ANALOG DEVICES

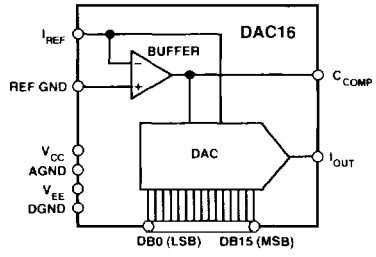
16-Bit High Speed Current-Output DAC

DAC16

FEATURES
±1 LSB Differential Linearity (max)
Guaranteed Monotonic Over Temperature Range
±2 LSB Integral Linearity (max)
500 ns Settling Time
5 mA Full-Scale Output
TTL/CMOS Compatible
Low Power: 190 mW (typ)
Available in Die Form

APPLICATIONS
Communications
ATE
Data Acquisition Systems
High Resolution Displays

FUNCTIONAL BLOCK DIAGRAM



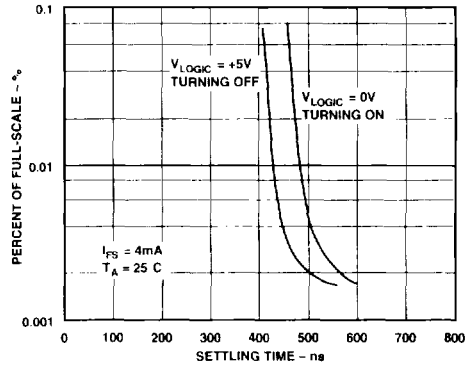


Figure 1. DAC16 Settling Time Accuracy vs. Percent of Full Scale

GENERAL DESCRIPTION

The DAC16 is a 16-bit high speed current-output digital-to-analog converter with a settling time of 500 ns. A unique combination of low distortion, high signal-to-noise ratio, and high speed make the DAC16 ideally suited to performing waveform synthesis and modulation in communications, instrumentation, and ATE systems. Input reference current is buffered, with full-scale output current of 5 mA. The 16-bit parallel digital input bus is TTL/CMOS compatible. Operating from +5 V and −15 V supplies, the DAC16 consumes 190 mW (typ) and is available in a 24-pin epoxy DIP, epoxy surface-mount small outline (SOL), ceramic side brazed DIP, 28-pin leadless ceramic chip carrier (LCC) packages, and in die form.

ORDERING GUIDE

Model	Grade DNL (max)	Temperature Range	Package Description	Package Option[1]
DAC16EP	±1	−40°C to +85°C	24-Pin PDIP	N-24
DAC16ES	±1	−40°C to +85°C	24-Pin SOL	R-24
DAC16FP	±2	−40°C to +85°C	24-Pin PDIP	N-24
DAC16FS	±2	−40°C to +85°C	24-Pin SOL	R-24
DAC16BWB[2]	±2	−55°C to +125°C	24-Pin Ceramic DIP	D-24A
DAC16BTC[2]	±2	−55°C to +125°C	28-Pin LCC	E-28A
DAC16GBC	±1	+25°C	Die	

NOTES
[1]For outline information see Package Information section.
[2]Consult factory for availability.

DAC16–SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (@ V_{CC} = +5.0 V, V_{EE} = −15.0 V, I_{REF} = 0.5 mA, C_{COMP} = 47 µF, −40°C ≤ T_A ≤ +85°C unless otherwise noted. See Note 1 for supply variations.)

Parameter		Conditions	Min	Typ	Max	Units
Integral Linearity "E"	INL	T_A = +25°C		±1.2	+2	LSB
Integral Linearity "E"	INL			±1.6	+4	LSB
Differential Linearity "E"	DNL	T_A = +25°C		±0.5	+1	LSB
Differential Linearity "E"	DNL			±0.7	+1.5	LSB
Integral Linearity "F"	INL	T_A = +25°C		±1.4	+4	LSB
Integral Linearity "F"	INL			±2	+6	LSB
Differential Linearity "F"	DNL	T_A = +25°C		±0.5	+1.5	LSB
Differential Linearity "F"	DNL			±0.6	+2	LSB
Zero Scale Error	ZSE				1	LSB
Zero Scale Drift	TC_{ZSE}			0.025		ppm/°C
Gain Error	GE				±0.225	% FS
Gain Drift	TC_{GE}			5		ppm/°C
REFERENCE						
Reference Input Current	I_{REF}	Note 2	350		625	µA
OUTPUT CHARACTERISTICS						
Output Current	I_{OUT}	Note 2	2.8		5.0	mA
Output Capacitance	C_{OUT}			10		pF
Settling Time	t_S	0.003% of Full Scale		500		ns
LOGIC CHARACTERISTICS						
Logic Input High Voltage	V_{INH}	T_A = +25°C	2.4			V
Logic Input Low Voltage	V_{INL}	T_A = +25°C			0.8	V
Logic Input Current	I_{INH}	V_{IN} = 5.0 V, DB0–DB10			7.5	µA
Logic Input Current	I_{INH}	V_{IN} = 5.0 V, DB11–DB15			100	µA
Logic Input Current	I_{INL}	V_{IN} = 0 V, DB0–DB15			1	µA
Input Capacitance	C_{IN}			8		pF
SUPPLY CHARACTERISTICS						
Power Supply Sensitivity	PSS	V_{CC} = 4.5 V to 5.5 V, V_{EE} = −13 V to −17 V			20	ppm/V
Positive Supply Current	I_{CC}	All Bits HIGH		15	22	mA
Positive Supply Current	I_{CC}	All Bits LOW		6	7.5	mA
Negative Supply Current	I_{EE}			7.5	10	mA
Power Dissipation	P_{DISS}			188	260	mW

NOTES

All supplies can be varied ±5% and operation is guaranteed. Device is tested with nominal supplies.

Operation is guaranteed over this reference range, but linearity is neither tested nor guaranteed (see Figures 7 and 8).

Specifications subject to change without notice.

WAFER TEST LIMITS (@ V_{CC} = +5.0 V, V_{EE} = −15.0 V, I_{REF} = 0.5 mA, C_{COMP} = 47 µF, T_A = +25°C unless otherwise noted.)

Parameter	Symbol	Conditions	DAC16G Limit	Units
Integral Nonlinearity	INL		±3	LSB max
Differential Nonlinearity	DNL		+1	LSB max
Zero Scale Error	ZSE		+1	LSB max
Gain Error	GE		+0.12	% FS max
Logic Input High Voltage	V_{INH}		2.4	V min
Logic Input Low Voltage	V_{INL}		0.8	V max
Logic Input Current	I_{IN}		75	µA max
Positive Supply Current	I_{CC}		20	mA max
Negative Supply Current	I_{EE}		10	mA max
Power Dissipation	P_{DISS}		250	mW max

NOTE

Electrical tests are performed at wafer probe to the limits shown. Due to variations in assembly methods and normal yield loss, yield after packaging is not guaranteed for standard product dice. Consult factory to negotiate specifications based on dice lot qualification through sample lot assembly and testing.