

**20-Bit, Digital-to-Analog  
Converter**

**FEATURES**

- **20-Bit Resolution**
- **2nVsec Maximum Glitch Energy**
- **Bipolar +/-10V Output**
- **20 $\mu$ 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 MN3396 is an 20-bit, Digital-to-Analog converter designed for applications requiring high-resolution performance.

The MN3396 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 MN3396 provides a bipolar analog output of -10V to +10 V. Digital inputs are compatible with the HCT logic family. The MN3396 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

## MN3396 20-Bit Digital-to-Analog 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 <sub>DD</sub> +0.5V

**ORDERING INFORMATION**

PART NUMBER	MN3396
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**SPECIFICATIONS** Typical at +25°C (unless otherwise indicated)

SPECIFICATIONS	MIN.	TYP.	MAX	UNITS
<b>DIGITAL INPUTS</b>				
Logic Levels (All Inputs): Logic "1" Logic "0"	+2.0		+0.8	Volts Volts
Logic Currents: Digital Input Bits: Logic "1" @ V <sub>IH</sub> =+5V Logic "0" @ V <sub>IL</sub> =0V Latch Control: Logic "1" @ V <sub>IH</sub> =+5V Logic "0" @ V <sub>IL</sub> =0V			+/-0.1 +0.1 +/-0.3 +/-0.3	μA μA μA μA
Latch Control: Transparent Latch		Logic "1" Logic "0"		
Digital Input Coding		Offset Binary		
<b>ANALOG OUTPUT</b>				
Output Voltage Range		+/-10		Volts
Output Current Load			+/-5	mA
Short Circuit Current		Protected		
Reference Output Voltage		+10		Volts
Reference Accuracy			+/-10	mV
<b>TRANSFER CHARACTERISTICS</b>				
Resolution		20		Bits
Integral Linearity Error Differential Linearity Error Monotonicity	18		+/-0.00095 +/-0.00075	%FSR %FSR Bits
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
Settling Time: 1/2 Full Scale Step to 0.003%FSR 1 LSB Step to +/-0.00075%FSR			20 5	$\mu$ sec $\mu$ sec
<b>POWER SUPPLIES</b>				
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     | 32. Analog Ground    |
| 2. Digital Ground | 31. -15V Supply      |
| 3. N.C.           | 30. +15V Supply      |
| 4. Digital Ground | 29. N.C.             |
| 5. Latch Control  | 28. DAC Output       |
| 6. Bit 20 (LSB)   | 27. Reference Output |
| 7. Bit 19         | 26. N.C.             |
| 8. Bit 18         | 25. Bit 1 (MSB)      |
| 9. Bit 17         | 24. Bit 2            |
| 10. Bit 16        | 23. Bit 3            |
| 11. Bit 15        | 22. Bit 4            |
| 12. Bit 14        | 21. Bit 5            |
| 13. Bit 13        | 20. Bit 6            |
| 14. Bit 12        | 19. Bit 7            |
| 15. Bit 11        | 18. Bit 8            |
| 16. Bit 10        | 17. Bit 9            |