

Product Datasheet - Technical Specifications



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Specifications

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Analog Input Specifications

Table 29 lists the specifications for the A/D subsystem on the DT9836 Series modules.

Table 29: A/D Subsystem Specifications

Feature	Specifications ^a
Number of analog input channels ^b	6 or 12 single-ended Simultaneous
Resolution	16 bits
Range	± 10 V, ± 5 V
Throughput per channel DT9836S-6-2-OEM: DT9836S-6-2-BNC: DT9836S-6-0-OEM: DT9836S-6-0-BNC: All other DT9836 Series modules:	800 kSamples/s ^c 800 kSamples/s ^c 800 kSamples/s ^c 800 kSamples/s ^c 225 kSamples/s
Channel bandwidth	>4 MHz to -3 dB point for the DT9836S >1.125 MHz to -3 dB point for all other DT9836 Series modules
Sample-and-hold Aperture uncertainty: Aperture delay: Aperture match: Gain match: Zero match:	1 ns 35 ns 5 ns $\pm 0.015\%$ ± 1.5 mV
System accuracy, to % of FSR Gain = 1:	$\pm 0.015\%$
Bipolar input range	± 10 V, ± 5 V
Data encoding	Offset binary
Maximum input voltage (without damage) Power on: Power off:	± 30 V ± 20 V
Input impedance	> 9 M Ω , 10 pF for the DT9836S 100 M Ω , 10 pF for all other DT9836 Series modules
Input bias current	± 1 nA
Integral nonlinearity	$\pm 0.015\%$
Differential nonlinearity	$\pm 0.003\%$
Inherent quantizing error	$\pm 1/2$ LSB
Drift Zero: Gain:	± 25 μ V/ $^{\circ}$ C ± 50 ppm of FSR/ $^{\circ}$ C
ESD protection Arc: Contact:	8 kV 4 kV

Table 29: A/D Subsystem Specifications (cont.)

Feature	Specifications ^a
Effective Number of Bits (ENOB) at full-scale	>14.4 bits typical for the DT9836S >13.5 bits typical for all other DT9836 Series modules
Spurious Free Dynamic Range (SFDR)	96 dB typical

- a. Input cables must be properly matched for optimum performance.
- b. The the number of channels available depends on the model you purchase.
- c. This throughput can be achieved if the channel list includes six or fewer channels; refer to [page 70](#) for more information on throughput and the number of channel list entries.

Analog Output Specifications

Table 30 lists the specifications for the D/A subsystem on the DT9836 Series modules.

Table 30: D/A Subsystem Specifications

Feature	Specifications
Number of analog output channels	0, 2, or 4 Simultaneous
Resolution	16 bits
Settling time to 0.01% of FSR	2.0 μ s, 100 mV steps 5.0 μ s, 10 V steps
Throughput	500 kSamples/s per channel
Slew rate	10 V/ μ s
Glitch energy	12 nV/s, typical
Output range	\pm 10 V
Data encoding	Offset binary
Output current	\pm 5 mA maximum load
Output impedance	0.1 Ω maximum
Capacitive driver capability	0.004 μ F
Protection	Short circuit to analog ground
Integral nonlinearity	1.0 LSB
Differential nonlinearity	1.0 LSB
Inherent quantizing error	\pm 1/2 LSB
Error Zero: Gain:	\pm 0.0003 V \pm 0.0003 V
Drift Zero (bipolar): Gain:	\pm 10 ppm of FSR/ $^{\circ}$ C \pm 30 ppm of FSR/ $^{\circ}$ C
FIFO	128 kSamples, total
ESD protection Arc: Contact:	8 kV 4 kV

Digital I/O Specifications

Table 31 lists the specifications for the DIN/DOUT subsystems on the DT9836 Series modules.

Table 31: DIN/DOUT Subsystem Specifications

Feature	Specifications
Number of digital I/O lines	32 (16 in, 16 out)
Number of ports	2 (16 bits each)
Input termination DT9836:	Inputs tied to +3.3 V through 15 k Ω pull-up resistors
DT9836S:	No pull-up resistors provided
Logic family	LVTTL
Logic sense	Positive true
Inputs Input type: Input logic load: High input voltage: Low input voltage: Low input current:	Level-sensitive 1 LVTTL 2.0 V minimum 0.8 V maximum -0.4 mA maximum
Outputs High output: Low output:	2.4 V minimum with up to 6 mA 0.4 V maximum with up to 3 mA
Interrupt on change	Yes
Clocked with sample clock	Yes
Software I/O selectable	No

Counter/Timer Specifications

Table 32 lists the specifications for the C/T subsystems on the DT9836 Series modules.

Table 32: C/T Subsystem Specifications

Feature	Specifications
Number of channels C/T: Quadrature decoder:	2 3
Internal reference clock	36 MHz
Resolution	32 bits per channel
Clock divider Minimum: Maximum:	2 4,294,967,296
Clock output Minimum: Maximum:	0.0084 Hz 18 MHz
Maximum clock or gate input frequency	18 MHz ^a
Minimum pulse width (minimum amount of time it takes a C/T to recognize an input pulse)	Greater than 27.8 ns ^a
Maximum input frequency	17.986 MHz
Logic family	LVTTL
Inputs Input logic load: High input voltage: Low input voltage: Low input current:	1 LVTTL 2.0 V minimum 0.8 V maximum –0.4 mA maximum
Outputs High output: Low output:	2.4 V minimum with up to 6 mA 0.4 V maximum with up to 3 mA

a. The integrity of the signal degrades at frequencies greater than 10 MHz.

External Trigger Specifications

Table 33 lists the specifications for the external A/D and D/A triggers on the DT9836 Series modules.

Table 33: External A/D and D/A Trigger Specifications

Feature	Specifications
Trigger sources Internal: External:	Software-initiated Software-selectable
Input type	Edge-sensitive
Logic family	LVTTL
Inputs Input logic load: Input termination: High input voltage: Low input voltage: High input current: Low input current:	1 LVTTL 2.2 k Ω pull-up to +3.3 V 2.0 V minimum 0.8 V maximum 25 μ A maximum -0.25 mA maximum
Minimum pulse width High: Low:	25 ns 25 ns
Triggering modes Single scan: Continuous scan: Triggered scan:	Yes Yes No

Clock Specifications

Table 34 lists the specifications for the internal A/D and D/A clocks on the DT9836 Series modules.

Table 34: Internal A/D and D/A Clock Specifications

Feature	Specifications
Reference frequency	36 MHz
Divisor range	3 to 4,294,967,295
Usable A/D clock range: DT9836S-6-2-OEM: DT9836S-6-2-BNC: DT9836S-6-0-OEM: DT9836S-6-0-BNC: All other DT9836 Series modules:	0.00838 Hz to 800 kHz 0.00838 Hz to 800 kHz 0.00838 Hz to 800 kHz 0.00838 Hz to 800 kHz 0.00838 Hz to 225 kHz
Usable D/A clock range:	0.00838 Hz to 500 kHz
Oscillator accuracy (recording time error)	±50 ppm

Table 35 lists the specifications for the external A/D and D/A clocks on the DT9836 Series modules.

Table 35: External A/D and D/A Clock Specifications

Feature	Specifications
Input type ^a A/D: D/A:	falling edge rising edge
Logic family	LVTTL
Inputs Input logic load: Input termination: High input voltage: Low input voltage: Low input current:	1 LVTTL 2.2 kΩ pull-up to +3.3 V 2.0 V 0.8 V 1.2 mA
Analog input oscillator frequency DT9836S-6-2-OEM: DT9836S-6-2-BNC: DT9836S-6-0-OEM: DT9836S-6-0-BNC: All other DT9836 Series modules:	DC to 800 kHz DC to 800 kHz DC to 800 kHz DC to 800 kHz DC to 225 kHz
Analog output oscillator frequency	DC to 500 kHz
Minimum pulse width High: Low:	25 ns 25 ns

- a. A quiet (glitch-free) stable clock is required for best results and to prevent overclock conditions. In addition, it is recommended that you avoid gating the clock unless gating on and off is synchronous to the clock.

Power, Physical, and Environmental Specifications

Table 36 lists the power, physical, and environmental specifications for the DT9836 Series modules.

Table 36: Power, Physical, and Environmental Specifications

Feature	Specifications
Power, +5 V	±5% @ 2 A maximum
Physical Dimensions (OEM): Dimensions (BNC): Weight (OEM):	190 mm x 100 mm 215.9 mm x 105.9 mm x 50 mm 4.6 ounces
Environmental Operating temperature range: Storage temperature range: Relative humidity:	0° C to 55° C –25° C to 85° C to 95%, noncondensing

Mating Connector Specifications

Table 37 lists the mating cable connectors for the connectors on the BNC connection box, the OEM version of the DT9836 Series module, and the EP353 and EP356 accessory panels.

Table 37: Mating Cable Connectors

Module/Panel	Connector	Part Number on Module (or Equivalent)	Mating Cable Connector
BNC connection box	Analog input	AMP/Tyco AMP 5747375-8	AMP/Tyco 5-747917-2
	Digital I/O	AMP/Tyco 5747301-8	AMP/Tyco 5-747916-2
	C/T, DAC, Clk, Trig	AMP/Tyco 5747301-8	AMP/Tyco 5-747916-2
OEM version	J2	AMP/Tyco 6-104068-8	AMP/Tyco 3-111196-4 ^a
	J3	AMP/Tyco 6-104068-8	AMP/Tyco 3-111196-4 ^a
	TB1 ^b	Phoenix Contact 1707434	Phoenix Contact 1839610
EP353 accessory panel	J1	AMP/Tyco 5102321-6	AMP/Tyco 1658622-6
	J2	AMP/Tyco 5747375-8	AMP/Tyco 5-747917-2
EP356 accessory panel	J1	AMP/Tyco 5747301-8	AMP/Tyco 5-747916-2
	J2	AMP/Tyco 5747301-8	AMP/Tyco 5-747916-2

a. The mating PCB receptacle is AMP/Tyco 6-104078-3.

b. Secondary power connector.

Regulatory Specifications

The DT9836 Series modules are CE-compliant. [Table 38](#) lists the regulatory specifications for the DT9836 Series modules.

Table 38: Regulatory Specifications

Feature	Specifications
Emissions (EMI)	FCC Part 15, Class A EN55011:2007 (Based on CISPR-11, 2003/A2, 2006)
Immunity	EN61326-1:2006 Electrical Equipment for Measurement, Control, and Laboratory Use <u>EMC Requirements</u> EN61000-4-2:2009 Electrostatic Discharge (ESD) 4 kV contact discharge, 8 kV air discharge, 4 kV horizontal and vertical coupling planes EN61000-4-3:2006 Radiated electromagnetic fields, 3 V/m, 80 to 1000 MHz; 3 V/m, 1.4 GHz to 2 GHz; 1 V/m, 2 GHz to 2.7 GHz EN61000-4-4:2004 Electrical Fast Transient/Burst (EFT) 1 kV on data cables EN61000-4-6:2009 Conducted immunity requirements, 3 Vrms on data cables 150 kHz to 80 MHz
RoHS (EU Directive 2002/95/EG)	Compliant (as of July 1st, 2006)

External Power Supply Specifications

Table 39 lists the specifications for the EP361 +5 V external power supply that is used with the DT9836 Series modules.

Table 39: External Power Supply (EP361) Specifications

Feature	Specifications
Type	Total Power medical power supply (TPES22-050400 or TPEMG24-S050400-7)
Input voltage	Typical 90 - 264 V AC
Input current TPES22-050400	Typical 0.38 A at 115 V AC, 0.15 A at 230 V AC
TPEMG24-S050400-7	Typical 0.347 A at 115 V AC, 0.215 A at 230 V AC
Frequency	47 to 63 Hz
Inrush current TPES22-050400	35 A at 230 V AC typical or less than 30 A by adding thermistor
TPEMG24-S050400-7	6.274 A RMS at 230 V AC
Output voltage	5 V DC
Output current	4.0 A
Output wattage TPES22-050400	Typical 22 - 24 W
TPEMG24-S050400-7	Typical 20 - 24 W
Noise and ripple	1% peak to peak
Regulatory specifications TPES22-050400	UL, N, CE, FCC Class B
TPEMG24-S050400-7	UL, ITE, CE, FCC Class B, Energy Star compliant