intech
ADVANCED ANALOG

VDAC-0405H
VDAC-0605H
VDAC-0805H

HYBRID VIDEO DIGITAL TO ANALOG CONVERTERS

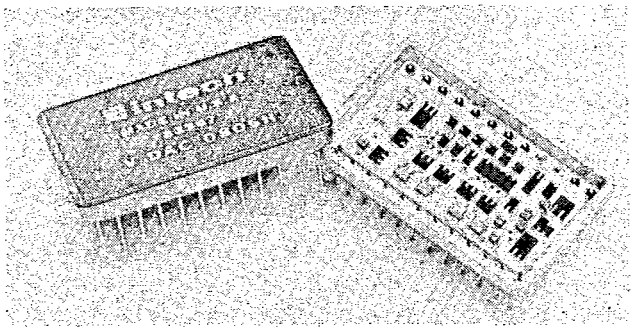
DESCRIPTION

These hybrid digital-to-analog converters are ultra high speed converters with full composite video capabilities. They are available in 4, 6, or 8 bits of resolution and have update rates in excess of 100 MHz. The units have all the control inputs required to generate an output wave form which is compatible with EIA standards RS-170 and RS-343 (see Fig. 1).

The VDAC 0805 provides 8 bits of resolution or 256 levels of "Gray Scale". While the VDAC 0605 has 6 bits or 64 levels and the VDAC 0405 has 4 bits or 16 levels of gray. The control inputs include composite Sync, Blanking, 10% Bright, Reference White and Set-up.

With their ultra-high update rates and the ability to develop a full 1V composite Video output signal across a 75Ω load these DAC's are ideally suited for computer graphics terminals using raster scan technology. Their low cost also makes them a good choice for high resolution color terminals where 3 are required for the RGB inputs.

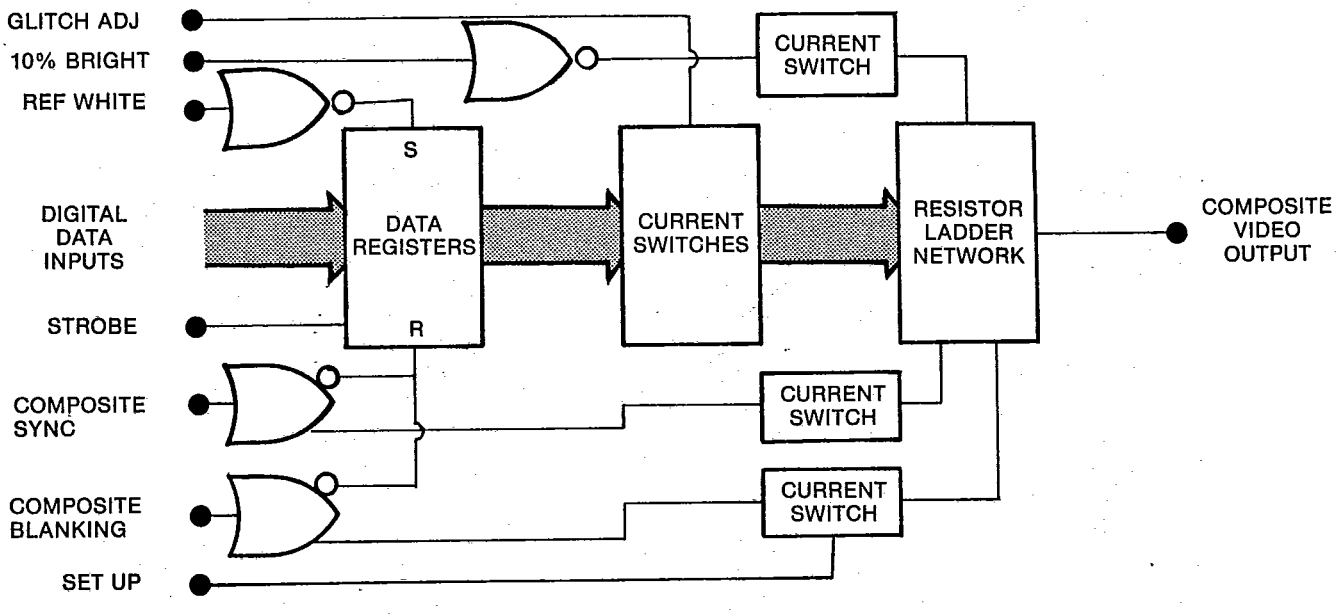
These DAC's are also ideally suited for many other high speed applications in industrial and military fields.



FEATURES:

- **UPDATE RATES TO MORE THAN 100 MHz**
- **SMALL SIZE — Hybrid 24 pin package**
- **COMPLETE COMPOSITE VIDEO CAPABILITY**
- **OPERATES FROM A SINGLE SUPPLY**
- **AVAILABLE IN 4, 6, OR 8 BIT RESOLUTION**
- **CLEAN OUTPUT — Deglitching not required**
- **MIL-STD-883 SCREENING AVAILABLE**
- **CONTAINS INPUT DATA REGISTERS**

BLOCK DIAGRAM



SPECIFICATIONS

(typical, 25°C, -5.2V supply and 75Ω load unless otherwise specified)

	VDAC-0805H	VDAC-0605H	VDAC-0405H	UNITS
RESOLUTION	8	6	4	BITS
ANALOG OUTPUT				
Voltage Range (±1%)	0 to -0.6375	0 to -0.630	0 to -0.600	V
Current (Max)	-8.5	*	*	mA
Impedance (±5%)	75	*	*	Ω
Compliance	±1.1	*	*	V
Short Circuit Proof		—Indefinitely—		
ACCURACY				
Absolute	± ½	*	*	LSB
Linearity	± ½	*	*	LSB
Offset	0.9	*	*	mV
Offset Tempco (Max)	10	*	*	ppm/°C
Linearity Tempco (Max)	25	*	*	ppm/°C
Gain Tempco (Max)	24	*	*	ppm/°C
DYNAMIC CHARACTERISTICS				
Settling Time (to 1 LSB)	8	6	4	ns (MAX)
Update Rate	100	*	*	MHz
Slew Rate	200	*	*	V/μs
Rise Time	3.0	*	*	ns
Glitch Energy	50	*	*	pV-s
DATA INPUTS[2]				
Compatibility	ECL[1]	*	*	
Coding		—COMPLEMENTARY BINARY—		
Input Impedance (bit)	50/5	*	*	KΩ/pF
CONTROL INPUTS				
STROBE[2]				
Compatibility	ECL	*	*	—
Loading	5/50	*	*	KΩ/pF
Set-up Time	2.5	*	*	ns
Hold Time	1.5	*	*	ns
Propogation Delay	3	*	*	ns
REFERENCE-WHITE[2], COMPOSITE BLANKING[2], 10% BRIGHT[2], COMPOSITE SYNC[2]				
Compatibility	ECL	*	*	—
Loading	50/5	*	*	KΩ/pF
Settling Time	8	*	*	ns
POWER REQUIREMENTS				
Voltage[3]	-5 to -5.45	*	*	V
Current (Max) Pin 2	250	200	150	mA
Pin 24	90	75	60	
TEMPERATURE RANGE				
Operating (Case)	-25 to +85	*	*	°C
Storage	-55 to +125	*	*	°C

*Specification same as VDAC-0805H

NOTES:
1. ECL Logic Levels — Logic "0" = -1.7V, Logic "1" = -0.9V
2. There inputs have internal pull-down resistors.
3. See "Applications Information" on page 4.

CONTROL INPUTS — DESCRIPTIONS

STROBE — (PIN 7)

The transition from Logic "0" to Logic "1" transfers digital input data into register.

COMPOSITE SYNC — (PIN 19)

A Logic "0" sets input register to all "0's" (Reference Black) and drives the output to a level of 286mV more negative than the Composite Blanking Level. This signal is used to synchonize the beam sweeps in a Raster Scan type display.

SETUP — (PIN 20)

Establishes the Composite Blanking Output level with respect to the Reference Black output as follows:

SETUP INPUT	BLANKING LEVEL (from Ref Black)
Grounded	0mV
Open	-71mV (Standard Setup)
-5.2V	-142mV

10% BRIGHT — (PIN 21)

A Logic "0" shifts the output positive by 71mV with respect to the Reference White Level.

COMPOSITE BLANKING — (PIN 22)

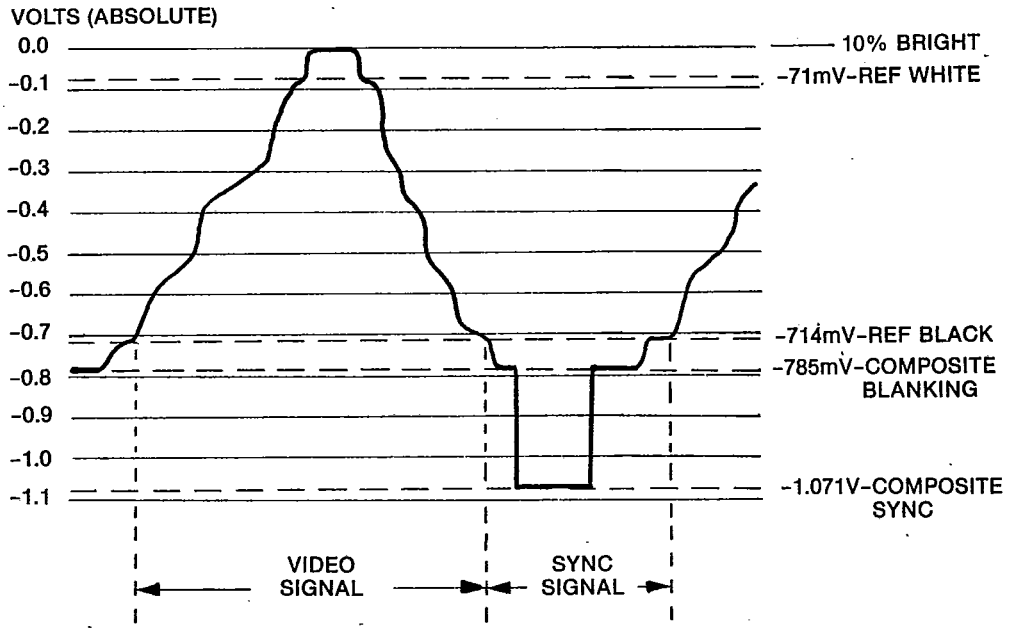
A Logic "0" sets the input register to all "0's" (Ref Black) and drives the output to the blanking level established by the Setup Control. This is used to shut-off the picture tube for the darkest display possible on the screen.

REFERENCE WHITE — (PIN 23)

A Logic "0" will drive the output of the DAC to full scale—the Reference White Level. This is 0 Volts absolute or 714mV more positive than the Blanking Level (643mV more positive than the Reference Black Level) with a standard Setup. Note: This pin should be held at a Logic "1" when the Composite Blanking input is activated.

FIGURE 1

COMPOSITE VIDEO OUTPUT SIGNAL
(Standard Setup)



ORDERING INFORMATION

Resolution (Bits)	Max Settling Time (ns)	Standard Model Number	MIL-STD-883 Screening Model
8	8	VDAC-0805H	VDAC-0805H/883
6	6	VDAC-0605H	VDAC-0605H/883
4	4	VDAC-0405H	VDAC-0405H/883

NOTE: These DACs are available with a "SYNCHRONOUS REFERENCE WHITE AND BLANKING" capability. For details contact the factory.

APPLICATIONS INFORMATION

PC BOARD LAYOUT

The VDAC-0405H, VDAC-0605H, and VDAC-0805H are very fast converters and to obtain the maximum performance possible from them at high update rates care must be used when making connections to external circuitry. High frequency wiring and printed circuit board techniques should be followed. These techniques should include the following:

- Decouple power supply inputs with a 1μf or larger Tantalum Capacitor and a 0.1μf high frequency ceramic as near as possible to the input pin. (Within one half inch).
- Provide a very low impedance grounding system around the DAC. Use a double sided copper board with one side as a ground and circuit traces on the other—add as much ground plane as possible. (Connect all Digital Return pins to the ground plane).
- If sockets must be used use only pin sockets soldered directly to the PC Board (use plated through holes).
- Use micro strip techniques for all high speed inputs and arrange traces for minimum length.

POWER SUPPLIES

To ensure maximum accuracy with these DAC's the -5.2 Volt supply at pin 24 should be well regulated and ripple free. Since the output of these DAC's will change 1% for every 1% of power supply change at this pin it is important that the supply ripple be less than 10 mV p-p for VDAC-0805H. A stable power supply will also enhance the accuracy of the DAC with temperature changes etc. Pins 2 & 24 may be tied together if the supply regulation is adequate for the accuracy required.

BROADCAST APPLICATIONS

The composite Video output wave form from these DAC's are compatible with EIA Standards RS-170, however if they are used in a broadcast application additional circuitry (such as bandwidth filtering and SIN X/X correction etc.) is needed to comply with broadcast requirements.

GLITCH ADJUSTMENT

These DAC's have inherently low glitch energy levels and adjustment is not normally required. If it becomes necessary to adjust for minimum glitch energy connect an external 200Ω potentiometer as near as possible to pin 13 as shown and adjust for equal positive and negative peak glitch signal levels. If this adjustment is not required leave pin 13 open.

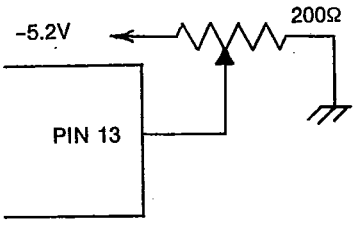
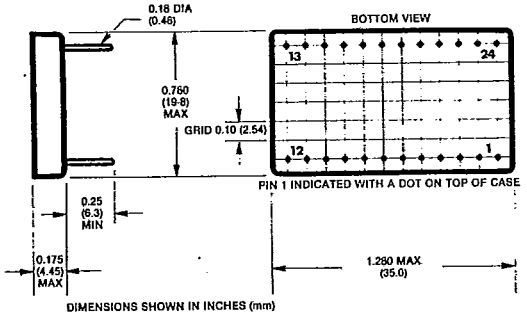


FIGURE 2
GLITCH ADJUSTMENT

MECHANICAL OUTLINE



METAL CASE—INTERNALLY CONNECTED TO GROUND

PIN DESIGNATIONS

PIN NO.	VDAC-0805H	VDAC-0605H	VDAC-0405H
1	Ground	*	*
2	-5.2V	*	*
3	Bit 1 (MSB)	*	*
4	Bit 2	*	*
5	Bit 3	*	*
6	Bit 4	*	*(LSB)
7	Strobe	*	*
8	Bit 5	*	NC
9	Bit 6	*(LSB)	NC
10	Bit 7	NC	NC
11	Bit 8 (LSB)	NC	NC
12	Ground	*	*
13	Glitch Adj	*	*
14-17	Ground	*	*
18	Analog out	*	*
19	Comp. Sync	*	*
20	Setup	*	*
21	10% bright	*	*
22	Comp. blank	*	*
23	Ref. white	*	*
24	-5.2V	*	*