FIGURE 1.   MT6 block diagram
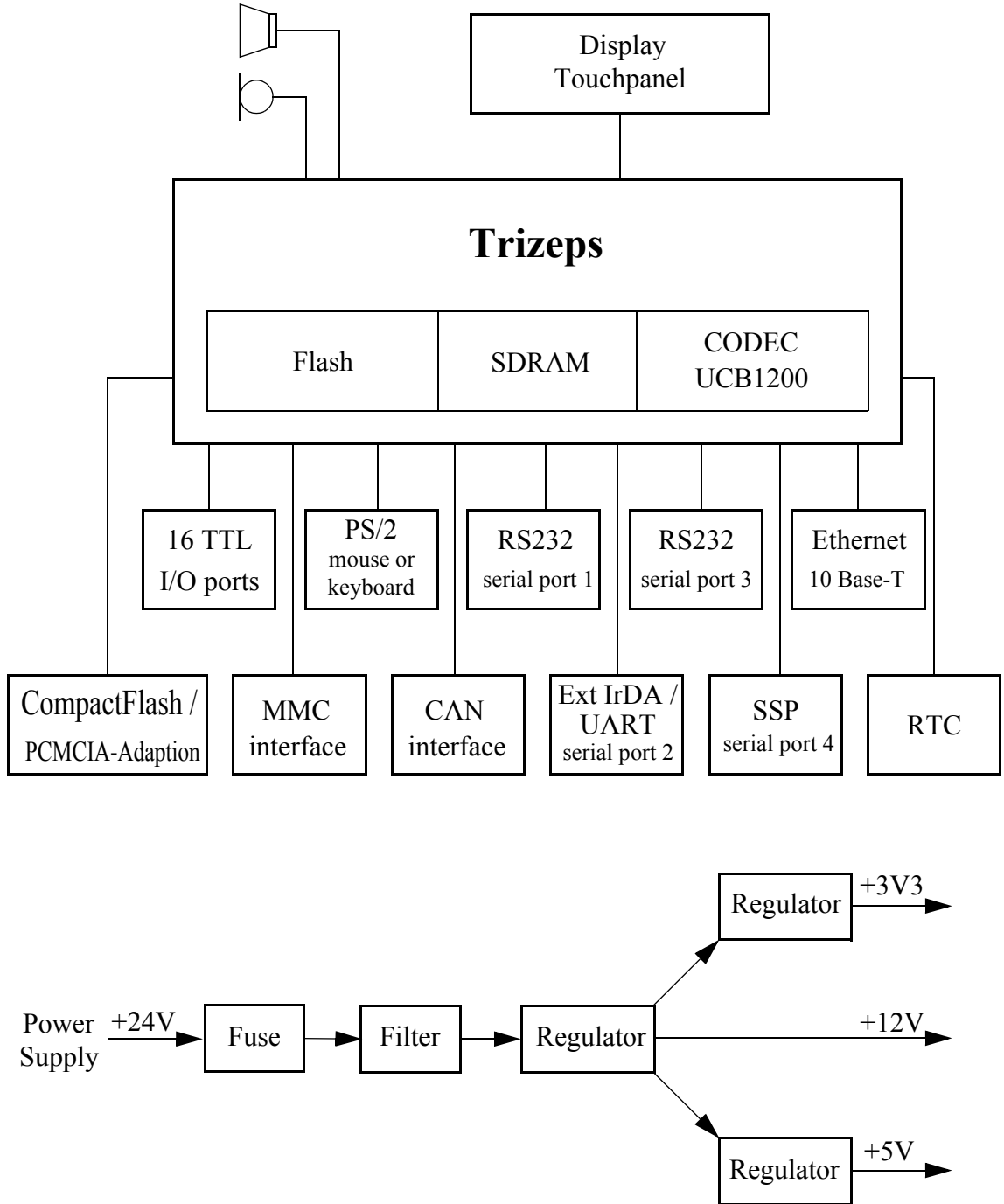
3.1   Trizeps

The MT6 board is fitted out either with the Trizeps I or the Trizeps II module.

3.1.1   Trizeps I

The Trizeps board is based on the Intel StrongArm SA-1110 Microprocessor - a highly integrated communications microcontroller that incorporates a 32-bit Strong-Arm Risc Processor core, system support logic, multiple communication channels, an LCD controller, a memory and PCMCIA controller, and general-purpose I/O ports.The SA-1110 is working very fast (150 Dhrystone 2.1 MIPS @ 133 MHz or 235 Dhrystone 2.1 MIPS @ 206 MHz) and needs very low power. Trizeps includes also the Philips UCB 1200 (a single chip, integrated mixed signal audio and telecom codec). The single channel audio codec is designed for direct connection of a micro-phone and a speaker. The built-in telecom codec can directly be connected to a DAA and supports high speed modem protocols. The incorporated analog to digital converter and the touch screen interface provides complete control and read-out of an 4 wire resistive touch screen.

3.1.2   Trizeps II

The Trizeps II Module is based on the Intel® XScale™ core-based CPU (200, 300 and 400 MHz) PXA250 - ARM Architecture v.5TE compliant and application code compatible with Intel® SA-1110 processor which is used on the Trizeps I module. The CPU based on Intel® Superpipelined RISC technology utilizing advanced Intel 0.18μ process for high core speeds at low power (480K Dhrystone 2.1 per second @ 400 MHz). Some features of the XScale: Integrated memory and PCMCIA/Com-pactFlash Controller with 100MHz Memory Bus, 16-bit or 32-bit ROM/Flash/ SRAM six banks, 16-bit or 32-bit SDRAM; System Control Module includes 17 dedicated general-purpose interruptible I/O ports, real-time clock, watchdog and interval timers, power management controller, interrupt and reset controller, LCD controller and two on-chip oscillators. Trizeps-II includes also the Philips UCB 1400, on a single chip it combines audio codec functions, a touch-screen controller and power management interfaces. The incorporated A/D converter and the touch screen interface provides complete control and read-out of a 4 wire resistive touch screen.

3.2   Serial EEPROM (optional)

MT6N provides a serial EEPROM (X24C16- Xicor) to be used as a non-volatile memory. It has a size of 16KBit and it is internal organized as 2048 x 8. The X24C16 offers a serial interface and a software protocol allowing operation on a simple two wire bus with I^2C_CLK (GPIO26 of SA-1110) and I^2C_DATA (GPIO27 of SA-1110). The EEPROM is optional and usually not placed.

FIGURE 2.   The slave address of the EEPROM:

Device Type Identifier				High order word address			
1	0	1	0	0	0	0	R/$\overline{W}$
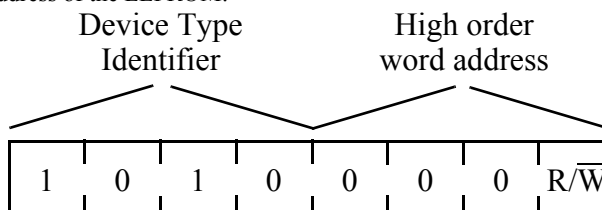
- Read address: A1
- Write address: A0

3.3   CompactFlash / PCMCIA

The MT6N is delivered with a Type I CompactFlash connector. In addition (optional) there is a 68-leaded adaption connector which carries all signals for a single Type II PCMCIA-Slot connector.

TABLE 1.   PCMCIA and CF Status Register

Offset 0x00000000   PCMCIA Status Register

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Reserved												VS[1.0]		BVD[1:0]	

Bits	Name	Type	Description
1:0	BVD[2..1]	Read Only	Charge Condition of PC-card 00 - Battery low, data loss 01 - Warning, battery must be changed, but no data loss till now 10 - Battery low, data loss 11 - Battery OK
3:2	VS[2:1]	Read Only	Voltage Sense lines xx^a - 5V operation 0x - 3V3 operation

a. x means unconnected

3.3.1   PCMCIA

In the past memory expansion cards (specification 1.0) of the size of check cards had just the purpose of providing memory. With the today generally valid specification 2.0 much of I/O units can be placed in a PCMCIA-slot. This includes for example SCSI-adaptation, Ethernet-Card or modem cards.

The PCMCIA-adaption connector on the board is designed on the basis of specification 2.0 (representative of this specification is the *Personal Computer Memory Card International Association*)

The adjustment of the supply voltage and the programming voltage of the PCMCIA-card is to be effected by the Board Control Register.

3.3.2   CompactFlash

CompactFlash is a very small removable mass storage device. It provides complete PCMCIA-ATA functionality and compatibility plus TrueIDE functionality compatible with ATA/ATAPI-4. At 43mm (1.7") x 36mm (1.4") x 3.3mm (0.13"), the device's thickness is less than one-half of a current PCMCIA Type II card. It is actually one-fourth the volume of a PCMCIA card. Compared to a 68-pin PCMCIA card, a CompactFlash card has 50 pins (the connector is similar to the PCMCIA card) but still conforms to PCMCIA-ATA specs. CompactFlash cards are designed with flash technology, a non-volatile storage solution that does not require a battery to retain data indefinitely. CompactFlash storage products are solid state, meaning

they contain no moving parts, and provide users with much greater protection of their data than conventional magnetic disk drives.

3.4 Board Control Register BCR

The MT6N board requires additional GPIO output functions, which are implemented in the Board Control Register (BCR) to control the Compact Flash, PCMCIA, display and something else.

TABLE 2.   Board Control Register

Offset 0x02000000   Board Control Register

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reset	?	?	?	?	?	?	?	?	0	0	1	0	0	0	0	0
				Reserved					PCMCIA_RESET	FORCE_ON	PCMCIA_BUF_EN	L_DISP		CONTR_LOGIC [3..0]		

Bits	Name	Type	Description
3:0	CONTR_ LOGIC [3..0]	Write Only	PCMCIA Power Control Logic see table 3 on page 8
4	L_DISP	Write Only	Display enable 0 - Display off 1 - Display on
5	PCMCIA_ BUF_EN	Write Only	PCMCIA buffer enable 0 - PCMCIA buffer enable ON 1 - PCMCIA buffer enable OFF
6	FORCE_ ON	Write Only	Turn on RS232 tranceiver 0 - RS232 transceiver OFF 1 - RS232 transceiver ON
7	PCMCIA_ RESET	Write Only	Resetting PCMCIA card 0 - Normal operation 1 - Resetting PCMCIA

The PCMCIA-Switcher (MIC2562a-1) can be adjusted by the data lines D00 to D03. The MIC2562a-1 switches between the three power supplies (0V, 3.3V and

5.0V) and the programming voltages (OFF, 0V, 3.3V, 5.0V or 12.0V), which are needed for the PCMCIA-cards.

TABLE 3.   MIC2562a-1 Control Logic Table

D00	D01	D02	D03	Vcc out	Vpp out
0	0	0	0	Clamped to Ground	Clamped to Ground
0	0	0	1	Clamped to Ground	High Z
0	0	1	0	Clamped to Ground	High Z
0	0	1	1	Clamped to Ground	High Z
0	1	0	0	5V	Clamped to Ground
0	1	0	1	5V	5V
0	1	1	0	5V	12V
0	1	1	1	5V	High Z
1	0	0	0	3.3V	Clamped to Ground
1	0	0	1	3.3V	3.3V
1	0	1	0	3.3V	12V
1	0	1	1	3.3V	High Z
1	1	0	0	Clamped to Ground	Clamped to Ground
1	1	0	1	Clamped to Ground	High Z
1	1	1	0	Clamped to Ground	High Z
1	1	1	1	Clamped to Ground	High Z

With setting the data bus D04 the display control signal L_DISP can be switched. The important thing about that is the power on/off timing of the display. Usually the correct sequence is as followed:

1. Power Supply
2. Input signal
3. Contrast voltage
4. Display control signal L_DISP

If you use another display as delivered from Keith & Koep you should test the correctness of the power on/off sequences.

Resetting the data bus D05 switches the address and control-signals of the PCMCIA-buffer.

With setting the data bus D06 the serial interface driver is switched on.

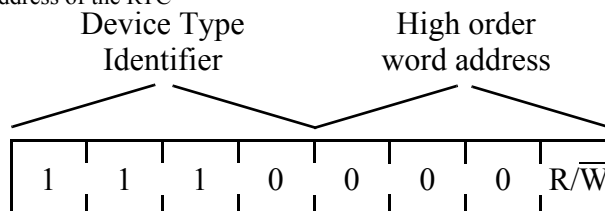With setting the data bus D07 a reset-signal is sent to the PCMCIA-slot.

3.5 Real Time Clock (RTC)

MT6N contains a Low-Power RTC from Philips, called PCF8593. This chip uses the same two wire bus as the serial EEPROM, which is described in figure 2 on page 5.

FIGURE 3.   The slave address of the RTC

Device Type Identifier				High order word address			
1	1	1	0	0	0	0	R/$\overline{W}$

Read address: A3

Write address: A2

The RTC is either supplied from the onboard battery or from an external battery.

3.6 JTAG interfaces

The SA-1110 contains a JTAG port that allows test access to the I/O pins of the device. The JTAG port is designed as a 10-pin header connector.

With a second JTAG interface program the CPLDs on board. It is designed as a 6-pin header.

3.7 Reset

There are two sources of reset on the MT6N:

1. Power-on Reset

2. Reset from the watchdog timer

Power-on reset is generated automatically when power is applied to the board. It can also be initiated by a push button switch attached to a 2-pole 0.1-inch pitch connector on the board.

Resets generated by any of these methods are equivalent and indistinguishable.

3.8 Power Supply

Power supply is possible on several ways:

First: The Power supply of MT6N is accessible by a power connector by Phoenix with part number PSC 1,5/3-M. Pin 1 is the positive one (+24V) and Pin 3 is Ground.

Second: It is also possible to supply MT6N by an optional PCB where the TTL I/O ports are electrically isolated. More information: http://www.keith-koep.com.

Third: Supply through a 2-pin connector by Phoenix, which is optional and usually not placed.

3.9 Power generation on board

+12V are generated from the +24V power supply using a DC-DC converter. This voltage is just needed for some PCMCIA cards and for some kinds of backlight inverter of the display.

The power supplies +5V and +3V3 are generated from the +12V power by two further DC-DC converters. The +5V are used by PCMCIA or CompactFlash cards, CAN and for backlight inverter. The +3V3 are used by Trizeps, Ethernet, PCMCIA or CompactFlash cards, serial interfaces and something else.

3.10 GPIO

Both (Trizeps I and Trizeps II) modules put GPIOs at free disposal.

3.10.1 GPIO (Trizeps I)

The SA-1110 provides 28 general purpose I/O port pins for use in generating and capturing application specific input and output signals. Each pin is programmable as an input or output and as an interrupt source. Most GPIO pins have an alternate function which can be invoked to enable additional functionality within the SA-1110. If a GPIO is used for this alternate function it cannot be used as a GPIO at the same time. The table below shows each GPIO pin with the using on MT6N and its corresponding alternate function.

TABLE 4.   GPIOs of SA1110 (Trizeps I) used on MT6 and their alternate functions

SA1110 Pin	Function on MT6	Dir	Description	Alternate function	Dir
GP[27]	I2C_DATA[a]	bi	Data I2C-bus	32KHZ_OUT	out
GP[26]	I2C_CLK[b]	out	Clock I2C-bus	RCLK_OUT	out
GP[25]	ANGELBOOT	in	Start of angel BSL	RTC Clock	out
GP[24]	$\overline{PCD}$	in	PCMCIA card detect	Reserved	
GP[23]	$\overline{IRQ\_IO}$	in	Interrupt of TTL I/O	TREQB	in
GP[22]	IRQ_CODEC[c]	in	Interrupt of UCB1200	TREQA	in
GP[21]	$\overline{IRQ\_CAN}$	in	Interrupt of CAN	TIC_ACK	out
GP[21]				MCP_CLK	in
GP[20]	$\overline{INVALID\_3}$	in	RS232-Invalid-signal (3)[d]	UART_SCLK3	in
GP[19]	$\overline{IRQ\_SMC}$	in	Interrupt of Ethernet	SSP_CLK	in
GP[18]	DCD_3	in	Data carrier detect (3)	UART_SCLK1	in
GP[17]	DSR_3	in	Data set ready (3)	SDLC_AAF	out
GP[16]	DTR_3	out	Data terminal ready (3)	SDLC_SCLK	bi
GP[15]	CTS_3	in	Clear to send (3)	UART_RXD	in
GP[14]	RTS_3	out	Request to send (3)	UART_TXD	out
GP[13]	CTS_1	in	Clear to send (1)	SPI_CS	out
GP[12]	RTS_1	out	Request to send (1)	SPI_CLK	out
GP[11]	SPI_RXD	in			in
GP[10]	SPI_TXD	out			out
GP[2-9]	LDD[8-15]	out	Display signal	LDD[8-15]	out

TABLE 4.   GPIOs of SA1110 (Trizeps I) used on MT6 and their alternate functions

SA1110 Pin	Function on MT6	Dir	Description	Alternate function	Dir
GP[1]	$\overline{\text{PRDY}}$	in	Interrupt PCMCIA	Reserved	
GP[0]	IRQ_PIC	in	Interrupt PIC	Reserved	

a. 100K pulled up

b. 100K pulled up

c. Used on Trizeps internally

d. The number in parenthesis named the serial port

3.10.2 GPIO (Trizeps II)

The PXA250 processor enables and controls its 81 general purpose I/O (GPIO) pins through the use of 27 registers which configure the pin direction (input or output), pin function, pin state (outputs only), pin level detection (inputs only), and selection of alternate functions. The PXA250 processor provides 81 GPIO pins for use in generating and capturing application specific input and output signals. Each pin can be programmed as either an input or output.When programmed to be an input, a GPIO can also serve as an interrupt source. If a GPIO is used for it alternate function it cannot be used as a GPIO at the same time. The table below shows each GPIO pin with the using on MT6N and its corresponding alternate function.

TABLE 5.   GPIOs of PXA250 (Trizeps II) used on MT6 and their alternate functions

PXA250 Pin	Function on MT6	Dir	Description	Alternate function	Dir
GP[80]	$\overline{\text{CS[4]}}$	out	Active low chip select 4	nCS[4]	out
GP[79]	$\overline{\text{CS[3]}}$	out	Active low chip select 3	nCS[3]	out
GP[78]	$\overline{\text{CS[2]}}$	out	Active low chip select 2	nCS[2]	out
GP[77]	L_BIAS	out	LCD AC BIAS	LCD_ACBIAS	out
GP[76]	L_PCLK	out	LCD pixel clock	LCD_PCLK	out
GP[75]	L_LCLK	out	LCD line clock	LCD_LCLK	out
GP[74]	L_FCLK	out	LCD frame clock	LCD_FCLK	out
GP[73]	LDD15	out	LCD data pin 15	LDD[15]	out
GP[73]			Memory controller grant	MBGNT	out
GP[72]	LDD14	out	LCD data pin 14	LDD[14]	out
GP[72]			32 KHz clock	32 kHz	out
GP[71]	LDD13	out	LCD data pin 13	LDD[13]	out
GP[71]			3.6 MHz oscillator clock	3.6 MHz	out
GP[70]	LDD12	out	LCD data pin 12	LDD[12]	out
GP[70]			Real Time Clock (1Hz)	RTCCLK	out
GP[69]	LDD11	out	LCD data pin 11	LDD[11]	out
GP[69]			MMC_CLK	MMCCLK	out
GP[68]	LDD10	out	LCD data pin 10	LDD[10]	out
GP[68]			MMC Chip Select 1	MMCCS1	out

TABLE 5.   GPIOs of PXA250 (Trizeps II) used on MT6 and their alternate functions

PXA250 Pin	Function on MT6	Dir	Description	Alternate function	Dir
GP[67]	LDD09	out	LCD data pin 9	LDD[9]	out
GP[67]			MMC Chip Select 0	MMCCS0	out
GP[66]	LDD08	out	LCD data pin 8	LDD[8]	out
GP[66]			MBREQ	MBREQ	in
GP[58]-GP[65]	LDD[00-07]	out	LCD data pin 0 to7	LDD[0-7]	out
GP[57]	$\overline{\text{PIOIS16}}$	in	Bus Width select I/O card	nIOIS16	in
GP[56]	$\overline{\text{PWAIT}}$	in	Wait signal for card space	nPWAIT	in
GP[55]	$\overline{\text{PREG}}$	out	Card address bit 26	nPREG	out
GP[54]	PSKTSEL	out	Socket select for card space	PSKTSEL	out
GP[54]			MMC Clock	MMCCLK	out
GP[53]	$\overline{\text{PCE2}}$	out	Card Enable for card space	nPCE[2]	out
GP[53]			MMC Clock	MMCCLK	out
GP[52]	$\overline{\text{PCE1}}$	out	Card Enable for card space	nPCE[1]	out
GP[51]	$\overline{\text{PIOW}}$	out	I/O Write for Card space	nPIOW	out
GP[50]	$\overline{\text{PIOR}}$	out	I/O Read for Card space	nPIOR	out
GP[49]	$\overline{\text{PWE}}$	out	Write enable for card space	nPWE	out
GP[48]	$\overline{\text{POE}}$	out	Output Enable for card space	nPOE	out
GP[47]	TXD_2	out	STD_UART transmit data	TXD	out
GP[47]			ICP transmit data	ICP_TXD	out
GP[46]	RXD_2	in	STD_UART receive data	RXD	in
GP[46]			ICP receive data	ICP_RXD	in
GP[45]	BT_RTS	out	BTUART request to send	RTS	out
GP[44]	BT_CTS	in	BTUART clear to send	CTS	in
GP[43]	BT_TXD	out	BTUART transmit data	BTTXD	out
GP[42]	BT_RXD	in	BTUART receive data	BTRXD	in
GP[41]	FF_RTS	out	FFUART request to send	RTS	out
GP[40]	FF_DTR	out	FFUART data terminal ready	DTR	out
GP[39]	FF_TXD	out	FFUART transmit data	FFTXD	out
GP[39]			MMC Chip select 1	MMCCS1	out
GP[38]	FF_RI	in	FFUART ring indicator	RI	in
GP[37]	FF_DSR	in	FFUART data set ready	DSR	in
GP[36]	FF_DCD	in	FFUART data carrier detect	DCD	in
GP[35]	FF_CTS	in	FFUART clear to send	CTS	in
GP[34]	FF_RXD	in	FFUART receive data	FFRXD	in
GP[34]			MMC chip select 0	MMCCS0	out
GP[33]	$\overline{\text{CS5}}$	out	Active low chip select 5	nCS[5]	out
GP[32]			AC97 Sdata_in1	SDATA_IN1	in
GP[31]	AC97SYNC[a]	out	AC97 sync	SYNC	out

TABLE 5.   GPIOs of PXA250 (Trizeps II) used on MT6 and their alternate functions

PXA250 Pin	Function on MT6	Dir	Description	Alternate function	Dir
GP[31]			I2S sync	SYNC	out
GP[30]	AC97DOUT[a]	out	AC97 Sdata_out	SDATA_OUT	out
GP[30]			I2S Sdata_out	SDATA_OUT	out
GP[29]	AC97DIN[a]	in	AC97 Sdata_in0	SDATA_IN0	in
GP[29]			I2S Sdata_in	SDATA_IN	in
GP[28]	BITCLK[a]	in	AC97 bit_clk	BITCLK	in
GP[28]			I2S bit_clk	BITCLK	in
GP[28]			I2S bit_clk	BITCLK	out
GP[27]				EXT_CLK	in
GP[26]				RXD	in
GP[25]	PWR_FAIL	in	Powerfail IRQ	TXD	out
GP[24]	$\overline{PCD}$	in	PCMCIA card detect	SFRM	out
GP[23]	$\overline{IRQ\_IO}$	in	TTL I/O IRQ	SCLK	out
GP[22]					
GP[21]	$\overline{IRQ\_CAN}$	in	CAN IRQ		
GP[20]	$\overline{INVALID\_3}$	in	RS232 Invalid signal	DREQ[0]	in
GP[19]	$\overline{IRQ\_SMC}$	in	Ethernet IRQ	DREQ[1]	in
GP[18]	RDY	in	External bus ready	RDY	in
GP[17]			PWM1 output	PWM1	out
GP[16]			PWM0 output	PWM0	out
GP[15]	$\overline{CS1}$	out	Active low chip select 1	nCS[1]	out
GP[14]			Memory bus master request	MBREQ	in
GP[13]			Memory controller grant	MBGNT	out
GP[12]			32 kHz out	32 kHz	out
GP[11]			3.6 MHz oscillator out	3.6 MHz	out
GP[10]			Real time clock (1Hz)	RTCCLK	out
GP[9]			MMC Chip select 1	MMCCS1	out
GP[8]			MMC Chip select 0	MMCCS0	out
GP[7]			48 MHz clock output	48 MHz clock	out
GP[6]			MMC clock	MMCCLK	out
GP[5]					
GP[4]					
GP[3]					
GP[2]	IRQ_CODEC[a]	in	UCB1x00 IRQ		
GP[1]	PRDY	in	PCMCIA IRQ	GP_RST	in
GP[0]	IRQ_PIC	in	PIC IRQ		

a. used on Trizeps II internally

3.11   Ethernet

The Ethernet Controller (LAN91C96 by SMSC) on the MT6N board supports the IEEE 802.3 (ANSI 8802-3) Ethernet Standards. It is connected to a 10 Base-T filter module. The Ethernet connector is of the type RJ45. The controller in the configuration of MT6N provides:

- 6K Bytes of On-Chip RAM
- Support of enhanced transmit queue management
- Direct interface to ISA buses with no wait states
- Fast access time (40ns)
- Pipelined data path
- Integrated 10Base-T Transceiver functions:
  - •Driver and receiver
  - •Link integrity test
  - •Receive polarity detection and correction
- 10 Mb/s Manchester Encoding / Decoding and clock recovery
- Automatic retransmission, bad packet rejection and transmit padding
- Optional configuration via serial EEPROM interface (jumperless)
- Two direct driven LEDs for diagnostics (transmit / receive indication)

3.12   Serial ports

The MT6 provides four kinds of serial ports:

- USB
- UART
- IrDA
- SPI

3.12.1   Serial port 0 - USB Device Controller

Serial port 0 is an universal serial bus device controller (UDC) that supports three endpoints and can operate half-duplex at a baud rate of 12 Mbps (slave only, not a host or hub controller).The UDC is USB-compliant and supports all standard device requests is issued by the host. The external pins dedicated to this interface are UDC+ and UDC-. The USB protocol uses differential signalling between the two pins for half-duplex data transmission. A 1.5 KOhm pull-up resistor is connected to the USB cable's D+ signal to pull the UDC+ pin high when not driven. This signifies the UDC is a high-speed, 12 Mbps device and provides the correct polarity for data transmission.

Serial port 0 is accessible by an SL1-4 (four pin header). However, the user should refer to the Universal Serial Bus Specification, Revision 1.0[1] for a full description of the USB protocol and its operation.

3.12.2   Serial port 1 - UART

Serial port 1 is configured as an universal asynchronous receiver / transmitter (UART) serial controller. A Maxim MAX3223 RS232 transceiver is used to manage the level conversion and line interface. The device has a power saving auto-

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1. The latest revision of the Universal Serial Bus Specification Revision 1.0 can be accessed via the World Wide Web Internet side at: http://www.teleport.com/~usb/

matic shutdown that powers down the chip if no valid RS232 levels are detected. The component may also be forced off by the FORCEON signal. Serial port 1 is accessible by the female serial port connector J18 (10-pin header). The external pins dedicated to this interface are TXD1 and RXD1. Further GPIO 12 and 13 are used as hand-shake signals RTS and CTS.

For the communication between the PC (DB9 male) and the MT6 a serial extension cable is needed. Therefore the serial port J18 (10 pin header) is to be connected with a short flat cable to a DB9 female connector (see figure 7 on page 36).

3.12.3 Serial port 2 - Infrared communications port

The infrared communications port (ICP) operates at half-duplex and provides direct connection to commercially available Infrared Data Association (IrDA) compliant LED transceivers. The ICP supports both the original IrDA standard with speeds up to 115.2 Kbps as well as the newer 4-Mbps standard. Both standards use different bit encoding techniques and serial packet formats. Low-speed IrDA transmission uses the Hewlett-Packard Serial Infrared standard (HP-SIR) for bit encoding and an UART as the serial engine; high-speed uses Four-Position Pulse Modulation (4PPM) and a specialized serial packet protocol developed expressly for IrDA transmission. Serial port 2 is accessible by a 10-pin header. The external pins dedicated to the ICP are TXD2 and RXD2.

FIGURE 4.   Sample: Use of IrDA
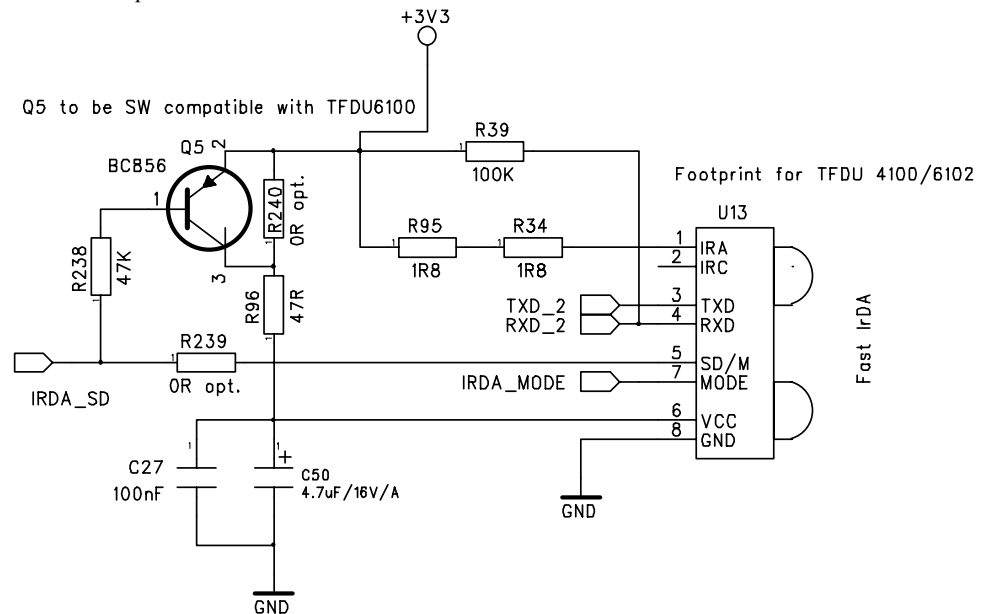
TABLE 6.   IrDA Control Register

	Offset 0x02400000											IrDA Control Register			
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reset	?	?	?	?	?	?	?	?	?	?	?	?	?	?	0	1

| | Reserved | | | | | | | | | | | | | | IRDA_MODE | IRDA_SD |

Bits	Name	Type	Description
0	IRDA_SD	Write Only	IrDA Shutdown 0 - IrDA activ 1 - IrDA inactiv
1	IRDA_MODE	Write Only	IrDA Mode 0 - Low speed 1 - High speed

Alternately you can use serial port 2 as an UART.

3.12.4 Serial port 3 - UART

Serial port 3 is configured as an universal asynchronous receiver / transmitter (UART) serial controller. A Maxim MAX3243 RS232 transceiver is used to manage the level conversion and line interface. The device has a power saving automatic shutdown that powers down the chip if no valid RS232 levels are detected. The component may also be forced off by the FORCEON signal. Serial port 3 is accessible by the male serial port connector J12 (DSUB9M). This port provides RTS, CTS, DSR, DTR and DCD modem signals to support a serial IO port PC synchronous application.

3.12.5 Serial port 4 - SSP

The synchronous serial port (SSP) of the SA-1110 is used to interface to a variety of analog-to-digital converters, audio and telecom codecs, memory chips, and keypad controllers as well as other miscellaneous serial devices. The SSP supports the National Microwire and Texas Instruments synchronous serial protocols as well as a subset of the Motorola serial peripheral interface (SPI) protocol. Serial port 4 controls full-duplex synchronous serial transfer between the SA-1110 and off-chip devices. The SSP functions as a master only and communicates to the off-chip slave device by driving a serial bit rate clock ranging from 7.2 KHz to 1.8432 MHz along with a frame synchronisation pulse to denote the start of each frame transfer, and supports any data format between 4 and 16 bits. The external pins dedicated to this interface are GPIO 10 to 13.

3.13 CAN interface

The CAN (Controller Area Network) is a serial bus system especially suited for networking "intelligent" devices as well as sensors and actuators within a system or subsystem. MT6 uses the SJA1000, a stand-alone CAN controller made by Philips. It is used within automotive and general industrial environments. SJA1000 is the successor of the PCA82C200 CAN controller (BasicCAN) from Philips Semiconductors. Additionally, a new mode of operation is implemented (PeliCAN) which supports the CAN 2.0B protocol specification with several new features.

This controller offers the following features:

- PIN and Electrical compatibility to the PCA82C200 stand-alone CAN controller
- PCA82C200 mode (BasicCan mode is default)
- Extended receive buffer (64-byte FIFO)
- CAN 2.0B protocol compatibility
- Supports 11-bit identifier as well as 29-bit identifier
- Bit rates up to 1Mbits/s
- PeliCAN mode extensions:
  - Error counters with read/write access
  - Programmable error warning limit
  - Last error code register
  - Error interrupt for each CAN-bus error
  - Arbitration lost interrupt with detailed bit position
  - Single-shot transmission (no re-transmission)
  - Listen only mode (no acknowledge, no active error flags)
  - Hot plugging support (software driven bit rate detection)
  - Acceptance filter extension (4-byte code, 4-byte mask)
  - Reception of 'own' messages (self reception request)

To use the can interface, please refer to the pinout description of the can connector (J3 DB9 female) in table 12 on page 25.

3.14 TTL I/O

MT6 offers 16 TTL Inputs and 16 TTL Outputs. There are 2 I/O connectors called J15 and J16 on the board. Both connectors comprise each 8 TTL Input ports and 8 TTL Output ports. The pinout is shown in table 24 on page 33 and table 25 on page 34. The output signals (OUTPUT[00:15]) correspond with dataline signals D[00:15], which are switched by a CPLD. They will be selected by addressing 0x19800000 (\CS_IO_OUT and \CS_IO_IN). The Inputs can be read as follows:

read = *(short *) ADR

The Outputs can be written as follows:

*(short *) portadr = value

Keith & Koep GmbH offers an optional circuit board with electrically isolated ports, one which can be placed directly on J15 and another one that will be connected by a flat cable to J16. With this board it is possible to provide +24V for the

MT6. You'll find more information about the I/O board on our homepage (www.keith-koep.com/trizeps.html)

3.15 Audio In/Out

The Trizeps board includes a single chip integrated mixed signal audio and telecom codec (Philips UCB 1200). JJ2 and JJ3 on the MT6 give access to the speaker and microphone signals. The pinout of JJ2 is shown in table 34 on page 39 and of JJ3 in table 35 on page 39.

From MT6 Version 5 the board can be fitted out with an audio stereo connector.

3.16 Display connector and 4 wire Touch Panel

The SA-1110 on the Trizeps offers a 16 bit LCD-controller. The audio and telecom codec (see chapter 3.15, "Audio In/Out" on page 18) provides also a 4 wire touch screen interface. The relevant signals are accessible at J14 see table 23 on page 32.

The contrast voltage can be adjusted by an Digitally-Controlled Potentiometer by Xicor. The device consists of a resistor array, wiper switches, a control section, and nonvolatile memory. The wiper position is controlled by a three-wire interface.

The potentiometer is implemented by a resistor array composed of 99 resistive elements and a wiper switching network. Between each element and at either end are tap points accessible to the wiper terminal. The position of the wiper element is controlled by the CS, U/D, and INC inputs. The position of the wiper can be stored in nonvolatile memory and then be recalled upon a subsequent power-up operation.

TABLE 7.   Display Contrast Register

Offset 0x03800000   Display Contrast Register

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reset	?	?	?	?	?	?	?	?	?	?	?	?	?	?	1	1
	Reserved													EEPOT_U_D	EEPOT_INC	EEPOT_CS

Bits	Name	Type	Description
0	EEPOT_CS	Write Only	Chip Select of EEPOT 0 - activ 1 - inactiv
1	EEPOT_INC	Write Only	Increment of EEPOT 0 - increment by 1 1 - inactive
2	EEPOT_U_D	Write Only	Direction (Up/Down)of EEPOT 0 - decrement 1 - increment

3.17 MultiMediaCard

The MultiMediaCard standard grew out of a joint development between SanDisk Corporation and Siemens AG/Infineon Technologies AG, and was introduced in

November 1997. MultiMediaCards weigh less than two grams and, about the size of a postage stamp, are the world's smallest (24mm x 32mm x 1.4 mm) removable solid-state memory solutions for mobile applications. These convenient, reliable, rugged and lightweight standardized data carriers store up to 64 MBytes.

MultiMediaCards use ROM technology for read-only applications and Flash technology for read/write applications. The cards are fast for excellent system performance; energy efficient for prolonged battery life in portable products; and cost-efficient for use in systems sold at consumer price points. The simple molded package has a seven pad (pin) serial interface. This easy-to-install simple serial interface offers easy integration into various devices regardless of the microprocessor used. The MultiMediaCard has a wide variety of uses in some of the most exciting products on the market today.

3.18 PS/2 connector

The MT6 is fitted out with an PS/2 connector which allows the use of a keyboard or a mouse.

3.19 Powerfail - Interrupt

Falling down power supply under ~14V generates an interrupt GPIO25 (Powerfail-IRQ).

3.20 Uninterruptible Power Supply (UPS)

The easiest way to get an UPS is to use the following electrical circuit.

FIGURE 5.   UPS
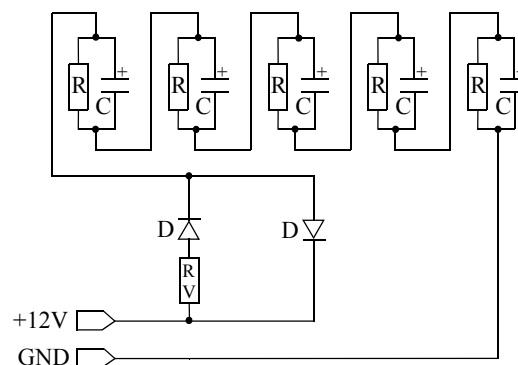
Values:
R: 22KΩ
RV: 10Ω   (Power resistor)
C: 10F / 2,3V   (UltraCap by EPCOS)
D: 1N5819

You can use connector J23 to supply this circuit with +12V and Ground.

This circuit is able to supply the MT6 with Trizeps in case of Powerfail for 15 seconds.

TABLE 8.   UPS Register

Offset 0x02800000   **UPS Register**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reset	?	?	?	?	?	?	?	?	?	?	?	0	1	1	0	0

												BATT_EMPTY	AUTO_DSPL_OFF	AUTO_PWR_OFF	CHARGE	BATT_EN
Reserved																

Bits	Name	Type	Description
0	BATT_EN	Output R/W	External battery enable signal 0 - external battery OFF 1 - external battery ON
1	CHARGE	Output R/W	Charge external battery 0 - Do not charge 1 - Charge
2	AUTO_PWR_OFF	Flag R/W	Turn off system flag 0 - OS does not power down after powerfail-IRQ 1 - OS powers down after power-fail-IRQ
3	AUTO_DISPL_OFF	Flag R/W	Turn off backlight inverter flag 0 - Leave backlight ON 1 - Powerfail-IRQ handler switches backlight OFF
4	BATT_EMPTY	Input Read Only	External battery status 0 - External battery empty 1 - External battery full

Appendix A

In this chapter you can find detailed description about all headers and connectors on MT6.

A.1   Overview of all jumpers, connectors

TABLE 9.   Overview of all jumpers and connectors

Name	Function	Type
J1	Power Supply	Phoenix MSTBVA 2,5/2-G-5,08 (optional)
J2	CompactFlash connector	3M N7E50-7516VY-2O
J3	CAN connector	DSUB9 female
J4	JTAG connector (CPLD)	Header SL2-6
J5	RS232 connector (port 3)	DSUB9 male
J6	Ethernet connector	RJ45
J7	JTAG connector (Trizeps)	Header SL2-10
J8	BLI (external)	Header SL3-4 (optional)
J9	BLI (direct)	Header SL3-4 (optional)
J10	Power Supply	Phoenix PSC 1,5/3-M
J11	PCMCIA interface	2 x Header SL2-34 (optional)
J12	Serial port 3 (Transformed signals)	Header SL2-10 (optional)
J13	Serial port 3 (TTL-signals)	Header SL2-10 (optional)
J14	Display connector	Header SL2-40
J15	TTL I/O connector	Header SL2-26
J16	TTL I/O connector	Header SL2-26
J17	Serial port 2 connector	Header SL2-10
J18	RS232 connector (port 1)	Header SL2-10
J19	SPI and A/D connector	Header SL2-14
J20	USB / IrDA connector	Header SL2-10
J21	PIC16F84 program connector	Header SL1-6
J22	PS/2 connector	Molex 87123-08
J23	Uninterruptible Power Supply (UPS) connector	Header SL2-10
J24	MultiMediaCard (MMC) connector	JST Drawing No. KRD-24511-1 (optional)
JJ1	CAN Termination	Header SL1-2
JJ2	Speaker connector	Header SL1-2
JJ3	Microphone connector	Header SL1-2
JJ5	Reset connector	Header SL1-2
JJ6	Battery (onboard or external)	Header SL1-4
JJ7	Invalid signal for serial connection	Header SL1-3
JJ8	Angelboot	Header SL1-2
S1	Audio stereo connector	Reichelt EBS35A
U1	Trizeps	SODIMM 144
X9	Display LM8V31	MOLEX 53261-1590 (optional)
X10	Display LM8V31	MOLEX 53261-1490 (optional)
X14	Touch LM8V31	JST 04FE-ST-VK-N (optional)

FIGURE 6. Jumper and connector locations
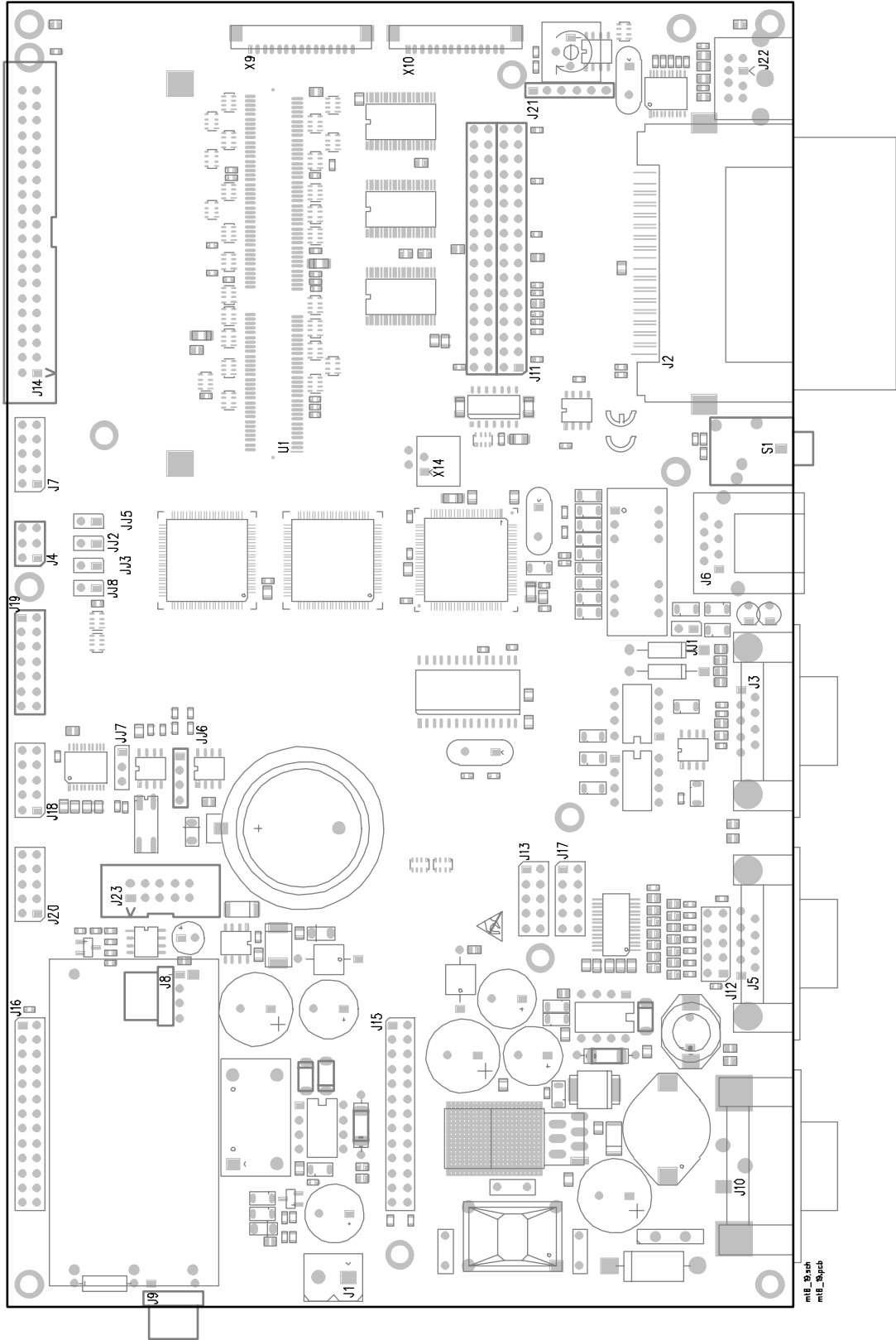
A.2   Power Supply (I)

The Power Supply connector is produced by PHOENIX. It's a 2 pin connector with the part number MSTBVA 2,5/2-G-5,08. This part is optional and usually not placed.

TABLE 10.   J1 - Power Supply

Pin	Signal	Description
1	24V	Power Supply
2	GND	Ground

A.3   CompactFlash connector

In table 11 on page 24 you see the pin description of the CompactFlash Connector. The „MC_" in front of the signal names is used by buffered signals. For example: MC_D01 means the second databus of SA1110 buffered by CPLD.

TABLE 11.   J2 - CompactFlash Connector

Pin	Signal	Description
1	GND	Ground
2	MC_D03	Databus
3	MC_D04	Databus
4	MC_D05	Databus
5	MC_D06	Databus
6	MC_D07	Databus
7	$\overline{MC\_CE1}$	Card Enable signal
8	MC_A10	Memory address bus
9	MC_OE	Output Enable signal
10	MC_A09	Memory address bus
11	MC_A08	Memory address bus
12	MC_A07	Memory address bus
13	MC_VDD	Power Supply
14	MC_A06	Memory address bus
15	MC_A05	Memory address bus
16	MC_A04	Memory address bus
17	MC_A03	Memory address bus
18	MC_A02	Memory address bus
19	MC_A01	Memory address bus
20	MC_A00	Memory address bus
21	MC_D00	Databus
22	MC_D01	Databus
23	MC_D02	Databus
24	$\overline{MC\_IOIS}$	Write Protect signal

TABLE 11.   J2 - CompactFlash Connector

Pin	Signal	Description
25	$\overline{MC\_CD2}$	Card Detect signal
26	$\overline{MC\_CD1}$	Card Detect signal
27	MC_D11	Databus
28	MC_D12	Databus
29	MC_D13	Databus
30	MC_D14	Databus
31	MC_D15	Databus
32	$\overline{MC\_CE2}$	Card Enable signal
33	$\overline{MC\_VS1}$	Voltage Sense signal
34	$\overline{MC\_IOR}$	I/O Read signal
35	$\overline{MC\_IOW}$	I/O Write signal
36	$\overline{MC\_WE}$	Write Enable signal
37	$\overline{MC\_RDY}$	Ready / Busy signal
38	MC_VDD	Power Supply
39	nc	not connected
40	$\overline{MC\_VS2}$	Voltage Sense signal
41	PCM_RESET	Reset signal
42	$\overline{MC\_WAIT}$	Wait signal
43	nc	not connected
44	$\overline{MC\_REG}$	Attribute-Memory-Select or Register signal
45	MC_BVD2	Battery Voltage Detect signal
46	MC_BVD1	Battery Voltage Detect signal
47	MC_D08	Databus
48	MC_D09	Databus
49	MC_D10	Databus
50	GND	Ground

A.4 CAN connector

The CAN-interface is electrically isolated. Usually the CAN-interface is terminated with an 120 Ohm resistor by closing jumper JJ1.

The CAN connector is a 9-pin female DSUB connector with the following pinout:

TABLE 12.   J3 - CAN connector

Pin	Signal	Description
1	nc	not connected
2	CANL	negative differential signal
3	CAN_GND	Ground CAN

TABLE 12.   J3 - CAN connector

Pin	Signal	Description
4	nc	not connected
5	nc	not connected
6	nc	not connected
7	CANH	positive differential signal
8	nc	not connected
9	CAN_VCC	Power Supply CAN

A.5   JTAG connector (CPLD)

On the MT6 there are two CPLD by Xilinx which can be programmed through an 6-pin header with the following pinout.

TABLE 13.   J4 - JTAG connector (CPLD)

Pin	Signal	Description
1	+3V3	Power Supply
2	GND	Ground
3	XC_TCK	Clock signal
4	XC_TDO2	Output signal
5	XC_TDI	Input signal
6	XC_TMS	Mode signal

A.6   RS232 connector (port 3)

The connector J5 is a male DB9 connector with the following pin description.

TABLE 14.   J5 - Serial Interface connector (port 3)

Pin	Signal	Description
1	DCD3_V24X	Data Carrier Detect
2	RXD3_V24X	Receive Data
3	TXD3_V24X	Transmit Data
4	DTR3_V24X	Data Terminal Ready
5	GND	Ground
6	DSR_V24X	Data Set Ready
7	RTS3_V24X	Request to Send
8	CTS3_V24X	Clear to Send
9	+5V	Power Supply

A.7 Ethernet connector

The Ethernet connector is an usually RJ45 connector with the following pin description.

TABLE 15.   J6 - Ethernet connector

Pin	Signal	Description
1	TPETXP	Transmit differential output
2	TPETXN	Transmit differential output
3	TPERXP	Receive differential output
4	nc	not connected
5	nc	not connected
6	TPERXN	Receive differential output
7	nc	not connected
8	nc	not connected

A.8 JTAG connector (Trizeps)

The JTAG connector to program Flash memory on Trizeps is a 2 row 10 pin header. The pinout is shown in table 16 on page 27

TABLE 16.   J7 - JTAG connector (Trizeps)

Pin	Signal	Description
1	$\overline{\text{TRST}}$	Test interface reset
2	+3V3	Power Supply
3	TDI	JTAG test interface data input
4	+3V3	Power Supply
5	TDO	JTAG test interface data output
6	GND	Ground
7	TMS	JTAG test interface mode select
8	GND	Ground
9	TCK	JTAG test interface reference clock
10	GND	Ground

A.9 Backlight Inverter (BLI) (external)

For backlight power you can either use the onboard BLI or an external BLI. The external one can be connected by an 4-pin header with the following pinout: This part is optional and usually not placed.

TABLE 17.   J8 - Backlight Inverter connector (external)

Pin	Signal	Description
1	BL_POWER	Default Value: +5V (switchable to +12V)
2	GND	Ground
3	nc	not connected
4	nc	not connected

A.10 Backlight Inverter (BLI) (direct)

The backlight power on the MT6 can be build by a Backlight inverter from TDK with the part name CXA-M10A-L. The pinout of the connector (Header SL3-4) is shown in table 18 on page 28.This part is optional and usually not placed.

TABLE 18.   J9 - Backlight Inverter connector

Pin	Signal	Description
1	OUT1	Power out
2	nc	not connected
3	nc	not connected
4	OUT_GND	Power Ground

A.11 Power Supply (II)

The Power supply of MT6 can happen on many ways. Usually the power connector J10 by Phoenix with the part number PSC 1,5/3-M is used.

TABLE 19.   J10 - Power connector

Pin	Signal	Description
1	+24V	Power supply (in range of +15V to +24V)
2	nc	not connected
3	GND	Ground

A.12 PCMCIA interface

Normally the MT6 is delivered with a CompactFlash connector. Alternately the board can fitted out with an header (4 rows of 17 pins) for an PCMCIA-adapter board. It is available by Keith & Koep. In table 20 on page 29 the signals are

described in consideration of using only memory cards or using memory and I/O cards.This part is optional and usually not placed.

TABLE 20.   PCMCIA-slot J4

Pin	Signal	Description
1	GND	Ground
2	D03	Databus
3	D04	Databus
4	D05	Databus
5	D06	Databus
6	D07	Databus
7	$\overline{\text{CE1}}$	Card Enable signal
8	A10	Memory address bus
9	$\overline{\text{OE}}$	Output enable signal
10	A11	Memory address bus
11	A09	Memory address bus
12	A08	Memory address bus
13	A13	Memory address bus
14	A14	Memory address bus
15	$\overline{\text{WE}}/\overline{\text{PGM}}$	Write-enable signal / Program signal
16	$\overline{\text{IREQ}}$	Ready / Busy signal Interrupt request signal
17	Vcc	Power Supply
18	Vpp1	Program Voltage
19	A16	Memory address bus
20	A15	Memory address bus
21	A12	Memory address bus
22	A07	Memory address bus
23	A06	Memory address bus
24	A05	Memory address bus
25	A04	Memory address bus
26	A03	Memory address bus
27	A02	Memory address bus
28	A01	Memory address bus
29	A00	Memory address bus
30	D00	Databus
31	D01	Databus
32	D02	Databus
33	$\overline{\text{IOIS16}}$	Write-Protect signal
34	GND	Ground
35	GND	Ground
36	$\overline{\text{CD1}}$	Card-Detect signal

TABLE 20.   PCMCIA-slot J4

Pin	Signal	Description
37	D11	Databus
38	D12	Databus
39	D13	Databus
40	D14	Databus
41	D15	Databus
42	$\overline{CE2}$	Card-Enable signal
43	$\overline{VS1}$	Voltage sense
44	$\overline{IORD}$	reserved
		I/O-Read signal
45	$\overline{IOWR}$	reserved
		I/O-Write signal
46	A17	Memory address bus
47	A18	Memory address bus
48	A19	Memory address bus
49	A20	Memory address bus
50	A21	Memory address bus
51	Vcc	Power Supply
52	Vpp2	Program Voltage
53	A22	Memory address bus
54	A23	Memory address bus
55	A24	Memory address bus
56	A25	Memory address bus, grounded
57	$\overline{VS2}$	Voltage sense
58	RESET	Reset signal
59	$\overline{WAIT}$	Wait signal
60	$\overline{INPACK}$	reserved
		Input Acknowledge signal
61	$\overline{REG}$	Attribute-Memory-Select- or Register-Signal
62	$\overline{SPKR}$	Battery Voltage Detect signal
		Speaker- or Digital-Audio connect
63	$\overline{STSCHG}$	Battery Voltage Detect
		Status-Changed signal
64	D08	Databus
65	D09	Databus
66	D10	Databus
67	$\overline{CD2}$	Card-Detect signal
68	GND	Ground

A.13   **Serial port 3 connectors for other serial interface than RS232**

If you want to use another serial interface than RS232 you can use two 10-pin headers. At one of them, connector J13 (table 22 on page 31), serial port 3 TTL-signals are available and at the other one, connector J12 (table 21 on page 31), the transformed signals are available.Both connectors are optional and usually not placed.

TABLE 21.   J12 - Serial port 3 (transformed signals)

Pin	Signal	Description
1	DCD3_V24X	Data Carrier Detect
2	DSR3_V24X	Data Set Ready
3	RXD3_V24X	Receive Data
4	RTS3_V24X	Request To Send
5	TXD3_V24X	Transmit Data
6	CTS3_V24X	Clear To Send
7	DTR3_V24X	Data Terminal Ready
8	+5V	Power Supply
9	GND	Ground
10	nc	not connected

TABLE 22.   J13 - Serial port 3 (TTL-signals)

Pin	Signal	Description
1	+3V3	Power Supply
2	+5V	Power Supply
3	TXD_3	Transmit Data
4	RXD_3	Receive Data
5	DCD_3	Data Carrier Detect
6	DTR_3	Data Terminal Ready
7	DSR_3	Data Set Ready
8	RTS_3	Request To Send
9	CTS_3	Clear To Send
10	GND	Ground

A.14   Display connector

You can connect an Sharp DSTN display called LM8V31 directly to the MT6N. If you want to use another display you have to use the 40-pin header, where are all relevant signals available. table 23 on page 32 describes the pins and their functions.

TABLE 23.   J14 - Display connector (40-pin Header)

Pin	Signal	Description
1	LDD00	LCD controller display data (Trizeps - SA-1110)
2	LDD01	LCD controller display data (Trizeps - SA-1110)
3	LDD02	LCD controller display data (Trizeps - SA-1110)
4	LDD03	LCD controller display data (Trizeps - SA-1110)
5	LDD04	LCD controller display data (Trizeps - SA-1110)
6	LDD05	LCD controller display data (Trizeps - SA-1110)
7	LDD06	LCD controller display data (Trizeps - SA-1110)
8	LDD07	LCD controller display data (Trizeps - SA-1110)
9	LDD08	LCD controller display data (Trizeps - SA-1110)
10	LDD09	LCD controller display data (Trizeps - SA-1110)
11	LDD10	LCD controller display data (Trizeps - SA-1110)
12	LDD11	LCD controller display data (Trizeps - SA-1110)
13	LDD12	LCD controller display data (Trizeps - SA-1110)
14	LDD13	LCD controller display data (Trizeps - SA-1110)
15	LDD14	LCD controller display data (Trizeps - SA-1110)
16	LDD15	LCD controller display data (Trizeps - SA-1110)
17	L_FCLK	LCD frame clock (Trizeps - SA-1110)
18	L_LCLK	LCD line clock (Trizeps - SA-1110)
19	L_PCLK	LCD pixel clock (Trizeps - SA-1110)
20	L_BIAS	LCD ac bias drive (Trizeps - SA-1110)
21	TSMX	negative X-plate touch screen (Trizeps - UCB 1200)
22	TSMY	negative Y-plate touch screen (Trizeps - UCB 1200)
23	TSPX	positive X-plate touch screen (Trizeps - UCB 1200)
24	TSPY	positive Y-plate touch screen (Trizeps - UCB 1200)
25	L_DISP	LCD on
26	NC	not connected
27	+3V3	Power supply
28	GND	Ground
29	+5V	Power supply
30	GND	Ground
31	+12V	Power supply
32	GND	Ground
33	GND	Ground
34	GND	Ground
35	I2C_DATA	Data I^2C Bus (Trizeps - SA-1110/GP27)

TABLE 23.   J14 - Display connector (40-pin Header)

Pin	Signal	Description
36	I2C_CLK	Clock I^{2}C Bus (Trizeps - SA-1110/GP26)
37	IRQ_PIC	Interrupt of the PIC (optional)
38	NC	not connected
39	NC	not connected
40	BL_POWER	Backlight power

A.15 TTL I/O connector

The connectors for the 16 TTL I/Os are called J15 and J16. The pinout of J15 is shown in table 24 on page 33, the other one in table 25 on page 34.

TABLE 24.   J15 - TTL I/O Connector (Databus 00 to 07)

Pin	Signal	Description
1	GND	Ground
2	OUTPUT00	TTL Output
3	OUTPUT01	TTL Output
4	OUTPUT02	TTL Output
5	OUTPUT03	TTL Output
6	OUTPUT04	TTL Output
7	OUTPUT05	TTL Output
8	OUTPUT06	TTL Output
9	OUTPUT07	TTL Output
10	GND	Ground
11	INPUT00	TTL Input
12	INPUT01	TTL Input
13	INPUT02	TTL Input
14	INPUT03	TTL Input
15	INPUT04	TTL Input
16	INPUT05	TTL Input
17	INPUT06	TTL Input
18	INPUT07	TTL Input
19	+3V3	Power Supply
20	+3V3	Power Supply
21	IRQ_IO	Interrupt Request TTL I/O
22	EXT_GND	Power Supply (external)
23	EXT_GND	Power Supply (external)
24	EXT_GND	Power Supply (external)

TABLE 24.   J15 - TTL I/O Connector (Databus 00 to 07)

Pin	Signal	Description
25	EXT_24V	Power Supply (external)
26	EXT_24V	Power Supply (external)

TABLE 25.   J16 - TTL I/O Connector (Databus 08 to 15)

Pin	Signal	Description
1	GND	Ground
2	OUTPUT08	TTL Output
3	OUTPUT09	TTL Output
4	OUTPUT10	TTL Output
5	OUTPUT11	TTL Output
6	OUTPUT12	TTL Output
7	OUTPUT13	TTL Output
8	OUTPUT14	TTL Output
9	OUTPUT15	TTL Output
10	GND	Ground
11	INPUT08	TTL Input
12	INPUT09	TTL Input
13	INPUT10	TTL Input
14	INPUT11	TTL Input
15	INPUT12	TTL Input
16	INPUT13	TTL Input
17	INPUT14	TTL Input
18	INPUT15	TTL Input
19	+3V3	Power Supply
20	+3V3	Power Supply
21	IRQ_IO	Interrupt Request TTL I/O
22	EXT_GND	Power Supply (external)
23	EXT_GND	Power Supply (external)
24	EXT_GND	Power Supply (external)
25	EXT_24V	Power Supply (external)
26	EXT_24V	Power Supply (external)

A.16   Serial port 2 connector

Signals of serial port 2 are available at a 10-pin header. Keith & Koep offers an Par-tyLine module using this interface.

TABLE 26.   J17 - Serial port 2 Connector

Pin	Signal	Description
1	TXD_2	Transmit Data
2	RXD_2	Receive Data
3	GND	GROUND
4	IrDA_SD	IrDA Shut Down Signal
5	+3V3	Power Supply
6	IRDA_MODE	IrDA Mode sIGNAL
7	+5V	Power Supply
8	EXT_24V	Power Supply
9	EXT_GND	Power Supply
10	nc	not connected

A.17   Serial port 1 connector

Signals of serial port 1 are available at this 10-pin header. **Attention**: If you use SPI-signals you can't use RTS and CTS at this interface!

TABLE 27.   J18 - Serial port 1 connector

| Pin	Signal	Description
1	-	internally connected to Pin 2 and 7
2	-	internally connected to Pin 1 and 7
3	TXD1S_V24	Transmit Data
4	CTS1_V24	Clear To Send (GPIO 13 of SA1110)[a]
5	RXD1S_V24	Receive Data
6	RTS1_V24	Request To Send (GPIO 12 of SA1110)[b]
7	-	internally connected to Pin 1 and 2
8	+3V3	Power Supply
9	GND	Ground
10	nc	not connected

a. GPIO 13 either connected as serial signal or as Chip Select of SPI

b. GPIO 12 either connected as serial signal or as Clock Signal of SPI

If you want to connect J18 with a PC you can use the solution shown in figure 7 on page 36:

FIGURE 7.   Connection of the serial interface header (J18) to the PC
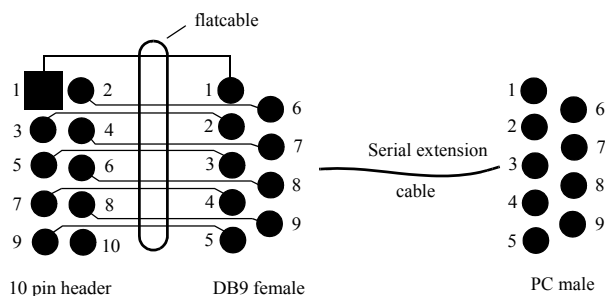
A.18   SPI and ADC connector

This connector is usually used by Keith & Koep with a daughterboard that contains a memory card connected by serial peripheral interface (SPI) protocol. **Attention**: If CTS and RTS of serial port 1 are used, you can't use SPI_CLK and SPI_CS!

TABLE 28.   J19 - GPIO and A/D Connector

Pin	Signal	Description
1	SPI_TXD	Transmit Data
2	+3V3	Power Supply
3	SPI_CLK	Clock Signal (GPIO 12 of SA1110)[a]
4	SPI_RXD	Receive Data
5	nc	not connected
6	SPI_CS	Chip Select signal (GPIO 13 of SA1110)[b]
7	nc	not connected
8	nc	not connected
9	GND	Ground
10	nc	not connected
11	AD1	Analog / Digital Input 1
12	AD0	Analog / Digital Input 0
13	GND	Ground
14	AD3	Analog / Digital Input 3

a. GPIO 12 either connected as serial signal or as Clock signal of SPI

b. GPIO 13 either connected as serial signal or as Chip Select of SPI

A.19   USB / IrDA connector

USB and IrDA signals are available at connector J20.

TABLE 29.   J20 - USB and IrDA Connector

Pin	Signal	Description
1	+3V3	Power Supply
2	TUDC+	bidirectional serial port (UDC Trizeps)
3	TUDC-	bidirectional serial port (UDC Trizeps)
4	GND	Ground
5	+3V3	Power Supply
6	TXD_2	Transmit data
7	RXD_2	Receive data
8	IRDA_MODE	
9	IRDA_SD	
10	GND	Ground

A.20   Connector to program PIC16F84

The PIC16F84 is used as keyboard or mouse controller and can be programmed via this connector.

TABLE 30.   J21 - Connector to program PIC16F84 (PS/2 controller)

Pin	Signal	Description
1	nc	not connected
2	nc	not connected
3	+5V	Power Supply
4	RB7	Serial programming data
5	RB6	Serial programming clock
6	GND	Ground

A.21   PS/2 connector

A standard PS/2 keyboard or PS/2 mouse can be connected to the MT6 via the PS/2 connector. The connector is by Molex and has the part number 87123-08.

TABLE 31.   J22 - PS/2 connector for mouse and keyboard

Pin	Signal	Description
1	PS2_DATA1	connected with PIC16F84 pin RB1
2	nc	not connected
3	GND	Ground
4	+5V	Power Supply

TABLE 31.   J22 - PS/2 connector for mouse and keyboard

Pin	Signal	Description
5	PS2_CLK1	connected with PIC16F84 pin RB0/INT
6	nc	not connected

A.22 UPS connector

An UPS is available for the MT6N. The UPS is connected with MT6N via the following connector.

TABLE 32.   J23 - UPS connector

Pin	Signal	Description
1	I2C_DATA	data I^2C Bus (SA-1110/GP27)
2	I2C_CLK / ANGBOOT	clock I^2C Bus (SA-1110/GP26)
3	+3V3	Power Supply
4	BATT_EMPTY	CPLD signal
5	BATT_EN	CPLD signal
6	CHARGE	CPLD signal
7	+12V	Battery Power
8	+12V	Battery Power
9	GND	Ground
10	GND	Ground

A.23 MultiMediaCard connector

The MultiMediaCard connector has the following pinout: This part is optional and usually not placed:

Pin	Signal	Description
1	SPI_CS	SPI chip select
2	SPI_TXD	SPI transmit pin
3	GND	Ground
4	+3V3	Power Supply
5	SPI_CLK	SPI clock
6	GND	Ground
7	SPI_RXD	SPI receive pin

A.24 CAN Termination

Use the jumper to terminate the CAN-interface with an 120 Ohm resistor.

TABLE 33.   JJ1 - Can termination

Pin	Signal	Description
1	CANL	connected to CANL over an 120R resistor
2	CANH	connected to CANH

A.25 Speaker connector

Connect a speaker to JJ2.

TABLE 34.   JJ2 - Speaker connector

Pin	Signal	Description
1	SPKRP	Speaker positive signal
2	SPKRN	Speaker negative signal

A.26 Microphone connector

Connect a microphone to JJ3.

TABLE 35.   JJ3 - Microphone connector

Pin	Signal	Description
1	MIC_OUT	Microphone output signal
2	MIC_GND	Microphone ground

A.27 Reset connector

For normal operation this jumper is left open. For resetting the board connect $\overline{\text{RESIN}}$ to GND.

TABLE 36.   JJ5 - Reset connector

Pin	Signal	Description
1	GND	Ground
2	$\overline{\text{RESIN}}$	Reset in

A.28   Battery (onboard or external)

The onboard battery (CR2450) supplies the Real Time Clock (RTC) PCF8593. To use this battery connect Pin 3 with Pin 4. If you want to use an external battery connect it to Pin 1 (battery minus) and Pin 3 (battery plus).

TABLE 37.   JJ6 - Battery connector

Pin	Signal	Description
1	GND	Ground
2	nc	not connected
3	-	Vcc RTC
4	-	battery plus

A.29   Invalid signal

The INVALID-signal indicates a valid RS232-level is present on receiver inputs. You can choose this function between this two RS232 transceivers, on the one side the MAX3223 for serial port 1 and on the other side the MAX3243 for serial port 3. Usually the jumper is set between pin 2 and 3.

TABLE 38.   JJ7 - Invalid signal change

Pin	Signal	Description
1	INVALID_SP1	Invalid signal serial port 1
2	$\overline{\text{INVALID}}$	Invalid signal out
3	INVALID_SP3	Invalid signal serial port 3

A.30   Angelboot

You can start the firmware by closing JJ8 when powering up.

TABLE 39.   JJ8 - Angel boot connector

Pin	Signal	Description
1	ANGELBOOT	Angel boot
2	GND	Ground

A.31   Audio stereo connector

The audio stereo connector has the following pinout:

TABLE 40.   JJ8 - Angel boot connector

Pin	Signal	Description
1	SPKRP	positive speaker output (UCB1200)
2	HEADPHONE_L	(only Trizeps II)
3	nc	not connected
4	SPKRN	negative speaker output (UCB1200)
5	nc	not connected

A.32   Trizeps Connector U1

In the following you find the pinout of the Trizeps socket.

TABLE 41.   U1 - Trizeps connector

Pin	Name	Description
1	TSMY	negative Y-plate touch screen (UCB 1200)
2	TSMX	negative X-plate touch screen (UCB 1200)
3	TSPY	positive Y-plate touch screen (UCB 1200)
4	TSPX	positive X-plate touch screen (UCB 1200)
5	MIC_OUT	microphone input signal
6	FF_RI / GP38	Full function UART ring indicator pin (only Trizeps-II)
7	MIC_GND	microphone ground switch input
8	LINEIN_R	Line in right channel (UCB1400) (only Trizeps-II)
9	SPKRN	negative speaker output (UCB 1200)
10	LINEIN_L	Line in left channel (UCB1400) (only Trizeps-II)
11	SPKRP	positive speaker output (UCB 1200)
12	HEADPHONE_L	Line out left channel (UCB1400) (only Trizeps-II)
13	AD3	analog voltage input (UCB 1200)
14	VIN_AD2	analog voltage input (UCB 1200)[a]
15	AD1	analog voltage input (UCB 1200)
16	AD0	analog voltage input (UCB 1200)
17	GND	Ground
18	GND	Ground
19	TMS	JTAG test interface mode select (SA-1110)
20	TCK	JTAG test interface reference clock (SA-1110)
21	$\overline{\text{TRST}}$	test interface reset (SA-1110)
22	TDO	JTAG test interface data output (SA-1110)
23	$\overline{\text{RESET\_IN}}$	reset input
24	TDI	JTAG test interface data input (SA-1110)

TABLE 41.   U1 - Trizeps connector

Pin	Name	Description
25	$\overline{\text{RESET\_OUT}}$	reset output (SA-1110)
26	L_BIAS	LCD ac bias drive
27	RXD_1S	serial port one receive pin (SDLC) (SA-1110)
28	BATT_FAULT	battery fault - main power is going down (SA-1110)
29	TXD_1S	serial port one transmit pin (SDLC) (SA-1110)
30	RXD_2	serial port two receive pin (IrDA) (SA-1110)
31	RXD_3	serial port three receive pin (UART) (SA-1110)
32	TXD_2	serial port two transmit pin (IrDA) (SA-1110)
33	TXD_3	serial port three transmit pin (UART) (SA-1110)
34	TUDC-	serial port zero bidirectional (UDC) (SA-1110)
35	+3V3	power supply
36	+3V3	power supply
37	I2C_DATA	data I^{2}C Bus (SA-1110/GP27)
38	TUDC+	serial port zero bidirectional (UDC) (SA-1110)
39	GPIO25	General purpose I/O
40	I2C_CLK / ANG-BOOT	clock I^{2}C Bus (SA-1110/GP26)
41	$\overline{\text{IRQ\_IO}}$	Interrupt request TTL I/O
42	$\overline{\text{PCD}}$	Card detect ($\overline{\text{CD1}} \geq \overline{\text{CD2}}$)
43	$\overline{\text{INVALID\_3}}$	invalid signal of the selected (by JJ7) RS232
44	$\overline{\text{IRQ\_CAN}}$	CAN Interrupt
45	DCD_3	Data Carrier Detect (serial port 3)
46	$\overline{\text{IRQ\_SMC}}$	Interrupt request Ethernet
47	DTR_3	Data Terminal Ready (serial port 3)
48	DSR_3	Data Set Ready (serial port 3)
49	RTS_3	Request To Send (serial port 3)
50	CTS_3	Clear To Send (serial port 3)
51	GPIO12	General purpose I/O
52	GPIO13	General purpose I/O
53	SPI_TXD	SPI transmit pin
54	SPI_RXD	SPI receive pin
55	LDD14	LCD controller display data (Trizeps - SA-1110)
56	LDD15	LCD controller display data (Trizeps - SA-1110)
57	LDD12	LCD controller display data (Trizeps - SA-1110)
58	LDD13	LCD controller display data (Trizeps - SA-1110)
59	LDD10	LCD controller display data (Trizeps - SA-1110)
60	LDD11	LCD controller display data (Trizeps - SA-1110)
61	LDD8	LCD controller display data (SA-1110)
62	LDD9	LCD controller display data (SA-1110)

TABLE 41.   U1 - Trizeps connector

Pin	Name	Description
63	IRQ_PIC	Interrupt of the PIC (optional)
64	$\overline{\text{PRDY}}$	PCMCIA ready signal
65	GND	Ground
66	GND	Ground
67	L_FCLK	LCD frame clock (SA-1110)
68	L_LCLK	LCD line clock (SA-1110)
69	L_PCLK	LCD pixel clock (SA-1110)
70	LDD6	LCD controller display data (SA-1110)
71	LDD7	LCD controller display data (SA-1110)
72	LDD4	LCD controller display data (SA-1110)
73	LDD5	LCD controller display data (SA-1110)
74	LDD2	LCD controller display data (SA-1110)
75	LDD3	LCD controller display data (SA-1110)
76	LDD0	LCD controller display data (SA-1110)
77	LDD1	LCD controller display data (SA-1110)
78	GND	Ground
79	$\overline{\text{PWE}}$	PCMCIA write enable (SA-1110)
80	$\overline{\text{POE}}$	PCMCIA output enable (SA-1110)
81	$\overline{\text{PIOW}}$	PCMCIA I/O write (SA-1110)
82	$\overline{\text{PIOR}}$	PCMCIA I/O read (SA-1110)
83	$\overline{\text{PWAIT}}$	PCMCIA wait (SA-1110)
84	$\overline{\text{PIOIS16}}$	I/O select 16 (SA-1110)
85	$\overline{\text{PREG}}$	PCMCIA register select (SA-1110)
86	PSKTSEL	PCMCIA socket select (SA-1110)
87	$\overline{\text{PCE1}}$	PCMCIA card enable (low-byte lane) (SA-1110)
88	$\overline{\text{PCE2}}$	PCMCIA card enable (high-byte lane) (SA-1110)
89	+3V3	power supply
90	+3V3	power supply
91	D14	memory data (SA-1110)
92	D15	memory data (SA-1110)
93	D12	memory data (SA-1110)
94	D13	memory data (SA-1110)
95	D10	memory data (SA-1110)
96	D11	memory data (SA-1110)
97	D08	memory data (SA-1110)
98	D09	memory data (SA-1110)
99	D06	memory data (SA-1110)
100	D07	memory data (SA-1110)
101	D04	memory data (SA-1110)

TABLE 41.   U1 - Trizeps connector

Pin	Name	Description
102	D05	memory data (SA-1110)
103	D02	memory data (SA-1110)
104	D03	memory data (SA-1110)
105	D00	memory data (SA-1110)
106	D01	memory data (SA-1110)
107	GND	ground
108	GND	ground
109	RDY	static data ready signal (SA-1110)
110	$\overline{\text{WE}}$	memory write enable (SA-1110)
111	RD/$\overline{\text{WR}}$	read/write direction control for memory and PCMCIA data bus (SA-1110)
112	$\overline{\text{OE}}$	memory output enable (SA-1110)
113	GND	ground
114	nc	not connected
115	nc	not connected
116	$\overline{\text{CS3}}$	static chip select (SA-1110)
117	nc	not connected
118	nc	not connected
119	A25	memory adress bus (SA-1110)
120	A24	memory adress bus (SA-1110)
121	A23	memory adress bus (SA-1110)
122	A22	memory adress bus (SA-1110)
123	A21	memory adress bus (SA-1110)
124	A20	memory adress bus (SA-1110)
125	A19	memory adress bus (SA-1110)
126	A18	memory adress bus (SA-1110)
127	A17	memory adress bus (SA-1110)
128	A16	memory adress bus (SA-1110)
129	A15	memory adress bus (SA-1110)
130	A14	memory adress bus (SA-1110)
131	A13	memory adress bus (SA-1110)
132	A12	memory adress bus (SA-1110)
133	A11	memory adress bus (SA-1110)
134	A10	memory adress bus (SA-1110)
135	A09	memory adress bus (SA-1110)
136	A08	memory adress bus (SA-1110)
137	A07	memory adress bus (SA-1110)
138	A06	memory adress bus (SA-1110)
139	A05	memory adress bus (SA-1110)

TABLE 41.   U1 - Trizeps connector

Pin	Name	Description
140	A04	memory adress bus (SA-1110)
141	A03	memory adress bus (SA-1110)
142	A02	memory adress bus (SA-1110)
143	A01	memory adress bus (SA-1110)
144	A00	memory adress bus (SA-1110)

a. For an input voltage of 24V VIN_AD2 is about 4.21V
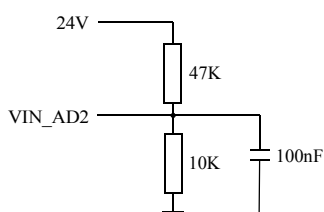
A.33 Display LM8V31

The DSTN LCD LM8V31 by Sharp can be directly connected to MT6N through two connectors by MOLEX. Both connectors are optional and usually not placed.

TABLE 42.   X9 - Display connector 1 for LM8V31 by Sharp

Pin	Signal	Description
1	L_FCLK	LCD frame clock
2	GND	Ground
3	L_DISP	LCD enable
4	L_LCLK	LCD line clock
5	GND	Ground
6	L_PCLK	LCD pixel clock
7	GND	Ground
8	LDD0	LCD controller display data
9	LDD1	LCD controller display data
10	LDD2	LCD controller display data
11	LDD3	LCD controller display data
12	LDD4	LCD controller display data
13	LDD5	LCD controller display data
14	LDD6	LCD controller display data
15	LDD7	LCD controller display data

TABLE 43.   X10 - Display connector 2 for LM8V31 by Sharp

Pin	Signal	Description
1	LDD8	LCD controller display data
2	LDD9	LCD controller display data
3	LDD10	LCD controller display data
4	LDD11	LCD controller display data
5	LDD12	LCD controller display data
6	LDD13	LCD controller display data
7	LDD14	LCD controller display data
8	LDD15	LCD controller display data
9	+3V3	Power Supply
10	GND	Ground
11	GND	Ground
12	nc	not connected
13	nc	not connected
14	VCON_LM8V31	Contrast voltage

A.34 Touch LM8V31

The LM8V31 contains an integrated touch panel which can be connected to the touch connector by JST with part number 04FE-ST-VK-N.This part is optional and usually not placed.

TABLE 44.   X14 - Touch connector for LM8V31

Pin	Signal	Description
1	TSMX	negative X-plate touch screen
2	TSMY	negative Y-plate touch screen
3	TSPX	positive X-plate touch screen
4	TSPY	positive Y-plate touch screen

A.35   On board peripherals (address code)

TABLE 45.   On board peripherals

Offset ($\overline{CS3}$)	Device	Address Trizeps I	Address Trizeps II
0x00000000	READ: PCMCIA Status	0x18000000	0x0C000000
0x00800000	R/W: SMSC91C96	0x18800000	0x0C800000
0x01000000	R/W: CAN SJA1000	0x19000000	0x0D000000
0x01800000	WRITE: TTL OUTPUT READ: TTL INPUT	0x19800000	0x0D800000
0x02000000	WRITE: PCMCIA CTL READ: PCMCIA STATUS	0x1A000000	0x0E000000
0x02400000	WRITE: IrDA	0x1A400000	0x0E400000
0x02800000	R/W: UPS	0x1A800000	0x0E800000
0x03000000	RESERVED	0x1B000000	0x0F000000
0x03800000	WRITE: EEPOT (display contrast)	0x1B800000	0x0F800000

Revision

Board: MT6

TABLE 46.

Revision	PCB number	Date	Changes
2.0	02_06_00	28.11.00	--------------
3.0	03_03_01	29.05.01	Hilscher module disappeared, CompactFlash connector on board, PCMCIA connector only at PCB-adaption, several different interrupts
4.0	04_05_01	05.10.01	Contrast voltage
5.0	05_01_02	28.05.02	UPS connector added Audio stereo connector added PS2 - connector added MultiMediaCard connector added
6.0	06_03_02	04.06.02	Some production corrections In documentation added: - UPS register - IrdA register and schematic

FIGURE 8.   Dimensions of the MT6N board