

Product Datasheet - Technical Specifications



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Specifications

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Analog Input Specifications

Table 27 lists the analog input specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 27: Analog Input Specifications

Feature	DT9812-2.5V Specifications	DT9812-10V, DT9812-10V-OEM, DT9813-10V, DT9814-10V Specifications	DT9812A, DT9813A, DT9814A Specifications
Number of analog input channels	8 single-ended	DT9812-10V: 8 single-ended DT9812-10V-OEM: 8 single-ended DT9813-10V: 16 single-ended DT9814-10V: 24 single-ended	DT9812-A: 8 single-ended DT9813A: 16 single-ended DT9814A: 24 single-ended
Number of gains	5 (1, 2, 4, 8, 16)	4 (1, 2, 4, 8)	4 (1, 2, 4, 8)
Resolution	12-bit	12-bit	12-bit
Data encoding	binary	twos complement	twos complement
System accuracy, to % of FSR (Averaged over 50 readings)			
Gain = 1:	0.04%	0.04%	0.04%
Gain = 2:	0.06%	0.06%	0.06%
Gain = 4:	0.08%	0.08%	0.08%
Gain = 8:	0.10%	0.10%	0.10%
Gain = 16:	0.15%	–	–
Input Range			
Gain = 1:	0 to 2.44 V,	±10 V,	±10 V,
Gain = 2:	0 to 1.22 V,	±5 V,	±5 V,
Gain = 4:	0 to 0.610 V,	±2.5 V,	±2.5 V,
Gain = 8:	0 to 0.305 V	±1.25 V	±1.25 V
Gain = 16:	0 to 0.1525 V	–	–
Nonlinearity	0.05%	0.05%	0.05%
Differential nonlinearity	±1/2 LSB	±1/2 LSB	±1/2 LSB
Inherent quantizing error	1 LSB	1 LSB	1 LSB
Drift			
Zero:	±50 μV	±100 μV	±100 μV
Gain:	±100 ppm	±100 ppm	±100 ppm
Differential linearity:	monotonic	monotonic	monotonic
Input impedance ^a			
Off channel:	10 MΩ, 10 pf	10 MΩ, 10 pf	10 MΩ, 10 pf
On channel:	10 MΩ, 100 pf	10 MΩ, 100 pf	10 MΩ, 100 pf
Input bias current	±10 nA	±10 nA	±10 nA
Maximum input voltage (without damage)			
Power on:	±35 V	±35 V	±35 V
Power off:	±20 V	±20 V	±20 V
Channel acquisition time (±½ LSB)	20 μs	20 μs	10 μs

Table 27: Analog Input Specifications (cont.)

Feature	DT9812-2.5V Specifications	DT9812-10V, DT9812-10V-OEM, DT9813-10V, DT9814-10V Specifications	DT9812A, DT9813A, DT9814A Specifications
Sample-and-hold Aperture uncertainty: Aperture delay:	2 ns 200 ns	2 ns 200 ns	2 ns 200 ns
Throughput	50 kHz	50 kHz	100 kHz ^b
ESD protection (per spec) Arc: Contact:	8 kV 4 kV	8 kV 4 kV	8 kV 4 kV
Reference	2.44 V	2.5 V	2.5 V
Monotonicity	Yes	Yes	Yes
Sample Clock Internal: External:	Yes Yes	Yes Yes	Yes Yes
Trigger Source Internal: External:	Yes Yes	Yes Yes	Yes Yes
A/D Converter Noise	0.6 LSB rms	0.6 LSB rms	0.6 LSB rms
Channel-to-Channel Offset	0.1 mV	0.1 mV	0.1 mV
Effective Number of Bits at 50 kHz with a 1 kHz sine wave:	10.5 bits	10.5 bits	10.5 bits
Total Harmonic Distortion	< -70 dB @ 1 kHz	< -70 dB @ 1 kHz	< -70 dB @ 1 kHz
Channel Crosstalk	-74 dB @ 1 kHz	-74 dB @ 1 kHz	-74 dB @ 1 kHz
Maximum A/D Pacer Clock Single Analog Input Throughput: Multiple Analog Input Throughput:	50 kHz 50 kHz	50 kHz 50 kHz	100 kHz 100 kHz
Input FIFO	–	–	–

a. Very high input impedance minimizes any source error.

b. To avoid overrun and underrun errors, it is recommended that you do not run both the A/D and D/A subsystems at the same time using the maximum frequencies.

Analog Output Specifications

Table 28 lists the analog output specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 28: Analog Output Specifications

Feature	DT9812-2.5V Specifications	DT9812-10V, DT9812-10V-OEM, DT9813-10V, DT9814-10V Specifications	DT9812A, DT9813A, DT9814A Specifications
Number of waveform analog output channels	2	2	2
Resolution	12-bit	12-bit	12-bit
Data encoding	Binary	Twos Complement	Twos Complement
Nonlinearity	0.05%	0.05%	0.05%
Differential nonlinearity	± LSB	±1 LSB	±1 LSB
Inherent quantizing error	1 LSB	1 LSB	1 LSB
Output range	0 to 2.44 V	±10 V	±10 V
Error Zero: Gain:	±1 mV ±0.1%	±4 mV ±0.2%	±4 mV ±0.2%
Drift Zero (bipolar): Gain:	±20 μV /°C ±100 ppm	±100 μV /°C ±100 ppm	±100 μV /°C ±100 ppm
Throughput) Continuously paced analog output mode:	50 kHz	50 kHz	75 kHz ^a
Current output	± 2 mA	± 2 mA	± 2 mA
Output impedance	< 200 Ω	< 0.2 Ω	< 0.2 Ω
Capacitive driver capability	1000 pF minimum	1000 pF minimum	1000 pF minimum
Protection	Short to ground	Short to ground	Short to ground
Power-on voltage	0 V ±5 mV	0 V ±10 mV	0 V ±10 mV
Settling time to 0.01% of FSR	20 μs	20 μs	15 μs
Slew rate	2 V / μs	2 V / μs	2 V / μs
Glitch energy	1 μV -sec	1 μV -sec	1 μV -sec
ESD protection (per spec) Arc: Contact:	8 kV 4 kV	8 kV 4 kV	8 kV 4 kV

Table 28: Analog Output Specifications (cont.)

Feature	DT9812-2.5V Specifications	DT9812-10V, DT9812-10V-OEM, DT9813-10V, DT9814-10V Specifications	DT9812A, DT9813A, DT9814A Specifications
Monotonicity	Yes	Yes	Yes
Output Clock Internal: External:	Yes No	Yes No	Yes No
Trigger Source Internal: External:	Yes No	Yes No	Yes No

- a. To avoid overrun and underrun errors, it is recommended that you do not run both the A/D and D/A subsystems at the same time using the maximum frequencies.

Digital I/O Specifications

Table 29 lists the digital I/O specifications for the DT9812 and DT9813 Series modules. The DT9814-10V module does not support digital I/O operations.

Table 29: Digital I/O Specifications

Feature	DT9812 Series, DT9813 Series Specifications
Number of digital I/O lines	DT9812 Series: 16 (8 in/8 out) DT9813 Series: 8 (4 in/4 out)
Number of ports	DT9812 Series: 2, 8-bit DT9813 Series: 2, 4-bit
Input termination	No
Logic family	TTL
Logic sense	Positive true
Inputs Input type: Input logic load: High input voltage: Low input voltage: Low input current:	Level sensitive 1 TTL Load 2.4 V min 0.8 V max -0.4 mA max
Outputs High output: Low output: High output current (source): Low output current (sink):	2.8 V min 0.6 V max 2 mA 10 mA
Software I/O selectable	No
ESD protection (per spec) Arc: Contact:	8 kV 4 kV

Counter/Timer Specifications

Table 30 lists the counter/timer specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 30: Counter/Timer Specifications

Feature	DT9812 Series, DT9813 Series, DT9814 Series Specifications
Number of counter/timers	1
Counter/timer modes	Event counting, frequency measurement, edge-to-edge measurement, rate generation
Resolution	32-bit ^a
Minimum pulse width: (minimum amount of time it takes a C/T to recognize an input pulse)	200 ns
Logic family	TTL
Inputs Input logic load: High input voltage: Low input voltage: Low input current:	Level sensitive 1 TTL Load 2.4 V min 0.8 V max -0.4 mA max
Outputs High output: Low output: High output current (source): Low output current (sink):	2.8 V min 0.6 V max 2 mA 12 mA
ESD protection (per spec) Arc: Contact:	8 kV 4 kV
Internal clock frequency	15 Hz to 12 MHz
External clock divider	2 to 65536

a. The resolution is 16-bits for rate generation operations.

External Trigger Specifications

Table 31 lists the external A/D trigger specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 31: External A/D Trigger Specifications

Feature	DT9812 Series, DT9813 Series, DT9814 Series Specifications
Input type	Low-level or falling edge sensitive
Logic family	TTL
Inputs Input logic load: High input voltage: Low input voltage: Low input current:	Level sensitive 1 TTL Load 2.4 V min 0.8 V max -0.4 mA max
Minimum pulse width High: Low:	200 ns 200 ns
Triggering modes Single scan: Continuous scan:	Yes Yes

External Clock Specifications

Table 32 lists the external A/D clock specifications DT9812, DT9813, and DT9814 Series modules.

Table 32: External A/D Clock Specifications

Feature	DT9812-10V, DT9812-10V-OEM, DT9813-10V, DT9814-10V Specifications	DT9812A, DT9813A, DT9814A Specifications
Input type	Rising-edge sensitive	Rising-edge sensitive
Logic family	TTL	TTL
Inputs Input logic load: Input termination: High input voltage: Low input voltage: Low input current:	Level sensitive 1 TTL Load 2.4 V min 0.8 V max -0.4 mA max	Level sensitive 1 TTL Load 2.4 V min 0.8 V max -0.4 mA max
Oscillator frequency	40 kHz maximum	75 kHz maximum
Minimum pulse width High: Low:	200 ns 200 ns	200 ns 200 ns

Power, Physical, and Environmental Specifications

Table 33 lists the power, physical, and environmental specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 33: Power, Physical, and Environmental Specifications

Feature	DT9812-2.5V Specifications	DT9812-10V, DT9812-10V-OEM, DT9812A, DT9813-10V, DT9813A, DT9814-10V, DT9814A Specifications
USB +5 V out (pin 20)	100 mA maximum	100 mA maximum
Power +5 V Enumeration: Operation:	<100 mA <100 mA	<100 mA <175 mA
Physical Dimensions (board): Dimensions (box with screw terminals and feet): Weight (board): Weight (box with screw terminals and feet):	100 mm (L) x 100 mm (W) x 15.5 mm (H) 107.7 mm (L) x 100 mm (W) x 33.5 mm (H) 65.3 g 138.4 g	100 mm (L) x 100 mm (W) x 15.5 mm (H) 107.7 mm (L) x 100 mm (W) x 33.5 mm (H) 65.3 g 138.4 g
Environmental Operating temperature range: Storage temperature range: Relative humidity:	0 to 55° C –40 to 85° C to 95% non-condensing	0 to 55° C –40 to 85° C to 95% non-condensing

Regulatory Specifications

The DT9812, DT9813, and DT9814 Series modules are CE-compliant. [Table 34](#) lists the regulatory specifications for the DT9812, DT9813, and DT9814 Series modules.

Table 34: Regulatory Specifications

Feature	DT9812 Series, DT9813 Series, DT9814 Series 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> EN61000-4-2:2001 Electrostatic Discharge (ESD) 4 kV contact discharge, 8 kV air discharge, 4 kV horizontal and vertical coupling planes EN61000-4-3:2009 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 EN61000-4-4:2006 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)

Mating Connector Specifications

Table 35 lists the mating connector specifications for the DT9812-10V-OEM module.

Table 35: Mating Connector Specifications for the DT9812-10V-OEM Module

Connector on Module	Mating Connector Specifications
USB Connector	Bulgin part#14193 USB cable
Analog I/O Connector (J3)	Tyco part# 1658622-4
Digital I/O Connector (J4)	Tyco part# 1658622-4