20-Bit, Deglitched Digital-to-Analog Converter

FEATURES

- 20-Bit Resolution
- Deglitched Analog Output
- 2nVsec Maximum Glitch Energy
- Bipolar +/-10V Output
- 20∝sec Settling Time to +/-0.003%FSR
- Offset Binary Coding
- +/-0.00095%FSR INLE
- +/-0.00075%FSR DNLE
- 0°C to +50°C Specified Temperature Range

DESCRIPTION

The MN3395 is an 20-bit, deglitched-output, Digital-to-Analog converter designed for applications requiring high-resolution and glitch-free performance. The on-board deglitcher circuit reduces output glitch to 2nVsec maximum.

The MN3395 offers excellent performance characteristics. The device guarantees +/-0.00095%FSR Integral Linearity Error (INLE) and +/-0.00075%FSR Differential Linearity Error (DNLE). Initial offset error is specified at +/-5mV maximum and initial gain error is specified as +/-0.05% maximum. The device is specified for a 0°C to +50°C operating range.

The MN3395 provides a bipolar analog output of -10V to +10 V. Digital inputs are compatible with the HCT logic family. The MN3395 operates from standard +/-15 and +5V power supplies and consumes 1 Watt of power. The device is packaged in a hermetically-sealed, 32-pin DIP package.

APPLICATIONS

Magnetic Resonance Imaging
Robotics
Instrumentation
Process Control
ATE

MN3395 20-Bit Deglitched D/A Converter

ABSOLUTE MAXIMUM RATINGS

Operating Temperature Range	0°C to +70°C
Specified Temperature Range (case)	0°C to +50°C
Storage Temperature Range	-65°C to +70°C
+15 Volt Supply	-0.5 to +18 Volts
-15 Volt Supply	+0.5 to -18 Volts
+5 Volt Supply	-0.5 to +7.0Volts
Digital Inputs	-0.5 to +V_{DD}+0.5V

ORDERING INFORMATION

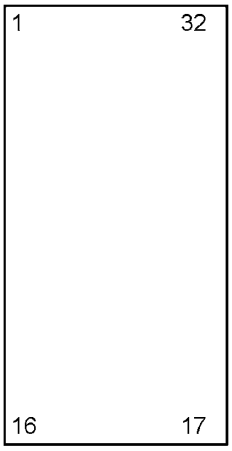
PART NUMBER	MN3395

SPECIFICATIONS Typical at +25°C (unless otherwise indicated)

SPECIFICATIONS	MIN.	TYP.	MAX	UNITS
DIGITAL INPUTS				
Logic Levels (All Inputs): Logic "1" Logic "0"	+2.0		 +0.8	Volts Volts
Logic Currents: Digital Input Bits: Logic "1" @ V_{IH}=+5V Logic "0" @ V_{IL}=0V Latch Control: Logic "1" @ V_{IH}=+5V Logic "0" @ V_{IL}=0V S/H Control: Logic "1" @ V_{IH}=+5V Logic "0" @ V_{IL}=0V			+/-0.1 +/0.1 +/-0.3 +/-0.3 +/-0.2 +/-0.2	µA µA µA µA µA µA
S/H Control: "Hold Mode" "Track Mode"		Logic "1" Logic "0"		
Latch Control: Transparent Latch		Logic "1" Logic "0"		
Digital Input Coding		Offset Binary		
ANALOG OUTPUT				
Output Voltage Range		+/-10		Volts
Output Current Load			+/-5	mA
Short Circuit Current		Protected		
Reference Output Voltage		+10		Volts
Reference Accuracy			+/-10	mV
TRANSFER CHARACTERISTICS				
Resolution		20		Bits
Integral Linearity Error Differential Linearity Error			+/-0.00095 +/-0.00075	%FSR %FSR
Offset Error		+/-2	+/-5	mV
Gain Error		+/-0.02	+/-0.05	%
Stability: Offset Drift Gain Drift Warm-up Time	 10	+/-0.05 +/-5		mV/°C ppm/°C Minutes

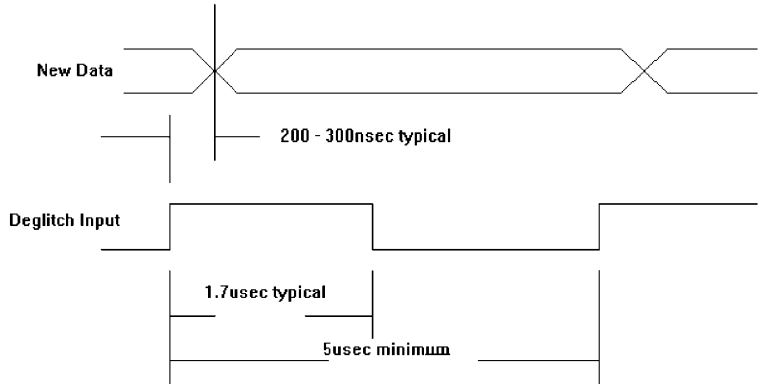
DYNAMIC CHARACTERISTICS	MIN.	TYP.	MAX.	UNITS
Update Rate			200	kHz
Deglitcher Hold Time		1.7		µsec
Glitch Energy		0.7	2	nVsec
Settling Time: 1/2 Full Scale Step tp 0.003%FSR 1 LSB Step to +/-0.00075%FSR			20 5	µsec µsec
POWER SUPPLIES				
Power Supply Range: +15V Supply -15V Supply +5V Supply	+14.550 -14.550 +4.75	+15.000 -15.000 +5.000	+15.450 -15.450 +5.25	Volts Volts Volts
Current Drains: +15V Supply -15V Supply +5V Supply		37 27 2	45 35 5	mA mA mA

PIN DESIGNATIONS

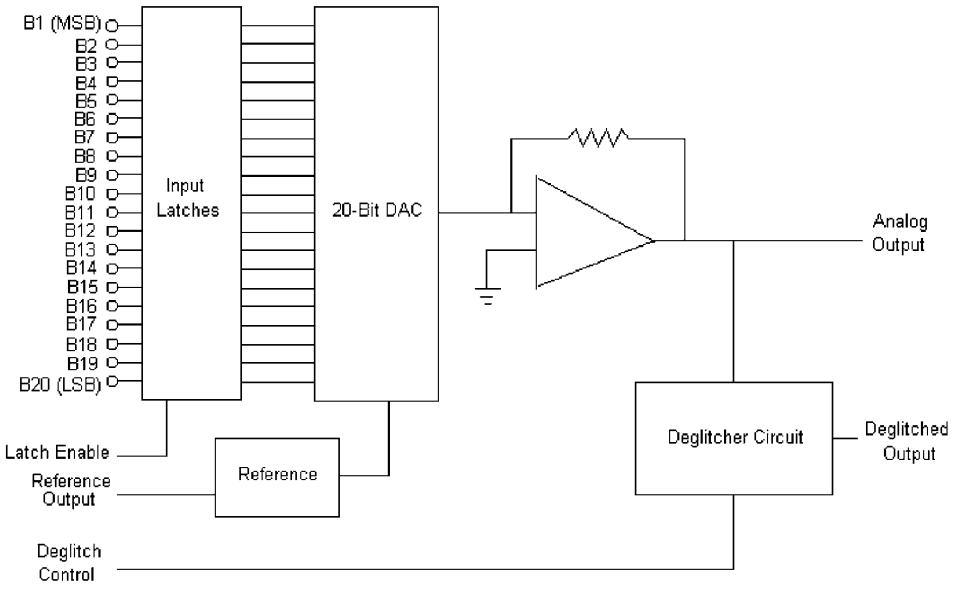


1. +5V Supply
2. Digital Ground
3. S/H Command
4. Digital Ground
5. Latch Control
6. Bit 20 (LSB)
7. Bit 19
8. Bit 18
9. Bit 17
10. Bit 16
11. Bit 15
12. Bit 14
13. Bit 13
14. Bit 12
15. Bit 11
16. Bit 10
32. Analog Ground
31. -15V Supply
30. +15V Supply
29. Deglitched Output
28. DAC Output
27. Reference Output
26. N.C.
25. Bit 1 (MSB)
24. Bit 2
23. Bit 3
22. Bit 4
21. Bit 5
20. Bit 6
19. Bit 7
18. Bit 8
17. Bit 9

TIMING DIAGRAM

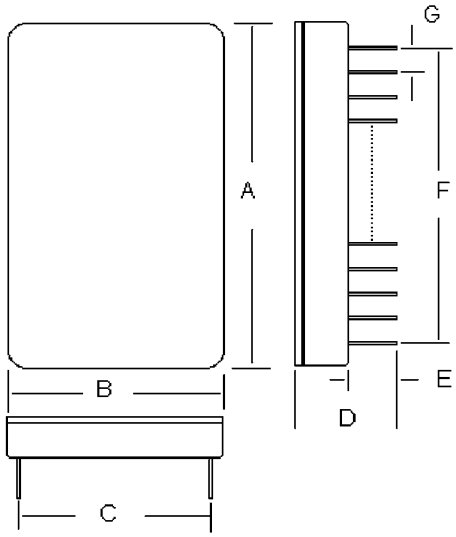


BLOCK DIAGRAM



PAGKAGE OUTLINE

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A		1.740		44.20
B		1.140		28.96
C	0.900 typ		22.86 typ	
D		0.425		10.80
E	0.195	0.215	4.95	5.46
F	1.50 typ		38.1 typ	
G	0.100 typ		2.54 typ	



LAYOUT, GROUNDING AND DECOUPLING - Proper attention to layout, grounding and decoupling is required to obtain specified linearity and accuracy from the MN3395. It is critically important that power supplies be filtered, well-regulated, and free from high-frequency noise. Use of noisey supplies can easily degrade the devices performance and cause unstable output levels to be generated. Switching power supplies are not recommended for circuits attempting to achieve 12-bit or greater accuracy unless great care is used in filtering any switching spikes present in their output.

The MN3395's digital ground pins (pins 2 and 4) are not connected internally to the device's analog ground pin (pin 32). These pins should be tied together at the device to a large-area, low-impedance analog ground plane beneath the device.

Power supply connections should be short and direct, and all supply lines should be decoupled (bypassed) with tantalum or electrolitic capacitors located on board close to the MN3395. For optimum performance, a relatively large value tantalum (1-10µF) capacitor paralleled with a smaller (0.01 to 0.1µF) ceramic disc capacitor should be used as shown in the diagram below. Coupling between digital inputs and analog output should be minimized to avoid noise pick-up. Care should be utilized to avoid long runs of digital signals close to analog runs.