

MIOAQU

Mica I/O & analog Acquisition module



I/O & ANALOG Gateway compatible with HARTING MICA®

Main characteristics

- DW0108 board is a MICA Functional Board
- USB isolation to/from CPU module
- 2x RS-485 I/F
- 8x Digital Inputs 24V
- 2x PTC (3/2 wire)
- 2x Analog Inputs 0-10V
- 2x Analog Inputs 4-20mA
- 1x 24V(max) Relay N.O./ N.C.(option)
- Waterproof rate: IP67
- Temperature range -40° to +85° C

Typical applications

Evaluation equipment for:

- Photovoltaics / Energy harvesting
- Industrial process monitor
- Railways applications
- Data logging applications



Figure 1: DW0108 board

Product Overview

The DW0108 board is a functional module for the MICA ecosystem. It is used to provide datalogging functionalities, acquiring from the field many different type of sensors and providing a relay output for an actuation. All the interfaces are controlled by the FTDI chip, FT4232HQ, that convert the USB data/command into the UART, GPIO and I2C peripherals. The peripherals are used to design the interfaces to the external JS1 connector. In this way it is quite simple to control all interfaces using MICA microprocessor.

The two RS485 interfaces are implemented with a fail-safe, hot swap, ESD protected 15kV transceiver. All the 8 digital inputs are implemented in a negative logic (via discrete Schmitt trigger buffer). About the analog inputs interfaces, the two PTC, the two 0-10V and the two 4-20mA are acquired via the 12bit A/D converter and read via I2C interface by the FTDI chip. An output relays (Normally Open, Normally Closed available as option via component change request) is made using a solid-state relay chip.

Each interface, routed to the external connector JS1, is protected with additional discrete protections in order to meet IEC 61000-4-4 EFT and IEC 61000-4-5 Surge.

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Isolation is achieved at USB and Power Supply level, so the isolated ground is common for all the interfaces.

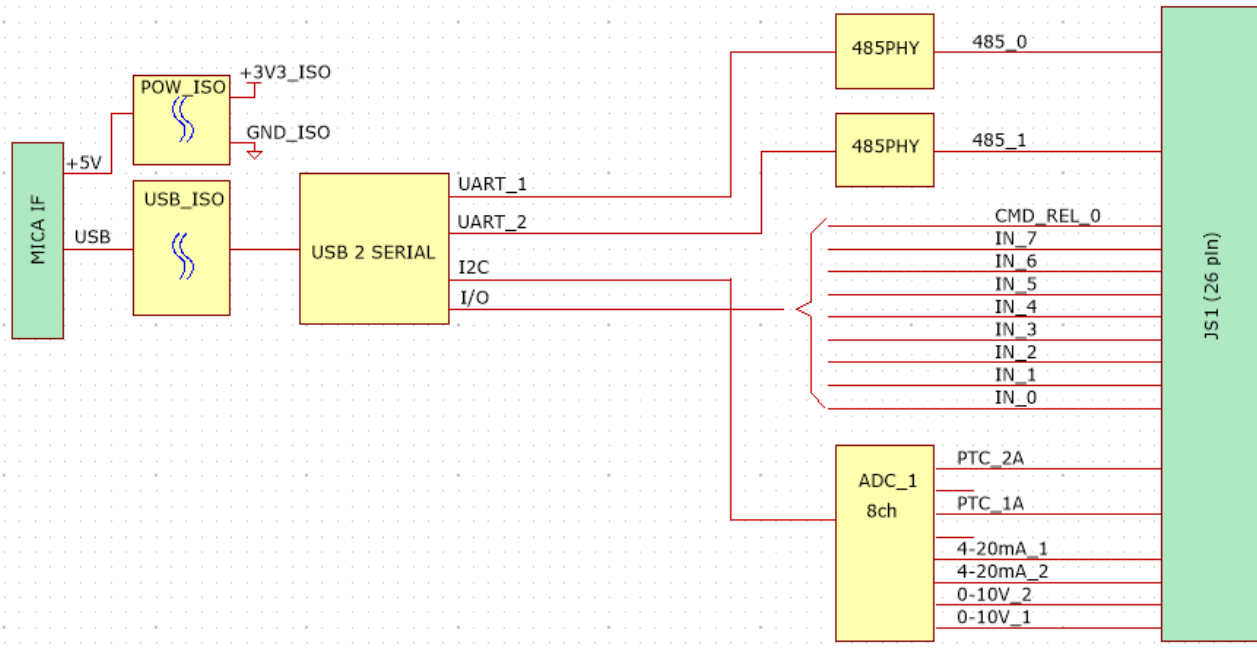


Figure 2: Block diagram

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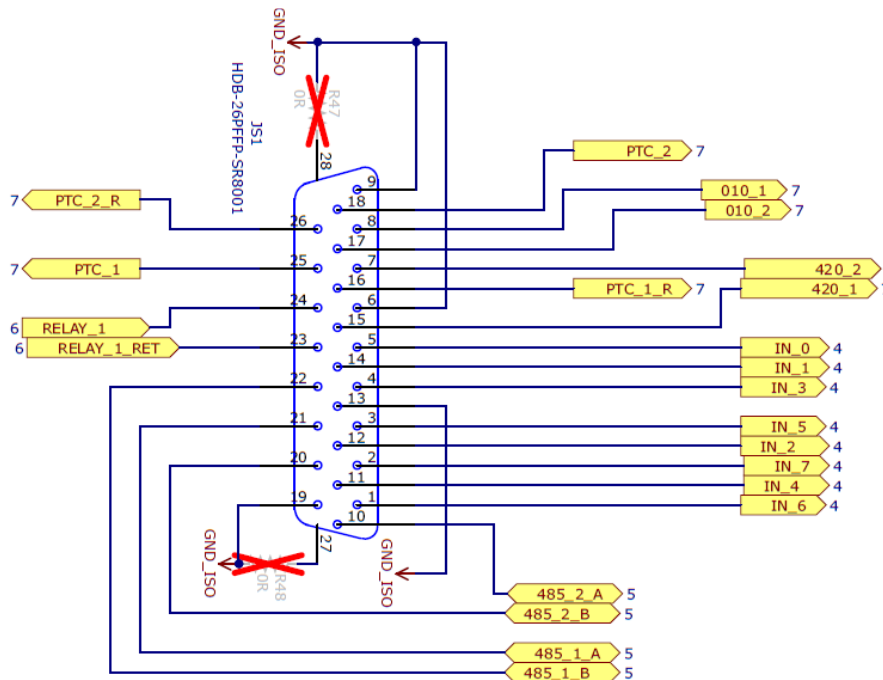


Figure 3: JS1 connector

JS1 Pin Description			
Pin #	Name	Description	Electrical characteristics
1	IN_6	Digital input 6	Vmax=24V
2	IN_7	Digital input 7	Vmax=24V
3	IN_5	Digital input 5	Vmax=24V
4	IN_3	Digital input 3	Vmax=24V
5	IN_0	Digital input 0	Vmax=24V
6	GND_ISO	Isolated GROUND and PTC wire 3	
7	420_2	Analog input 4-20 mA	I _{max_hold} (fuse)=29mA, Vmax=24V
8	010_1	Analog input 0-10V	Vmax=20V (nominal 10V)
9	GND_ISO	Isolated GROUND and PTC wire 3	
10	485_2_A	RS-485 pin A	See RS-485 std
11	IN_4	Digital input 4	Vmax=24V
12	IN_2	Digital input 2	Vmax=24V
13	GND_ISO	Isolated GROUND and PTC wire 3	
14	IN_1	Digital input 1	Vmax=24V
15	420_1	Analog input 4-20 mA	I _{max_hold} (fuse)=29mA, Vmax=24V
16	PTC_1_R	Analog input PTC wire 2	
17	010_2	Analog input 0-10V	Vmax=20V (nominal 10V)
18	PTC_2	Analog input PTC wire 1	
19	GND_ISO	Isolated GROUND and PTC wire 3	
20	485_2_B	RS-485 pin B	See RS-485 std
21	485_1_A	RS-485 pin A	See RS-485 std
22	485_1_B	RS-485 pin B	See RS-485 std
23	RELAY_1_RET	Relay return pin	Vmax 28V, I _{max hold} (FUSE) =400mA
24	RELAY_1	Relay Output	Vmax 28V, I _{max hold} (FUSE) =400mA
25	PTC_1	Analog input PTC wire 1	
26	PTC_2_R	Analog input PTC wire 2	

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Table 1: Connector JS1 pin-out

The PTC may be used as TWO WIRES shorting together the *wire1* and *wire2* pins. The GND_ISO pin must be used as *wire3*.

The relays are “high level trigger” output that means that a high signal on Arduino interface enables the current to go through the relay (ON). In other words:

FTDI Output signal (REL_CMD_1)	Relay state
<i>High</i>	<i>ON (RELAY_1 shorted to RELAY_1_RET)</i>
<i>Low</i>	<i>OFF (RELAY_1 and RELAY_1_RET are open)</i>
<i>Absent</i>	<i>OFF (RELAY_1 and RELAY_1_RET are open)</i>

Table 2: Relay status

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All the information included in the following tables are related to $T_{AMB} = 25^{\circ}\text{C}$, unless otherwise specified.

Absolute Maximum Rating					
PARAMETER	MIN	TYP	MAX	UNIT	REMARKS
Digital Inputs					
Continuous Digital Input voltage	-45		45	V	
Continuous Digital Input current	-10		10	mA	
Analog Inputs 0-10 Volts					
Continuous Analog Input voltage	-45		45	V	
Continuous Analog Input current	-10		10	mA	
Analog Inputs 4-20 mA					
Continuous Analog Input current	-29		29	mA	
Continuous Analog Input Voltage	-45		45	V	
Analog Inputs PT100					
Continuous Analog Input Voltage	-45		45	V	
Relay output					
Load Voltage	-28		+28	V	
Load Current	-0.2		0.2	A	at 23°C
Load Current	-0.1		0.1	A	In the -40 +85°C range
Peak load current	-1.5		1.5	A	100 ms (1 shot)
General					
Operative temperature range	-40		+85	°C	
Storage temperature range	-40		+100	°C	

Table 3: absolute maximum ratings

Electrical characteristics (-40 +85°C range)					
PARAMETER	MIN	TYP	MAX	UNIT	REMARKS
Digital Inputs					
Input voltage "High"	11.4	24		V	Considering $V_{th+}(\text{max}) = 2.4\text{V}$ for input buffer NC7WZ14
Input voltage "Low"		0	3.44	V	Considering $V_{th-}(\text{min}) = 0.7\text{V}$ for input buffer NC7WZ14
Rise/Fall time		75		ns	
Input current		407		uA	24V input signal
Isolation: Maximum Withstand Isolation Voltage (V_{ISO})			2500	Vrms	
Isolation: Maximum Repetitive Peak Isolation Voltage (V_{IORM})			560	Vpeak	
Isolation: Maximum transient isolation voltage (V_{IOTM})			3500	Vpeak	
Analog Inputs 0-10 Volts					
Input voltage range	0	10	11.87	V	
Input current		170		uA	10V input
Throughput			50	kSps	
Input bandwidth		25		kHz	-3dB input bandwidth
Isolation: Maximum Withstand Isolation Voltage (V_{ISO})			2500	Vrms	
Isolation: Maximum Repetitive Peak Isolation Voltage (V_{IORM})			560	Vpeak	
Isolation: Maximum transient isolation voltage (V_{IOTM})			3500	Vpeak	

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Electrical characteristics (-40 +85°C range)					
PARAMETER	MIN	TYP	MAX	UNIT	REMARKS
Analog Inputs 4-20 mA					
Input current range	0	20	20.8	mA	
Input voltage		11.8		V	20mA 25°C
Throughput			50	kSps	
Input bandwidth		25		kHz	-3dB input bandwidth
Isolation: Maximum Withstand Isolation Voltage (V_{ISO})			2500	Vrms	
Isolation: Maximum Repetitive Peak Isolation Voltage (V_{IORM})			560	Vpeak	
Isolation: Maximum transient isolation voltage (V_{IOTM})			3500	Vpeak	
Analog Inputs PCT					
PCT temperature range	-61	25	250	°C	
Input voltage range	0	20	120	mV	
Throughput			100	Sps	
Relay output					
ON resistance	1		2.5	Ω	
OFF state leakage current			2	μ A	
Latency (T_{ON})	0.9		3.0	ms	Delay between internal variation and output effect. $I_{LOAD} = 0.5A$.
Latency (T_{OFF})	0.5		2.0	ms	Delay between internal variation and output effect. $I_{LOAD} = 0.5A$.

Table 4:electrical characteristics

Outline Drawing

The DW0108-01 top outline drawing is shown in the following figure. All measurements are expressed in millimeters.

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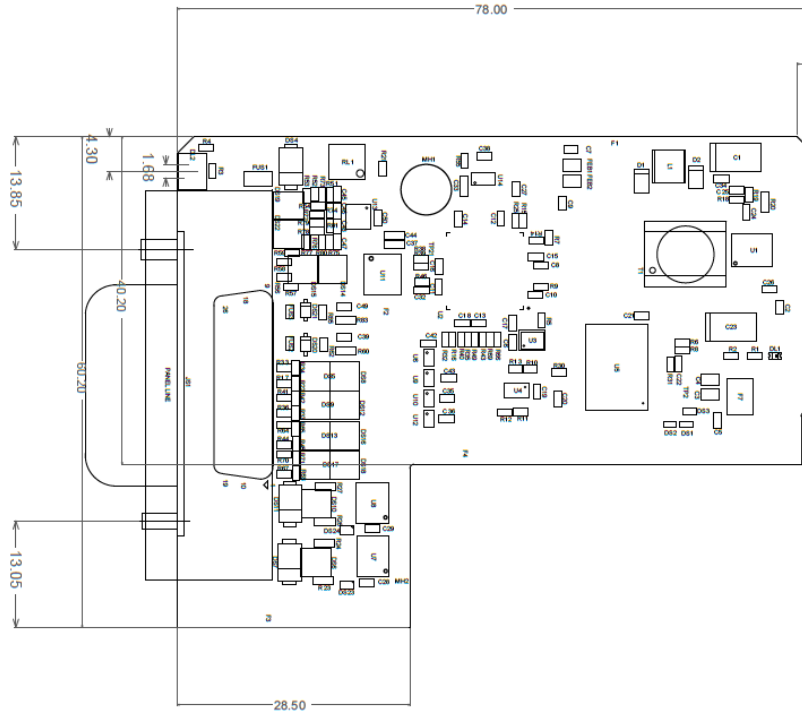


Figure 4: TOP silk layer with quote.

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Connectors Information

REFERENCE	MANUFACTURER	MANUFACTURER PN	DESCRIPTION
JS1	ASSMANN	AE10125-ND	D-SUB- 26P HD 3 row female right angle PCB, IP67

Ordering informations

The following part numbers are designed:

Board PN	Variant description	Status
DW0108-00	BASELINE: PCBA board full mounted with relay NO.	available
DW0108-10	VARIANT_1: PCBA board full mounted with relay NO.	Not available
DW0108-20	VARIANT_2: PCBA board without relay.	Not available

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