

September 2006

# 16-Channel Discrete-to-Digital Interface Sensing 28 Volt / Open and Open / Ground Signals

## DESCRIPTION

The HI-8422 is a sixteen channel discrete-to-digital interface device. The device has eight channels designed to sense 28 V / Open signals and eight channels that sense Open / Ground signals. Data is multiplexed from each bank of sensors to an eight bit digital databus. Mixed-signal CMOS technology is used to provide superior low-power performance. The device outputs are CMOS / TTL compatible and may be disabled (tri-state) using the  $\overline{CE}$  and  $\overline{OE}$  pins.

The HI-8422 is offered in a small footprint 32-pin Plastic Quad Flat Package (PQFP). Please contact the Holt sales department for other packaging options.

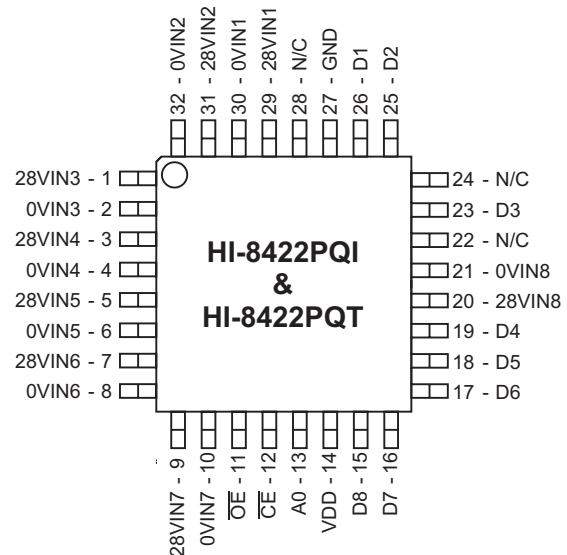
## FUNCTION TABLE

28V Inputs	0V Inputs	A0	$\overline{CE}$	$\overline{OE}$	Output
Open	X	1	0	0	1
28 Volts	X	1	0	0	0
X	Open	0	0	0	0
X	Ground	0	0	0	1
X	X	X	1	X	High Z
X	X	X	X	1	High Z

## FEATURES

- 8 independent 28 Volt / Open sensing channels
- 8 independent Open / Ground sensing channels
- 5.0 V single supply operation
- Low power CMOS technology
- Sense inputs are internally lightning protected per DO-160D level 3
- Military processing options available

## PIN CONFIGURATION

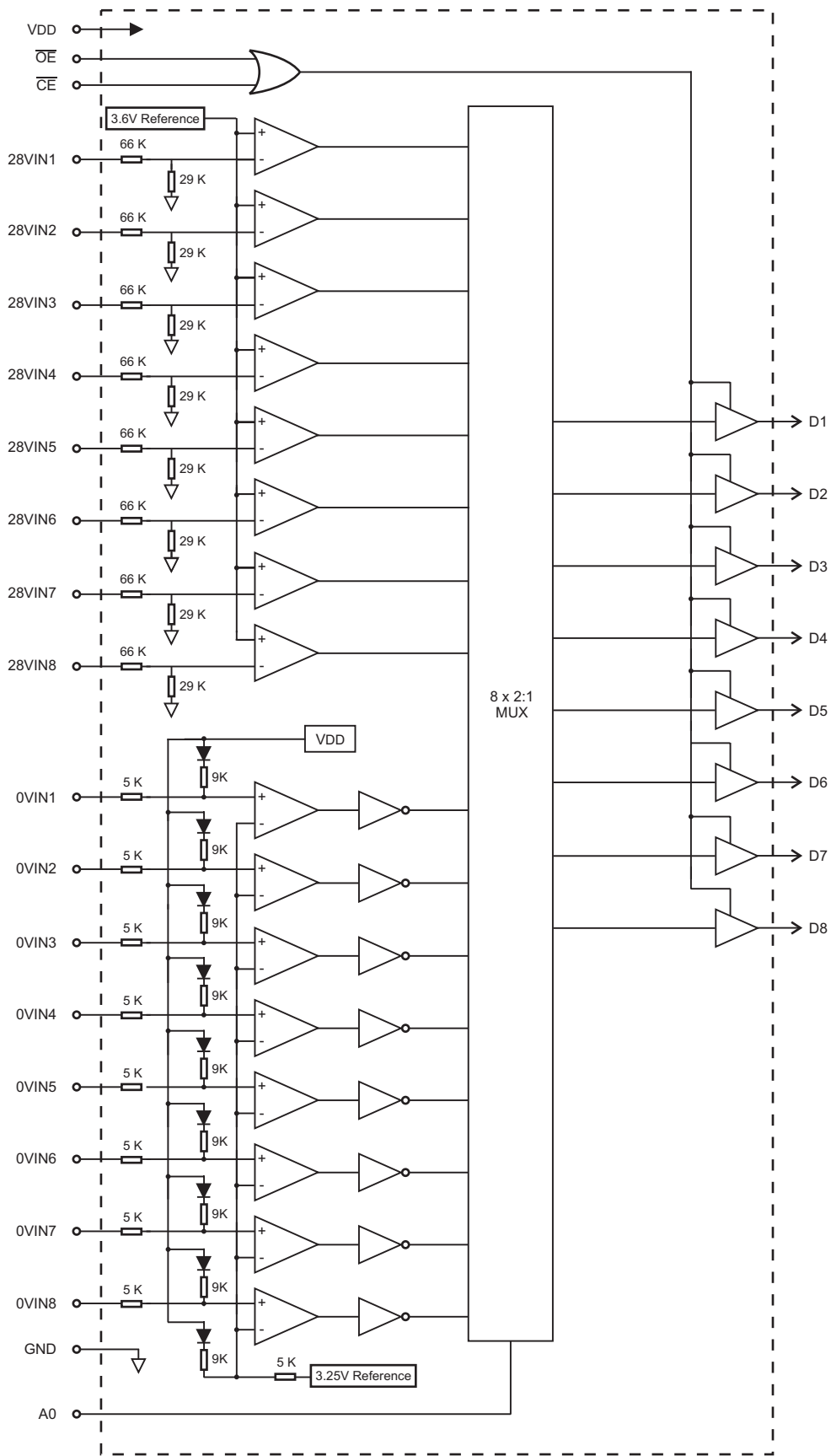


**32 Pin PQFP package**

## PIN DESCRIPTIONS

PIN	SYMBOL	FUNCTION	DESCRIPTION
1	28VIN3	Discrete Input	28 Volt / Open sensing input, channel 3
2	0VIN3	Discrete Input	Open / Ground sensing input, channel 3
3	28VIN4	Discrete Input	28 Volt / Open sensing input, channel 4
4	0VIN4	Discrete Input	Open / Ground sensing input, channel 4
5	28VIN5	Discrete Input	28 Volt / Open sensing input, channel 5
6	0VIN5	Discrete Input	Open / Ground sensing input, channel 5
7	28VIN6	Discrete input	28 Volt / Open sensing input, channel 6
8	0VIN6	Discrete Input	Open / Ground sensing input, channel 6
9	28VIN7	Discrete Input	28 Volt / Open sensing input, channel 7
10	0VIN7	Discrete Input	Open / Ground sensing input, channel 7
11	$\overline{OE}$	Digital input	Output Enable. D1-D8 are high-impedance if $\overline{OE}$ is high
12	$\overline{CE}$	Digital input	Chip Enable. D1-D8 are high-impedance if $\overline{CE}$ is high
13	A0	Digital input	When A0 is high D1 - D8 outputs data from 28V comparators When A0 is low D1 - D8 show results from 0V comparators
14	VDD	Power	Positive supply voltage 5.0 V
15	D8	Tri-state output	Logic output, channel 8
16	D7	Tri-state output	Logic output, channel 7
17	D6	Tri-state output	Logic output, channel 6
18	D5	Tri-state output	Logic output, channel 5
19	D4	Tri-state output	Logic output, channel 4
20	28VIN8	Discrete Input	28 Volt / Open sensing input, channel 8
21	0VIN8	Discrete Input	Open / Ground sensing input, channel 8
22	N/C		Not connected
23	D3	Tri-state output	Logic output, channel 3
24	N/C		Not connected
25	D2	Tri-state output	Logic output, channel 2
26	D1	Tri-state output	Logic output, channel 1
27	GND	Power	Ground
28	N/C		Not connected
29	28VIN1	Discrete Input	28 Volt / Open sensing input, channel 1
30	0VIN1	Discrete Input	Open / Ground sensing input, channel 1
31	28VIN2	Discrete Input	28 Volt / Open sensing input, channel 2
32	0VIN2	Discrete Input	Open / Ground sensing input, channel 2

**BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Supply voltage (VDD)	-0.3 V to +7 V
Logic input voltage range	-0.3 V to +5.5 V
Discrete input voltage range: 28V / Open Sensing	-80 V to + 80 V
Open / Ground Sensing	-5 V to + 35 V
Power dissipation at 25°C	350 mW
Solder Temperature	275°C for 10 sec
Storage Temperature	-65°C to +150°C

**RECOMMENDED OPERATING CONDITIONS**

Supply Voltage	VDD ..... 4.5 V to 5.5 V
Operating Temperature Range	Industrial Screening ..... -40°C to +85°C
	Hi-Temp Screening ..... -55°C to +125°C

NOTE: Stresses above absolute maximum ratings or outside recommended operating conditions may cause permanent damage to the device. These are stress ratings only. Operation at the limits is not recommended.

**DC ELECTRICAL CHARACTERISTICS**

VDD = 5.0V ± 10%, GND = 0V, TA = Operating Temperature Range (unless otherwise specified).

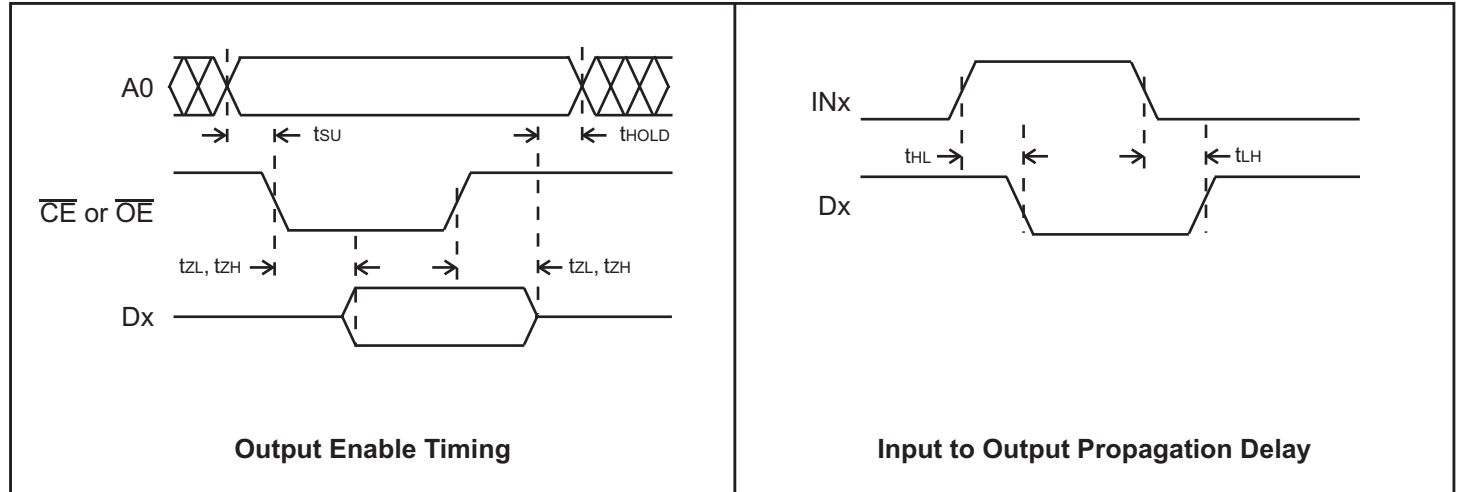
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS
<b>28 V / OPEN DISCRETE INPUTS</b>						
Open state input voltage	V <sub>SO</sub>	Input voltage to give high output	-5		10	V
28 V state input voltage	V <sub>S28</sub>	Input voltage to give low output	14			V
Open state input current	I <sub>SO</sub>	Maximum input current to give high output			84	µA
28 V state input current	I <sub>S28</sub>	Minimum input current to give low output	197			µA
Input resistance	R <sub>IN</sub>	0 V < V <sub>IN</sub> < 16 V	71		119	KΩ
Input current at 28 V	I <sub>IN28</sub>	V <sub>IN</sub> = 28 V			394	µA
<b>OPEN / GROUND DISCRETE INPUTS</b>						
Ground state input voltage	V <sub>SG</sub>	Input voltage to give high output			3.0	V
Open state input voltage	V <sub>SO</sub>	Input voltage to give low output	3.5			V
Ground state input resistor	R <sub>IG</sub>	Resistor from input to ground to give high output	0		100	Ω
Open state input resistor	R <sub>IO</sub>	Resistor from input to ground to give low output	100			KΩ
Input source current	I <sub>IO</sub>	Current sourced into 100Ω to ground	-100	-330		µA
Reverse leakage current	I <sub>IR</sub>	V <sub>IN</sub> = 35 V, V <sub>DD</sub> = 0 V			5.0	mA
<b>LOGIC INPUTS (<math>\overline{CE}</math>, <math>\overline{OE}</math>)</b>						
Input Voltage	Input voltage HI	V <sub>IH</sub>	2.0			V
	Input voltage LO	V <sub>IL</sub>			0.8	V
Input current	Input sink	I <sub>IH</sub>			1.0	µA
	Input source	I <sub>IL</sub>	-1.0			µA
<b>OUTPUTS</b>						
Logic output voltage	High	V <sub>OH</sub>	2.4			V
	Low	V <sub>OL</sub>			0.4	V
Logic output voltage (CMOS)	High	V <sub>OH</sub>	V <sub>DD</sub> - 0.2			V
	Low	V <sub>OL</sub>			0.2	V
Tri-state output current		I <sub>OZ</sub>			±10	µA
<b>SUPPLY CURRENT</b>						
V <sub>DD</sub> current		I <sub>DD</sub>	V <sub>IN</sub> = 0 V (28V inputs) V <sub>IN</sub> = V <sub>DD</sub> (other inputs)	10	20	mA

## AC ELECTRICAL CHARACTERISTICS

VDD = 5.0V ± 10%, GND = 0V, TA = Operating Temperature Range (unless otherwise specified).

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS
SWITCHING CHARACTERISTICS						
Propagation delay	IN to OUT	tLH, tHL			500	ns
Output enable time		tZL, tZH	From $\overline{CE}$ or $\overline{OE}$		25	ns
Output disable time		tLZ, tHZ	From $\overline{CE}$ or $\overline{OE}$		25	ns
A0 Set-up time		tSU	0			ns
A0 Hold time		tHOLD	0			ns

## TIMING DIAGRAMS



## LIGHTNING PROTECTION

The HI-8422's 28V / Open Sensing inputs will survive lightning testing to DO-160D, Level 3 waveforms 3, 4 and 5A without external components. The Open / Ground inputs will survive waveforms 3 and 4 without external components. In order to guarantee survival to waveform 5A an external series resistor of at least 3.3KΩ is recommended.

## INPUT SWITCHING THRESHOLD

The input switching threshold of the Open / Ground inputs will decrease with increasing series resistance according to the function

$$V_T = 3.25 - 0.1R$$

where  $V_T$  is the nominal input switching threshold, and R is the value of the external series resistor in Kohms.

## ORDERING INFORMATION

HI - 8422PQ x x

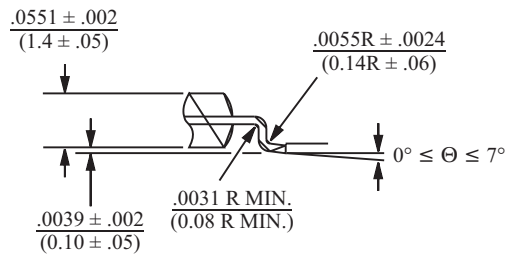
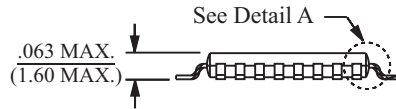
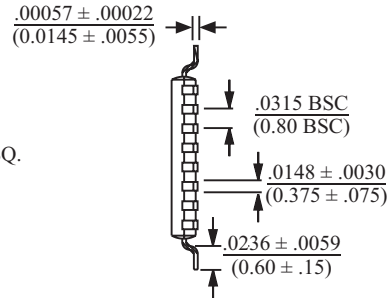
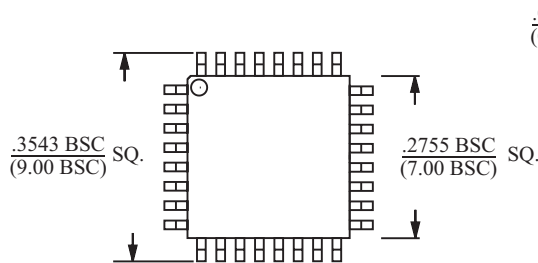
PART NUMBER	LEAD FINISH
Blank	Tin / Lead (Sn / Pb) Solder
F	100% Matte Tin (Pb-free, RoHS compliant)

PART NUMBER	TEMPERATURE RANGE	FLOW	BURN IN
I	-40°C TO +85°C	I	NO
T	-55°C TO +125°C	T	NO

PART NUMBER	PACKAGE DESCRIPTION
8422PQ	32 PIN PLASTIC QUAD FLATPACK (PQFP)

**32 PIN PLASTIC QUAD FLAT PACK (PQFP)**

Package Type: 32PTQS



Detail A