

ADVANCED ANALOG

A Division of intech

VDAC1850/1852

8-BIT, 80MHz
VIDEO DAC

DESCRIPTION

The VDAC1850 and VDAC1852 are monolithic video speed digital-to-analog converters with 8-bit resolution. They contain latches for input data and produce a clean video output signal capable of driving 75Ω or 37.5Ω loads. Both models are also capable of producing composite sync and blanking signals plus reference black, reference white, and 10% bright. The VDAC1850 is capable of accepting both binary or complementary binary coded data inputs while the VDAC1852 operates on straight binary inputs. The VDAC1850 has additional control pins to permit an adjustment of the composite sync, blanking and 10% bright output signal levels.

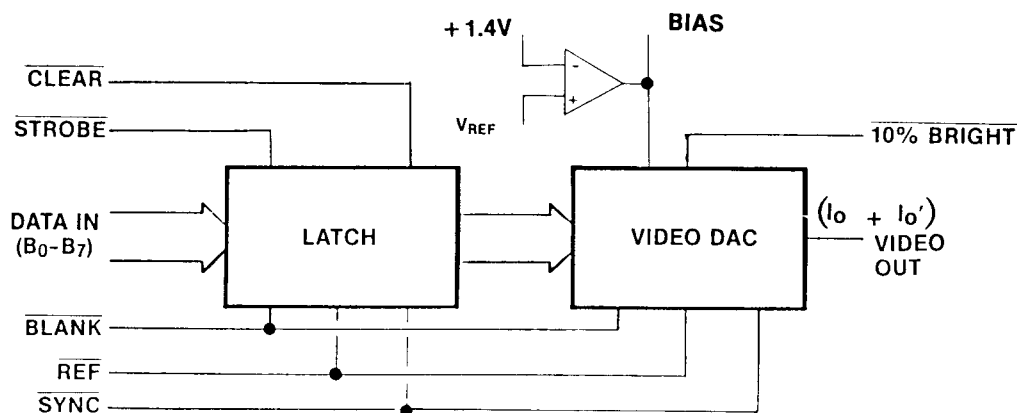
The DACs operate from a single positive 5V power supply and produce a standard 1V video output signal. The output circuitry may be connected to high voltage circuits to produce output voltage swings of up to 100V. The VDAC1850/1852 are available in standard DIP or LCC packages. See Ordering Information for details.

The VDAC1850J/B is in a hermetically sealed 24-pin DIP package. The VDAC1850L/B is in a 24-pin ceramic chip carrier package and the VDAC1852J/B is in a 20-pin ceramic side braze package.

FEATURES

- Low power CMOS circuitry - 150mW
- Update rates to 80 MHz
- Input data latches
- CMOS/TTL compatible inputs
- 75 ohm video outputs
- Composite sync and blanking output signals
- $\pm 1\text{LSB}$ nonlinearity
- Input data latches
- TTL compatible inputs
- 20 or 24-pin DIP and 24 pin leadless chip carrier packages
- Single +5V supply
- Military screening

BLOCK DIAGRAM



SPECIFICATIONS

Typical @ +25°C, VDD = +5V, RL = 37.5¹Ω I_o = 10 mA typical @25°C for commercial units.

ABSOLUTE MAXIMUM RATINGS	MIN	TYP	MAX	UNITS
Supply Voltage			6	V
Supply Current			60	mA
Full Scale Output Current (I _o)			40	mA
Drive Current (any pin)			+10	mA
I _o , I _{o'} , Voltage Range	-10		+2.5	V
Logic Input	-0.3		VDD +0.3	V
Ambient Operating Temperature Range	VSS -0.3			°C
Ambient Storage Temperature Range	-55		+125	°C
I _o (VIDEO DAC OUTPUT)	-55		+125	°C
Max Current (@ VO = 1.2V)		17.5	33	mA
Max Voltage (@ IO = 10 mA)				
I _{o'}				
Blanking Current	19	21	23	LSB
Sync Current	103	110	115	LSB
10% Bright Current	25	28	31	LSB
ACCURACY				
Absolute		±1/2	±1	LSB
Linearity		±1/2	±1	LSB
Offset Current			0.2	LSB
Voltage Reference (@25°C)	1.26	1.40	1.54	V
DYNAMIC CHARACTERISTICS				
Max Conversion Rate	6	8	10	ns
Set-up Time t _{SU}	3			ns
Hold Time t _H	0			ns
Glitch Energy		150		pV-s
Amplitude		60		mV
DIGITAL INPUTS				
Logic "0" V _{IL}	0		0.8	V
Logic "1" V _{IH}	2.4		VDD	V
I _{IL}			±50	μA
I _{IH}			±50	μA
Compatibility		TTL/CMOS		
Coding		BINARY ²		
TEMPERATURE COEFFICIENT				
Full Scale Tempco		±.5	±2	mV/°C
Voltage Reference		±.5	±1.5	mV/°C
POWER REQUIREMENTS				
Voltage	4.75	5	5.25	V
Current ³		30	45	mA
TEMPERATURE RANGE				
Ambient - Commercial	0		70	°C
Ambient - Military	-55		+125	°C
THERMAL RESISTANCE				
θ _{JA} Junction to ambient		73		°C/W
θ _{JC} Junction to case		37		°C/W

1. 75Ω resistor at IO pin and 75Ω load impedance in parallel.
2. VDACC1850 operates on inverted binary with pin 16 at logic "1".
3. Includes 28 mA delivered to load.

Military units are tested over full temperature range.

DEVICE OPERATION

The output of the VDAC-1850/1852 is a current source whose full scale value is set by an external resistor. This resistor is connected to an internal reference (1.4V nominal), and the current through the resistor represents 7 LSBs of output current. Thus, for a full scale current of 255 LSBs, $I_O = 1.4/R \times 255/7 = 51/R$, where I_O = full scale output current, R = current setting resistor (ohms). This resistor is connected from pin 21 to ground.

Example: $R_L = 37.5\Omega$, $I_O = .017$ ($V_O = 637.5$ mV from black to white level)

$$R = \frac{51}{I_O} = \frac{51}{0.017} = 3K$$

The value of R would be 6K nominal for $R_L = 75\Omega$, $I_O = .0085$

$$R = \frac{51}{.0085} = 6K$$

There is a separate pin (I_O') for the composite video signal. The output currents for composite sync, composite blank, and 10% bright are summed and appear at this pin (1). Normally I_O' is connected to pin 23, I_O . The three video signals have the following weighted values:

- Composite sync 110 LSB (40 IRE)
- Composite blank 21 LSB (7½ IRE)
- 10% bright 28 LSB (10 IRE)

Note that these currents are ratioed to the 8-BIT DAC full scale current (255 LSBs).

PIN DESCRIPTIONS

DATA

These pins are the digital data inputs to the latch for the DAC. The inputs operate on normal TTL logic levels and the coding is binary. (The VDAC-1850 will accept inverted binary data if pin 16 is at logic "1".) The input data is transferred to the DAC when the strobe makes a HI to LO transition.

STROBE

This input is used to clock the input data into the latch. Data is loaded into the latches and transferred from their outputs to the DAC inputs on a logic "1" to logic "0" transition.

SYNC

A logic "0" clears the DAC (inputs all zeros) and turns off this current source (at I_O' pin) driving the output negative by 289 mV, with a normal configuration.

BLANK

A logic "0" clears the DAC (inputs all zeros) and turns off this current source at I_O' pin) driving the output negative by 53 mV with a normal configuration.

I_O

This is the output of the 8-BIT Video DAC. It is a current output and has a full scale value of 92.5 IRE units or 17 mA (0.6375V) with a normal 37.5Ω load. The full scale output current value is programmable with an external resistor at the 1.4V pin. This output is normally tied to the I_O' pin to obtain video signals with composite sync, blanking and 10% bright output levels.

+1.4V

This pin is used to calibrate the gain of the 8-BIT VIDEO DAC. This is normally accomplished by connecting a resistor between it and ground. The value of the resistor is selected so that the current through it is equal to 7 LSBs of output current at I_O as described under DEVICE OPERATION.

I_O'

This pin contains the outputs for the current sources for the composite sync, composite blanking and 10% bright signals. It is normally summed with I_O pin to generate a video output which contains all these signals.

REF

This input provides a convenient way to force the output of the DAC to go to "Ref-White" level. A logic "0" at this input will override the other inputs and cause the output to go to its full-scale level.

CLEAR

This is a control pin that is synchronized with the clock. If CLEAR is pulled low, then the input latches will be set to zero when the clock goes high. When the clock then goes low, the zeros are transferred to the output latches and this sets the DAC output current to zero. This line must be kept low to override data, but REF will override it.

10% BRIGHT

A logic "0" turns on this current source at I_O' pin) boosting the output by 71 mV with a normal configuration. This input is normally used to generate extra brilliant pixels for a cursor, etc.

BIAS

Sets the current for the current sources. This line is driven by an internal amplifier. It can also be easily driven by an external source if desired. This line should be bypassed to V_{DD} with a $.01\mu F$ capacitor.

INVERT (VDAC 1850 ONLY)

A logic "1" on this input complements the data inputs (B_0 - B_7). It is used if the digital data inputs are inverted or complementary binary coded.

SADJ, CADJ, BADJ (VDAC 1850 ONLY)

These three lines may be used to adjust the output current levels of the 10% Bright, Composite Blanking and SYNC signals. For normal applications these circuits are not required and these pins may be left open. To adjust these current levels, connect a 10K potentiometer from V_{DD} to V_{SS} . Connect a 10K resistor from the center tap of the potentiometer to the adjustment pin. www.DataSheet4U.com

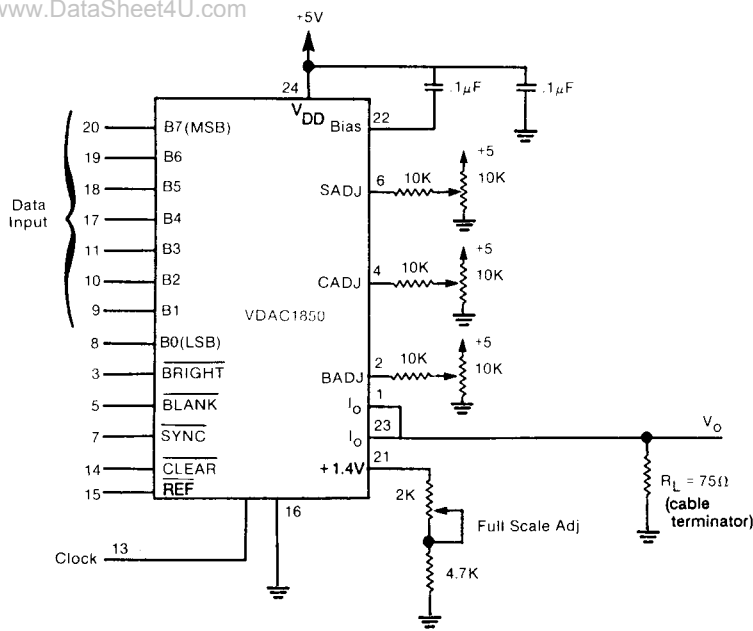


Figure 1 Typical Video Application

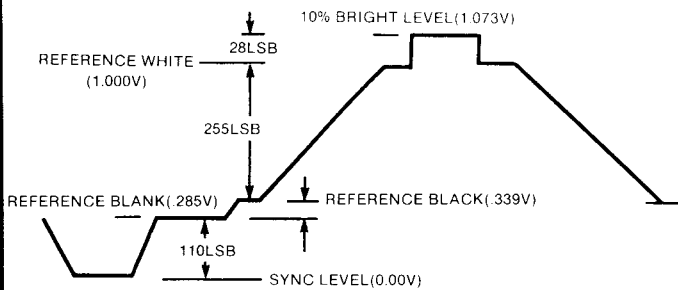


Figure 2 Composite video output signal with typical voltage levels given in parentheses

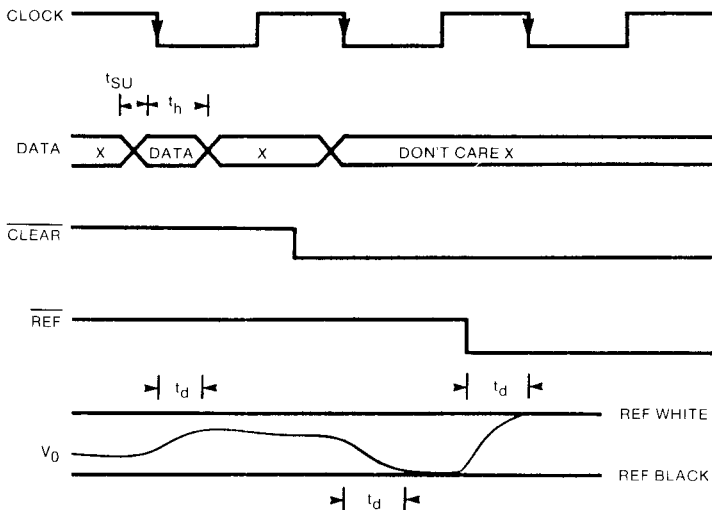


Figure 3 Timing Diagram

Note that CLEAR input is synchronous and REF input is asynchronous.

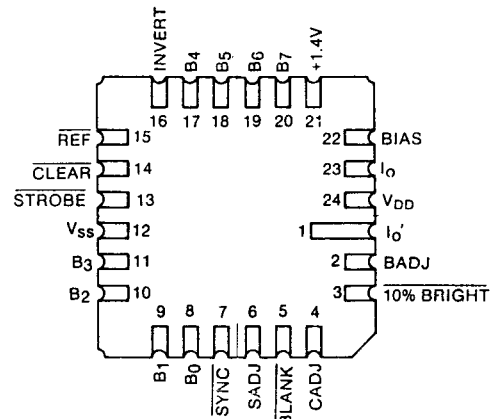
PIN DESIGNATION

Pin 1	I_o'	Pin 24	V_{DD}
Pin 2	BADJ	Pin 23	I_o
Pin 3	10% BRIGHT	Pin 22	BIAS
Pin 4	CADJ	Pin 21	+1.4V
Pin 5	BLANK	Pin 20	B7
Pin 6	SADJ	Pin 19	B6
Pin 7	SYNC	Pin 18	B5
Pin 8	B0	Pin 17	B4
Pin 9	B1	Pin 16	INVERT
Pin 10	B2	Pin 15	REF
Pin 11	B3	Pin 14	CLEAR
Pin 12	V_{SS}	Pin 13	STROBE

VDAC1850N VDAC1850J VDAC1850J/B

Pin 1	I_o'	Pin 20	V_{DD}
Pin 2	10% BRIGHT	Pin 19	I_o
Pin 3	BLANK	Pin 18	BIAS
Pin 4	SYNC	Pin 17	+1.4V
Pin 5	B0	Pin 16	B7
Pin 6	B1	Pin 15	B6
Pin 7	B2	Pin 14	B5
Pin 8	B3	Pin 13	B4
Pin 9	V_{SS}	Pin 12	REF
Pin 10	STROBE	Pin 11	CLEAR

VDAC1852N VDAC1852J VDAC1852J/B



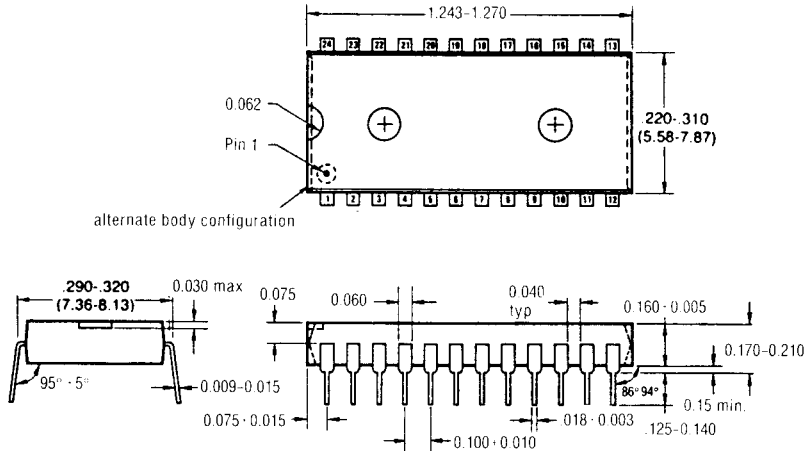
Bottom View

VDAC1850L/B

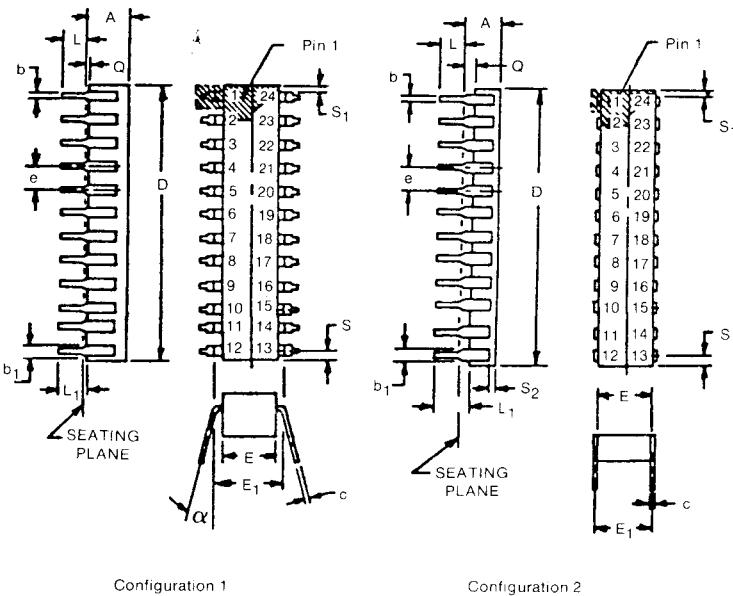
ORDERING INFORMATION

	Temp. Range	Package	Screening
VDAC1850N	0°C to +70°C	24-pin plastic	Commercial
VDAC1850J	0°C to +70°C	24-pin hermetic ceramic	Commercial
VDAC1850J/B	-55°C to +125°C	24-pin hermetic ceramic	Military
VDAC1850L/B	-55°C to +125°C	24-pin hermetic LCC	Military
VDAC1852N	0°C to +70°C	20-pin plastic	Commercial
VDAC1852J	0°C to +70°C	20-pin hermetic ceramic	Commercial
VDAC1852J/B	-55°C to +125°C	20-pin hermetic ceramic	Military

MECHANICAL OUTLINE



VDAC1850N

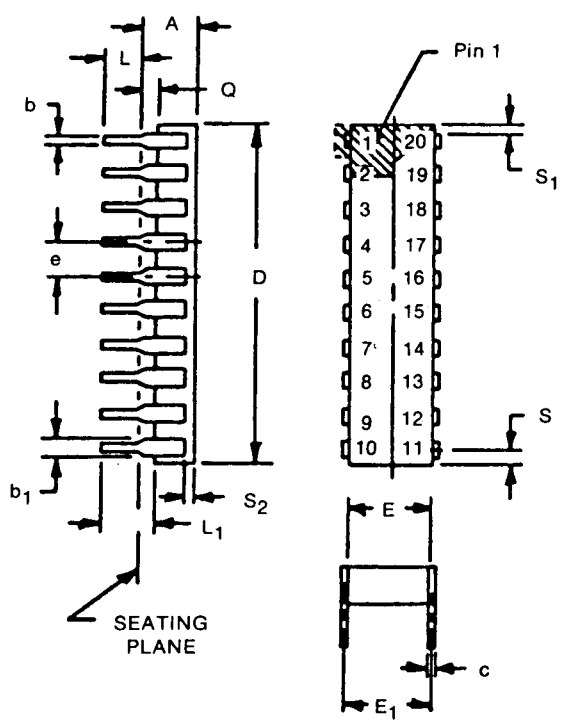
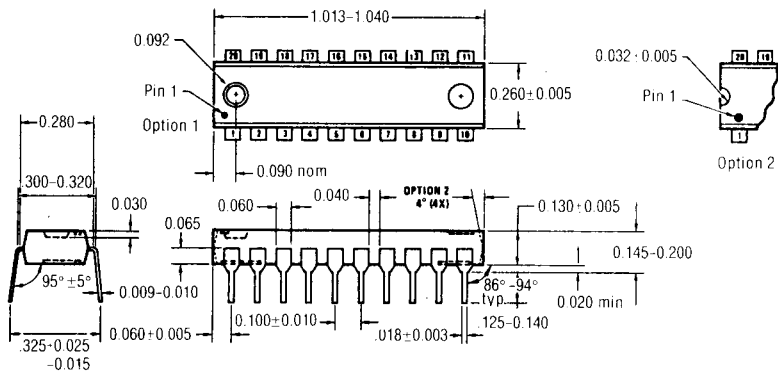
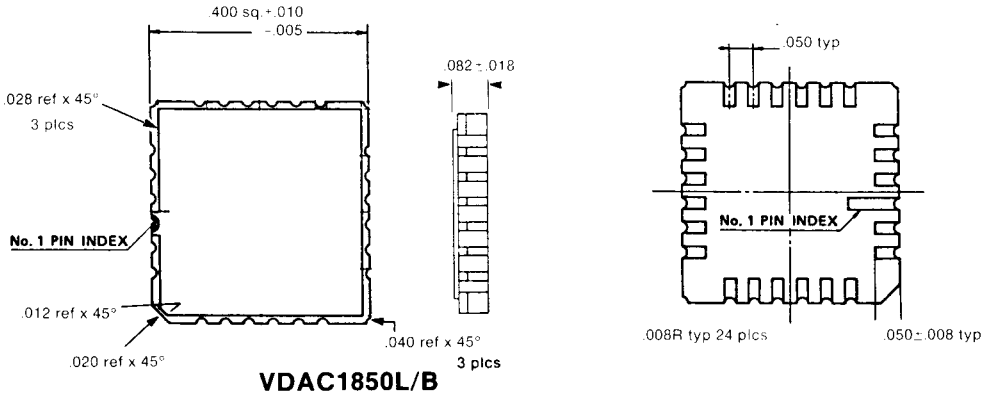


VDAC1850J/B

SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	---	.200	---	5.08
b	.014	.023	0.36	0.58
b ₁	.030	.070	0.76	1.78
c	.008	.015	0.20	0.38
D	---	1.250	---	31.75
E	.220	.310	5.59	7.87
E ₁	.290	.320	7.37	8.13
E ₂	.100	---	2.54	---
E ₃	.050	---	1.27	---
e	.100BSC		2.54 BSC	
L	.125	.200	3.18	5.08
L ₁	.150	---	3.81	---
Q	.015	.060	0.38	1.52
Q ₁	.020	---	0.51	---
S	---	.080	---	2.03
S ₁	.005	---	0.13	---
S ₂	.005	---	0.13	---
α	0°	15°	0°	15°

Finer of these cerdip packages will be used to fulfill a J package requirement depending on package availability at time of order.

MECHANICAL OUTLINE



SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	---	.200	---	5.08
b	.014	.023	0.36	0.58
b ₁	.030	.070	0.76	1.78
c	.008	.015	0.20	0.38
D	---	1.060	---	26.92
E	.220	.310	5.59	7.87
E ₁	.290	.320	7.37	8.13
E ₂	.100	---	2.54	---
E ₃	.050	---	1.27	---
e	.100BSC		2.54 BSC	
L	.125	.200	3.18	5.08
L ₁	.150	---	3.81	---
Q	.015	.060	0.38	1.52
Q ₁	.020	---	0.51	---
S	---	.080	---	2.03
S ₁	.005	---	0.13	---
S ₂	.005	---	0.13	---
a	0°	15°	0°	15°

PART NUMBER

VDAC 1850 X / B

Model

Military screening.
Omit for commercial.

N - 24 pin DIP - plastic
J - 24 pin DIP - ceramic
L - Leadless

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The information in this data sheet has been carefully checked and is believed to be accurate, however, no responsibility is assumed for possible errors. The specifications are subject to change without notice.

5-8801

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