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# ***DT300 Series Specifications***

# Analog Input Specifications

Table 1 lists the specifications for the A/D subsystem.

**Table 1: A/D Subsystem Specifications**

Feature	DT301/302 Specifications	DT303/304 Specifications	DT321/322 Specifications
Number of analog inputs Single-ended/ pseudo-differential: Differential:	16  8		
Number of gains	4 (1, 2, 4, 8)		
Resolution	12 bits	12 bits	16 bits
Data encoding	Offset binary		
System accuracy (full-scale) Gain = 1: Gain = 2: Gain = 4: Gain = 8:	0.03% 0.04% 0.05% 0.05%	0.03% 0.04% 0.05% 0.05%	0.01% 0.02% 0.03% 0.03%
Nonlinearity (integral)	±1.0 LSB	±1.0 LSB	±4.0 LSB
Differential linearity	±0.5 LSB (no missing codes)	±0.5 LSB (no missing codes)	±1.2 LSB (no missing codes to 15 bits)
Range (V) Bipolar:  Unipolar:	±1.25, 2.5, 5, 10  0 to 1.25, 0 to 2.5, 0 to 5, 0 to 10	±1.25, 2.5, 5, 10  0 to 1.25, 0 to 2.5, 0 to 5, 0 to 10	±1.25, 2.5, 5, 10

**Table 1: A/D Subsystem Specifications (cont.)**

Feature	DT301/302 Specifications	DT303/304 Specifications	DT321/322 Specifications
Drift Zero:	$\pm 30 \mu\text{V} + (+20 \mu\text{V} * \text{Gain})/^{\circ} \text{C}$	$\pm 30 \mu\text{V} + (+20 \mu\text{V} * \text{Gain})/^{\circ} \text{C}$	$\pm 25 \mu\text{V} + (+10 \mu\text{V} * \text{Gain})/^{\circ} \text{C}$
Gain:	$\pm 30 \text{ ppm}/^{\circ} \text{C}$	$\pm 30 \text{ ppm}/^{\circ} \text{C}$	$\pm 20 \text{ ppm}/^{\circ} \text{C}$
Input impedance Off:	100 M $\Omega$ 10 pF		
On:	100 M $\Omega$ 100 pF		
Input bias current	$\pm 20 \text{ nA}$		
Common mode voltage	$\pm 11 \text{ V}$ maximum (operational)		
Maximum input voltage	$\pm 40 \text{ V}$ maximum (protection)		
A/D converter noise	0.3 LSB rms		
Amplifier input noise	20 $\mu\text{V}$ rms + (10 $\mu\text{V}$ rms*gain)  200 pA rms (current)	20 $\mu\text{V}$ rms + (10 $\mu\text{V}$ rms*gain)  200 pA rms (current)	15 $\mu\text{V}$ rms + (10 $\mu\text{V}$ rms*gain)  100 pA rms (current)
Channel-to-channel offset	$\pm 40.0 \mu\text{V}$		
Channel acquisition time	3 $\mu\text{s}$	1 $\mu\text{s}$	1 $\mu\text{s}$
A/D conversion time	4.4 $\mu\text{s}$	2.5 $\mu\text{s}$	4 $\mu\text{s}$
Effective number of bits (ENOB)	11.5 bits	11.5 bits	13.5 bits
Total Harmonic Distortion	-80 dB typical	-80 dB typical	-90 dB typical
Channel crosstalk	-80 dB @ 1 kHz		

**Table 1: A/D Subsystem Specifications (cont.)**

Feature	DT301/302 Specifications	DT303/304 Specifications	DT321/322 Specifications
Data throughput			
Single analog channel:	225 kSamples/s (0.03% accuracy)	400 kSamples/s (0.03% accuracy)	250 kSamples/s (0.01% accuracy)
Multiple channels (scan):	225 kSamples/s (0.05% accuracy)	400 kSamples/s (0.05% accuracy)	250 kSamples/s (0.03% accuracy)
	200 kSamples/s (.03% accuracy)	360 kSamples/s (.03% accuracy)	150 kSamples/s (.01% accuracy)
Single digital channel:	3 MSamples/s	3 MSamples/s	3 MSamples/s
External A/D sample clock	Schmitt trigger, falling-edge sensitive 1 HCT14 (TTL) 2.0 V minimum 0.8 V maximum 0.4 V (minimum); 1.5 V (maximum) 1.0 $\mu$ A -1.0 $\mu$ A 100 ns (high); 100 ns (low) See Data Throughput spec above 33 $\Omega$ series resistor		
Input type:			
Input load:			
High-level input voltage:			
Low-level input voltage:			
Hysteresis:			
High-level input current:			
Low-level input current:			
Minimum pulse width:			
Maximum frequency:			
Termination:			

**Table 1: A/D Subsystem Specifications (cont.)**

Feature	DT301/302 Specifications	DT303/304 Specifications	DT321/322 Specifications
External A/D digital (TTL) trigger Input type: Input load: High-level input voltage: Low-level input voltage: Hysteresis: High-level input current: Low-level input current: Minimum pulse width: Termination:	Schmitt trigger, edge sensitive 1 HCT14 (TTL) 2.0 V minimum 0.8 V maximum 0.4 V (minimum); 1.5 V (maximum) 1.0 $\mu$ A -1.0 $\mu$ A 100 ns (high); 100 ns (low) 33 $\Omega$ series resistor		

## Analog Output Specifications

Table 2 lists the specifications for the D/A subsystem.

**Table 2: D/A Subsystem Specifications**

Feature	Specifications
Number of analog output channels (DT302, DT304, and DT322 only)	2
Resolution DT302, DT304: DT322:	12 bits 16 bits
Data encoding (input)	Offset binary
Nonlinearity (integral) DT302, DT304: DT322:	$\pm 1$ LSB $\pm 4$ LSB
Differential linearity DT302, DT304: DT322:	$\pm 0.5$ LSB (monotonic) $\pm 1$ LSB (monotonic)
Output range DT302, DT304: DT322:	$\pm 10$ V, 0 to 10 V, $\pm 5$ V, 0 to 5 V $\pm 10$ V
Zero Error:	Software-adjustable to zero
Gain Error DT302, DT304: DT322:	$\pm 2$ LSB + reference $\pm 6$ LSB + reference
Current output	$\pm 5$ mA minimum (10 V/ 2 k $\Omega$ )
Output impedance	0.3 $\Omega$ typical
Capacitive drive capability	0.001 $\mu$ F minimum (no oscillations)
Protection	Short circuit to Analog Common

**Table 2: D/A Subsystem Specifications (cont.)**

<b>Feature</b>	<b>Specifications</b>
Power-on voltage	0 V $\pm$ 10 mV maximum
Settling time to 0.01% of FSR	50 $\mu$ s, 20 V step; 10.0 $\mu$ s, 100 mV step
Slew rate	2 V/ $\mu$ s
Multiplying Zero Error	$\pm$ 10 mV maximum
External Reference Output	+10 V $\pm$ 10 mV
Reference Input Impedance	5 k $\Omega$ typical



## Digital I/O Specifications

Table 3 lists the specifications for the DIN/DOOUT subsystems.

**Table 3: DIN/DOOUT Subsystem Specifications**

Feature	Port A Specifications	Port B Specifications	Port C Specifications
Number of lines	8 (bidirectional)	8 (bidirectional)	7 (bidirectional)
Termination	47 k $\Omega$ resistor pullup to +3.3 V; 33 $\Omega$ series resistor		
Inputs			
Input type:	Level sensitive	Level sensitive	Level sensitive
Input load:	2 TTL	2 TTL	1 TTL
High-level input voltage:	2.0 V minimum	2.0 V minimum	2.0 V minimum
Low-level input voltage:	0.8 V maximum	0.8 V maximum	0.8 V maximum
High-level input current:	3 $\mu$ A	3 $\mu$ A	100 $\mu$ A
Low-level input current:	-3 $\mu$ A	-3 $\mu$ A	-100 $\mu$ A
Outputs			
Output driver:	TTL	TTL	TTL
Output driver high voltage:	2.4 V minimum (IOH = -15 mA)	2.4 V minimum (IOH = -15 mA)	2.4 V minimum (IOH = 4 mA)
Output driver low voltage:	0.5 V maximum (IOL = 12 mA)	0.5 V maximum (IOL = 12 mA)	0.8 V maximum (IOL = 4 mA)

# Counter/Timer Specifications

Table 4 lists the specifications for the C/T subsystems.

**Table 4: C/T Subsystem Specifications**

Feature	Specifications
Number of counter/timer channels	4
Clock Inputs Input type: Input load: High-level input voltage: Low-level input voltage: Hysteresis: High-level input current: Low-level input current: Minimum pulse width: Maximum frequency: Termination:	Schmitt trigger, rising-edge sensitive 1 HCT14 (TTL) 2.0 V minimum 0.8 V maximum 0.4 V (minimum); 1.5 V (maximum) 1.0 $\mu$ A -1.0 $\mu$ A 100 ns (high); 100 ns (low) 5.0 MHz 33 $\Omega$ series resistor
Gate Inputs Input type: Input load: High-level input voltage: Low-level input voltage: Hysteresis: High-level input current: Low-level input current: Minimum pulse width: Termination:	Schmitt trigger, level sensitive 1 HCT14 (TTL) 2.0 V minimum 0.8 V maximum 0.4 V (minimum); 1.5 V (maximum) 1.0 $\mu$ A -1.0 $\mu$ A 100 ns (high); 100 ns (low) 33 $\Omega$ series resistor

**Table 4: C/T Subsystem Specifications (cont.)**

Feature	Specifications
Counter Outputs Output driver: Output driver high voltage:  Output driver low voltage:  Termination:	TTL  2.0 V minimum (IOH = -15 mA); 2.4 V minimum (IOH = -3 mA)  0.5 V maximum (IOL = 24 mA); 0.4 V maximum (IOL = 12 mA)  33 $\Omega$ series resistor

# Power, Physical, and Environmental Specifications

Table 5 lists the power, physical, and environmental specifications for the DT300 Series board.

**Table 5: Power, Physical, and Environmental Specifications**

Feature	Specifications
Power +5 V ( $\pm 0.25$ V): -5 V: +12 V: -12 V: + 5 V Power Out (J1-1):	1.2 A nominal not used 55 mA maximum; 48 mA nominal 50 mA maximum; 38 mA nominal 1 A maximum (with resettable fuse)
Physical Dimensions:  Weight:	Length: 6.875 inches (174.63 mm) Width: 4.2 inches (106.68 mm)  4.38 ounces (124 grams)
Environmental Operating temperature range: Storage temperature range: Relative humidity:	0° C to 70° C -25° C to 85° C To 95%, noncondensing

## Connector Specifications

Table 6 lists the connector specifications for the DT300 Series board.

**Table 6: Connector Specifications**

Feature	Specifications
Connector part number	AMP, 68-pin, 0.05 Subminiature D, #749621-7
Shielded enclosure with jack screws	AMP #750752-1
Recommended shielded cable	Madison, 28 GA, Twisted Pair, #68KDK00029

# STP300 Specifications

Table 7 lists the specifications for the STP300 screw terminal panel.

**Table 7: STP300 Specifications**

Feature	Specifications
Mechanical J1: J2: Terminal block insulator: Screw type: Wire size: Dimensions:  Terminal material: Board material: Weight: Mounting:	68-pin connector, SCSI II (AMP/ Tyco 5787170-7) 26-pin connector (3M N2526-50K2RB) Polyamide 6.6 GV M 2.5 x 5, Chrome-plated steel 14 to 28 AWG 4.9 inches (W) x 6.9 inches (L) x 0.90 inches (H) on 0.062 inches G10/FR4 Nickel-plated brass FR4 7 ounces via four, 4-40 screws
Environmental: Storage temperature range: Operational: Relative humidity:	-25° C to 85° C (derated operation) 0° C to 55° C To 95%, noncondensing

## ***EP305 Cable Specifications***

Table 8 lists the specifications for the cable EP305.

**Table 8: EP305 Cable Specifications**

<b>Feature</b>	<b>Specifications</b>
Length	2 meters
Conductors	34 twisted pairs, shielded, #28 AWG on 50 mil centers
Connectors	(1) 68-pin, self-locking receptacle (AMP/Tyco 5749621-7)



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