intech
ADVANCED ANALOG

RGB DAC 3800

CMOS, TRIPLE, 8-BIT
40 MHz, VIDEO DAC

FEATURES

- **CMOS CIRCUITRY**
- **3 VIDEO DACs IDEAL FOR COLOR GRAPHICS**
- **UPDATE RATES TO 40 MHz**
- **75 OHM VIDEO OUTPUTS**
- **COMPOSITE SYNC and BLANKING OUTPUT SIGNALS**
- **INPUT DATA LATCHES**
- **TTL, CMOS COMPATIBLE INPUTS**
- **40 PIN DIP PACKAGE**
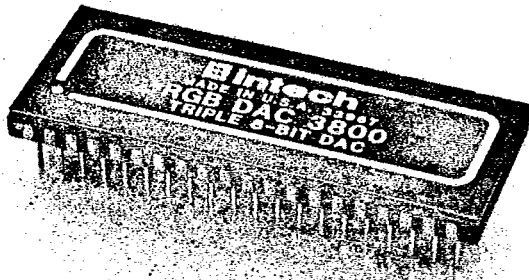
DESCRIPTION

The Intech RGB DAC 3800 is a hybrid circuit containing three complete video speed digital-to-analog converters. The device makes an ideal interface between the computer output signals and the CRT in an RGB type computer graphics terminal. The DACs have 8-BITs of resolution, providing a color palette of 16.7 million possible display colors.
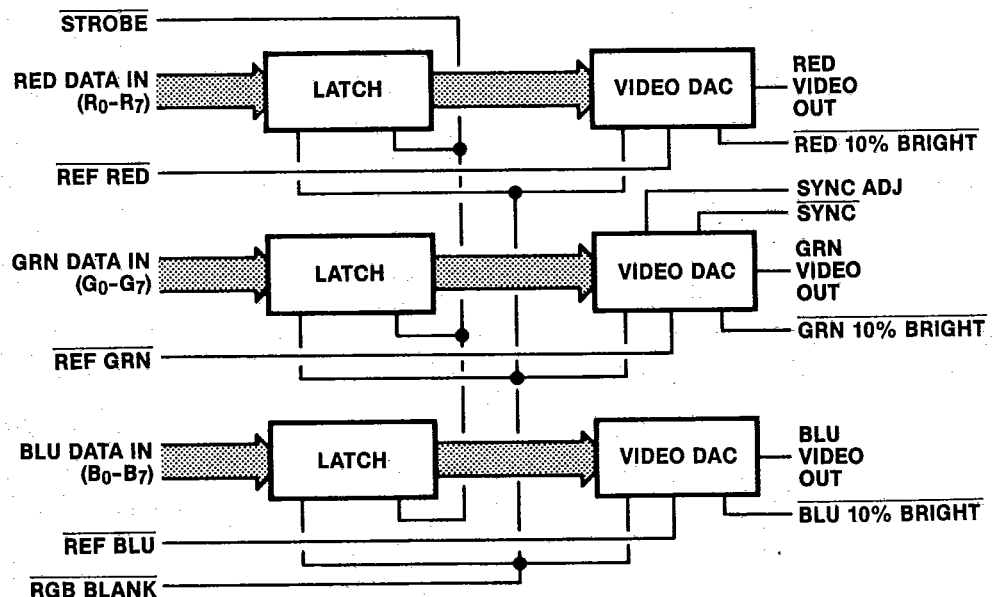
The DACs are very high speed and have update rates of up to 40 MHz. The data inputs have data latches and their outputs provide a clean video signal which does not require additional deglitching circuits. The outputs will drive a 75 ohm load and will provide the composite sync and blanking levels required for CRT vertical and horizontal retrace operations.

All three DACs and latches are packaged in a single, cost effective, dual-in-line package requiring less than 1.7 square inches of PC Board area.

BLOCK DIAGRAM

SPECIFICATIONS

(Typical @ +25°C, +5V and 75Ω load unless otherwise stated)

RESOLUTION	8 BITs	**DYNAMIC CHARACTERISTICS**	
PALLETTE	16.7 million	Settling Time (to 1 LSB)	10 ns
		Update Rate (min)	40 MHz
		Rise Time	5 ns
ANALOG OUTPUTS		Slew Rate	100V/μs
(each channel)		**DATA INPUTS**	
Voltage Range	0 to 1.04	Compatibility	TTL, CMOS
Current	8 mA	Coding	BIN
Short Circuit Current	17 mA	**CONTROL INPUTS**	
Impedance (±0.5%)	75Ω		
Compliance	±1.5V	$\overline{STROBE}$	
		Compatibility	TTL, CMOS
VIDEO OUTPUT LEVEL	0 to 0.06375 V	Set-up Time (min)	8 ns
		Hold Time	0 ns
BLANKING OUTPUT LEVEL		Propagation (max)	20 ns
(Referred to Black Level) ±5%	−53 mV	COMPOSITE $\overline{BLANKING}$, $\overline{SYNC}$	
		Compatibility	TTL, CMOS
SYNC OUTPUT LEVEL		Settling Time	10 ns
(Referred to Blanking Level)	−280 mV	Set-up Time (max)	10 ns
		Propagation (max)	20 ns
10% BRIGHT LEVEL	+70 mV	**POWER REQUIREMENTS**	
		Voltage	+4.5 to +5.5V
ACCURACY		Current	100 mA typ
(each channel)			140 mA max
Channel to Channel Gain Difference	±1 LSB		
Absolute Accuracy	±1.6 LSB	**TEMPERATURE RANGE**	
Differential Linearity	±1 LSB	Ambient	0° to +70°C*
Offset	±1.0 mV		
Offset Tempco	±10 ppm/°C	*−55°C to +125°C Ranges Available	
Gain Tempco	±200 ppm/°C		
Linearity Tempco	±100 ppm/°C		
PSRR	±0.2%/%		

COMPOSITE VIDEO WAVEFORMS

GREEN OUTPUT
(SYNC ENABLED and
10% BRIGHT OFF*)
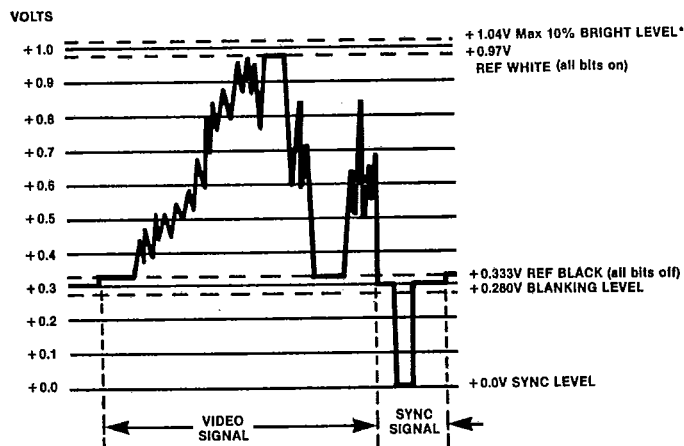
RED & BLUE OUTPUT
(OR GRN OUT with NO SYNC,
10% BRIGHT OFF*)
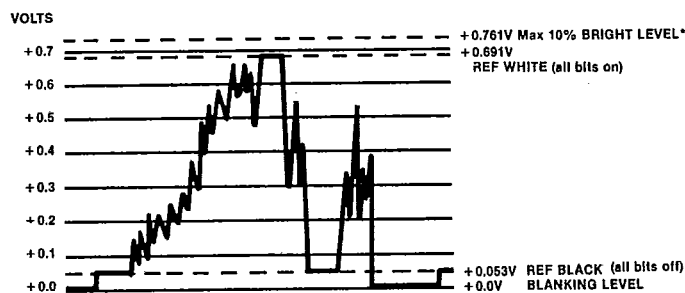
*An active 10% BRIGHT signal on any channel will cause the output level of that channel to go 70 mV more positive regardless of the status of other input signals or output level. The maximum 10% Bright levels shown are with all bits on and the 10% Bright input on.

PIN DESCRIPTIONS

STROBE

This input is used to clock the input data into the latches. It operates on normal TTL logic levels and is active on the transition from logic "1" to logic "0".

DATA (R0-R7, G0-G7, B0-B7)

These pins are the digital data inputs to the latches for the DACs in each channel (Red, Green, Blue). They operate on normal TTL logic levels and the coding is binary. The input data is transferred to the DACs when the strobe makes a logic "1" to logic "0" transition.

RGB BLANK

A logic "0" sets the registers to all "0's" (Ref Black) and drives the output to a level 53mV more negative than the Reference Black level. This signal has priority over the data inputs and is used to shut off the beam for the darkest display possible. Blanking is synchronous with strobe.

SYNC ADJ

This input should be left open to enable the 280 mV sync level feature of the Green Output. If this feature is not desired this input should be connected to ground. This is not a digital input.

SYNC

When enabled (Sync Adj. open) a logic "0" on this input activates the sync function which sets the inputs to the DACs, on all three channels, to all "0's", thereby driving their outputs to Reference Black. In addition it drives the output on the green channel to a level 280 mV more negative than the reference black level. When combined with an active blanking signal the output of all three channels will be driven to 0.0 volts, as shown in the Composite Video Waveforms.

VIDEO OUTPUTS

These are the outputs of the DACs in each channel. They control the CRT display color and brightness in an RGB type color graphics sytem. A separate output is provided for each gun (red, green, and blue) in the CRT. Each of the output waveforms contain the video signals plus a composite blanking level in accordance with the Composite Video Waveforms. In addition the Green Output will supply a composite sync signal which is used to trigger the retrace cycles in the CRT's beam sweep circuitry.

The DAC outputs have been designed to provide a clean signal, free from excessive switching spikes, and no additional deglitching circuitry is required. Its output circuitry will develop a full output across a 75 ohm load which is sufficient to drive the inputs of most CRT video amplifiers directly.
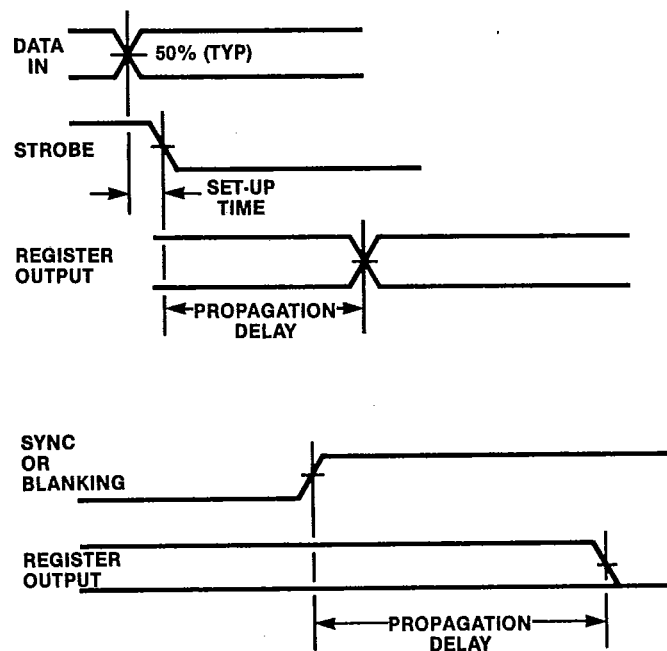
REF RED, GRN, BLU

These inputs provide a convenient way to force the output of the DACs to go to their "Ref-White" level. A logic "0" at these inputs will override the digital data inputs and cause the output to go to its full-scale value.

Any one of seven colors, of full intensity, may be generated by using combinations of these inputs. A logic "0" at all inputs simultaneously will generate white pixels at full intensity. These inputs are asynchronous and, for the best results, should be synchronized with the STROBE signal then latched externally.
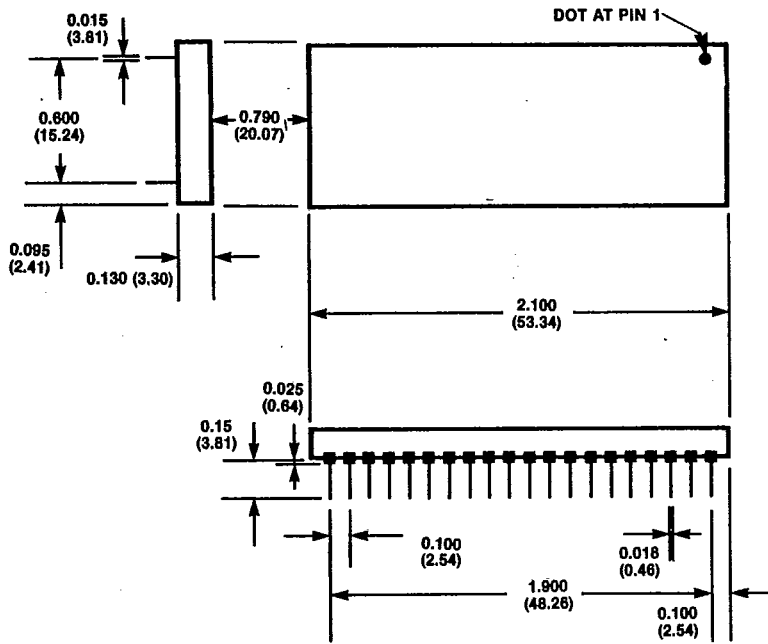
RED, GRN, BLU 10% BRIGHT

These inputs provide a convenient way to add 10% to the DACs output. A logic "0" at these inputs will increase the DACs output by 70 mV, thus facilitating word and cursor highlighting.

TIMING DIAGRAM

MECHANICAL OUTLINE

DOT AT PIN 1

0.015
(3.81)

0.600
(15.24)

0.790
(20.07)

0.095
(2.41)

0.130 (3.30)

2.100
(53.34)

0.025
(0.64)

0.15
(3.81)

0.100
(2.54)

0.018
(0.46)

1.900
(48.26)

0.100
(2.54)

PIN DESIGNATION

B_0	1.		40.	+5V
B_1	2.		39.	DIG GND
B_2	3.		38.	REF BLUE
B_3	4.		37.	10% BLU BRIGHT
B_4	5.		36.	BLU OUT
B_5	6.		35.	STROBE
B_6	7.		34.	SYNC
B_7	8.		33.	RGB BLANK
G_0	9.		32.	REF GRN
G_1	10.		31.	SYNC ADJ
G_2	11.		30.	10% GRN BRIGHT
G_3	12.		29.	GRN OUT
G_4	13.		28.	ANA GND
G_5	14.		27.	REF RED
G_6	15.		26.	10% RED BRIGHT
G_7	16.		25.	RED OUT
R_0	17.		24.	R_7
R_1	18.		23.	R_6
R_2	19.		22.	R_5
R_3	20.		21.	R_4

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