

1.1 Scope.

This specification covers the detail requirements for a hybrid quad 12-bit voltage output CMOS D/A converter with individual DAC reference inputs.

1.2 Part Number.

The complete part number per Table 1 of this specification is as follows:

| Device | Part Number |
|--------|--------------|
| -1 | AD394SD/883B |
| -2 | AD394TD/883B |

1.2.3 Case Outline.

See Appendix 1 of General Specification ADI-H-1000: package outline: DH-28A.

1.3 Absolute Maximum Ratings. ($T_A = +25^\circ\text{C}$ unless otherwise noted)

| | | |
|---------------------------------------|-------|--|
| $+V_S$ to DGND | | -0.3V to +17V |
| $-V_S$ to DGND | | +0.3V to -17V |
| Digital Inputs (Pins 1-16) to DGND | | -0.3V to +7V |
| V_{REFIN} to DGND | | $\pm 25V$ |
| AGND to DGND | | -0.3V to $+V_S$ |
| Analog Outputs (Pins 18, 21, 24, 27) | | Indefinite |
| | | Short to AGND or DGND Momentary Short to $\pm V_S$ |
| Operating Temperature Range (Ambient) | | -55°C to $+125^\circ\text{C}$ |
| Storage Temperature Range | | -65°C to $+150^\circ\text{C}$ |
| Lead Temperature (Soldering 10secs) | | $+300^\circ\text{C}$ |

1.5 Thermal Characteristics.

Thermal Resistance $\theta_{JC} = 8^\circ\text{C}/\text{W}$ typ
 $\theta_{JA} = 25^\circ\text{C}/\text{W}$ typ

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Table 1.

| Test | Symbol | Device | Design Limit @ 25°C/(−55°C to +125°C) | Sub Group 1 | Sub Group 2, 3 | Sub Group 4 | Test Condition ¹ | Units |
|--|--|-------------------|---|-------------------|----------------------|-------------------|--|-------------------------------|
| Data Input Voltage High End Point Electrical | V _{IH} | −1, 2 −1, 2 | 2.4/(2.4) 5.5/(5.5) | | | 2.4 | Test Limits Apply to Pins 1–12. Design Limits Apply to Pins 13–16. | + V min + V max + V min |
| Data Input Voltage Low End Point Electrical | V _{IL} | −1, 2 −1, 2 | 0.0/(0.0) 0.8/(0.8) | | | 0.8 | Test Limits Apply to Pins 1–12. Design Limits Apply to Pins 13–16. | + V min + V max + V min |
| Input Current High | I _{IH} | −1, 2 | 40/(40) | | | 40 | V _{IN} = 0V or +5V | ± μA max |
| Input Current Low End Point Electrical | I _{IL} I _{IH} , I _{IL} | −1, 2 −1, 2 | 40/(40) | 40 | | 40 | V _{IN} = 0V or +5V | ± μA max |
| Output Voltage Range ² | V _{OUT} | −1, 2 | 11/(11) 11/(11) | | | 10 10 | Output Voltage Equals −REFIN to +REFIN | − V min + V max |
| Output Current Range | I _{OR} | −1, 2 | 5/(5) | | | | | ± mA min |
| Gain Error End Point Electrical | A _E | −1 −2 −1, 2 | 0.1 0.05 | 0.1 0.2 | | 0.05 | External + 10.000V REF Bit Code = 1111 1111 1111 | ± %FSR ³ max |
| Gain Error Temperature Coefficient | TC _{AE} | −1 −2 | /(10) /(5) | | 10 5 | | External + 10.000V REF Bit Code = 1111 1111 1111 | ± ppm/°C max |
| Offset Error End Point Electrical | V _{OS} | −1 −2 −1, 2 | 0.05 0.025 | 0.05 0.1 | | 0.025 | External + 10.000V REF Bit Code = 0000 0000 0000 | ± %FSR max |
| Offset Temperature Coefficient | TC _{BPZ} | −1 −2 | /(10) /(5) | | 10 5 | | External + 10.000V REF Bit Code = 0000 0000 0000 | ± ppm/°C max |
| Differential Linearity Error ⁴ End Point Electrical | DLE | −1 −2 −1, 2 | 3/4 1/2 | 3/4 1.5 | 1 1 | 1/2 | | ± LSB max |
| Linearity Error ⁵ End Point Electrical | TC _{LE} | −1 −2 −1, 2 | 3/4 1/2 | 3/4 1/2 1 | 3/4 1/2 | | | ± LSB max |
| Power Supply Voltages ² | V _S | −1, 2 −1, 2 | 13.5/(13.5) 16.5/(16.5) | 15 15 | 15 15 | | | − V min V max |
| Power Supply Currents | I _{CC} I _{EE} | −1, 2 | 28/(35) 22/(22) | | | 28 22 | Data Input Bits = 1111 1111 1111 R _L = ∞ Data Input Bits = 1111 1111 1111 R _L = ∞ | − mA max + mA max |
| Power Supply Gain Sensitivity Δ Gain/ ΔV _S (+V _S and −V _S) | PSRR | −1, 2 | 0.006 | | | 0.006 | Input Bits = 1111 1111 1111 V _S = ±15V ±10% | ± %FS/% |
| Timing Specifications Chip Select | t _{CS} | −1, 2 | 170 | | | | See Figure 1 | ns min |
| Data Access Time | t _{DA} | −1, 2 | 0 | | | | See Figure 1 | ns min |
| Data Setup Time | t _{DS} | −1, 2 | 150 | | | | See Figure 1 | ns min |
| Data Hold Time | t _{DH} | −1, 2 | 5 | | | | See Figure 1 | ns min |

NOTES

¹T_A = +25°C and ±V_S = ±15V, V_{REFIN} = +10V.

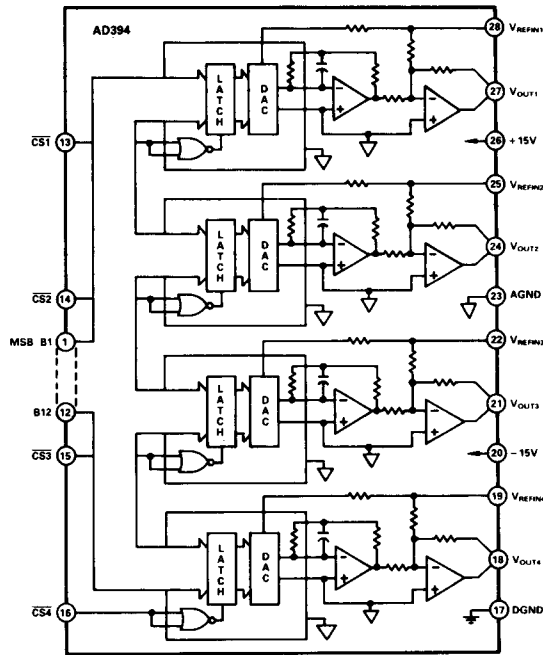
²The AD394 can be used with supplies as low as ±11.4V. See page 6, Figure 10 of product data sheet.

³FSR means Full-Scale Range and is equal to 20V for a ±10V bipolar range and 10V for 0 to 10V unipolar range.

⁴Monotonicity is tested for over the full military temperature.

⁵Integral nonlinearity is a measure of the maximum deviation from a straight line passing through the end points of the transfer function.

3.2.1 Functional Block Diagram and Terminal Assignments.



AD394 Functional Block Diagram

3.2.4 Microcircuit Technology Group.

This microcircuit is covered by technology group (I).

4.2.1 Life Test/Burn-In Circuit.

Steady state life test is per MIL-STD-883 Method 1005. Burn-in is per MIL-STD-883 Method 1015 test condition (B).

