

WEB-TC

Specifications



**MEASUREMENT
COMPUTING™**

Document Revision 1.1, February, 2010
© Copyright 2010, Measurement Computing Corporation

Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input

Table 1. Generic analog input specifications

Parameter	Conditions	Specification
A/D converters		Four dual 24-bit, Sigma-Delta type
Number of channels		8 differential
<i>Input isolation</i>		<i>500 VDC minimum between field wiring and power supply input.</i>
Channel configuration		Software programmable to match sensor type
Differential input voltage range	Thermocouple	±0.080 V
<i>Absolute maximum input voltage</i>	<i>±C0x through ±C7x relative to AGND (pins 9, 19, 28, 38)</i>	<i>±25 V (power on) ±40 V (power off)</i>
<i>Input impedance</i>		<i>5 Gigohm (power on) 1 Mohm (power off)</i>
<i>Input leakage current</i>	<i>Open thermocouple detect disabled</i>	<i>30 nA max.</i>
	<i>Open thermocouple detect enabled</i>	<i>105 nA max.</i>
<i>Common mode rejection ratio</i>	<i>fIN = 60 Hz</i>	<i>100 dB min.</i>
ADC Resolution		24 bits
<i>ADC No missing codes</i>		<i>24 bits</i>
Input coupling		DC
Warm-up time		30 minutes min.
Open thermocouple detect		The maximum open detection time is 3 seconds.
<i>CJC sensor accuracy</i>	<i>15 °C to 35 °C</i>	<i>-0.75 °C to 0.5 °C max.</i>
	<i>0 °C to 55 °C</i>	<i>-1.5 °C to 1.25 °C max.</i>

Channel configurations

Table 2. Channel configuration specifications

Sensor Category	Conditions	Specification
Thermocouple	J, K, S, R, B, E, T, or N	8 differential channels

Note 1: Channel configuration information is stored on a EEPROM external to the isolated microcontroller by the firmware whenever any item is modified. Modification is performed by commands issued over Ethernet from an external application, and the configuration is made non-volatile through the use of the EEPROM.

Note 2: The factory default configuration is *Type J*.

Compatible thermocouples

Table 3. Compatible sensor type specifications

Parameter	Conditions
Thermocouple	J: -210 °C to 1200 °C
	K: -270 °C to 1372 °C
	R: -50 °C to 1768 °C
	S: -50 °C to 1768 °C
	T: -270 °C to 400 °C
	N: -270 °C to 1300 °C
	E: -270 °C to 1000 °C
	B: 0 °C to 1820 °C

Accuracy

Thermocouple measurement accuracy

Table 4. Thermocouple accuracy specifications, including CJC measurement error. All specifications are (\pm).

Sensor Type	Sensor temperature	Accuracy error maximum (°C)	Accuracy error typical (°C)	Tempco (°C/°C)
J	-210 °C	3.098	1.762	0.040
	0 °C	1.282	0.724	
	1200 °C	1.178	0.684	
K	-210 °C	3.318	1.843	0.045
	0 °C	1.292	0.730	
	1372 °C	1.495	0.799	
S	-50 °C	1.892	1.058	0.027
	250 °C	0.853	0.479	
	1768 °C	0.734	0.416	
R	-50 °C	2.010	1.124	0.025
	250 °C	0.844	0.475	
	1768 °C	0.612	0.347	
B	250 °C	2.199	2.192	0.004
	700 °C	0.824	0.821	
	1820 °C	0.471	0.469	
E	-200 °C	3.050	1.708	0.038
	0 °C	1.465	0.826	
	1000 °C	1.010	0.564	
T	-200 °C	3.226	1.797	0.045
	0 °C	1.334	0.754	
	400 °C	0.856	0.496	
N	-200 °C	3.406	1.897	0.035
	0 °C	1.300	0.735	
	1300 °C	0.978	0.571	

Note 3: Thermocouple measurement accuracy specifications include polynomial linearization, cold-junction compensation and system noise. These specs are for one year, or 3000 operating hours, whichever comes first, and for operation of the WEB-TC between 15 °C and 35 °C after 30 minute warm-up. The tempco should be applied to the accuracy specifications for operation at an ambient temperature outside of the 15 °C and 35 °C range. There are total of four CJC sensors, two per side of the module. Each CJC sensor is dedicated to one of the four channel pairs. The accuracy listed above assumes the screw terminals are at the same temperature as the CJC sensor. Errors shown do not include inherent thermocouple error. Contact your thermocouple supplier for details on the actual thermocouple accuracy error.

Note 4: Thermocouples must be connected to the WEB-TC such that they are floating with respect to AGND (pins 9, 19, 28, 38, 48). The WEB-TC AGND pins are isolated from earth ground. You can connect thermocouple sensors to voltages referenced to earth ground as long as the isolation between the AGND pins and earth ground is maintained.

Note 5: When thermocouples are attached to conductive surfaces, the voltage differential between multiple thermocouples must remain within ± 1.4 V. For best results, we recommend using insulated or ungrounded thermocouples when possible.

Throughput rate

Table 5. Throughput rate specifications

Number of Input Channels	Maximum Throughput
1	2 Samples/second
2	2 S/s on each channel, 4 S/s total
3	2 S/s on each channel, 6 S/s total
4	2 S/s on each channel, 8 S/s total
5	2 S/s on each channel, 10 S/s total
6	2 S/s on each channel, 12 S/s total
7	2 S/s on each channel, 14 S/s total
8	2 S/s on each channel, 16 S/s total

Note 6: The analog inputs are configured to run continuously. Each channel is sampled twice per second. The maximum latency between when a sample is acquired and the temperature data is provided by the Ethernet unit is approximately 0.5 seconds.

Digital input/output

Table 6. Digital input/output specifications

Digital type	CMOS
Number of I/O	8 (DIO0 through DIO7)
Configuration	Independently configured for input or output. Switch selectable output voltages: +5 V and +3.3 V
Power on conditions	Power on reset is Input mode except when bits are configured to operate as alarms.
Pull-up/pull-down configuration	All pins are connected to 47 kOhm resistors that share a common point accessible at Pin 22 of the device (PU/D). This pin is floating by default and is user-configurable via external connection. For pull-up mode, connect this pin to Pin 21 (+5V). For pull-down mode, connect this pin to Pin 48 (GND).
Digital I/O transfer rate (software paced)	<ul style="list-style-type: none"> ▪ Digital input – 50 port reads or single bit reads per second typical. ▪ Digital output – 100 port writes or single bit writes per second typical.
Input high voltage (+5 V mode)	4 V min, 5.5 V absolute max.
Input high voltage (+3.3 V mode)	2.64 V min, 5.5 V absolute max.
Input low voltage (+5 V mode)	1 V max., -0.3 V absolute min.
Input low voltage (+3.3 V mode)	0.66 V max., -0.3 V absolute min.
Output low voltage (IOL = 2.5 mA)	0.6 V max.
Output high voltage (IOH=-2.5 mA)	4.3 V min. (+5 V mode), 2.7 V (+3.3 V mode)

Note 7: Ground pins on the WEB-TC labeled GND are isolated from AGND pins and from earth ground.

Temperature alarms

Table 7. Temperature alarm specifications

Number of alarms	8 (one per digital I/O line)
Alarm functionality	Each alarm controls its associated digital I/O line as an alarm output. The input to each alarm may be any of the analog temperature input channels. When an alarm is enabled, its associated I/O line is set to output and driven to the appropriate state determined by the alarm options and input temperature. The alarm configurations are stored in non-volatile memory and are loaded at power on.
Alarm input modes	<ul style="list-style-type: none"> ▪ Alarm when input temperature > T1 ▪ Alarm when input temperature > T1, reset alarm when input temperature goes below T2 ▪ Alarm when input temperature < T1 ▪ Alarm when input temperature < T1, reset alarm when input temperature goes above T2 ▪ Alarm when input temperature is < T1 or > T2 <p>Note: T1 and T2 may be independently set for each alarm.</p>
Alarm output modes	<ul style="list-style-type: none"> ▪ Disabled, digital I/O line may be used for normal operation ▪ Enabled, active high output (digital I/O line goes high when alarm condition is met) ▪ Enabled, active low output (digital I/O line goes low when alarm condition is met)
Alarm update rate	1 second

Memory

Table 8. Memory specifications

EEPROM	512 bytes for sensor configuration
FLASH	2 MB for device configuration and website storage

Microcontroller

Table 9. Microcontroller specifications

Type	One high-performance 8-bit RISC microcontroller (isolated) One high-performance 16-bit RISC microcontroller (non-isolated)
------	---

Power

Table 10. Power specifications

Parameter	Conditions	Specification
Supply current (Note 9)	Continuous mode	440 mA max.
External power input (Note 8)		+5 VDC \pm 5% (+5 VDC power supply provided)
External power supply (included)	MCC p/n PS-5V2AEPS	+5 VDC, 10W, 5% regulation
Voltage supervisor limits	4.75 V > V _{ext} or V _{ext} > 5.25 V	PWR LED = Off; (power fault)
	4.75 V < V _{ext} < 5.25 V	PWR LED = On
User output voltage range	Available at +5V screw terminal	4.65 V min., 5.25 V max.
User output current available	Available at +5V screw terminal	10 mA max

Note 8: Voltage specification applies at barrel plug power input. The power supply provided with the board meets this specification at the rated total power supply current. If a different power supply is used, small line resistances could cause significant voltage drop between the power supply and the barrel plug input.

Note 9: This is the total current requirement for the WEB-TC which includes up to 20 mA for the LEDs and 10 mA for the user voltage output.

Network

Ethernet compliance

Table 11. Ethernet compliance specifications

Device type	IEEE 802.3 Ethernet 10Base-T
Device compatibility	IEEE 802.3-2003 10 Mbps Media Access Control

Ethernet connection

Table 12. Ethernet connection specifications

Ethernet type	10Base-T
Connector	RJ-45, 8 position
Cable	CAT-5 shielded, unshielded twisted pair
Length	100 meters max.
MAC address	00:12:71:Cx:xx:xx, where xxxxx is the device's serial number

Network factory default settings

Table 13. Factory default specifications

Factory default IP address	192.168.0.101
Factory default subnet mask	255.255.255.0
Factory default Gateway	192.168.0.1
Factory default DHCP setting	Enabled
Factory default user name	"webtc"
Factory default password	"mccdaq"
Web Server	Enabled

Network protocols

Table 14. Factory default specifications

Protocols implemented	IP, ARP, ICMP, DHCP, UDP, TCP, NBNS, HTTP Protocols using UDP or TCP for transport communicate on their IETF assigned ports (for example HTTP on TCP port 80).
UDP messaging protocol	UDP port 54211
TCP downloading protocol	TCP port 54267
HTTP 1.0 alternate port	TCP port 49152-65535 (not including 54267)
Network name	"webtc_XXXXX", where XXXXX is the device's serial number
Network name publication	via NBNS (responds to b-node broadcasts, therefore only available on the local subnet)
Max number of simultaneous HTTP connections	3
Max number of non-HTTP TCP sockets	5

Network security

Table 15. Factory default specifications

Security implementation	IP address based session manager with user-name/password login for configuration and control transactions (data is not secured.)
Session timeout	5 minutes with no activity
User-name/password encryption	Base64 (The default web page does not support encryption if Javascript is disabled in the web browser.)
Vulnerabilities	Denial of service attacks, user-name/password spoofing, script probing and simple decryption

LED displays and the factory reset button

Table 16. LED and button configurations

POWER/COMM LED (top)	4.75 V < Vext < 5.25 V On Vext < 4.75 V, Vext > 5.25 V Off (power fault) Blinks during microcontroller communications.
LINK/ACTIVITY LED (bottom)	On when there is a valid Ethernet connection and blinks when an Ethernet packet is sent or received.
Factory reset button	When held for 3 seconds, the POWER LED will turn off for a short time, indicating a reset is in process. When the POWER LED turns back on, reset is complete and the factory default network settings have been restored.

Environment

Table 17. Environmental specifications

Operating temperature range	0 to 55 ° C
Storage temperature range	-40 to 85 ° C
Humidity	0 to 90% non-condensing

Mechanical

Table 18. Mechanical specifications

Dimensions	127 mm (L) x 88.9 mm (W) x 35.56 (H)
------------	--------------------------------------

Screw terminal connector type and pin out

Table 19. Screw terminal connector specifications

Connector type	Screw terminal
Wire gauge range	16 AWG to 30 AWG

Table 20. Screw terminal pin out

Pin	Signal Name	Pin Description	Pin	Signal Name	Pin Description
1	RSVD	Reserved - see Note 10	27	RSVD	Reserved - see Note 10
2	NC	No connect - see Note 10	28	AGND	Analog ground
3	C0H	CH0 sensor input (+)	29	C7L	CH7 sensor input (-)
4	C0L	CH0 sensor input (-)	30	C7H	CH7 sensor input (+)
5	RSVD	Reserved - see Note 10	31	RSVD	Reserved - see Note 10
6	RSVD	Reserved - see Note 10	32	RSVD	Reserved - see Note 10
7	C1H	CH1 sensor input (+)	33	C6L	CH6 sensor input (-)
8	C1L	CH1 sensor input (-)	34	C6H	CH6 sensor input (+)
9	AGND	Analog ground	35	NC	No connect - see Note 10
10	RSVD	Reserved - see Note 10	36	RSVD	Reserved - see Note 10
11	RSVD	Reserved - see Note 10	37	RSVD	Reserved - see Note 10
12	NC	No connect - see Note 10	38	AGND	Analog ground
13	C2H	CH2 sensor input (+)	39	C5L	CH5 sensor input (-)
14	C2L	CH2 sensor input (-)	40	C5H	CH5 sensor input (+)
15	RSVD	Reserved - see Note 10	41	RSVD	Reserved - see Note 10
16	RSVD	Reserved - see Note 10	42	RSVD	Reserved - see Note 10
17	C3H	CH3 sensor input (+)	43	C4L	CH4 sensor input (-)
18	C3L	CH3 sensor input (-)	44	C4H	CH4 sensor input (+)
19	AGND	Analog ground	45	NC	No connect - see Note 10
20	RSVD	Reserved - see Note 10	46	RSVD	Reserved - see Note 10
21	+5V	+5V output	47	NC	No connect - see Note 10
22	PU/D	Pull-up/down for digital outputs	48	GND	Digital ground
23	DIO0	Digital Input/Output	49	DIO7	Digital Input/Output
24	DIO1	Digital Input/Output	50	DIO6	Digital Input/Output
25	DIO2	Digital Input/Output	51	DIO5	Digital Input/Output
26	DIO3	Digital Input/Output	52	DIO4	Digital Input/Output

Note 10: Do not make connections to pins marked "NC" or "RSVD".

Measurement Computing Corporation
10 Commerce Way
Suite 1008
Norton, Massachusetts 02766
(508) 946-5100
Fax: (508) 946-9500
E-mail: info@mccdaq.com
www.mccdaq.com