

Analog Input Subsystem Specifications

| Feature | DT9841, DT9841-E, DT9841-VIB Specifications | DT9842 Specifications |
|------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Number of analog inputs | 8 (DT9841, DT9841-VIB) or 2 (DT9841E) differential, simultaneously sampled and held (SSH) | 8 single-ended, simultaneously sampled and held (SSH) |
| Number of gains | 1 (the value is always 1) | 1 (the value is always 1) |
| Resolution | 24 bits | 16 bits |
| Data encoding | Twos complement | Twos complement |
| System accuracy (full-scale) | 0.024%, 0.044% for DT9841-VIB | 0.02% |
| Nonlinearity (integral) | ±4096 LSBs | ±0.01% |
| Differential linearity (monotonic) | ±64 LSBs | ±1 LSB |
| 1 LSB | 1.192 μV ($20 \text{ V}/2^{24}$) | 305 μV ($20 \text{ V}/2^{16}$) |
| Input signal range | ±10 V | ±10 V |
| Coupling | DC DC Offset: 1.5mV, AC -3dB: 1.6 Hz | DC |
| Zero error | ±0.001 V | ±0.001 V |
| Drift | | |
| Zero: | ±40 $\mu\text{V}/^\circ\text{C}$ | ±20 $\mu\text{V}/^\circ\text{C}$ |
| Gain: | ±100 ppm/ $^\circ\text{C}$ | ±25 ppm/ $^\circ\text{C}$ |
| Input impedance | 100 M Ω 10 pF, 1 M Ω 20 pF for DT9841-VIB | 100 M Ω 10 pF |
| Input bias current | ±10 nA | ±10 nA |
| Common mode voltage | ±11 V maximum (operational) | ±11 V maximum (operational) |
| Maximum input voltage | ±25 V maximum (protection DC) ±40 V maximum (protection DC) for DT9841-VIB | ±25 V maximum (protection DC) |
| Internal reference | +2.5 V ±0.002 V | +2.5 V ±0.002 V |
| A/D converter noise | 16 LSBs rms | 0.75 LSBs rms |
| Channel-to-channel offset | ±700 μV | ±700 μV |
| Channel-to-channel aperture match | ±5 ns | ±3 ns |
| Aperture jitter | 100 ps rms | 10 ps rms |
| A/D conversion time | 10 μs | 8 μs |
| A/D type | Delta-Sigma | Successive Approximation |
| Group delay | 370 μs @ 100 kHz (37/Throughput) | — |
| Pass-band | 0.453 x Throughput | — |
| Stop-band | 0.547 x Throughput | — |
| Signal/(Noise + Distortion) | -92 db @ 1 kHz | -86 db @ 1 kHz |
| Spurious Free Dynamic Range | 110 dB | 90 dB |
| Channel crosstalk | -100 dB @ 1 kHz | -100 dB @ 1 kHz |
| Data Throughput | | |
| Single channel: | 100 kS/s | 100 kS/s |
| Scan all eight channels: | 800 kS/s (DT9841, DT9841-VIB) | 800 kS/s |
| Scan both channels: | 200 kS/s (DT9841E) | |
| Accuracy of Clock Oscillator | 0.01% | 0.01% |

Analog Output Subsystem Specifications

| Feature | DT9841, DT9841E & DT9841-VIB Specifications | DT9842 Specifications |
|-----------------------------------|---------------------------------------------|------------------------------------------|
| Number of analog output channels | 2 | 2 for the DT9842/2 8 for the DT9842/8 |
| Resolution | 24 bits | 16 bits |
| Data encoding | Twos complement | Twos complement |
| Nonlinearity (integral) | ± 1024 LSBs | $\pm 0.01\%$ |
| Differential linearity | ± 64 LSBs | ± 1 LSB |
| Zero error | Software-adjustable to zero | Software-adjustable to zero |
| Gain error) | ± 2048 LSBs | ± 2 LSBs |
| Output ranges | ± 10 V and ± 2.5 V (bipolar) | ± 10 V (bipolar) |
| Throughput (full-scale) | 100 kHz | 100 kHz |
| Current output | ± 5 mA minimum (10 V/ 2 k Ω) | ± 5 mA minimum (10 V/ 2 k Ω) |
| Output impedance | 0.3 Ω typical | 0.3 Ω typical |
| Capacity drive capability | 0.001 μ F minimum (no oscillations) | 0.001 μ F minimum (no oscillations) |
| Protection | Short circuit to analog common | Short circuit to analog common |
| Power-on voltage | 0 V ± 10 mV maximum | 0 V ± 10 mV maximum |
| Settling time to 0.01% of FSR | 10 μ s, 20 V step | 10 μ s, 20 V step |
| Total harmonic distortion | -94 dB | -88 dB |
| Glitch area | Glitch-free | 10 nV - Seconds, typical, deglitched |
| Slew rate | 5 V/ μ s | 5 V/ μ s |
| Group delay 34 /conversion rate | 340 μ s @ 100 kHz | — |
| Passband | 0.454 x Throughput | — |
| Stopband | 0.546 x Throughput | — |
| Pass-band ripple | ± 0.002 dB | — |
| Software-selectable 4-pole filter | 20 kHz or 5 kHz | — |
| FIFO | DSP memory | DSP memory |

Digital Input Subsystem Specifications

| Feature | Specifications |
|------------------------------------|-----------------------------------------------------------------------|
| Number of lines DT9841, DT9841E | 24 (Ports 0, 1, and 2 consisting of 8 programmable digital I/O lines) |
| DT9841-VIB | 16 (Ports 0 & 1 each consisting of 8 programmable digital I/O lines) |
| Termination | 22 k Ω pull-up series 22 Ω |
| Input type | HCT |
| +5 V tolerant | Yes |
| Input load | 22 k Ω pull-up to 3.3 V |
| Inputs | |
| Input type: | Level sensitive |
| Input load: | 1 (HCT) |
| High-level input voltage: | 2.4 V minimum |
| Low-level input voltage: | 0.8 V maximum |
| High-level input current: | 0 μ A |
| Low-level input current: | 0.2 mA |
| Back EMF diodes | Yes |

Digital Output Subsystem Specifications

| Feature | Specifications |
|------------------------------------|-----------------------------------------------------------------------|
| Number of lines DT9841, DT9841E | 24 (Ports 0, 1, and 2 consisting of 8 programmable digital I/O lines) |
| DT9841-VIB | 16 (Ports 0 & 1 each consisting of 8 programmable digital I/O lines) |
| Termination | 22 k Ω pull-up series 22 Ω |
| Outputs Output driver: | CMOS |
| Output driver high voltage: | 22 k Ω pull-up to 3.3 V |
| Output driver low voltage: | 0.4 V @ 10 mA |
| Back EMF diodes | Yes |

Counter/Timer Subsystem Specifications

| Feature | Specifications |
|------------------------------------------------|-----------------------------------------|
| Number of counter/timer channels | 3 |
| Clock Inputs Input types: | HCT with 22 k Ω pull-up to 3.3 V |
| High-level input voltage: | 2.4 V minimum |
| Low-level input voltage: | 0.8 V maximum |
| +5 V tolerant | Yes |
| Minimum pulse width: | 25 ns (high); 25 ns (low) |
| Maximum frequency: | 20 MHz |
| Gate Inputs: Input type: | HCT with 22 k Ω pull-up to 3.3 V |
| Output driver low voltage | 0.4 V maximum @ 2 mA Sink |
| High-level input voltage: | 2.4 V minimum |
| Low-level input voltage: | 0.8 V maximum |
| +5 V tolerant | Yes |
| Minimum pulse width: | 25 ns (high); 25 ns (low) |
| Counter Outputs Output driver high voltage: | 3.0 V minimum @ 0.1 mA Source |
| Output driver low voltage: | 0.4 V maximum @ 2 mA Sink |

External Clock Specifications

| Feature | Specifications |
|-------------------------------|--------------------------------------------------------------|
| Input type | HTC Rising-Edge Sensitive with 22k Ω pull-up resistor |
| High-level input voltage | 2.4 V minimum |
| Low-level input voltage | 0.8 V maximum |
| Minimum pulse width | 9 ns (high); 9 ns (low) |
| Maximum frequency | |
| DT9841, DT9841E & DT9841-VIB: | 51.2 MHz ^a |
| DT9842/2 and DT9842/8: | 100 kHz |

^a For the DT9841, DT9841E and DT9841-VIB, the conversion rate = clock frequency/512.

External Trigger Specifications

| Feature | Specifications |
|--------------------------|--------------------------------------------------------------|
| Input type | HTC Rising-Edge Sensitive with 22k Ω pull-up resistor |
| High-level input voltage | 2.4 V minimum |
| Low-level input voltage | 0.8 V maximum |
| Minimum pulse width | 50 ns (high); 50 ns (low) |
| Maximum frequency | 50.0 kHz |

Power, Physical, and Environmental Specifications

| Feature | Specifications |
|------------------------------|----------------------------------------------------------------------------------------------|
| Power | |
| +5 V \pm 0.25 V: | 4 A maximum (3.3 A typical) for DT9841-VIB 5 A maximum (3 A typical) for all other models |
| +5 V Isolated Power Out | 700 mA for DT9841-VIB 1 A maximum for all other models |
| Physical Dimensions | |
| Board-Level: | 233.35 mm x 220 mm (DT9841E: 280 mm x 100 mm) |
| Sleek Box: | 229 mm (L) x 247 mm (W) x 114 mm (H) |
| Weight | |
| Board-Level: | 1.572 lbs (713 g) (DT9841E: .492 lbs. or 223 grams) |
| Sleek Box: | 5.85 lbs (2.654 kg) |
| Environmental | |
| Operating temperature range: | 0° C to 45° C |
| Storage temperature range: | -25° C to 85° C |
| Relative humidity: | To 95%, noncondensing |
| Altitude: | 10,000 feet |

Regulatory Specifications

| Feature | Specifications |
|---------------------------------------------|-----------------------------------------------------------------------------|
| EMI | FCC part 15, class A EN 55022:1994 (based on CISPR-22:1993) |
| EN 50082-1:1998 IEC 801-2:1984: | 8 kV through air discharge/4 kV through contact 3 V/m from 27 to 500 MHz |
| IEC 801-3: IEC 801-4: | 1 kV coupled to AC lines 0.5 kV coupled to I/O lines |
| VCCI (Japan version of CISPR-22) Safety: | UL, CSA |