



Fast, 16-Bit, 100 kSPS A/D Converter with Serial Interface

SMD/883B**AD677**

Scope

This specification covers the detail requirements for a 16-bit resolution, sampling A/D converter with a serial output interface. The electrical specifications match the Standard Microcircuit Drawing (SMD) 5962-95592 in effect at the release of this data sheet. For a copy of the latest official SMD, contact DESC-ELDS.

Part Number/Case Outline

For case outline dimensions, see Package Information Appendix of General Specification ADI-M-1000. The complete part numbers of these SMD and 883 devices are as follows:

Device Type	SMD Part Number	ADI 883B Part Number	Package Description	Package Designation	
01	5962-9559201MEA	AD677TD/883B	16-Pin Side Braze Ceramic DIP	D-16	CDIP2-T16

Absolute Maximum Ratings ($T_A = +25^\circ\text{C}$ unless otherwise noted)¹

V_{CC} to V_{EE}	−0.3 V to +26.4 V
V_{DD} to DGND	−0.3 V to +7 V
V_{CC} to AGND	−0.3 V to +18 V
V_{EE} to AGND	−18 V to +0.3 V
AGND to DGND	±0.3 V
Digital Inputs (CAL, SAMPLE, CLK) to DGND	0 V to +5.5 V
Analog Inputs (V_{IN} , V_{REF} , AGND SENSE) to AGND	($V_{CC} + 0.3$ V) to ($V_{EE} - 0.3$ V)
Power Dissipation (P_D) 10 V	630 mW
Power Dissipation (P_D) 5 V	530 mW
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering 10 sec)	+300°C

Recommended Operating Conditions²

Ambient Operating Temperature Range (T_A)	−55°C to +125°C
Positive Analog Supply Voltage (V_{CC})	11.4 V to 12.6 V
Negative Analog Supply Voltage (V_{EE})	−11.4 V to −12.6 V
Digital Supply Voltage (V_{DD})	4.5 V to 5.5 V
Analog Reference Voltage (V_{REF})	5 V to 10 V
Analog Input Voltage Range (V_{IN})	− V_{REF} to V_{REF}
Analog Ground Sense Voltage	−0.1 V to 0.1 V

Thermal Characteristics

Thermal Resistance, Junction-to-Case (θ_{JC})	15°C/W
Thermal Resistance, Junction-to-Ambient (θ_{JA})	80°C/W

NOTES

¹Permanent damage may occur if any absolute maximum rating is exceeded. Functional operation is not implied and device reliability may be impaired by exposure to higher-than-recommended voltages for extended periods of time.

²AGND and DGND tied at ADC.

REV. A

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AD677—SPECIFICATIONS

Table 1. Electrical Performance Characteristics

Test	Symbol	Conditions $V_{CC} = +12\text{ V}$, $V_{EE} = -12\text{ V}$, $V_{DD} = +5\text{ V}$, $V_{REF} = 10\text{ V}$, $V_{IH} = 2.0\text{ V}$, $V_{IL} = 0.8\text{ V}$ unless otherwise specified	Group A Subgroups	Device Type	Limits		Units
					Min	Max	
Logic Input High Voltage	V_{IH}		1, 2, 3	01	2.0		V
Logic Input Low Voltage	V_{IL}		1, 2, 3	01		0.8	V
Logic Input Current	I_{LIN}	$V_{IH} = 5\text{ V}$; $V_{IL} = 0\text{ V}$	1, 2, 3	01	-10	+10	μA
Logic Output High Voltage	V_{OH}	$I_{OH} = 0.5\text{ mA}$	1, 2, 3	01	2.4		V
Logic Output Low Voltage	V_{OL}	$I_{OL} = 1.6\text{ mA}$	1, 2, 3	01		0.4	V
Power Supply Current	I_{CC}	$V_{REF} = 10\text{ V}$, Device Converting	1, 2, 3	01		24	mA
	I_{EE}					-24	mA
	I_{DD}					5	mA
	I_{CC}	$V_{REF} = 5\text{ V}$, Device Converting	1, 2, 3	01		20	mA
	I_{EE}					-20	mA
	I_{DD}					5	mA
Power Dissipation	P_D	10 V	1, 2, 3	01		630	mW
		5 V				530	
Integral Nonlinearity	INL	All Codes	1	01		± 1.5	LSB
			2, 3			± 2	
Differential Nonlinearity ¹	DNL	All Codes	1, 2, 3	01	16		Bits
Bipolar Zero Error	B_{PZE}	Code = 32767.5	1	01		± 3	LSB
			2, 3			± 4	
Negative Full-Scale Error	A_N	Code = 0.5	1	01		± 3	LSB
			2, 3			± 4	
Positive Full-Scale Error	A_P	Code = 65535.5	1	01		± 3	LSB
			2, 3			± 4	
Voltage Reference Input	V_{REF}		1, 2, 3	01	5	10	V
Signal-to-Noise + Distortion ²	$S/(N + D)$	$f_{IN} = 1\text{ kHz}$	4, 5, 6	01	89		dB
Total Harmonic Distortion ²	THD	$f_{IN} = 1\text{ kHz}$	4, 5, 6	01		-95	dB
Conversion Time	t_C	See Figures 1, 2	9, 11	01	10		μs
			10		13.3		
CLK Period	t_{CLK}	See Figures 1, 2	9, 11	01	480		ns
			10		670		
Calibration Time	t_{CT}	See Figures 1, 2	9, 10, 11	01		85532	t_{CLK}
Sampling Time (Included in t_C)	t_S	See Figures 1, 2	9, 10, 11	01	2		μs
CAL to BUSY Delay	t_{CALB}	See Figures 1, 2	9, 10, 11	01		50	ns
Last CLK to SAMPLE Delay	t_{LCS}	See Figures 1, 2	9, 10, 11	01	2.1		μs
SAMPLE to BUSY Delay	t_{SB}	See Figures 1, 2	9, 10, 11	01		75	ns
CLK High	t_{CH}	See Figures 1, 2	9, 10, 11	01	50		ns
CLK Low	t_{CL}	See Figures 1, 2	9, 10, 11	01	50		ns
1st CLK Delay	t_{FCD}	See Figures 1, 2	9, 10, 11	01	50		ns
SCLK Low	t_{SCL}	See Figures 1, 2	9, 10, 11	01	35		ns

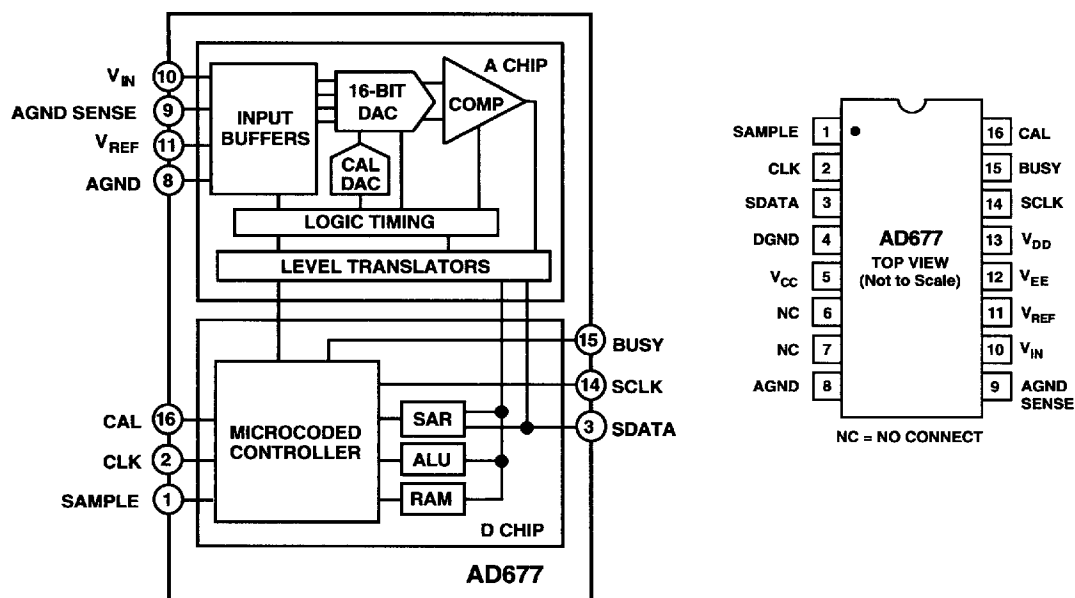
Test	Symbol	Conditions $V_{CC} = +12\text{ V}$, $V_{EE} = -12\text{ V}$, $V_{DD} = +5\text{ V}$, $V_{REF} = 10\text{ V}$, $V_{IH} = 2.0\text{ V}$, $V_{IL} = 0.8\text{ V}$ unless otherwise specified	Group A Subgroups	Device Type	Limits		Units
					Min	Max	
CLK to Busy Delay	t_{CB}	See Figures 1, 2	9, 10, 11	01		350	ns
CLK to SDATA Valid	t_{CD}	See Figures 1, 2	9, 10, 11	01	50	200	ns
CLK to SCLK High	t_{CSH}	See Figures 1, 2	9, 10, 11	01	75	350	ns
SDATA to SCLK High	t_{DSH}	See Figures 1, 2	9, 10, 11	01	35		ns
Sample Low	t_{SL}	See Figures 1, 2	9, 10, 11	01	100		ns
CAL HIGH	t_{CALH}	See Figures 1, 2	9, 10, 11	01	50		ns

NOTES

¹Minimum resolution for which "No Missing Codes" is guaranteed.

² $V_{IN} = 0.05\text{ dB}$, $f_{IN} = 1\text{ kHz}$, all measurements referred to a 0 dB (20 V p-p) input signal. The full Nyquist bandwidth is used for all values.

Functional Block Diagram and Terminal Assignment



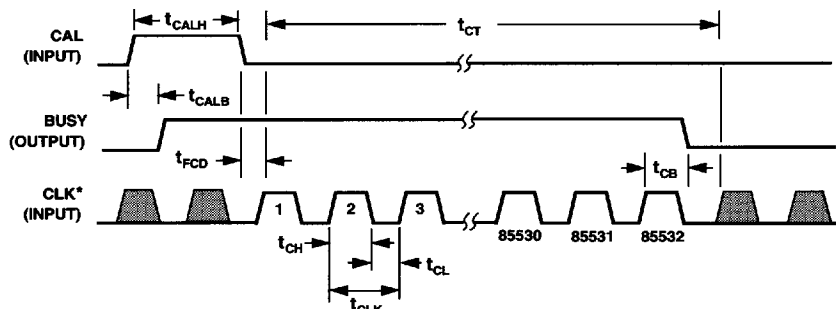
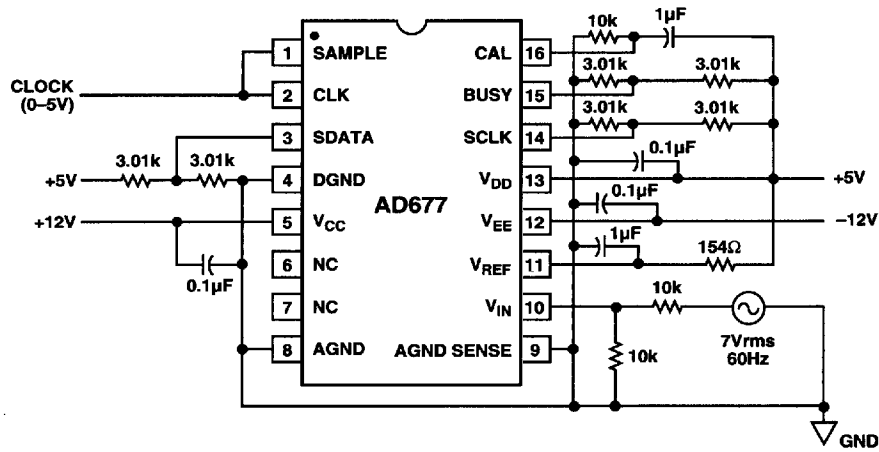
Microcircuit Technology Group

This microcircuit is covered by technology group (H).

AD677

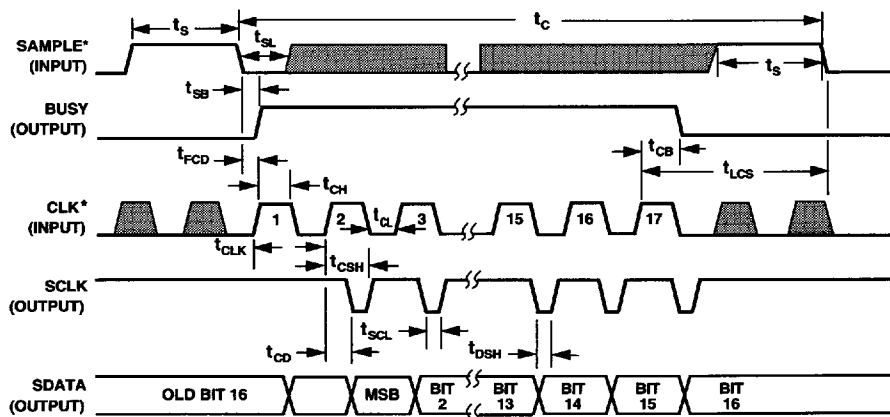
Life Test /Burn-In Circuit

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



*SHADED PORTIONS OF INPUT SIGNALS ARE OPTIONAL. FOR BEST PERFORMANCE, WE RECOMMEND THAT THESE SIGNALS BE HELD LOW EXCEPT WHEN EXPLICITLY SHOWN HIGH.

Figure 1. Calibration Timing



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Figure 2. General Conversion Timing

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