

# HI-8382

## ARINC 429 DIFFERENTIAL LINE DRIVER

### General Description

The HI-8382 bus interface device is a silicon gate CMOS device designed as a line driver in accordance with the ARINC 429 bus specifications.

Inputs are provided for clocking and synchronization. These signals are AND'd with the DATA inputs to enhance system performance and allow the HI-8382 to be used in a variety of applications. Both logic and synchronization inputs feature built-in 2,000V minimum ESD input protection as well as TTL and CMOS compatibility.

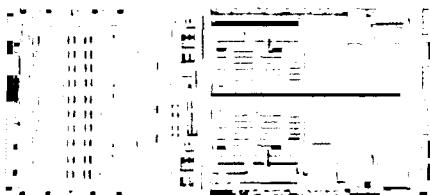
The differential outputs of the HI-8382 are independently programmable to the ARINC 429 output rise and fall time specifications, for both high speed and low speed applications, through the use of two external capacitors. The output voltage swing is also adjustable by the application of an external voltage to the  $V_{REF}$  input. On-chip overvoltage and short-circuit protection is provided for the differential outputs.

The HI-8382 is intended for use with either of two companion CMOS devices, the HI-8282 ARINC 429 Serial Transmitter/Dual Receiver, or the HI-8482 ARINC 429 Dual Line Receiver. These devices provide the necessary data formatting between the system processor bus and the ARINC 429 protocol. All three products are readily available for both industrial and military applications. Please contact the Holt Sales Department for additional information, including HI-8282 and HI-8482 data sheets.

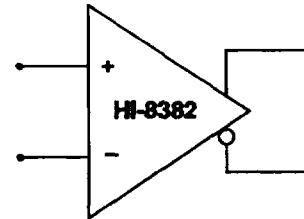
### Features

- Low Power CMOS
- TTL and CMOS Compatible Inputs
- Programmable Output Voltage Swing
- Adjustable ARINC Rise and Fall Times
- Operates at Data Rates Up to 100 Kbits
- Short Circuit and Overvoltage Protection
- Full Military Temperature Range and DESC

### Chip Topography

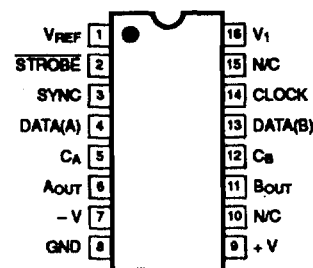


### Function

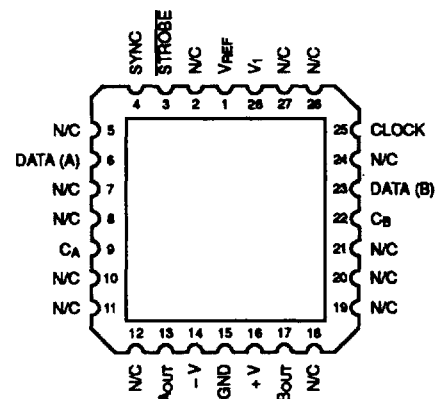


ARINC 429 DIFFERENTIAL LINE DRIVER

### Pin Configurations



16 PIN DIP (TOP VIEW)



28 PIN CHIP CARRIERS (LCC & PLCC) (TOP VIEW)

**HOLT** INC.  
INTEGRATED CIRCUITS

# Functional Description

The SYNC and CLOCK inputs establish data synchronization utilizing two AND gates, one for each data input. This built in feature allows the HI-8382 to be used in applications not requiring the HI-8282 companion circuit. Each logic input, including the power enable (STROBE) input, are TTL/CMOS compatible.

Figure 1 illustrates a typical ARINC 429 bus application. Three power supplies are necessary to operate the HI-8382: +15V, -15V and +5V. The +5V supply powers the internal bus current regulator and also provides a reference voltage that determines the output voltage swing. The differential output voltage swing will equal  $2V_{REF}$ . If a value of  $V_{REF}$  other than +5V is needed, a separate +5V power supply is required for pin  $V_1$ .

With the DATA (A) input at a logic high and Data (B) input at a logic low,  $A_{OUT}$  will switch to the  $+V_{REF}$  rail and  $B_{OUT}$  will switch to the  $-V_{REF}$  rail (a logic high state). Reversing the data input states will cause  $A_{OUT}$  to switch to the  $-V_{REF}$  rail and  $B_{OUT}$  to switch to the  $+V_{REF}$  rail (a logic low state). With both data input signals at a logic low state, the outputs will both switch to 0V (null state).

The driver output impedance is nominally 75 Ohms. The rise and fall times of the outputs can be calibrated through the selection of two external capacitor values that are connected to the  $C_A$  and  $C_B$  input pins. For high-speed operation (100KBPS), the values are typically  $C_A = C_B = 75$  pF, while  $C_A = C_B = 500$  pF is typical for low-speed operation (12.5 to 14KBPS).

The functional block diagram (Figure 2) shows the internal Zener diodes that provide overvoltage protection and the fuses that provide protection from short circuit.

The driver can be externally powered down by applying a logic high to the STROBE input pin. If this feature is not being used, the pin should be tied to ground.

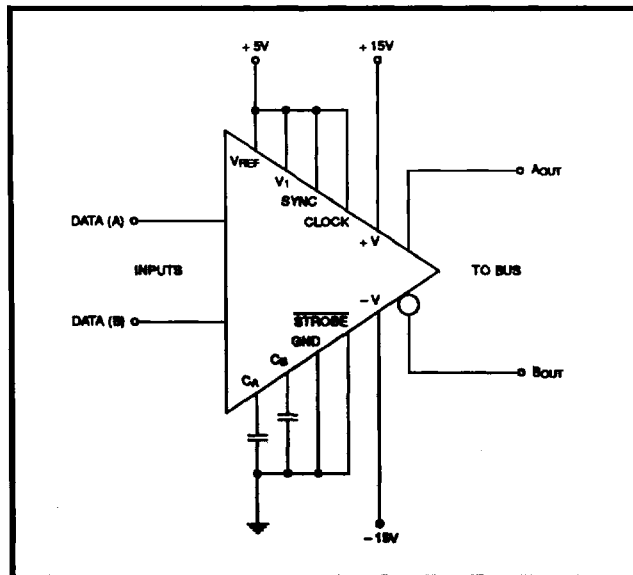


FIGURE 1. ARINC 429 BUS APPLICATION

## Truth Table

SYNC	CLOCK	DATA(A)	DATA(B)	AOUT	BOUT	COMMENTS
X	L	X	X	0V	0V	NULL
L	X	X	X	0V	0V	NULL
H	H	L	L	0V	0V	NULL
H	H	L	H	$-V_{REF}$	$+V_{REF}$	LOW
H	H	H	L	$+V_{REF}$	$-V_{REF}$	HIGH
H	H	H	H	0V	0V	NULL

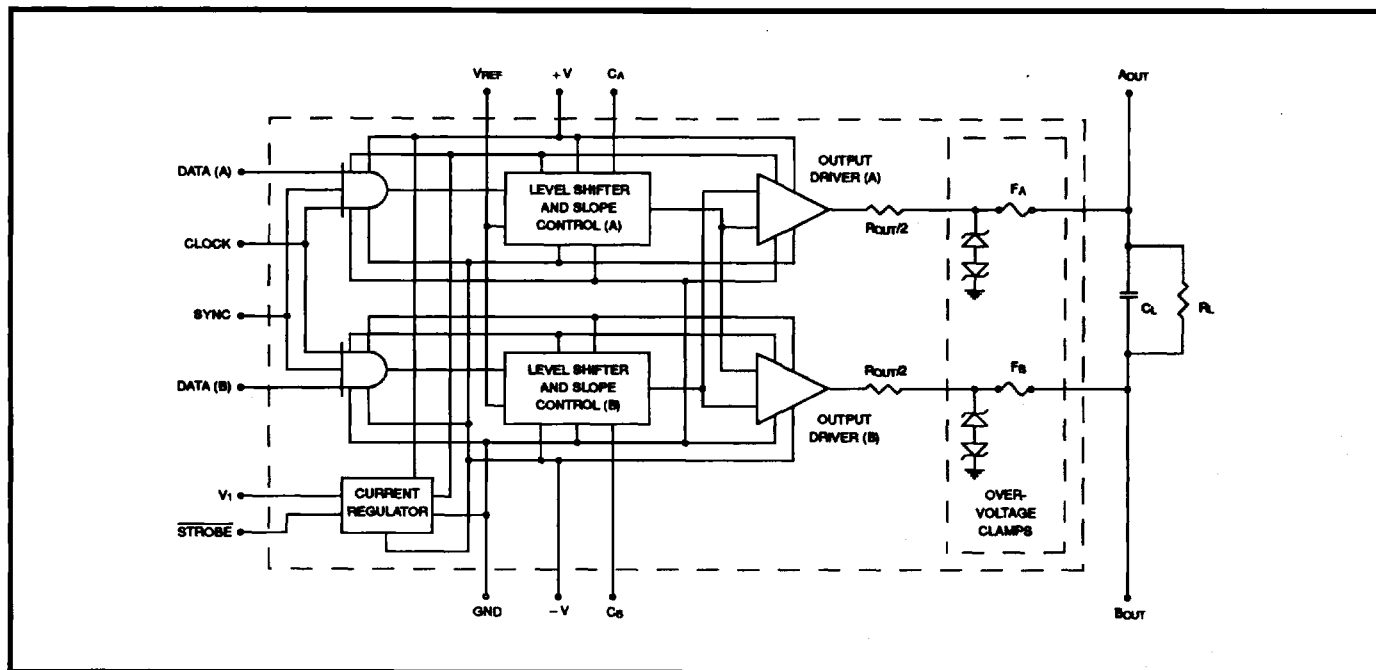


FIGURE 2. FUNCTIONAL BLOCK DIAGRAM

## Pin Descriptions

SYMBOL	FUNCTION	DESCRIPTION	SYMBOL	FUNCTION	DESCRIPTION
VREF	POWER	THE REFERENCE VOLTAGE USED TO DETERMINE THE OUTPUT VOLTAGE SWING.	-V	POWER	-15V ± 10%
			GND	POWER	0.0V
STROBE	INPUT	A LOGIC HIGH ON THIS INPUT PLACES THE DRIVER IN POWER DOWN MODE.	+V	POWER	+15V ± 10%
SYNC	INPUT	SYNCHRONIZES DATA INPUTS.	BOUT	OUTPUT	ARINC OUTPUT TERMINAL B.
DATA (A)	INPUT	DATA INPUT TERMINAL A.	Cb	INPUT	CONNECTION FOR DATA (B) SLEW-RATE CAPACITOR.
CA	INPUT	CONNECTION FOR DATA (A) SLEW-RATE CAPACITOR.	DATA (B)	INPUT	DATA INPUT TERMINAL B.
			CLOCK	INPUT	SYNCHRONIZES DATA INPUTS
AOUT	OUTPUT	ARINC OUTPUT TERMINAL A.	V1	POWER	5V ± 5%

## Absolute Maximum Ratings

V<sub>DD</sub> = +15V dc ± 10%, All Voltages Referenced to GND

PARAMETER	SYMBOL	CONDITIONS	OPERATING RANGE	MAXIMUM	UNIT
Differential Voltage	V <sub>DF</sub>	Voltage Between +V and -V terminals		40	V
Supply Voltages	+V		+10.8 to +16.5		V
	-V		-10.8 to -16.5		V
	V <sub>1</sub>		+5 ± 10%	+7	V
Voltage Reference	VREF	For ARINC 429	+5 ± 5%	6	V
		For Applications Other Than ARINC	0 to 6	6	V
Input Voltage Range	V <sub>IN</sub>			≥ GND - 0.3 ≤ V <sub>1</sub> + 0.3	V V
Output Short-Circuit Duration		See NOTE: 1			
Output Overvoltage Protection		See NOTE: 2			
Operating Temperature Range	T <sub>A</sub>	16 PIN DIP & 28 PIN LCC	-55 to +125		°C
		28 PIN PLCC	-40 to +85		°C
Storage Temperature Range	T <sub>STG</sub>	Soldering, 10 seconds	-65 to +150	+275	°C
Lead Temperature					°C
Junction Temperature	T <sub>J</sub>			+175	°C
Power Dissipation @ +25°C	P <sub>D</sub>	16 PIN DIP	See NOTE: 3	1.725	W
		28 PIN LCC	See NOTE: 3	1.120	W
		28 PIN PLCC	See NOTE: 3	2.143	W
Thermal Resistance, Junction - to - Ambient	θ <sub>JA</sub>	16 PIN DIP		86.5	°C/W
		28 PIN LCC		133.7	°C/W
		28 PIN PLCC		70.0	°C/W

NOTE 1 - Heatinking may be required for Output Short Circuit at +125°C and for 100KBPS at +125°C.

NOTE 2 - The Fuses used for Output Overvoltage Protection may be blown by a fault at each output of greater than ± 6.5V relative to GND.

NOTE 3 - Derate above +25°C, 11.5 mW/°C for 16 PIN DIP, 7.5mW/°C for 28 PIN LCC and 14.2mW/°C for 28 PIN LCC.

NOTE: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

# DC Electrical Characteristics

T<sub>A</sub> = Operating Temperature Range (unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
Supply Current +V (Operating)	I <sub>CCOP</sub> (+V)	No Load (0-100KBPS)		+11		mA
Supply Current -V (Operating)	I <sub>CCOP</sub> (-V)	No Load (0-100KBPS)		-11		mA
Supply Current V <sub>1</sub> (Operating)	I <sub>CCOP</sub> (V <sub>1</sub> )	No Load (0-100KBPS)		500		μA
Supply Current V <sub>REF</sub> (Operating)	I <sub>CCOP</sub> (V <sub>REF</sub> )	No Load (0-100KBPS)		500		μA
Supply Current +V (Power Down)	I <sub>CCPD</sub> (+V)	STROBE = HIGH	-475		475	μA
Supply Current -V (Power Down)	I <sub>CCPD</sub> (-V)	STROBE = HIGH	-475		475	μA
Supply Current -V (During Short Circuit Test)	I <sub>SC</sub> (-V)	Short to Ground See NOTE: 1		-150		mA
Supply Current +V (During Short Circuit Test)	I <sub>SC</sub> (+V)	Short to Ground See NOTE: 1		+150		mA
Output Short Circuit Current (Output High)	I <sub>OHSC</sub>	Short to Ground V <sub>MIN</sub> = 0 See NOTE: 2	-80			mA
Output Short Circuit Current (Output Low)	I <sub>OLSC</sub>	Short to Ground V <sub>MIN</sub> = 0 See NOTE: 2	+80			mA
Input Current (Input High)	I <sub>IH</sub>			1.0		μA
Input Current (Input Low)	I <sub>IL</sub>			1.0		μA
Output Voltage High (Output to Ground)	V <sub>OH</sub>	No Load (0-100KBPS)	+V <sub>REF</sub> - .25	+V <sub>REF</sub> + .25		V
Output Voltage Low (Output to Ground)	V <sub>OL</sub>	No Load (0-100KBPS)	-V <sub>REF</sub> - .25	-V <sub>REF</sub> + .25		V
Output Voltage Null	V <sub>NULL</sub>	No Load (0-100KBPS)	-250	+250		mV
Input Capacitance	C <sub>IN</sub>			15		pF

NOTE: 1 Not tested, but characterized at initial device design and after major process and/or design change which affects this parameter.  
NOTE: 2 Interchangeability of force and sense is acceptable.

# AC Electrical Characteristics

+V = 15V, -V = -15V, V<sub>1</sub> = V<sub>REF</sub> = 5.0V, T<sub>A</sub> = Operating Temperature Range (unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
Rise Time (AOUT, BOUT)	t <sub>R</sub>	C <sub>A</sub> = C <sub>B</sub> = 75pF	1.0		2.0	μs
Fall Time (AOUT, BOUT)	t <sub>F</sub>	C <sub>A</sub> = C <sub>B</sub> = 75pF	1.0		2.0	μs
Propagation Delay Input to Output	t <sub>PLH</sub>	C <sub>A</sub> = C <sub>B</sub> = 75pF			3.0	μs
Propagation Delay Input to Output	t <sub>PHL</sub>	C <sub>A</sub> = C <sub>B</sub> = 75pF			3.0	μs

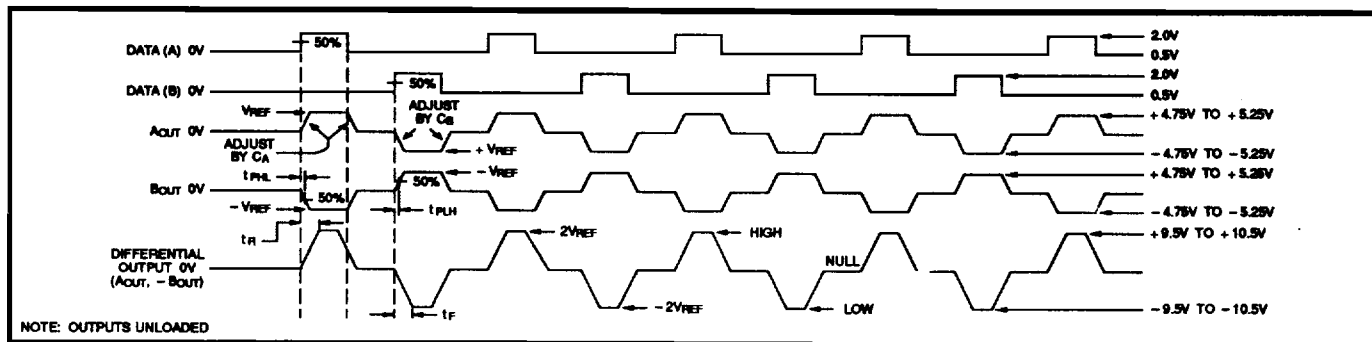


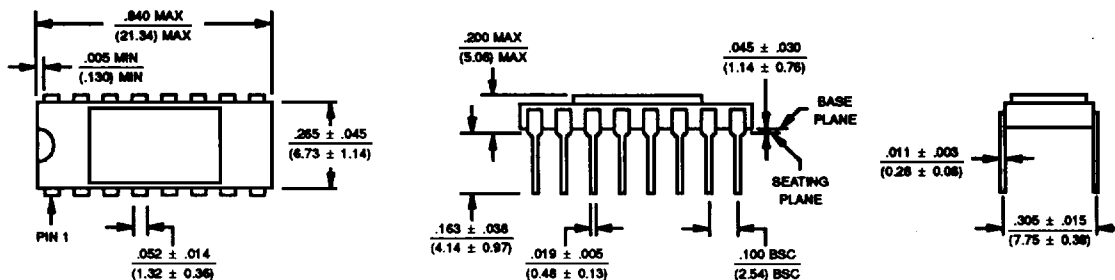
FIGURE 3. SWITCHING WAVEFORMS

# HI-8382 Standard Packaging

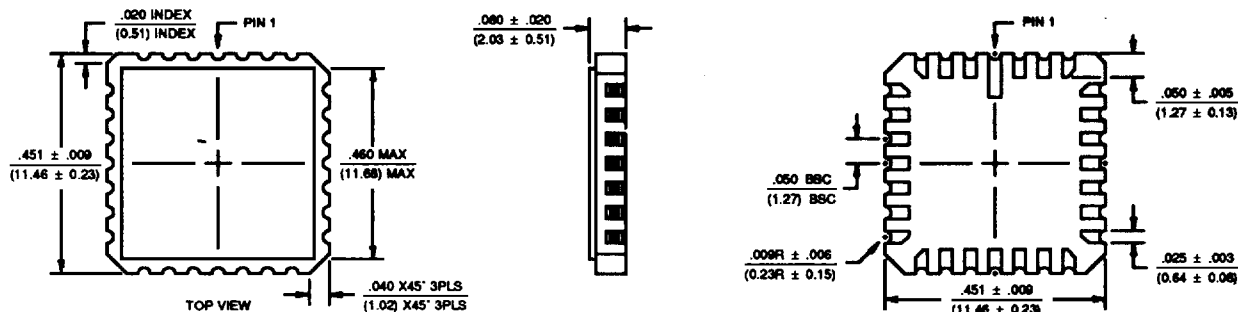
## TERMINAL CONNECTIONS

16 PIN DIP				28 PIN LEADLESS CHIP CARRIER (LCC) 28 PIN PLASTIC J-LEADED CHIP CARRIER (PLCC)							
PIN		PIN		PIN		PIN		PIN		PIN	
1	VREF	9	+V	1	VREF	8	N/C	15	GND	22	CB
2	STROBE	10	N/C	2	N/C	9	CA	16	+V	23	DATA (B)
3	SYNC	11	BOUT	3	STROBE	10	N/C	17	BOUT	24	N/C
4	DATA (A)	12	CB	4	SYNC	11	N/C	18	N/C	25	CLOCK
5	CA	13	DATA (B)	5	N/C	12	N/C	19	N/C	26	N/C
6	AOUT	14	CLOCK	6	DATA (A)	13	AOUT	20	N/C	27	N/C
7	-V	15	N/C	7	N/C	14	-V	21	N/C	28	V1
8	GND	16	V1								

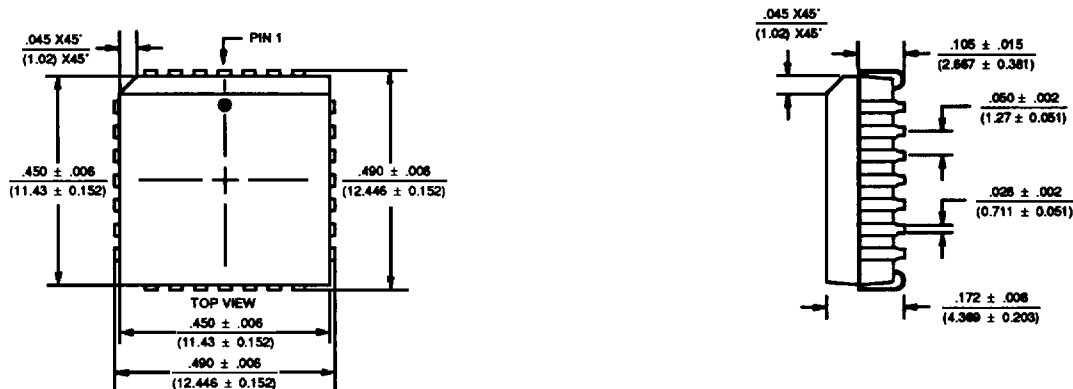
### 16 PIN DIP



### 28 PIN LEADLESS CHIP CARRIER (LCC)



### 28 PIN PLASTIC J-LEADED CHIP CARRIER (PLCC)



## Ordering Information

### INDUSTRIAL TEMPERATURE RANGE (-40°C to +85°C)

HI-8382C - 16 pin Ceramic DIP, Industrial Screen      HI-8382J - 28 pin Plastic J-led PLCC, Industrial Screen  
HI-8382S - 28 pin Ceramic LCC, Industrial Screen

### MILITARY TEMPERATURE RANGE (-55°C to +125°C)

HI-8382CT - 16 pin Ceramic DIP, Industrial Screen      HI-8382JT - 28 pin Plastic PLCC, Industrial Screen  
HI-8382CM - 16 pin Ceramic DIP, w/o burn-in      HI-8382ST - 28 pin Ceramic LCC, Industrial Screen  
HI-8382CM-01 - 16 pin Ceramic DIP, with burn-in      HI-8382SM - 28 pin Ceramic LCC, w/o burn-in  
HI-8382CM-02 - 16 pin Ceramic DIP, DESC      HI-8382SM-01 - 28 pin Ceramic LCC, with burn-in  
(SMD #5962-8687901EC)      HI-8382SM-02 - 28 pin Ceramic LCC, DESC  
(SMD #5962-86879013C)

Additional packaging and screening options are available upon request.

Vendor CAGE Number: 44270

### NOTES:

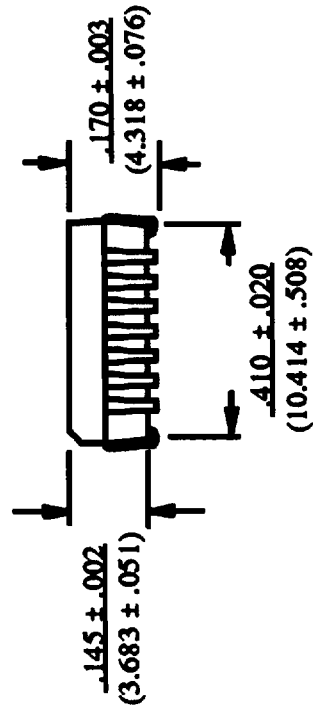
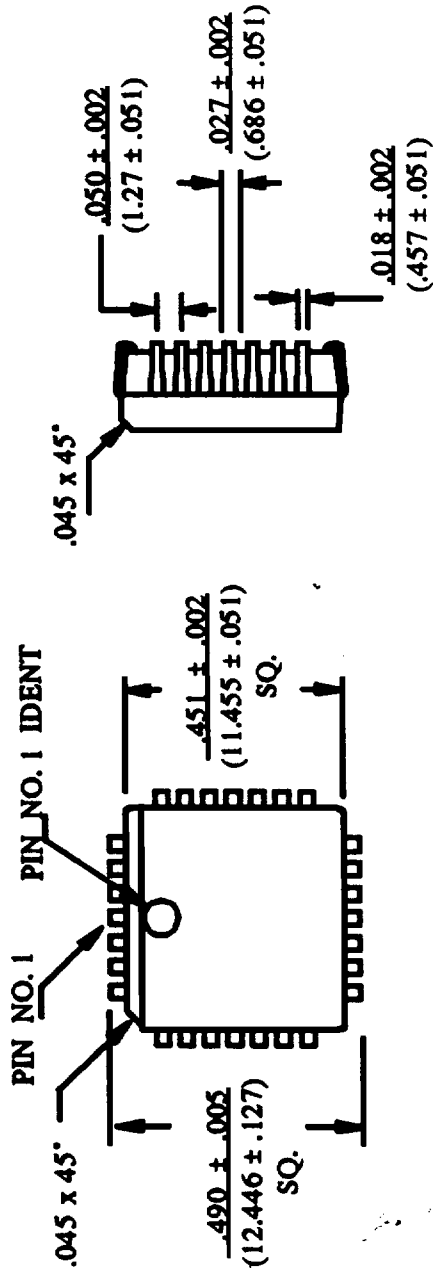
**HOLT**<sup>INC</sup>  
INTEGRATED CIRCUITS

Information given by HOLT is believed to be accurate and reliable. However, HOLT reserves the right to change product specifications at any time without notice. All devices sold by HOLT are covered by the warranty and patent indemnification provisions appearing in its Terms of Sale only. HOLT makes no warranty, express, statutory, implied or by description regarding the information set herein or regarding the freedom of the described devices from patent infringement.

Holt Integrated Circuits, Inc. / 45 Parker, Irvine, CA 92718 / (714) 859-8800 or (800) 222-HOLT 10/92/B

# 28-PIN PLASTIC PLCC HI-8382J / HI-8383J

Package Type Designator: J



**HOLTEK**  
INTEGRATED CIRCUITS



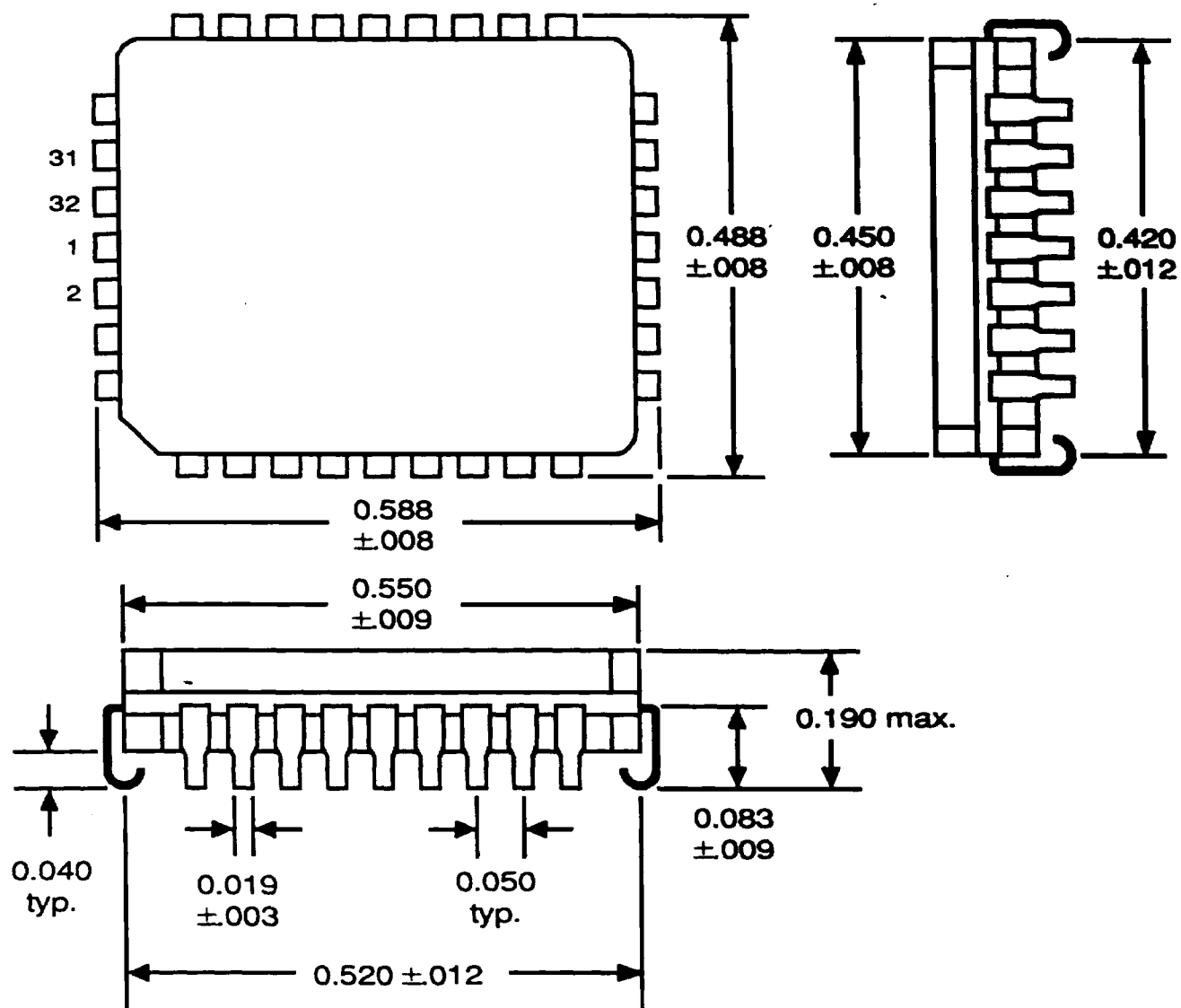
**HI-8382J PIN ASSIGNMENTS**

(28-Pin J-Lead Plastic PLCC Package)

<u>PIN NO.</u>	<u>PIN FUNCTION</u>	<u>PIN NO.</u>	<u>PIN FUNCTION</u>
1	VREF	15	GND
2	N/C	16	+V
3	<u>STROBE</u>	17	BOUT
4	SYNC	18	N/C
5	N/C	19	N/C
6	DATA (A)	20	N/C
7	N/C	21	N/C
8	N/C	22	CB
9	CA	23	DATA (B)
10	N/C	24	N/C
11	N/C	25	CLOCK
12	N/C	26	N/C
13	AOUT	27	N/C
14	-V	28	V <sub>1</sub>

# 32-PIN J-LEAD CERQUAD

HI-8382U / HI-8383U SERIES



SIZE	FSCM / CAGE NO.	DOC. NO.	REV. New
A	44270	SCALE: None	SHEET 2 OF 2

## PIN ASSIGNMENTS

### HI-8383U *Series Packages*

<u>PIN #</u>	<u>FUNCTION</u>
1	<u>VREF</u>
2	STROBE
3	SYNC
4	N/C
5	N/C
6	N/C
7	N/C
8	DATA (A)
9	C <sub>A</sub>
10	N/C
11	N/C
12	N/C
13	AOUT
14	N/C
15	-V
16	N/C
17	GND
18	+V
19	N/C
20	N/C
21	BOUT
22	N/C
23	N/C
24	C <sub>B</sub>
25	DATA (B)
26	N/C
27	N/C
28	N/C
29	N/C
30	CLOCK
31	V1
32	N/C