1.1 Scope.

This specification covers the detail requirements for a resolver-to-digital converter with up to 16 bits resolution and accuracies of 8 and 4 arc mins.

1.2 Part Number.

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

Device	Part Number[1]
−1	AD2S80AS(X)/883B
−2	AD2S80AT(X)/883B

NOTE
[1]See paragraph 1.2.3 for package identifier.

1.2.3 Case Outline.

See Appendix 1 of General Specification ADI-M-1000: package outline:

(X)	Package	Description
D	D-40A	40-Lead Side Brazed Ceramic DIP
E	E-44A	44-Terminal Leadless Ceramic Chip Carrier

1.3 Absolute Maximum Ratings. (T_A = +25°C unless otherwise noted)

$+V_S$ to GND[1]	+14.0 V dc
$-V_S$ to GND[1]	−14.0 V dc
$+V_L$ to GND[1]	$+V_S$
Digital Input Voltage to GND[1]	−0.4 V to $+V_L$
Demod I/P	+14.0 V to $-V_S$
Integrator I/P	+14.0 V to $-V_S$
VCO Input	+14.0 V to $-V_S$
V_{REF} to GND[2, 3]	+14.0 V to $-V_S$
Analog Input Voltage (SIN, COS) to GND[2, 3]	+14.0 V to $-V_S$
Power Dissipation	860 mW
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−55°C to +125°C

NOTES
[1]GND refers to ANALOG GND; ANALOG GND must be externally connected to DIGITAL GND.
[2]SIGNAL GND is internally connected to ANALOG GND.
[3]SIN, COS REF input voltage may be present without $+V_S$, $-V_S$, $+V_L$.

AD2S80A—SPECIFICATIONS

Table 1.

Test	Symbol	Device	Design Limit @ +25°C	Sub Group 1	Sub Group 2, 3	Sub Group 4	Test Condition[1]	Units
Angular Accuracy[2]		−1	±8	±8	±8	±8	$+V_S$ = +10.8 V dc, V_L = 5.0 V dc $-V_S$ = −10.8 V dc SC1 = SC2 = High 16 Bit Resolution	arc min max
							$+V_S$ = +13.2 V dc, V_L = 5.0 V dc $-V_S$ = −13.2 V dc SC1 = SC2 = High 16 Bit Resolution	
Angular Accuracy[2]		−2	±4	±4	±4	±4	$+V_S$ = +10.8 V dc, V_L = 5.0 V dc $-V_S$ = −10.8 V dc SC1 = SC2 = High 16 Bit Resolution	arc min max
							$+V_S$ = +13.2 V dc, V_L = 5.0 V dc $-V_S$ = −13.2 V dc SC1 = SC2 = High 16 Bit Resolution	
Resolution	RES	−1, 2	16				10, 12, 14, 16 User Selectable	1 Bit in 16 1 in 65536
Missing Codes[2]		−1, 2	4	4	4	4	$+V_S$ = +10.8 V dc, V_L = 5.0 V dc $-V_S$ = −10.8 V dc SC1 = SC2 = High 16 Bit Resolution	Codes max
							$+V_S$ = +13.2 V dc, V_L = 5.0 V dc $-V_S$ = −13.2 V dc SC1 = SC2 = High 16 Bit Resolution	
Signal and Reference Frequency		−1, 2	50 to 20,000					Hz
Total Effective Angular Offset		−1, 2	±800	±800	±800	±800	Output Data Nulled by Application of Offset Current to Integrator Input	nA max
Integrator Output Range		−1, 2	±8	±8	±8	±8	$+V_S$ = +12.0 V dc, V_L = 5.0 V dc $-V_S$ = −12.0 V dc 1 mA Load	V min
Integrator Output Range		−1, 2	±7	±7	±7	±7	$+V_S$ = +10.8 V dc, V_L = 5.0 V dc $-V_S$ = −10.8 V dc 1 mA Load	V min
Integrator Input Offset Voltage	V_{IO}	−1, 2	5					mV max
Integrator Dead Zone Current		−1, 2	110					nA/LSB max
Integrator Input Bias Current	I_{IB}	−1, 2	150					nA max
Integrator Input Impedance	Z_{IN}	−1, 2	1					MΩ min
Demod O/P Scaling		−1, 2	90	90	90	90		nA/Bit min
			110	110	110	110		nA/Bit max
PSD O/P Offset Voltage		−1, 2	12					mV max
PSD Input Bias Current	I_{IB}	−1, 2	150					nA max
PSD Input Impedance	Z_{IN}	−1, 2	1					MΩ min

Test	Symbol	Device	Design Limit @ +25°C	Sub Group 1	Sub Group 2, 3	Sub Group 4	Test Condition[1]	Units
VCO Maximum Rate		−1, 2	1.1	1	1	1		MHz min
VCO Rate Tempco		−1, 2	−0.05					%/°C
VCO Gain Scaling		−1, 2	7110	7110	7110	7110	Measured with VCO Input Current of ±10 μA	Hz/μA min
			8690	8690	8690	8690		Hz/μA max
VCO Input Bias Current	I_{IB}	−1, 2	380					nA max
VCO Input Bias Tempco		−1, 2	−1.22					nA/°C
VCO Linearity[4]		−1, 2	±3	±3	±3	±3	VCO Measured at 10 Points over the Frequency Range 0–1 MHz	% max
VCO Total Effective Offset	I_{IO}	−1, 2	380	380	Sub 2 380 Sub 3 400	380	Measured with 68 kΩ Input Resistance	nA max
Tracking Rate Range		−1, 2	1074 268 67 16.7				Comment: 10 Bit RES 12 Bit RES 14 Bit RES 16 Bit RES	rps max (Revolutions per Second)
Reference Input Voltage		−1, 2	1					V Peak min
			8					V Peak max
Reference Input Impedance		−1, 2		1				MΩ min
Reference Input Bias Current		−1, 2	150					nA max
Signal Input Voltage (SIN, COS)		−1, 2	2 ±10%					V rms
Signal Input Impedance		−1, 2	1					MΩ min
Signal Input Bias Current		−1, 2	150					nA max
Signal Input Phase Shift (wrt Reference)		−1, 2	±10					Degrees max
Digital Inputs High Voltage	V_{IH}	−1, 2	2.0	2.0	2.0	2.0	DB1–DB16, $\overline{\text{INHIBIT}}$, $\overline{\text{ENABLE}}$, BYTE SELECT $+V_S$ = +10.8 V dc, V_L = 5.0 V dc $-V_S$ = −10.8 V dc	V min
Digital Inputs Low Voltage	V_{IL}	−1, 2	0.8	0.8	0.8	0.8	DB1–DB16, $\overline{\text{INHIBIT}}$, $\overline{\text{ENABLE}}$, BYTE SELECT $+V_S$ = +13.2 V dc, V_L = 5.0 V dc $-V_S$ = −13.2 V dc	V max
Digital Inputs High Current	I_{IH}	−1, 2	±100	±100	±100	±100	DB1–DB16, $\overline{\text{INHIBIT}}$, $\overline{\text{ENABLE}}$, BYTE SELECT V_L = 5.5 V, V_{IH} = 5.5 V $+V_S$ = 13.2 V dc, $-V_S$ = −13.2 V dc	μA max
Digital Inputs Low Current	I_{IL}	−1, 2	±100	±100	±100	±100	DB1–DB16, $\overline{\text{INHIBIT}}$, $\overline{\text{ENABLE}}$, BYTE SELECT V_L = 5.5 V, V_{IL} = 0.0 V $+V_S$ = 13.2 V dc, $-V_S$ = −13.2 V dc	μA max
Digital Inputs Low Voltage[3]	V_{IL}	−1, 2	1.0	1.0	1.0	1.0	SC1, SC2, DATA LOAD, $+V_S$ = +12.0 V dc, $-V_S$ = −12.0 V V_L = 5.0 V, $\overline{\text{ENABLE}}$ = High	V max
Digital Inputs Low Current[3]	I_{IL}	−1, 2	400	400	400	400	SC1, SC2, DATA LOAD, $+V_S$ = +12.0 V dc, $-V_S$ = −12.0 V V_L = 5.0 V, $\overline{\text{ENABLE}}$ = High	μA max

Test	Symbol	Device	Design Limit @ +25°C	Sub Group 1	Sub Group 2, 3	Sub Group 4	Test Condition[1]	Units
Digital Outputs High Voltage	V_{OH}	−1, 2	2.4	2.4	2.4	2.4	DB1–DB16, RIPPLE CLOCK, DIRECTION $+V_S$ = +12.0 V, V_L = 4.5 V $-V_S$ = −12.0 V, I_{OH} = 100 μA	V min
Digital Outputs Low Voltage	V_{OL}	−1, 2	0.4	0.4	0.4	0.4	DB1–DB16, RIPPLE CLOCK, DIRECTION $+V_S$ = +12.0 V dc, V_L = 5.5 V dc $-V_S$ = −12.0 V, I_{OL} = 1.2 mA	V max
High Level Three State Leakage Current	I_{OZH}	−1, 2	±100	±100	±100	±100	DB1–DB16 Only $+V_S$ = +12.0 V dc, V_L = 5.5 V dc $-V_S$ = −12.0 V dc, V_{OL} = 5.0 V dc	μA max
Low Level Three State Leakage Current	I_{EZL}	−1, 2	±100	±100	±100	±100	DB1–DB16 Only $+V_S$ = +12.0 V dc, V_L = 5.5 V dc $-V_S$ = −12.0 V dc, V_{OL} = 0.0 V dc	μA max
Busy Pulse Width[2]	t_{BUSY}	−1, 2	200	200	200	200		ns min
			600	600	600	600		ns max
Power Supply Current								mA max
from $+V_S$	$+I_S$	−1, 2	30	30	30	30	$+V_S$ = +13.2 V dc	
from $-V_S$	$-I_S$	−1, 2	−30	−30	−30	−30	$-V_S$ = −13.2 V dc	
from $+V_L$	$+I_L$	−1, 2	1.5	1.5	1.5	1.5	$+V_S$ = +5.5 V dc	

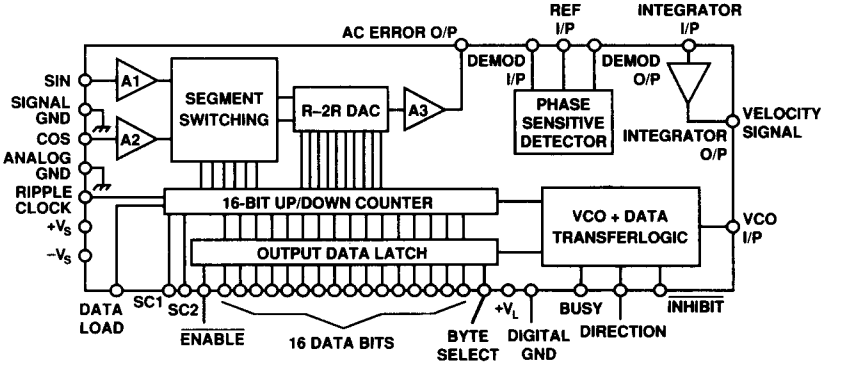
NOTES
[1]$+V_S$ = +12.0 V dc, $-V_S$ = −12.0 V dc, V_L = +5.0 V dc.
[2]V_{SIN}, V_{COS} = 2 V_{RMS} Maximum at 5 kHz. V_{REF} = 2 V_{RMS} at 5 kHz.
[3]Digital inputs SC1, SC2, DATA LOAD are internally pulled up to $+V_S$.
[4]VCO linearity is expressed as % (percentage) of reading.

1.5 Thermal Characteristics.

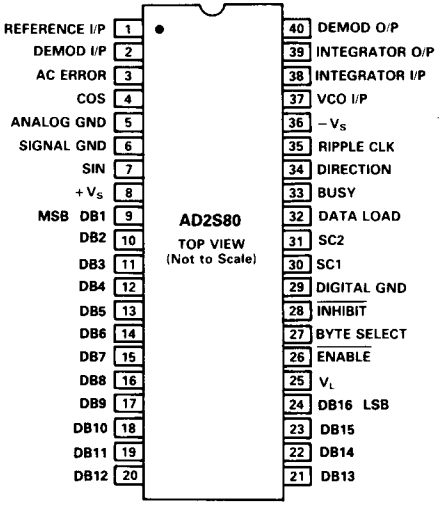
Thermal Resistance θ_{JC} = 11°C/W for D-40A
θ_{JC} = 10°C/W for E-44A

In accordance with Appendix C of MIL-M-38510.

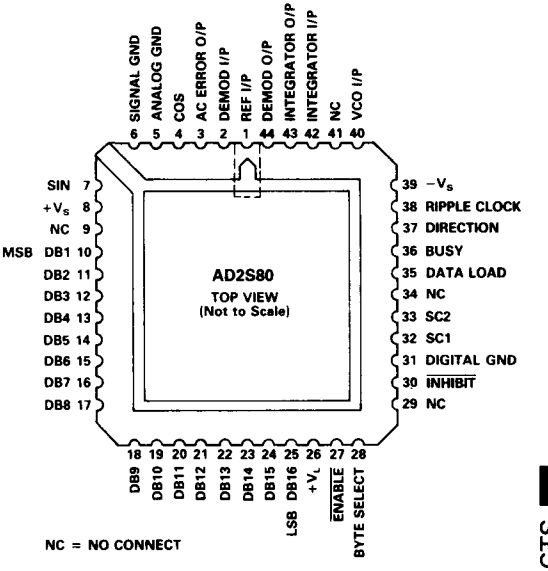
3.2.1 Functional Block Diagram and Terminal Assignments.



D Package (DIP)



E Package (LCC)



3.2.4 Microcircuit Technology Group.

This microcircuit is covered by technology group (80).

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).