HA4344B

350MHz, 4 x 1 Video Crosspoint Switch with Synchronous Controls

November 1996

Features

- Low Power Dissipation 105mW
- Symmetrical Slew Rates 1400V/µs
- 0.1dB Gain Flatness..... 100MHz
- -3dB Bandwidth 350MHz
- Off Isolation (100MHz)..... 70dB
- Crosstalk Rejection (30MHz)..... 80dB
- Differential Gain and Phase 0.01%/0.01Degrees
- High ESD Rating ..... >2000V
- TTL Compatible Control Signals
- Latched Control Lines for Synchronous Switching

Applications

- Professional Video Switching and Routing
- RGB Video Distribution Systems
- Computer Graphics
- RF Switching and Routing

Description

The HA4344B is a very wide bandwidth 4 x 1 crosspoint switch ideal for professional video switching, HDTV, computer display routing, and other high performance applications. This circuit features very low power dissipation, excellent differential gain and phase, high off isolation, symmetric slew rates, fast switching, and latched control signals. When disabled, the output is switched to a high impedance state, making the HA4344B ideal for matrix routers.

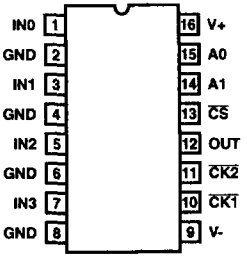
The latched control signals allow for synchronized channel switching. When $\overline{CK1}$ is low the master control latch loads the next switching address (A0, A1, $\overline{CS}$), while the closed (assuming $\overline{CK2}$ is the inverse of $\overline{CK1}$) slave control latch maintains the crosspoint in its current state. $\overline{CK2}$ switching low closes the master latch (with previous assumption), loads the now open slave latch, and switches the crosspoint to the newly selected channel. Channel selection is asynchronous (changes with any control signal change) if both $\overline{CK1}$ and $\overline{CK2}$ are low.

Ordering Information

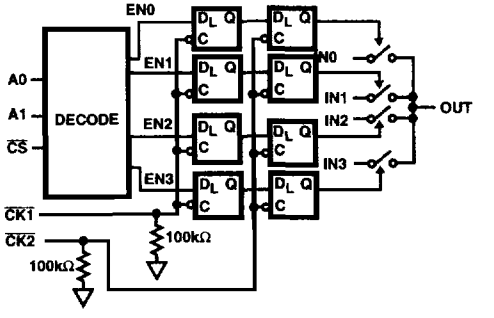
PART NUMBER	TEMP. RANGE (°C)	PACKAGE	PKG. NO.
HA4344BCP	0 to 70	16 Ld PDIP	E16.3
HA4344BCB	0 to 70	16 Ld SOIC	M16.15

Pinout

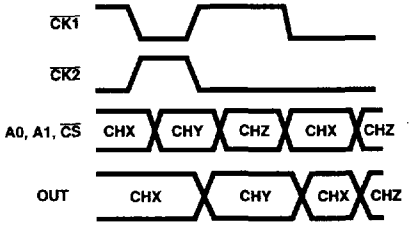
HA4344B
(PDIP, SOIC)
TOP VIEW



Functional Diagram



Timing Diagram



6 VIDEO CROSS-POINT SWITCHES

CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper IC Handling Procedures.

File Number 3956.1

Absolute Maximum Ratings

Voltage Between V+ and V- 12V
Input Voltage ..... V_{SUPPLY}
Digital Input Current (Note 2) ..... ±25mA
Analog Input Current (Note 2) ..... ±5mA
Output Current 20mA

Operating Conditions

Temperature Range ..... 0°C to 70°C

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} (°C/W)
PDIP Package	90
SOIC Package	115

Maximum Junction Temperature (Die) ..... 175°C
Maximum Junction Temperature (Plastic Package) ..... 150°C
Maximum Storage Temperature Range ..... -65°C to 150°C
Maximum Lead Temperature (Soldering 10s) ..... 300°C
(SOIC - Lead Tips Only)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTES:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.
2. If an input signal is applied before the supplies are powered up, the input current must be limited to these maximum values.

Electrical Specifications V_{SUPPLY} = ±5V, R_L = 10kΩ, $V_{\overline{CS}}$ = 0.8V, Unless Otherwise Specified

PARAMETER	TEST CONDITIONS	(NOTE 4) TEMP. (°C)	MIN	TYP	MAX	UNITS
DC SUPPLY CHARACTERISTICS						
Supply Voltage		Full	±4.5	±5.0	±5.5	V
Supply Current (V_{OUT} = 0V)	$V_{\overline{CS}}$ = 0.8V	25, 70	-	10.5	13	mA
	$V_{\overline{CS}}$ = 0.8V	0	-	-	15.5	mA
	$V_{\overline{CS}}$ = 2.0V	25, 70	-	400	450	µA
	$V_{\overline{CS}}$ = 2.0V	0	-	400	580	µA
ANALOG DC CHARACTERISTICS						
Output Voltage Swing Without Clipping	$V_{OUT} = V_{IN} \pm V_{IO} \pm 20mV$	25, 70	±2.7	±2.8	-	V
		0	±2.4	±2.5	-	V
Output Current		Full	15	20	-	mA
Input Bias Current		Full	-	30	50	µA
Output Offset Voltage		Full	-10	-	10	mV
Output Offset Voltage Drift (Note 3)		Full	-	25	50	µV/°C
SWITCHING CHARACTERISTICS						
Turn-On Time		25	-	160	-	ns
Turn-Off Time		25	-	320	-	ns
Output Glitch During Switching		25	-	±10	-	mV
DIGITAL DC CHARACTERISTICS						
Input Logic High Voltage		Full	2	-	-	V
Input Logic Low Voltage		Full	-	-	0.8	V
$\overline{CLK1}$, $\overline{CLK2}$ Input Current	0 to 4V	Full	-	40	50	µA
$\overline{CS}$, A0, A1 Input Current	0 to 4V	Full	-2	-	2	µA
AC CHARACTERISTICS						
Insertion Loss	$1V_{P-P}$	25	-	0.055	0.063	dB
		Full	-	0.07	0.08	dB
Channel-to-Channel Insertion Loss Match		Full	-	±0.004	±0.006	dB

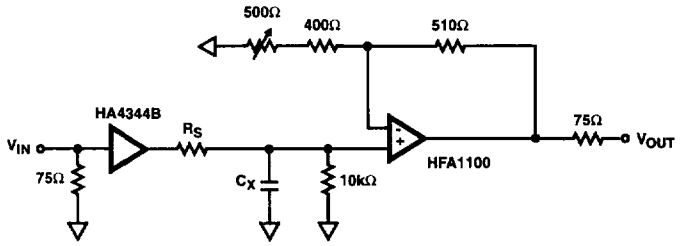
Electrical Specifications V_{SUPPLY} = ±5V, R_L = 10kΩ, $V_{\overline{CS}}$ = 0.8V, Unless Otherwise Specified **(Continued)**

PARAMETER	TEST CONDITIONS	(NOTE 4) TEMP. (°C)	MIN	TYP	MAX	UNITS
-3dB Bandwidth	R_S = 47Ω, C_L = 10pF	25	-	350	-	MHz
	R_S = 29Ω, C_L = 20pF	25	-	300	-	MHz
	R_S = 16Ω, C_L = 33pF	25	-	220	-	MHz
	R_S = 9Ω, C_L = 52pF	25	-	160	-	MHz
±0.1dB Flat Bandwidth	R_S = 47Ω, C_L = 10pF	25	-	150	-	MHz
	R_S = 29Ω, C_L = 20pF	25	-	110	-	MHz
	R_S = 16Ω, C_L = 33pF	25	-	100	-	MHz
	R_S = 9Ω, C_L = 52pF	25	-	70	-	MHz
Input Resistance		Full	200	400	-	kΩ
Input Capacitance		Full	-	1.5	-	pF
Enabled Output Resistance		Full	-	15	-	Ω
Disabled Output Capacitance	$V_{\overline{CS}}$ = 2.0V	Full	-	2.5	-	pF
Differential Gain	4.43MHz, Note 3	25	-	0.01	0.02	%
Differential Phase	4.43MHz, Note 3	25	-	0.01	0.02	Degrees
Off Isolation	$1V_{P-P}$, 100MHz, $V_{\overline{CS}}$ = 2.0V	Full	-	70	-	dB
Crosstalk Rejection	$1V_{P-P}$, 30MHz	Full	-	80	-	dB
Slew Rate ($1.5V_{P-P}$, +SR/-SR)	R_S = 47Ω, C_L = 10pF	25	-	1400/1490	-	V/µs
	R_S = 29Ω, C_L = 20pF	25	-	1200/1260	-	V/µs
	R_S = 16Ω, C_L = 33pF	25	-	870/940	-	V/µs
	R_S = 9Ω, C_L = 52pF	25	-	750/710	-	V/µs
Total Harmonic Distortion (Note 3)		Full	-	0.01	0.1	%
Disabled Output Resistance	$V_{\overline{CS}}$ = 2.0V	Full	-	12	-	MΩ

NOTES:

3. This parameter is not tested. The limits are guaranteed based on lab characterization, and reflect lot-to-lot variation.
4. Units are 100% tested at 25°C; guaranteed, but not tested at 0°C and 70°C.

AC Test Circuit



NOTE: $C_L = C_X$ + Test Fixture Capacitance.