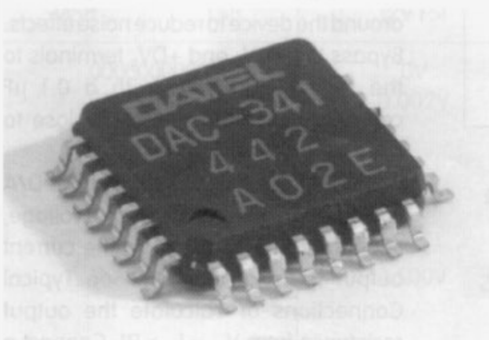
DATEL®

DAC-341

10-Bit 80 MHz Video Speed D/A Converter

PRODUCT DATA SHEET



FEATURES

- 10-bit Resolution
- Single +5V Operation
- TTL CMOS
- 80MHz Conversion Rate
- Low 150mW Power Dissipation
- Low Glitch Energy, 50pV/s
- $\pm^1/_2$ LSB Differential Non-linearity
- Built-in Independent Constant-Voltage Source

GENERAL DESCRIPTION

The DAC-341 is a single channel 10-bit, 80MHz Digital to Analog Converter designed for video applications. The DAC-341's main features include ±0.5 LSB differential nonlinearity, single +5V power supply operation, a built-in constant voltage reference and very low glitch energy.

The DAC-341 develops a full scale output current of 10mA or 2.0V with 200Ω shunt resistor. An internal voltage reference source may be used to provide stable output independent of power supply fluctuations. Input coding is straight binary.

The DAC-341 is a low power device requiring only 30mA max. of +5V power supply current.

The DAC-341 is packaged in a 32-pin plastic QFP and operates over a -20°C to +70°C temperature range.

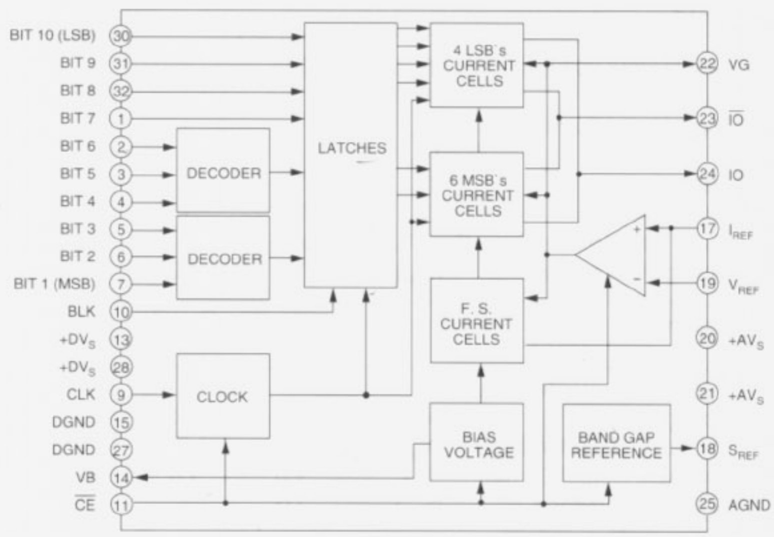


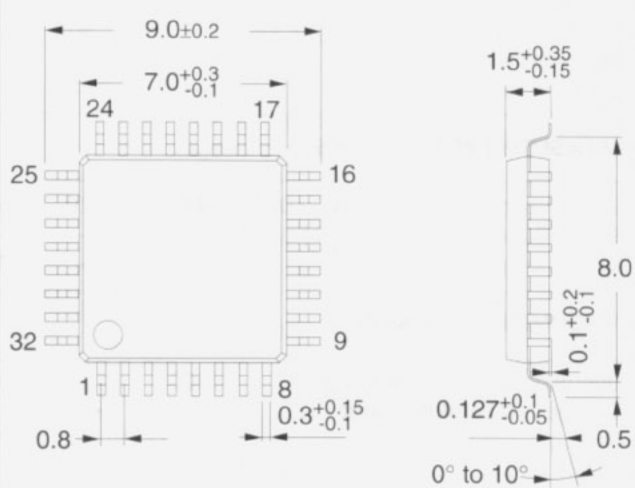
Figure 1: DAC-341 Functional Block Diagram

INPUT/OUTPUT CONNECTIONS

PIN	FUNCTION	PIN	FUNCTION
1	BIT 7	17	I_{REF}
2	BIT 6	18	S_{REF}
3	BIT 5	19	V_{REF}
4	BIT 4	20	$+AV_S$ (Analog)
5	BIT 3	21	$+AV_S$ (Analog)
6	BIT 2	22	VG
7	BIT 1 (MSB)	23	$\overline{IO}$
8	NO CONNECTION	24	IO
9	CLK	25	AGND
10	BLK	26	NO CONNECTION
11	CE	27	DGND
12	NO CONNECTION	28	$+DV_S$ (Digital)
13	$+DV_S$ (Digital)	29	NO CONNECTION
14	VB	30	BIT 10 (LSB)
15	DGND	31	BIT 9
16	NO CONNECTION	32	BIT 8

Mechanical Dimensions
Units: mm

Top View



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

PARAMETERS	SYMBOLS	LIMITS	UNITS
Supply Voltage	$(+AV_S, +DV_S)$	7	V
Input Voltage		-0.5 to $+V_S$	V
Output Current		0 to 15	mA

ELECTRICAL CHARACTERISTICS

(Typical at Ta = 25°C, $+AV_S = +DV_S = +5V$, $V_{REF} = 2.0V$, R = 200Ω, 16R = 3.3kΩ and F_S = 80MHz unless otherwise specified)

PARAMETERS	SYMBOLS	MIN.	TYP.	MAX.	UNITS
INPUTS					
Digital Input Voltage	$1(V_{IH})$	2.15	-	-	V
	$0(V_{IL})$	-	-	0.85	V
Digital Input Current	$1(I_{IH})$	-	-	5	µA
	$0(I_{IL})$	-5	-	-	µA
Setup Time	(T_S)	5.0	-	-	ns
Hold Time	(T_H)	1.0	-	-	ns
Clock Pulse Width	(T_{PW1}/T_{PW0})	6.25	-	-	ns
Voltage Reference	(V_{REF})	1.9	2.0	2.1	V
OUTPUTS					
Accuracy guaranteed Output					
Voltage Range	(V_{OC})	1.8	1.92	2.0	V
Full Scale Output Voltage	(V_{FS})	1.8	1.92	2.0	V
Full Scale Output Current	(I_{FS})	9.0	9.6	10	mA
S_{REF} Output Voltage	(S_{REF})	1.0	-	1.3	V
PERFORMANCE					
Resolution		-	10	-	Bits
Conversion Rate	(F_S)	80	-	-	MHz
Integral Linearity Error	(I_{NL})	-2.0	-	2.0	LSB
Differential Linearity Error	(D_{NL})	-0.5	-	0.5	LSB
Output Offset Voltage	(V_{OS})	-	-	1	mV
Propagation Delay Time	(T_D)	-	10	-	ns
Glitch Energy	$(@1V_{PP}$ F.S.)	-	50	-	pV/s
Differential Gain		-	2.5	-	%
Differential Phase		-	1.3	-	deg
POWER SUPPLY REQUIREMENTS					
Supply Voltage	$(+AV_S, +DV_S)$	4.75	5.0	5.25	V
Supply Current	(I_S)	-	-	30	mA
Power Dissipation	(P_D)	-	-	150	mW
ENVIRONMENTAL/PHYSICAL					
Operating Temperature Range		-20	-	+70	°C
Storage Temperature Range -55		-	+150	°C	
Package			32-Pin Plastic QFP		
Weight			0.2		g

Technical Notes

1. Separate the analog and digital signals around the device to reduce noise effects. Bypass the $+AV_S$ and $+DV_S$ terminals to the respective GNDs with a 0.1 µF ceramics capacitor placed as close to the pin as possible.

2. The DAC-341 is a current output D/A converter. To generate an output voltage, connect a 200Ω resistor to the current output terminal (Pin 24). See Typical Connections or calculate the output resistance from $V_{FS} = I_{FS} \times R1$. Connect a resistance (R2) sixteen times the output resistance (R1) to the reference current terminal I_{REF} (Pin 17). Note also that $V_{FS} = V_{REF} \times 16R1/R2$, and when connected directly to S_{REF}, $V_{FS} = S_{REF} \times 16R1/R2$. Power consumption can be reduced by increasing the resistance, but this will also increase the glitch energy and output settling time. Choose the best values according to the application.

3. The S_{REF} is an independent regulated voltage source. By connecting it to the V_{REF} (Pin 19) a stable output, independent of power supply fluctuations, can be obtained. Note that connecting S_{REF} to V_{REF} changes the value of R2.

4. For the DAC-341 to provide the specified performance the data transmitted from outside and the clock must be synchronized properly. Adjust the setup time (T_S) and hold time (T_H) as specified.

5. The $+AV_S$ and $+DV_S$ Pins must use the same power supply. This is required to prevent latch up that may be caused by a potential difference between the two terminals when the power is turned on.

Table 1. Coding Table

Input Code MSB LSB	Output Voltage (2V FS)
0000000000	0V
0000000001	0.002V
.	.
.	.
1000000000	1.000V
.	.
.	.
1100000000	1.500V
.	.
.	.
1111111111	1.998V

Timing Diagram

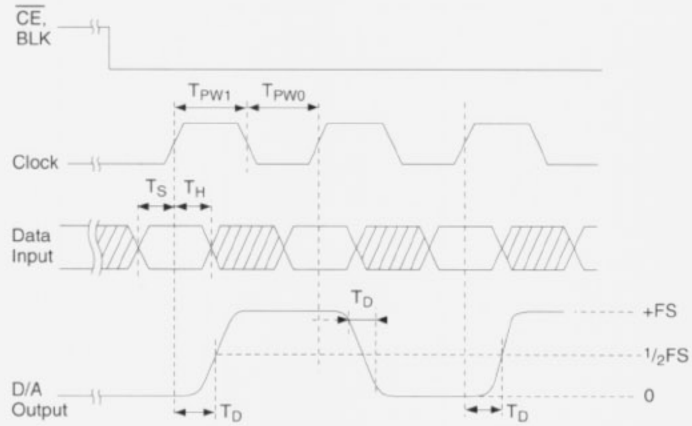
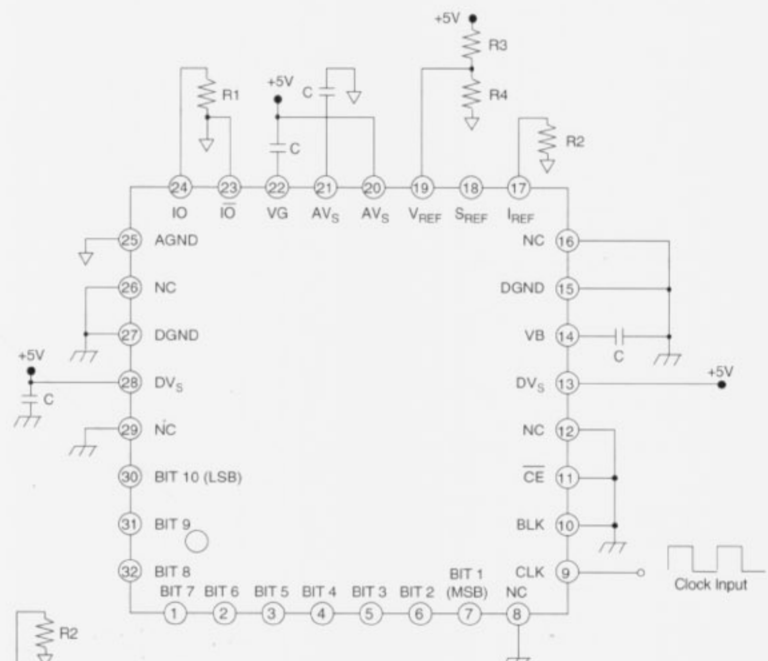
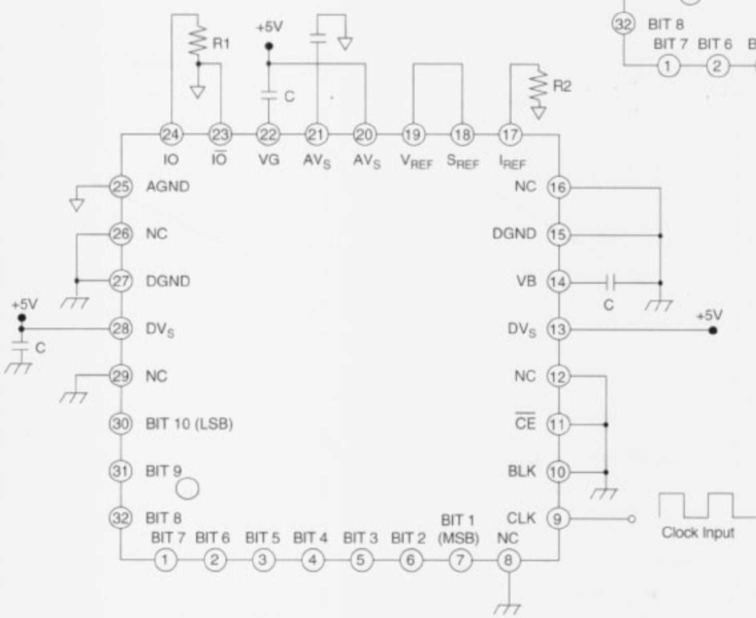


Figure 2. Typical Connection Diagrams

- 5.0V supply voltage (DV_S and AV_S)
- Digital input from Pins 30 to 32 and Pins 1 to 7
- Pin 18 is left open
- R1 = 200Ω
- R2 = 3.3kΩ
- R3 = 3.0kΩ
- R4 = 2.0kΩ
- C = 0.1µF





- 5.0V supply voltage (DV_S and AV_S)
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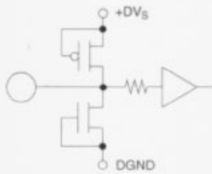
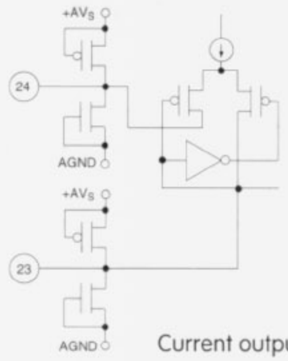
- C = 0.1µF

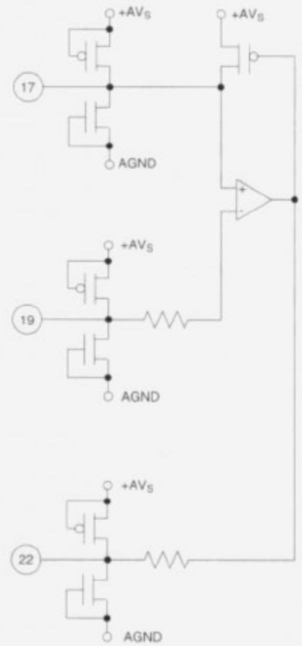
Equivalent Circuits

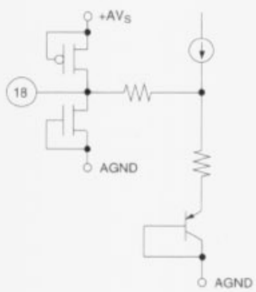


Digital input, BLK, $\overline{CE}$ and CLK inputs

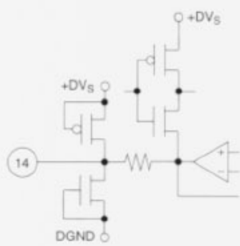


Current output pins





Constant Voltage output

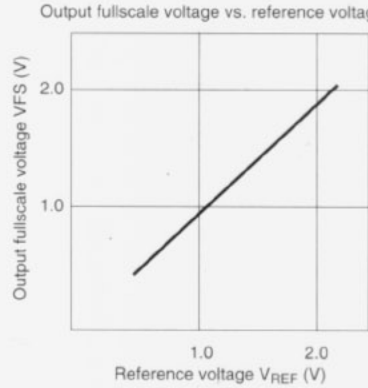


Bias Voltage

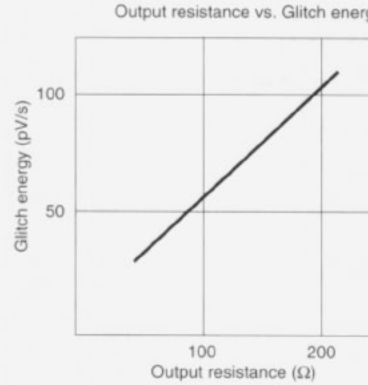
Reference Pins (V_{REF}, I_{REF}, VG)

Typical Performance Curves

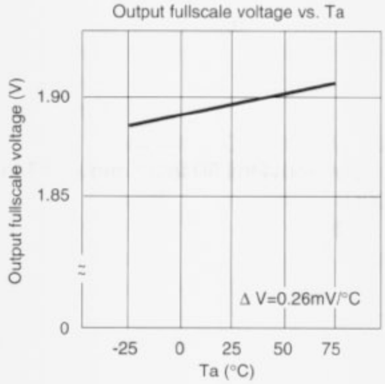
Output fullscale voltage vs. reference voltage



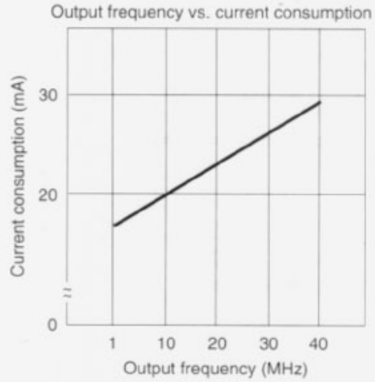
Output resistance vs. Glitch energy



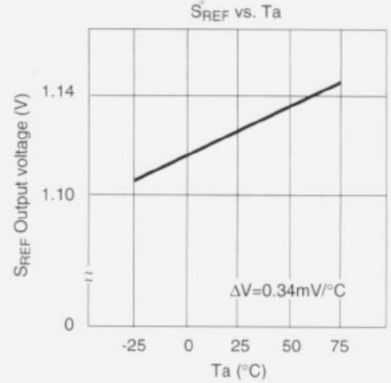
Output fullscale voltage vs. Ta



Output frequency vs. current consumption



S_{REF} vs. Ta



Specifications subject to change without notice

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