14-Bit Multiplying DAC

FEATURES
• 14-bit resolution and accuracy
• 2 and 4-quadrant multiplication
• Precision laser trimmed ladder
• Low power
• Single power supply operation
• Reliable

DESCRIPTION
The DAC9331-14 is a low cost 14-bit multiplying digital-to-analog converter packaged in a unique 24-pin double DIP. Capable of 2 and 4-quadrant multiplication, the unit is TTL/DTL and CMOS compatible with power consumption less than 30mW. Power supply options include +5V (-1) or +15V (-2). Outstanding features of the DAC9331-14 include:
True 14-bit performance — Up to 14-bit resolution and accuracy over the 0° to 70°C operating range.
2 and 4-quadrant multiplication — Reference input range to ±25 volts.
Low power — CMOS technology provides less than 30mW total power dissipation — a real battery saver.

Reliability plus — Packaged in a unique enclosure that has undergone extensive environmental testing during its development. The DAC9331-14 is continuously monitored during all assembly and test operations by our quality control organization. Reliability is enhanced by batch-processed, precision laser trimmed resistor networks fabricated in our own facility. Similar to monolithic circuits, the networks are processed and functionally trimmed to assure consistent performance.

FUNCTIONAL DIAGRAM
SPECIFICATIONS
(Typical @ +25°C and nominal power supply. VREF = +10V, unless otherwise noted)

MODEL DAC9331-14

TYPE Multiplying

DIGITAL INPUT
Resolution 14-Bits
2-Quad. Unipolar Coding Binary
4-Quad. Bipolar Coding Offset Binary
Logic Compatibility DTL, TTL, CMOS
Logic Thresholds $V_{IH}=3.5V$ (min), $V_{IL}=1.0V$ (max)\(^1\)
Input Leakage Current $\pm 1\mu A$ (max)

REFERENCE INPUT
Voltage Range $\pm 25V$ (max)
Input Impedance 25k

ANALOG OUTPUT
Gain Accuracy\(^2\) 0.1%
Offset\(^3\) 50µV (max)
Output Leakage 40nA (max)
Small Signal 3dB Bandwidth 600kHz (min)
Output Capacitance $C_{out1}$ 100pF (max) all inputs high
$C_{out2}$ 30pF (max) all inputs high
$C_{out1}$ 30pF (max) all inputs low
$C_{out2}$ 100pF (max) all inputs low

STATIC PERFORMANCE
Integral Linearity\(^4\) $\pm 1/2$ LSB (max)
Differential Linearity $\pm 1/2$ LSB (typ), $\pm 1$ LSB (max)

DYNAMIC PERFORMANCE
Major Carry Transition Settling to ±0.05% 3.0μS (max)
Reference Feedthrough Error (Vref=20Vpp @ 10kHz) 10mVpp

STABILITY\(^3\) (Over Specified Temp. Range)
Scale Factor\(^5\) ±3ppm/C F.S.R. (max)
Linearity ±3ppm/C F.S.R. (max)
Differential Linearity ±2ppm/C F.S.R. (max)

POWER SUPPLY (VDD)\(^6\)
Voltage Range @ Current
-1 Option $+5V$ (nom); $+4.75V$ to $+7V$ @ $<1mA$
-2 Option $+15V$ (nom); $+11.5V$ to $+15.5V$ @ $2mA$
Rejection Ratio 0.005% % (typ), 0.007% % (max)
Total Dissipation (inputs at GND) 30mW (max)

Consult factory for application information.

TEMPERATURE RANGE
Operating 0°C to +70°C
Storage 0°C to +85°C

MECHANICAL
Case Style 24-pin double-DIP
Case Dimensions

NOTES
1. The switching threshold is typically VDP/2 for −1 models and VDP/6 for −2 models.
2. The logic input must never exceed VDD/3 (or −2 models).
3. Using internal feedback resistor.
4. Using the internal feedback with nulled external amplifier in a constant 25°C ambient. (Offset doubles every 10°C).
5. Best straight line method of test.
6. The DAC9331-14 Series is designed to be used only in those applications where the current output is virtual ground: i.e., the summing junction of an op amp in the inverting mode. The internal feedback resistor (R feedback) must be used to achieve temperature tracking.

APPLICATIONS INFORMATION for recommended circuit configurations.

6. The power supply voltage must not exceed +10V for the −1 versions or +15.5V for the −2 versions.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAC9331-14-1</td>
<td>14-Bit MDAC, +5V Operation</td>
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<tr>
<td>DAC9331-14-2</td>
<td>14-Bit MDAC, +15V Operation</td>
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</tbody>
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Specifications subject to change without notice.