

embDev Design

# microTouch 2.8"

Control Programmable Interface



3/7/2014

Warnings, Cautions, and Notes:

#### **WARNING**

**Warnings are used to emphasize hazardous voltages, currents, temperatures, or other conditions that could cause personal injury.**

#### **CAUTION**

**Cautions are used where equipment might be damaged if care is not taken.**

**Note:** Call attention to information to understand the equipment operation

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## 1. Introduction

The uT2.8CPI is a compact size Control Programmable Interface designed to cover a wide range of applications. An "off-the-shelf" industrial grade device, with professional look design, is well suited to be embedded into the end customer product, offering an array of features, including:

- 2.8" vibrant colors touch TFT screen (320x240 pixels, 262K colors)
- Resistive touch screen with Touch-Pressure detection
- 100Mhz ARM Cortex-M3 processor
- 18 analogical and digital IO points
- 10/100 Fast Ethernet with Auto-MDIX
- Host and Device USB port
- RS232 serial port
- Nonvolatile configuration/data memory
- Very accurate Real-Time-Clock with backup
- Piezoelectric buzzer
- In System Programming (ISP)
- Serial Wire Debugging (SWD)
- Industrial grade panel mount design
- IP40 front panel protection grade
- Single 24V power supply

The uT2.8CPI hardware consists of a single module, including LCD, CPU, I/O, communication ports and power supply functions (Figure 1.1 and 1.2).

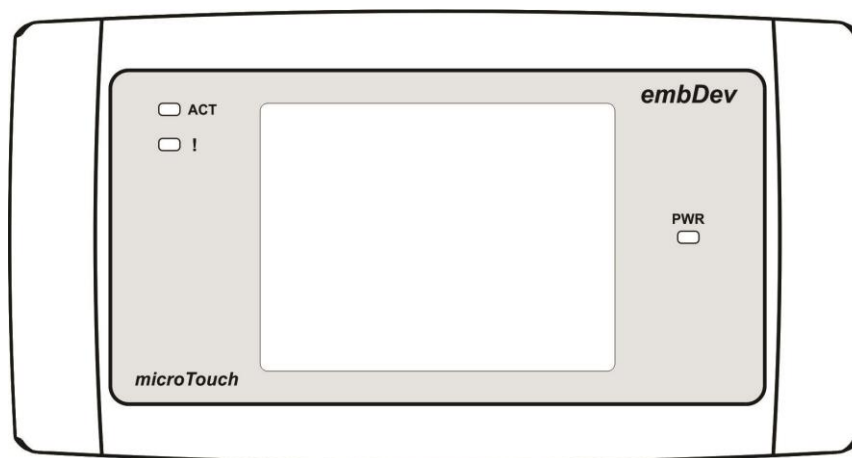


Figure 1.1: uT2.8CPI - Front view

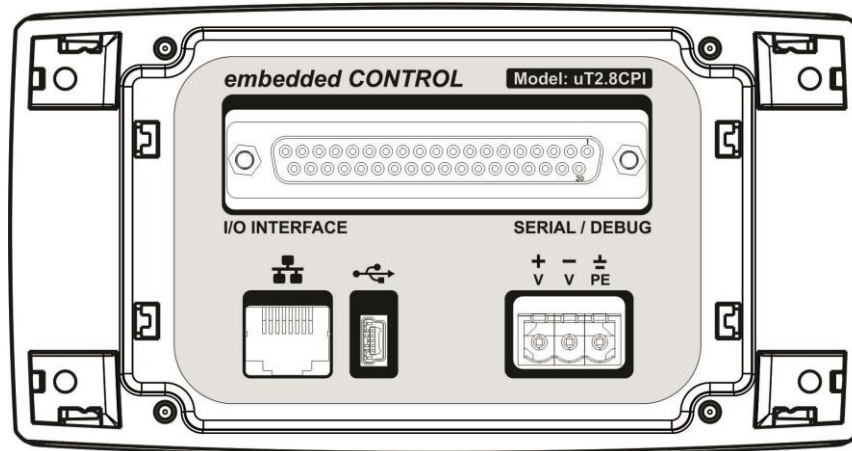


Figure 1.2: uT2.8CPI - Rear view

## 2. Specifications

### Display:

- 2.8" TFT-LCD, 262K/64K colors
- Resolution: 320 x 240 pixels
- Backlight type/lifetime: LED/>20,000 h at +25°C
- Controller: ILI9341

### Touch screen:

- Type: 4-wire resistive
- Controller: TSC2046

### Processor:

- NXP LPC1768 - ARM Cortex-M3, 100Mhz, 512kB on-chip Flash, 64kB SRAM

### DC Inputs:

- Number of inputs: 9
- Input voltage: 24VDC (max 30VDC)
- Input current : 5mA
- Isolation voltage: 1000V RMS field side to logic side; 500V RMS between groups

**Analog Inputs:**

- Number of inputs: 2
- Input range: 0 ... 5V / 0 ... 20mA
- Input impedance: 150 Kohm / 220 ohm
- Input filter: 2nd order active low pass filter,  $f_c = 1\text{Khz}$
- SAR ADC Resolution: 12-bit

**Transistor Outputs:**

- Number of outputs: 6
- Voltage range : 10 ... 35 VDC
- Maximum load: 350mA per point
- Response time: 0.1 ms at 24 VDC

**Analog outputs:**

- Number of outputs: 1
- Outputs range: 0 ... 20 mA
- Maximum load: 500 ohms
- Resolution: 10 bits

**Ethernet port:**

- Type: 10/100 Fast Ethernet
- Standards: IEEE 802.3, 802.3u
- Features: Auto-MDIX support

**USB port:**

- Mode: Host/Device
- Connector type: 5 pins mini-AB

**Serial port:**

- ISP programming / general use RS232 UART port

**Debug port:**

- SWD debug interface (LPC-Link2, J-link and ULink compatibility)

**Sound:**

- Type: piezoelectric buzzer
- Sound pressure: 60dBA/10cm min.

**Real time clock:**

- Temperature Compensated Crystal Oscillator (TCXO) with integrated capacitors
- Typical accuracy: +- 3ppm from -15°C to +60°C
- Super Capacitor: 0.33F
- Timekeeping operation: 6.5 days at +25°C (super capacitor fully charged)

**Configuration and data memory:**

- Type: EEPROM
- Size: 256Kb + 2Kb

**Status LEDs:**

- Front panel power, activity and warnings/alarms LEDs

**Power supply:**

- Voltage range: 10 ... 30 VDC
- Inrush current: 1A max at 30VDC
- Power consumption: 2.5VA max.

**Enclosure:**

- Dimensions (W x H x D): 141.4 x 74.7 x 31.5 mm
- Material: ABS
- Mounting: panel mount (wall frame accessories available)

**Protection grade:**

- Front panel: IP40
- Rear panel: IP20

**RoHS compliant:** Yes

**Operating temperature:** -20°C ... 50°C

**Storage temperature:** -30°C ... 65°C

**Relative humidity:** 5 - 85 % non-condensed

**Net Weight:** 180 grams

### 3. Installation

#### 3.1. Dimensions

<b>Table 3.1.1: Dimensions</b>	
Enclosure [mm]	141.4 x 74.7 x 31.5
Panel cutout [mm]	105 x 67

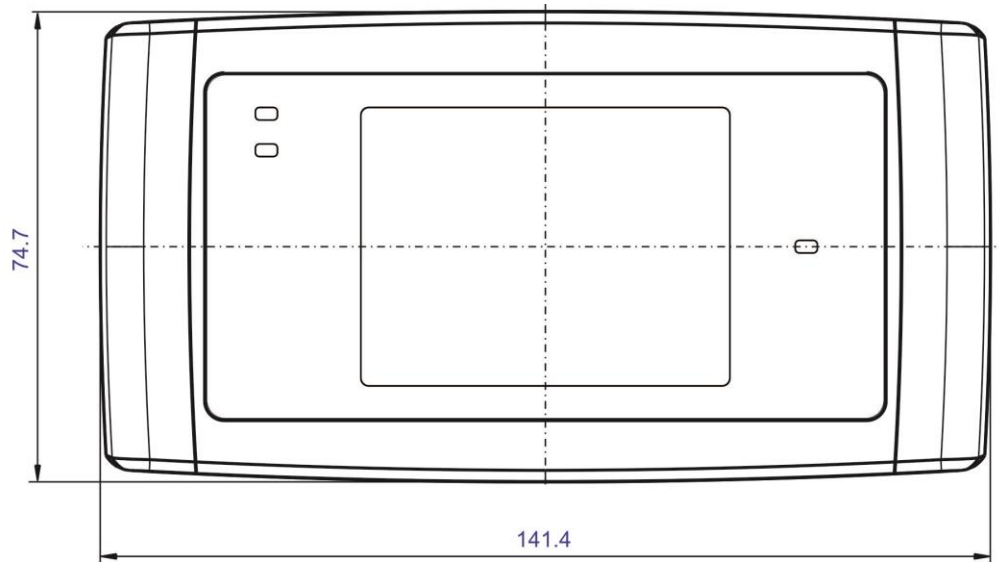


Figure 3.1.1: Dimensions [mm] – Front View

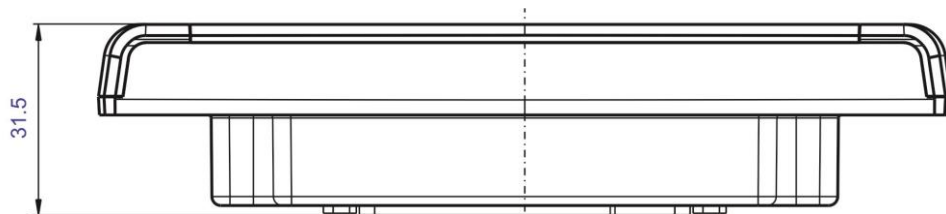


Figure 3.1.2: Dimensions [mm] – Side View

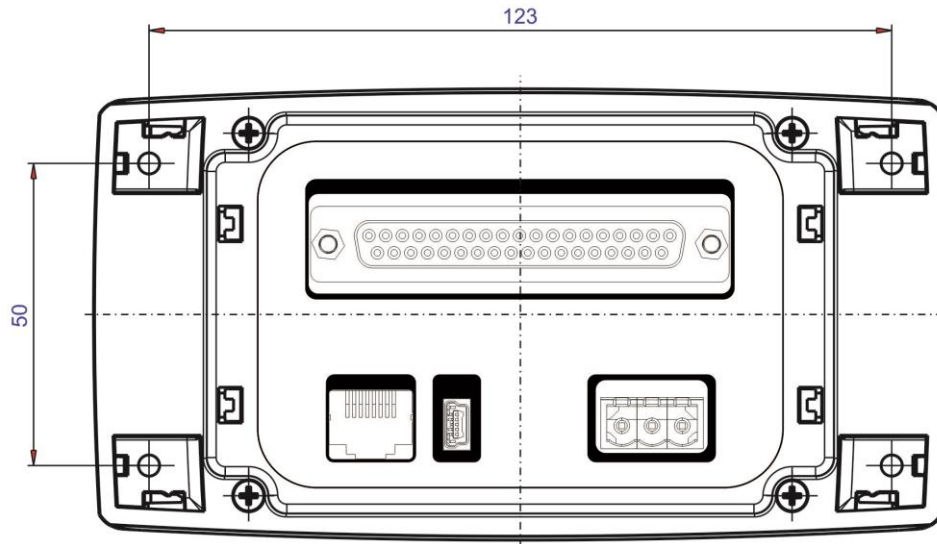


Figure 3.1.3: Dimensions [mm] – Rear View

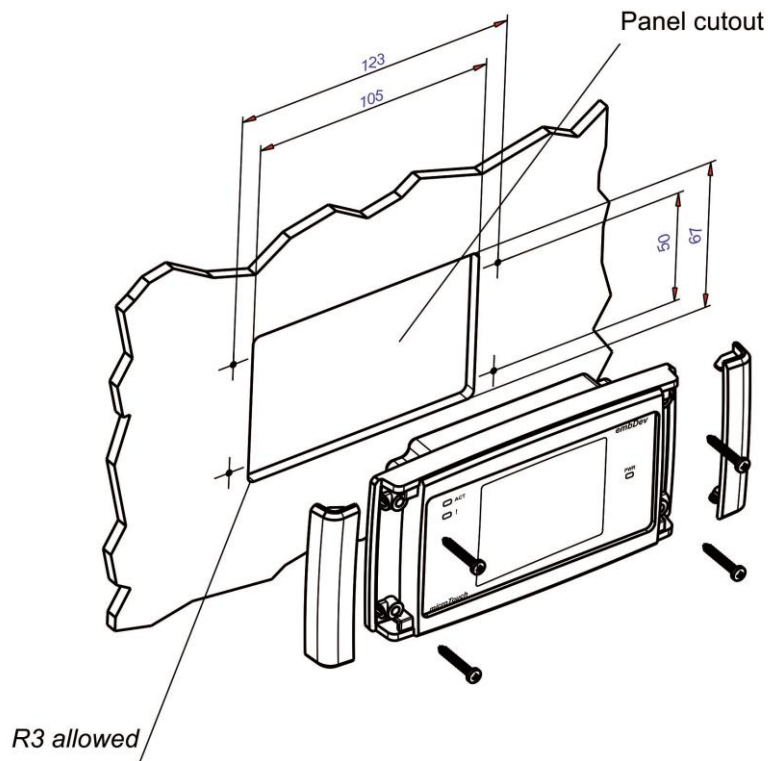


Figure 3.1.4: Panel cutout [mm]



### 3.2. Grounding

A proper grounding must meet the listed recommendations:

- Maximum resistance to ground < 0.2 ohms (equivalent of 100ft AWG#12 copper cable)
- Separate branches must be routed to the central earth ground point (Figure 3.5)
- Ground conductors should be as short as possible.
- Ground conductors must carry the maximum short circuit current of each path.

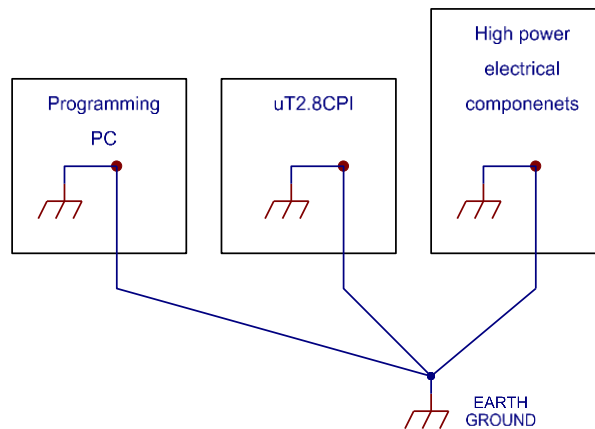


Figure 3.2: System grounding

#### 4. IO interface

##### 4.1. Positive/Negative logic inputs:

The 24VDC logic inputs circuits, with positive and negative logic characteristics, are designed compatible with a wide range of devices, such as: electronic sensors, pushbuttons and limit switches.

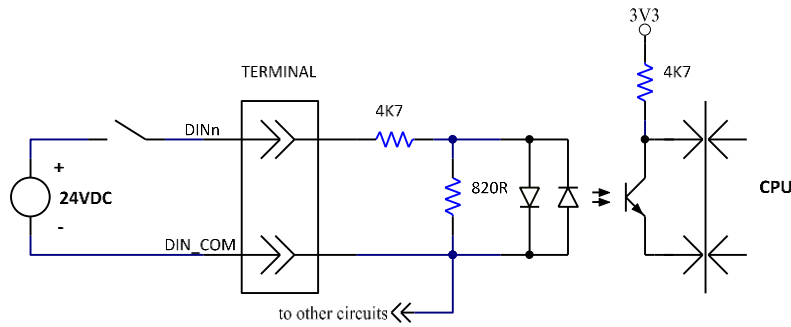


Figure 4.1: Typical 24 VDC Positive/Negative Logic Input Circuit (Positive logic connection shown)

Table 4.1.1: Positive/Negative logic inputs specifications	
Input voltage	24VDC typical (30VDC max.)
Input current	5mA typical
Input resistance	4.7Kohms
Input threshold voltage	17V for ON state, 5V for OFF state
Cutoff frequency	20Khz
Isolation voltage	1000V RMS field side to logic side (1 minute max.)

**Note:** field devices and input circuits are powered by an isolated 24VDC supply.

Selective inputs can be configured as interrupts (EINT), quadrature encoder interface (QEI) or general purpose inputs (GPIO). When in GPIO mode, 5 to 10ms software filter is recommended. The table below show all above described features and the link between input pin and CPU port.

Table 4.1.2: Logic inputs ports allocation			
Input	CPU port	Description	Port function
DIN1	P2.11	Logic input 1 - interrupt feature	GPIO/EINT1
DIN2	P2.12	Logic input 2 - interrupt feature	GPIO/EINT2
DIN3	P2.13	Logic input 3 - interrupt feature	GPIO/EINT3
DIN4	P1.29	Logic input 4 - capture feature	GPIO/PCAP1[1]
DIN5	P1.24	Logic input 5 - QEI feature	GPIO/MCI2
DIN6	P1.23	Logic input 6 - QEI feature	GPIO/MCI1
DIN7	P1.20	Logic input 7 - QEI feature	GPIO/MCI0
DIN8	P3.26	Logic input 8	GPIO
DIN9	P3.25	Logic input 9	GPIO

#### 4.2. Analog inputs:

The uT2.8CPI features analog single ended input channels, which can be used for voltage or current mode. After filtering, the signal is applied to the on-chip 12 bit successive-approximation A/D converter. Each analog input includes the sense resistor for current-voltage mode conversion.

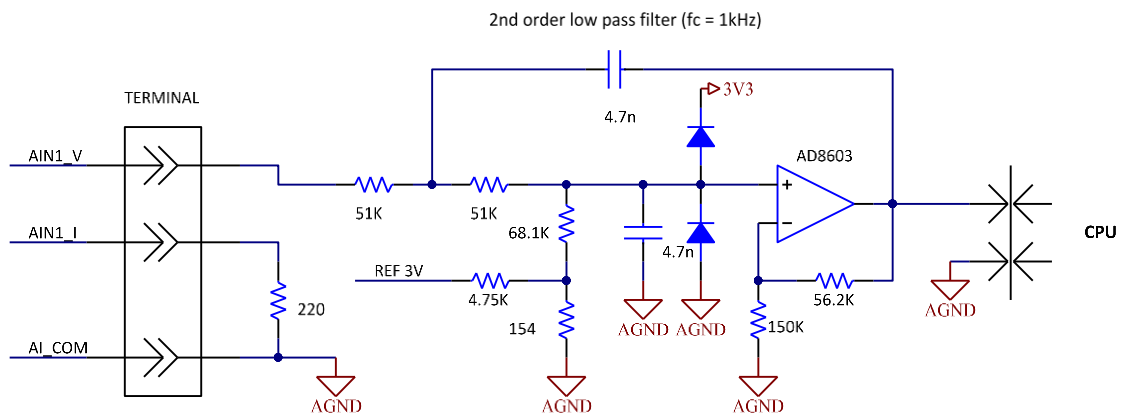


Figure 4.2: Analog input circuit

Table 4.2.1: Analog inputs specifications	
Input range	0 to 5V (5.28V max.) 0 to 20mA (24mA max.)
Resolution:	12 bits 1 LSB = 744uV (0 to 5V range) 1 LSB = 6uA (0 to 20mA range)
Accuracy	0.5% of full scale over full operating temperature range (-20°C to 50°C)
Linearity	±3LSB
Current input impedance	220 ohms 0.1%
Voltage input impedance	170 Kohms
Input filter	2 <sup>nd</sup> order low pass filter; fc = 1kHz
A/D Reference	
Voltage	3V
Initial accuracy	± 0.4% max.
Temperature Coefficient	75ppm/°C
Isolation voltage	not isolated

**Note:** current mode requires AINnV and AINnI terminals to be connected together.

Table 4.2.2: Analog inputs port allocation			
Input	CPU port	Description	Port function
AIN1	P0.24	Analog input 1 (0 to 5V/ 0 to 20mA ,12 bits ADC)	AD0[1]
AIN2	P0.25	Analog input 2 (0 to 5V/ 0 to 20mA ,12 bits ADC)	AD0[2]

**Note:** analog inputs are calibrated during production test; initial offset and the full scale value are saved on the EEPROM memory.

### 4.3. Transistor Outputs:

Transistor output circuits can be used to switch devices like valves, lamps or contactors. External relays should be used to interface to the load.

Each output has NPN Darlington pairs that feature high-voltage output with common-cathode clamp diodes for switching inductive loads.

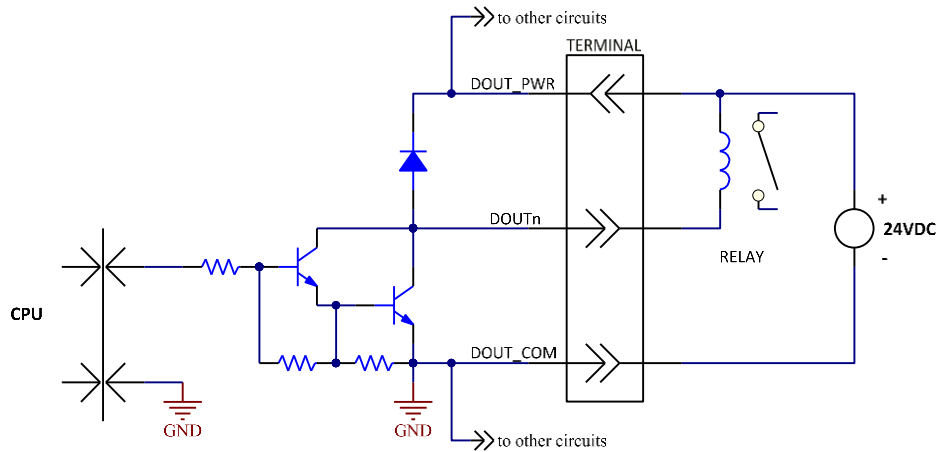


Figure 4.3: Typical relay driving circuit

Table 4.3.1: Transistor Outputs specifications	
Voltage range	10 to 30 VDC
Maximum load	0.35A per point
Response time	ON->OFF: 10us max. OFF->ON: 10us max.
Fuse	none
Isolation voltage	not isolated

**CAUTION**

*The outputs are not short circuit protected and require external fast fuses for each output to be effectively protected.*

Selective outputs can be configured as pulse train or pulse with modulation (PWM) outputs (for more details on table 4.3.2).

Table 4.3.2: Transistor Outputs port allocation			
Output	CPU port	Description	Port function
DOUT1	P2.2	Transistor output 1 - PWM feature	GPIO/PWM1[3]
DOUT2	P2.1	Transistor output 2 - PWM feature	GPIO/PWM1[2]
DOUT3	P2.0	Transistor output 3 - PWM feature	GPIO/PWM1[1]
DOUT4	P2.5	Transistor output 4 - PWM feature	GPIO/PWM1[6]
DOUT5	P0.6	Transistor output 5	GPIO/MAT2[0]
DOUT6	P0.5	Transistor output 6	GPIO

#### 4.4. Analog Outputs:

The uT2.8CPI features one current mode analog output channel. The analog output channels use the on-chip 10 bit D/A converter and a precision voltage-to-current converter. The analog output is powered from an external supply as shown below.

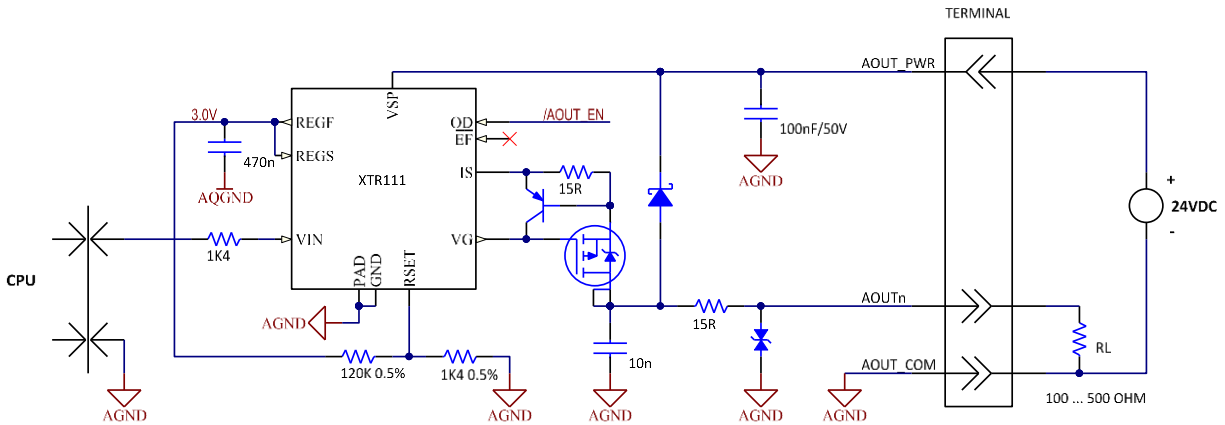


Figure 4.4: Analog output circuit

Table 4.4.1: Analog output specifications	
Output range	0 to 20mA (21.4mA max.)
Resolution:	10 bits 1 LSB = 21uA (0 to 20mA range)
Accuracy	±1% of full scale over full operating temperature range (-20°C to 50°C)
Load range	100 to 500 ohms
D/A Reference	
Voltage	3V
Initial accuracy	± 0.4% max.
Temperature Coefficient	75ppm/°C
Isolation voltage	not isolated

#### CAUTION

**The analog output is not protected against the power supply (AOUT\_PWR) polarity reversal and require attention when wiring the IO connector. A wrong connection can damage the device or causing it to malfunction.**

Output	CPU port	Description	Port function
AOUT1	P0.26	Analog output 1 (0 to 20mA ,10 bits DAC)	AOUT
/AOUT_EN	P1.31	Analog output enable signal	GPIO

**Note:** analog output is calibrated during production test; initial offset and the full scale value are saved on the EEPROM memory.

## 5. Communication

### 5.1. Ethernet port :

- 10BASE-T/100BASE-TX
- IEEE802.3/802.3u (Fast Ethernet) and ISO 802-3/IEEE 802.3 (10BASE-T) compliant
- HP Auto-MDIX support

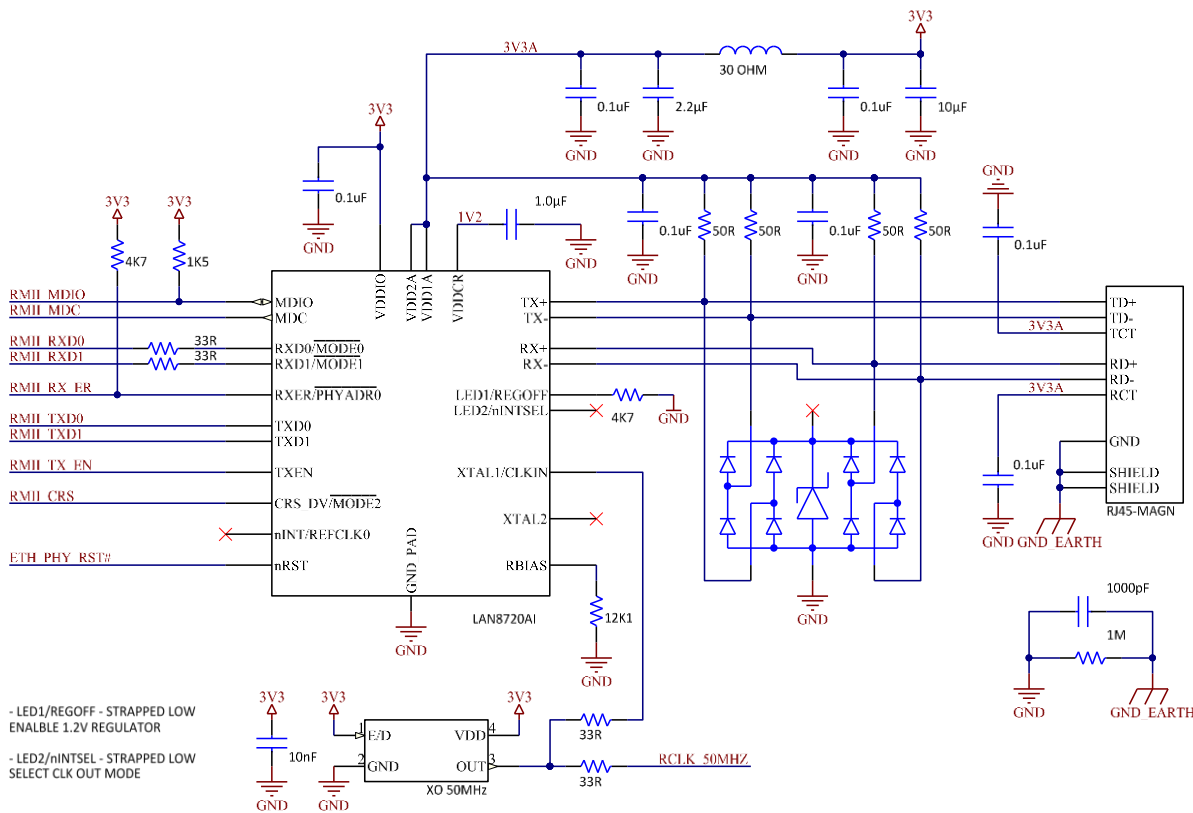


Figure 5.1: Ethernet PHY circuit

<b>Symbol</b>	<b>CPU port</b>	<b>Description</b>	<b>Port function</b>
TXD0	P1.0	Transmit data 0	ENET_TXD0
TXD1	P1.1	Transmit data 1	ENET_TXD1
TX_EN	P1.4	Transmit enable	ENET_TX_EN
CRS	P1.8	Carrier Sense / Receive Data Valid	ENET_CRS
RXD0	P1.9	Receive data 0	ENET_RXD0
RXD1	P1.10	Receive data 1	ENET_RXD1
RX_ER	P1.14	Receive error	ENET_RX_ER
RCLK_50M	P1.15	Input clock	ENET_REF_CLK
MDC	P1.16	SMI Clock	ENET_MDC
MDIO	P1.17	SMI Data Input/output	ENET_MDIO
/PHY_RST	P4.29	PHY reset	GPIO

**Note:** each device includes a pre-programmed globally unique EUI-48 node address, part of the 24AA025E48T EEPROM memory.



## 5.2. USB port:

The uT2.8CPI features an USB port, configurable as Host or Device.

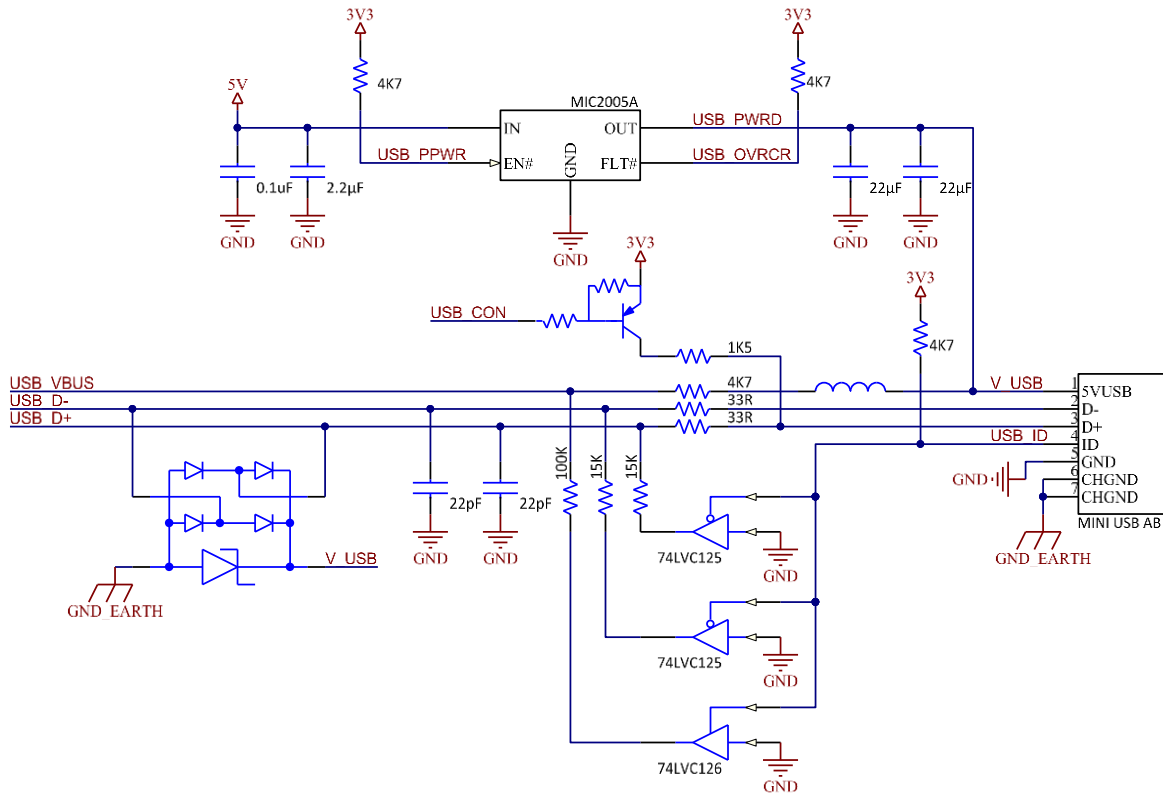


Figure 5.2: USB Host/Device circuit

Table 5.2.1: USB port specifications	
Interface	USB2.0
Speed	12 Mbit/s (Full speed)
Power	
Host	100mA max.
Device	self-powered
Connector type	5 pins miniAB

Table 5.2.2: USB port allocation			
Symbol	CPU port	Description	Port function
+D	P0.29	USB data +	USB_D+
-D	P0.30	USB data -	USB_D-
ID	P0.23	USB ID	GPIO
PPWR	P1.19	Power enable signal for USB port	USB_PPWR
PWRD	P1.22	Power Status for USB port	USB_PWRD
OVRCCR	P1.27	USB port Over-Current status	USB_OVRCCR
VBUS	P1.30	Monitors the presence of USB bus power	VBUS
CON	P2.9	SoftConnect USB feature	USB_CONNECT

### 5.3. Serial/ISP port:

The uT2.8CPI provides In System Programming capability on the RS232 port. When configured as RS232 communication port, RTS and DTR signals must be left unconnected to prevent unwanted resets.

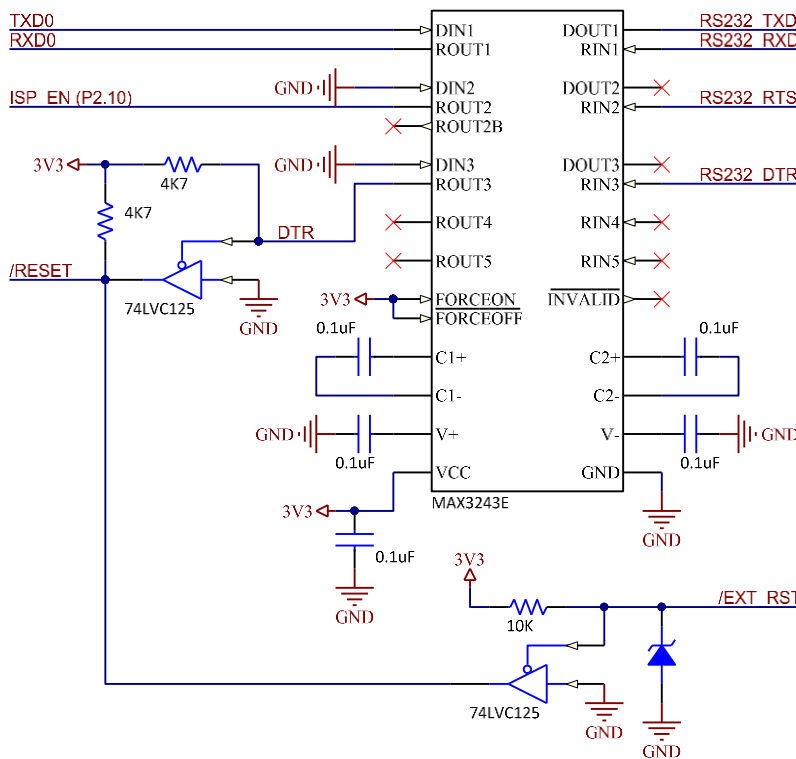


Figure 5.3: Serial/ISP port circuit

**Note:** "/EXT\_RST": serial wire debugging interface (SWD) external reset signal.

Symbol	CPU port	Description	Port function
TXD0	P0.2	UART0 transmit signal	TXD0
RXD0	P0.3	UART0 receive signal	RXD0
ISP_EN	P2.10	ISP entry pin	-

## 6. CPU, Display and Peripherals

### 6.1. CPU:

Power block, external power on reset (POR) and brown out reset (BOR) circuitry. For the IO connectivity/circuitry, the associated peripherals chapter should be seen.

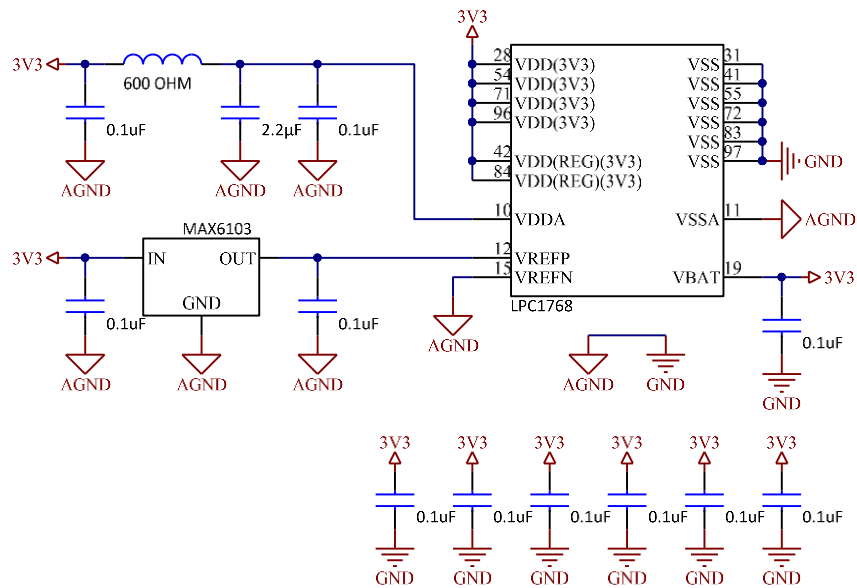


Figure 6.1.1: CPU power circuit

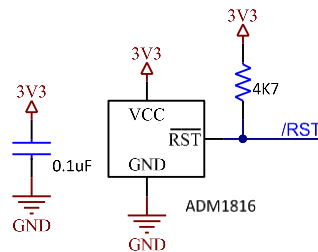


Figure 6.1.2: Low power reset circuit

Table 6.1.1: CPU specifications	
Microcontroller	
Family	ARM Cortex-M3
Type number	LPC1768
Speed	100Mhz
Memory	512 kB on-chip flash, 32/16 kB of SRAM
Main clock	12Mhz
RTC clock	32,768Hz
External low power reset	STM1816T

### 6.2. Display:

uT2.8CPI display's interface driver is shown below. All driving signals are buffered, providing the voltage level translation.

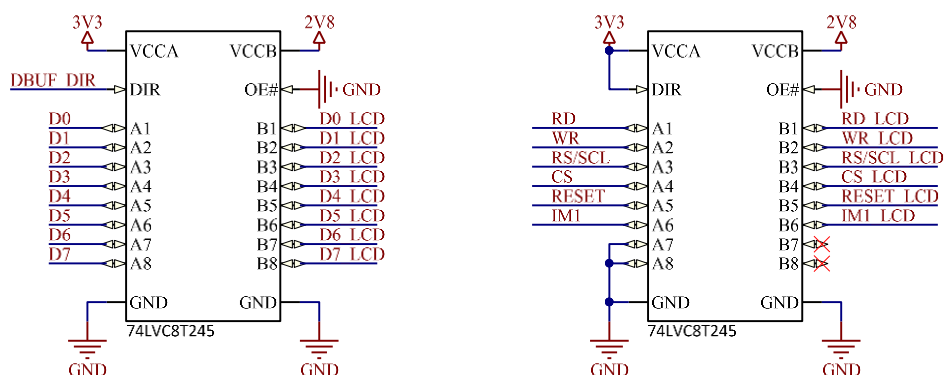


Figure 6.2: Display interface circuit

Table 6.2.1: Display specifications	
Display	
Size	2.8"
Type	TFT
Resolution	320 x 240 pixels
Colors	262K/64K
Controller	ILI9431
Interface	
Type	Parallel
Size	8-bit/9bit (configurable, see IM1 bit selector)
Backlight	
Type	4 parallel LEDs
Driver	CAT4139 - constant current If= 4x20mA; Vf=3.2V(typ.)

<b>Table 6.2.2: LCD controller port allocation</b>			
<b>Symbol</b>	<b>CPU port</b>	<b>Description</b>	<b>Port function</b>
D0	P0.15	Parallel bidirectional MCU data bus	GPIO
D1	P0.16		GPIO
D2	P0.17		GPIO
D3	P0.18		GPIO
D4	P0.19		GPIO
D5	P0.20		GPIO
D6	P0.21		GPIO
D7	P0.22		GPIO
D8	P0.11		GPIO
D9-D17	GND		-
/CS	P1.18	Chip select input pin	GPIO
/WR	P1.21	Write signal	GPIO
/RD	P1.28	Read signal	GPIO
RS/SCL	P1.26	Select data or command in parallel interface	GPIO
IM0	GND	MCU interface mode: IM1 = 0 - 80 MCU 8-bit bus interface IM1 = 1 - 80 MCU 9-bit bus interface	-
IM1	P0.0		GPIO
IM2	GND		-
IM3	GND		-
RESET	P1.25	Reset signal	GPIO
FMARK	NC	Not used	-
VSYNC	GND	Not used	-
HSYNC	GND	Not used	-
DOTCLK	GND	Not used	-
ENABLE	GND	Not used	-
SDO	NC	Not used	-
SDI	GND	Not used	-
BL_CTRL	P2.4	Backlight control	PWM
DBUF_DIR	P2.8	Data buffer direction signal "1": uC to LCD "0": LCD to uC	GPIO

### 6.3. Touch screen:

The uT2.8CPI features a standalone touch screen controller, providing accurate XY position measurements and touch-pressure detection.

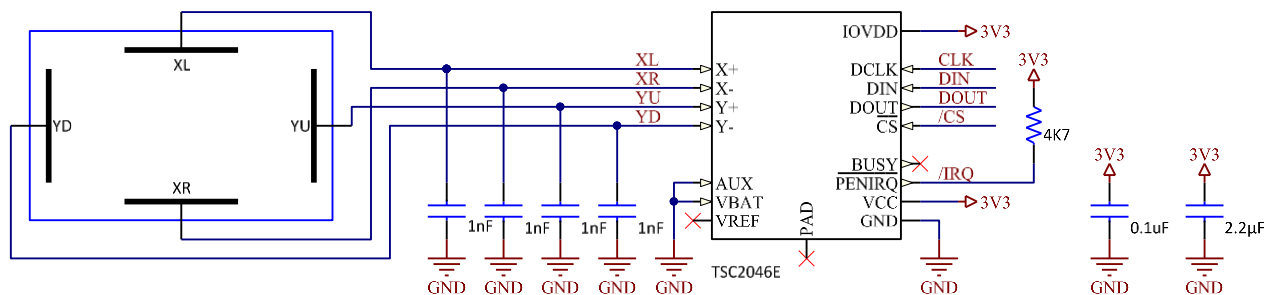


Figure 6.3: Touch screen circuit

Table 6.3.1: Touch screen specifications	
Touch panel type	4-wire resistive
Controller	TSC2046E
Interface	SPI (4 wire)
Speed	100Khz typ.

**Note:** Software average/filter algorithms should be used to improve overall filter efficiency.

Table 6.3.2: Touch screen port allocation			
Symbol	CPU port	Description	Port function
CLK	P0.7	SPI clock	SCK 1
DOUT	P0.8	SPI data out	MISO 1
DIN	P0.9	SPI data in	MOSI 1
/CS	P2.7	SPI chip select input	GPIO
/IRQ	P2.6	Interrupt signal	P2 IRQ/GPIO

**Note:** touch screen is calibrated during production test; 5 points XY values are saved on the EEPROM memory.

### 6.4. Status LEDs:

The uT2.8CPI features status LEDs on the front panel interface. Power status, communication link and alarms can be displayed even when the display is off.

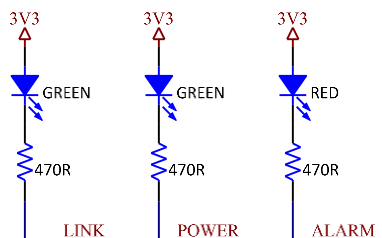


Figure 6.4: Status LEDs circuit

Symbol	CPU port	Description	Port function
ALARM	P0.1	Front panel alarm LED (Red)	GPIO
LINK	P0.10	Front panel link LED (Green)	GPIO
POWER	P4.28	Front panel power status LED (Green)	GPIO

### 6.5. EEPROM memory:

The uT2.8CPI features EEPROM memory for configuration or data storage.

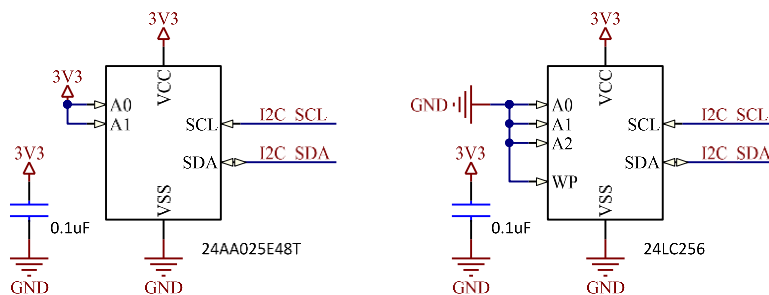


Figure 6.5: EEPROM memories circuit

Table 6.5.1: EEPROM specifications	
Interface	I2C
Speed	400Khz max.
Size:	
24LC256	256Kbit
24AA025E48	2Kbit*
Slave address:	
24LC256	0x50 (7bit address)
24AA025E48	0x53 (7bit address)

**Note:** \* includes pre-programmed Globally Unique, 48-bit Node Address.

Table 6.5.2: EEPROMs port allocation			
Symbol	CPU port	Description	Port function
SDA	P0.27	I2C data	SDA 0
SCL	P0.28	I2C clock	SCL 0

**Note:** SDA and SCL line's pull-up resistors (4.7Kohm) are installed on the CPU side.

### 6.6. Real Time Clock:

The uT2.8CPI features high precision CMOS Real Time Clock and calendar with an integrated temperature compensated crystal oscillator (TCXO) and a 32.768 kHz quartz.

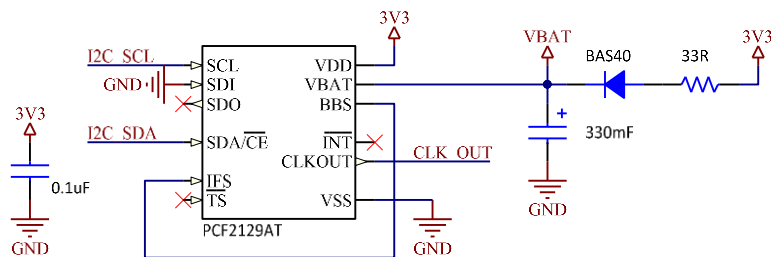


Figure 6.6: Real time clock circuit



Table 6.6.1: RTC specifications	
Part	PCF2129AT
Interface	I2C
Speed	400Khz max.
Slave address:	0x51 (7bit address)
Accuracy	± 3ppm (-15°C to 60°C)
Timekeeping operation:	6.5 days at +25°C (super capacitor fully charged)

Table 6.6.2: RTC port allocation			
Symbol	CPU port	Description	Port function
SDA	P0.27	I2C data	SDA 0
SCL	P0.28	I2C clock	SCL 0
CLK_OUT	P0.4	Clock output (calibration feature)	CAP2[0]

**Note:** SDA and SCL line's pull-up resistors (4.7Kohm) are installed on the CPU side.

### 6.7. Sound:

The uT2.8CPI features a piezoelectric buzzer, providing audio feedback on display touch events or to signal user process alarms /events.

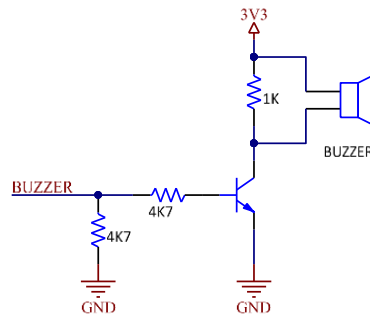


Figure 6.7: Buzzer circuit

Table 6.7.1: Buzzer specifications	
Part	PS1240P02CT3
Diameter	12.2 mm
Sound pressure	60dBA/ 10cm min.
Driving type	PWM

Symbol	CPU port	Description	Port function
BUZZER	P2.3	Pulse with modulation output	PWM1[4]

## 7. Power supply

The uT2.8CPI features single power supply operation. Field operated devices should not be driven or powered from this power supply.

Voltage range	10 to 30V DC
Power consumption	2.5VA max.
Inrush current	1A max at 30VDC
Isolation voltage	not isolated

**Note:** There is no internal fuse for the input power circuit. External circuit protection is needed to ensure the safety of service personnel and the safe operation of the device itself.

## 8. Wiring:

### WARNING

**The device must be grounded to minimize electrical shock hazard. Failure to do so could result in injury to personnel.**

### CAUTION

**When using stranded conductors, ensure there are no projecting strands of wire that could cause a short circuit, damaging the device or causing it to malfunction.**

### CAUTION

**Do not insert or remove a terminal when power is applied to the device. Injury to personnel and device damage may result. Dangerous voltages from field devices may be present on the terminals even if the power of the device is turned off. Care must be taken any time handling a removable terminator any wires connected to it.**

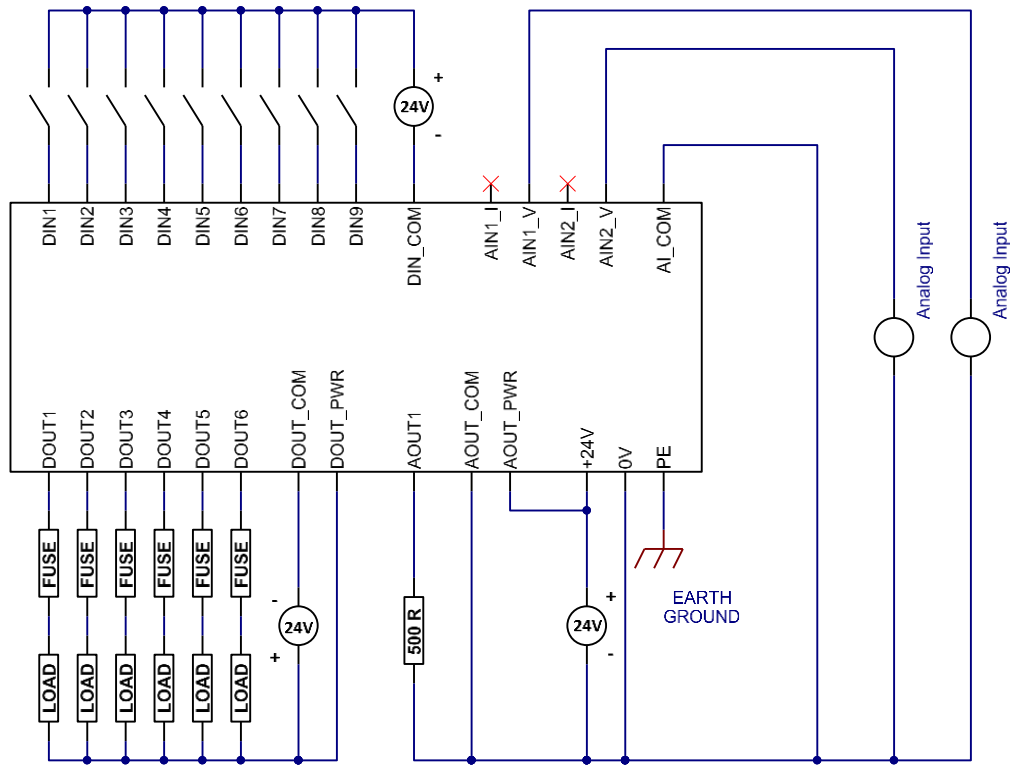


Figure 8: Wiring Diagram uT2.8CPI

### 8.1. IO interface connector

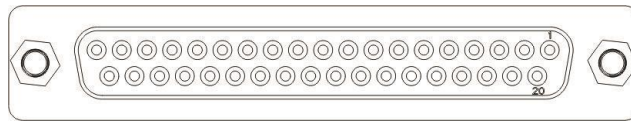


Figure 8.1: IO interface (37 position DSUB connector socket)

<b>IO interface connector pin out:</b>				
Pin	Name	Description	Function	Note
<b>Digital inputs:</b>				
1	DIN1	Digital input 1	P2.11, EINT1	1
20	DIN2	Digital input 2	P2.12, EINT2	1
2	DIN3	Digital input 3	P2.13, EINT3	1
21	DIN4	Digital input 4	P1.29, PCAP1.1	1
3	DIN5	Digital input 5	P1.24, MCI2	1
22	DIN6	Digital input 6	P1.23, MCI1	1
4	DIN7	Digital input 7	P1.20, MCI0	1
23	DIN8	Digital input 8	P3.26	1
5	DIN9	Digital input 9	P3.25	1
24	DIN_COM	Digital inputs return	GND	-
<b>Analog inputs:</b>				
7	AIN1_I	Analog input 1 - 0..20mA mode	AD0.1	2, 5
26	AIN1_V	Analog input 1 - 0..5V mode	AD0.1	2
8	AIN2_I	Analog input 2 - 0..20mA mode	AD0.2	2, 5
27	AIN2_V	Analog input 2 - 0..5V mode	AD0.2	2
9	AI_COM	Analog inputs return	GND	-
<b>Digital outputs:</b>				
28	DOUT1	Digital output 1	P2.2, PWM1.3	3
10	DOUT2	Digital output 2	P2.1, PWM1.2	3
29	DOUT3	Digital output 3	P2.0, PWM1.1	3
11	DOUT4	Digital output 4	P2.5, PWM1.6	3
30	DOUT5	Digital output 5	P0.6	3
12	DOUT6	Digital output 6	P0.5	3
31	DOUT_PWR	Digital outputs power	PWR_24V	-
13	DOUT_COM	Digital outputs return	GND	-
<b>Analog outputs:</b>				
32	AOUT1	Analog output 1 - 0..20mA	AOUT	4
14	AOUT_COM	Analog outputs return	GND	-
33	AOUT_PWR	Analog outputs power	PWR_24V	-
<b>Serial Wire port (SW):</b>				
15	/RESET	Reset signal	/RESET	6
34	SWDCLK	Serial wire clock	SWDCLK	6
16	SWDIO	Serial wire data	SWDIO	6
35	3V3_OUT	Auxiliary 3.3V power	PWR_3V3	8
17	GND	Return	GND	-
<b>Serial/In System Programming (ISP) port:</b>				
36	RS232_TX	Transmit data	P0.2, TDX0	7
18	RS232_RX	Receive data	P0.3, RDX0	7
37	RS232_RST	Data Terminal Ready	/RESET	7
19	RS232_ISPEN	ISP entry mode	P2.10	7
17	GND	Return	GND	-

6, 25	NC	Not connected	-	-
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Notes:

1. 24V isolated digital inputs
2. 12Bit non-isolated analog inputs
3. Non-isolated transistor output; 350mA maximum load.
4. 10 bit non-isolated analog outputs
5. Internal 220 ohm 0.1% resistor; connect AINn\_I to AINn\_V when using 0..20mA input.
6. 3.3V signals.
7. RS232 standard serial port.
8. Maximum 100mA loads; only for JTAG debugger.

The IO interface mating connector can accommodate AWG# 20-28 conductors. Recommended mating parts:

- DSUB 37 connector housing: FCI - 865637PLTXLF
- Crimp terminal 20-24AWG: FCI - 8656352064LF
- Crimp terminal 24-28AWG: FCI - 8656350064LF
- DSUB 37 plastic shell: FCI - 86303640BLF

### 8.2. Power supply connector

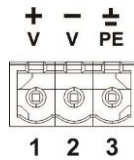


Figure 8.2: Power supply connector

<b>Power supply connector pin out:</b>				
Pin	Name	Description	Function	Note
1	+24V	Positive input	Power supply	-
2	0V	Negative input		
3	PE	Protective earth		

Power supply mating connector can accommodate AWG# 12-24 conductors. Recommended mating connector:

- Terminal block plug, 3 positions: On Shore Technology Inc – OSTTJ035153

**CAUTION**

There are no user-replaceable parts in the device.

**CAUTION**

Do not attempt to open the device or to remove the circuit boards from the uT2.8CPI assembly. Any disassembly could damage the unit and will invalidate the warranty.

**9.1 Ordering information:**

Type Number	Description	Status
<b>UT28090621EU</b>	2.8" LCD, 9 DC inputs, 6 transistor outputs, 2 analog inputs, 1 analog output, 10/100 Fast Ethernet, USB host/client port.	Active
<b>UT28090600</b>	2.8" LCD, 9 DC inputs, 6 transistor outputs.	-

**10.1 Revision history:**

Rev	Date	Description
2	20140307	Added 24AA025E48 memory
1	20130701	uT2.8CPI user manual revision