

## Description

The AH1925 is an ultra-low power digital and high sensitivity omnipolar Hall effect switch IC from Diodes Incorporated's broad Hall Effect switches family. The sensitive device is designed to meet a wide range of potential applications with low power requirements including battery-operated equipment, the average supply current is only 1.4µA at 1.85V. To support portable equipment the AH1925 can operate over the supply range of 1.6V to 3.6V and uses a hibernating clocking system to minimize the power consumption. The high ESD level up to 8kV helps to improve the system robustness. To minimize PCB space the AH1925 is available in small low profile X2-DFN1410-4 package.

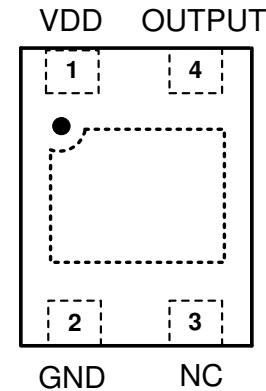
The single open-drain output can switch on with either a north or south pole of sufficient strength. When the magnetic flux density (B) perpendicular to the package is larger than operate point ( $B_{OP}$ ) the output is switched on (pulled low). The output is turned off when B becomes lower than the release point ( $B_{RP}$ ).

## Features

- Omnipolar Operation (North or South Pole)
- Supply Voltage of 1.6V to 3.6V
- Micropower Operation
- Chopper Stabilized Design Provides:
  - Superior Temperature Stability
  - Minimal Switch Point Drift
  - Enhanced Immunity to Physical Stress
- AH1925 is Open-Drain Output
- -40°C to +85°C Operating Temperature
- High ESD Capability of 8kV (Human Body Model)
- Small Low Profile, X2-DFN1410-4 Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Pin Assignments

(Top View)



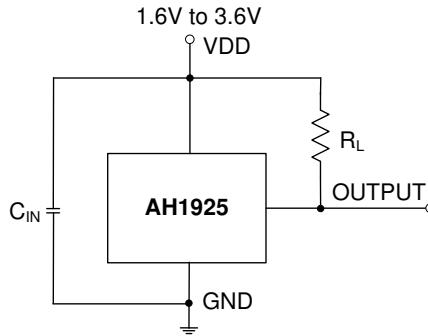
**X2-DFN1410-4**

## Applications

- Smart Cover or Dock Detect for Cellular Phones and Tablet PCs
- Gas or Water Consumption Measurement in Remote, Battery-Operated Utility Meters
- Medical Devices, IoT Systems
- Level, Proximity and Position Switches
- E-Locks, Smoke Detectors, Appliances

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

**Typical Applications Circuit** (Note 4)



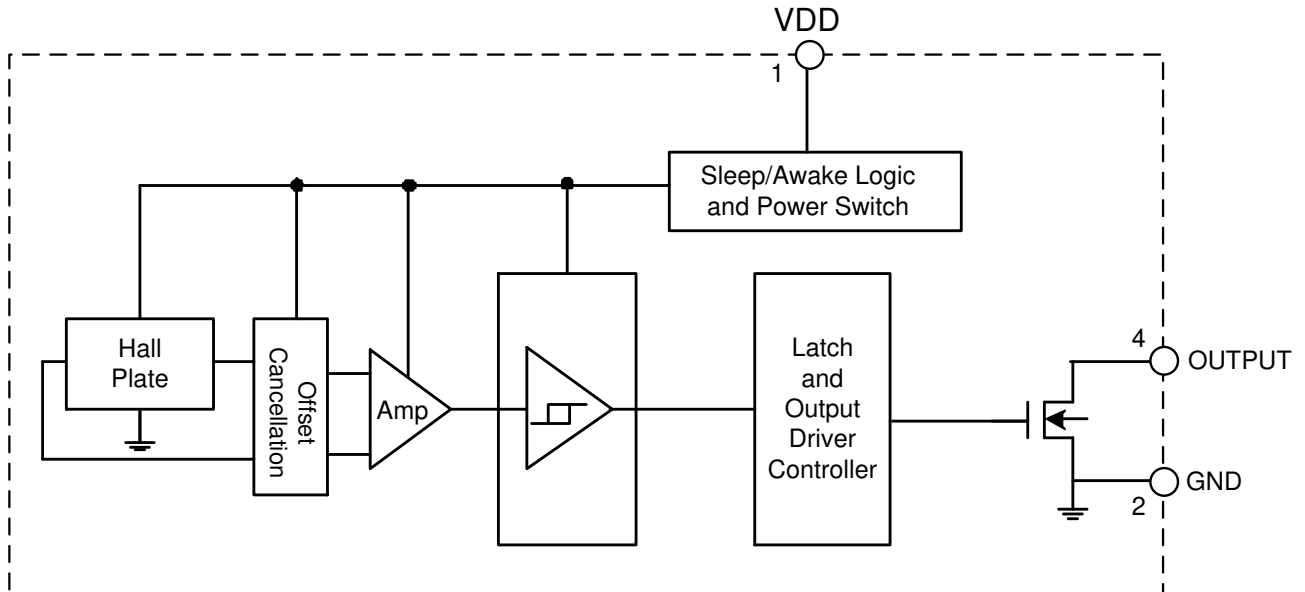
Note: 4.  $C_{IN}$  is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF to 100nF.  
 $R_L$  is the pull-up resistor, the recommended resistance is 10k $\Omega$  to 100k $\Omega$ .

**Pin Descriptions**

Package: X2-DFN1410-4

Pin Number	Pin Name	Function
1	VDD	Power Supply Input
2	GND	Ground Pin
3	NC	No Connection
4	OUTPUT	Output Pin
Pad	Pad	The center exposed pad should be tied to the GND or floating – No connection internally.

**Functional Block Diagram**



### Absolute Maximum Ratings (Note 5) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Rating	Unit
V <sub>DD</sub>	Supply Voltage (Note 6)	6	V
V <sub>DD_REV</sub>	Reverse Supply Voltage	-0.3	V
I <sub>OUTPUT</sub>	Output Current (Source and Sink)	1	mA
B	Magnetic Flux Density	Unlimited	
P <sub>D</sub>	Package Power Dissipation	X2-DFN1410-4	230
T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>J</sub>	Maximum Junction Temperature	+150	°C
ESD HBM	Human Body Model (HBM) ESD Capability	8	kV

- Notes:
- Stresses greater than the 'Absolute Maximum Ratings' specified above can cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions exceeding those indicated in this specification is not implied. Device reliability can be affected by exposure to absolute maximum rating conditions for extended periods of time.
  - The absolute maximum V<sub>DD</sub> of 6V is a transient stress rating and is not meant as a functional operating condition. It is not recommended to operate the device at the absolute maximum rated conditions for any period of time.

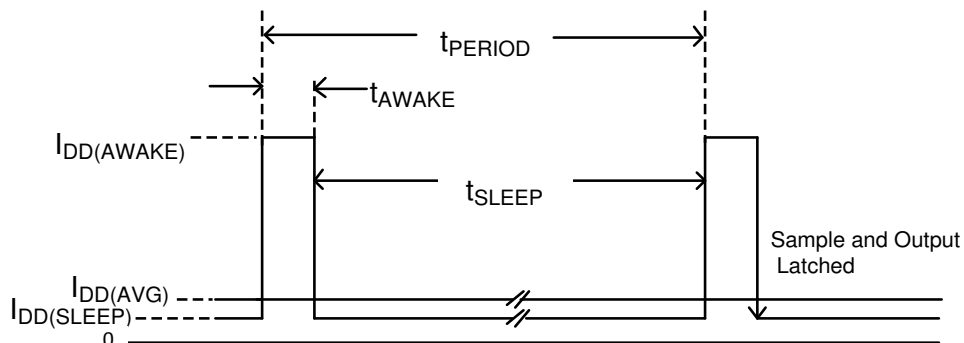
### Recommended Operating Conditions (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Rating	Unit
V <sub>DD</sub>	Supply Voltage	Operating	1.6 to 3.6	V
T <sub>A</sub>	Operating Temperature Range	Operating	-40 to +85	°C

### Electrical Characteristics (@T<sub>A</sub> = +25°C, V<sub>DD</sub> = 1.6V to 3.6V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>OUT_ON</sub>	Output On Voltage	I <sub>OUT</sub> = 0.1mA	—	0.1	0.2	V
I <sub>OFF</sub>	Output Leakage Current	V <sub>OUT</sub> = 3.6V, Output off	—	< 0.1	1	μA
I <sub>DD(AWAKE)</sub>	Supply Current (Awake)	T <sub>A</sub> = +25°C, V <sub>DD</sub> = 1.85V	—	720	—	μA
I <sub>DD(SLEEP)</sub>	Supply Current (Sleep)	T <sub>A</sub> = +25°C, V <sub>DD</sub> = 1.85V	—	0.36	—	μA
I <sub>DD(AVG)</sub>	Average Supply Current	T <sub>A</sub> = +25°C, V <sub>DD</sub> = 1.85V	—	1.4	3	μA
		T <sub>A</sub> = +25°C, V <sub>DD</sub> = 3.6V	—	2.2	6	μA
t <sub>AWAKE</sub>	Awake Time	(Note 7)	30	45	80	μs
t <sub>PERIOD</sub>	Period	(Note 7)	30	45	80	ms
D.C.	Duty Cycle	—	—	0.1	—	%

- Note:
- When power is initially turned on, the operating V<sub>DD</sub> (1.6V to 3.6V) must be applied to guarantee the output sampling. The output state is valid after the second operating cycle (typical 90ms).

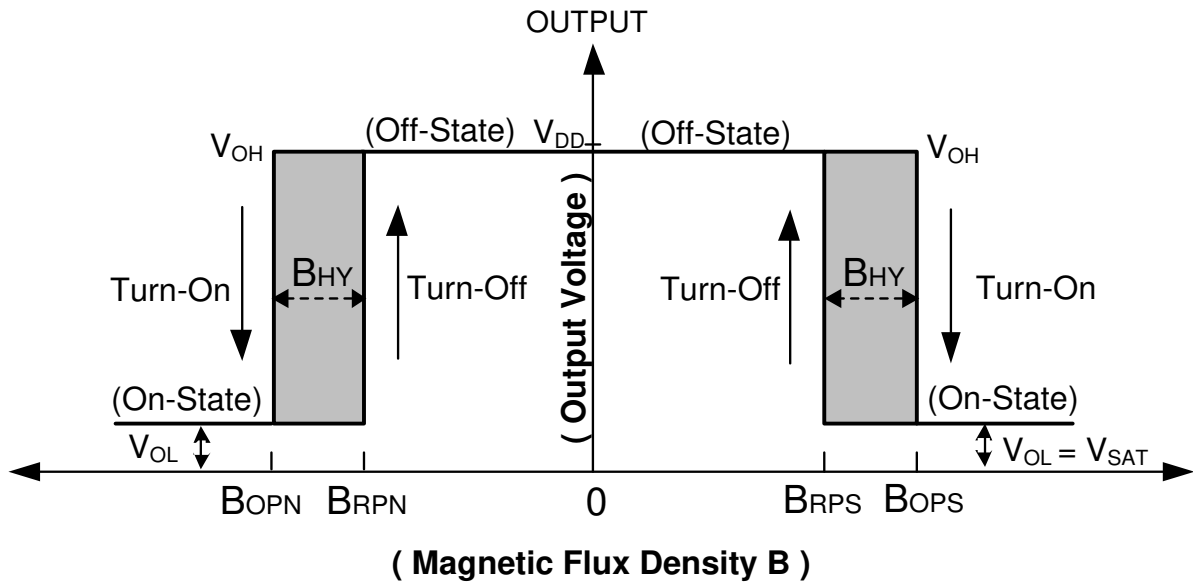


**Magnetic Characteristics** (Note 8) ( $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{DD} = 1.6\text{V}$  to  $3.6\text{V}$ , unless otherwise specified.)

(1mT=10 Gauss)

Symbol	Characteristics	Test Condition	Min	Typ	Max	Unit
B <sub>OPS</sub> (South Pole to the Part Marking Side)	Operation Point	$V_{DD} = 1.85\text{V}$ $T_A = +25^{\circ}\text{C}$	18	25	32	Gauss
		$V_{DD} = 1.6\text{V to } 3.6\text{V}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	14	25	35	
B <sub>OPN</sub> (North Pole to the Part Marking Side).		$V_{DD} = 1.85\text{V}$ $T_A = +25^{\circ}\text{C}$	-32	-25	-18	
		$V_{DD} = 1.6\text{V to } 3.6\text{V}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	-35	-25	-14	
B <sub>RPS</sub> (South Pole to the Part Marking Side)	Release Point	$V_{DD} = 1.85\text{V}$ $T_A = +25^{\circ}\text{C}$	13	20	27	
		$V_{DD} = 1.6\text{V to } 3.6\text{V}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	9	20	30	
B <sub>RPN</sub> (North Pole to the Part Marking Side)		$V_{DD} = 1.85\text{V}$ $T_A = +25^{\circ}\text{C}$	-27	-20	-13	
		$V_{DD} = 1.6\text{V to } 3.6\text{V}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	-30	-20	-9	
B <sub>HY</sub> ( $ B_{OPX}  -  B_{RPX} $ )	Hysteresis	$V_{DD} = 1.85\text{V}$ $T_A = +25^{\circ}\text{C}$	1	5	—	

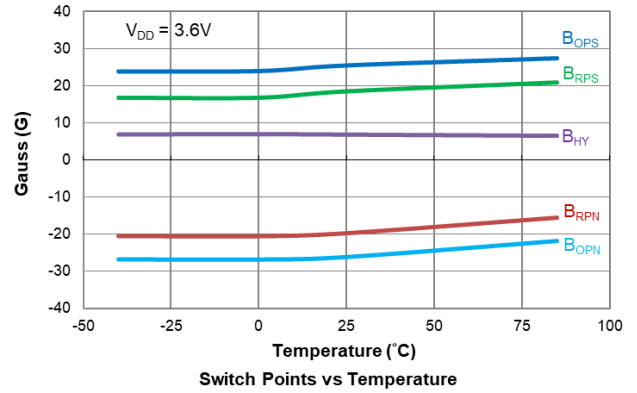
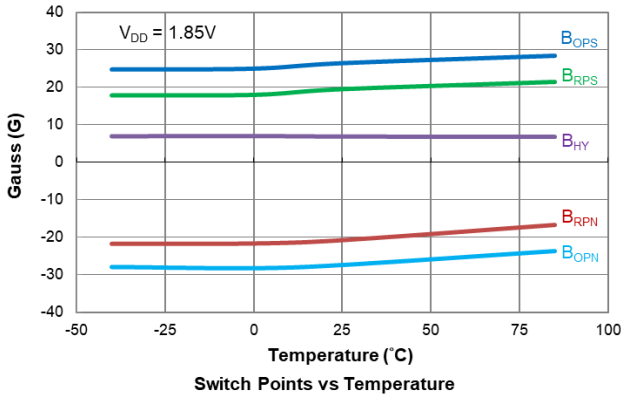
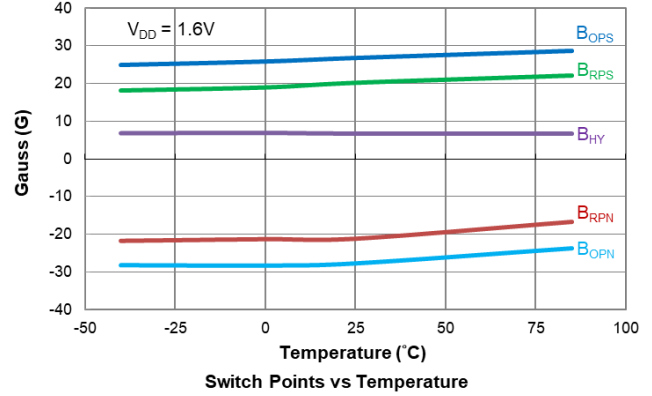
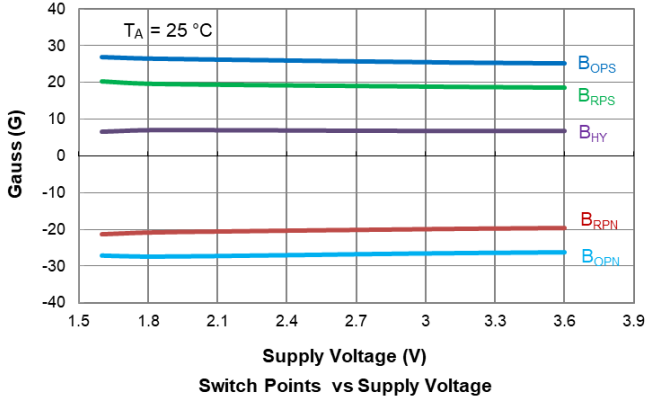
Note: 8. Maximum and minimum parameters values over operating temperature range are not tested in production, they are guaranteed by design, characterization and process control. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



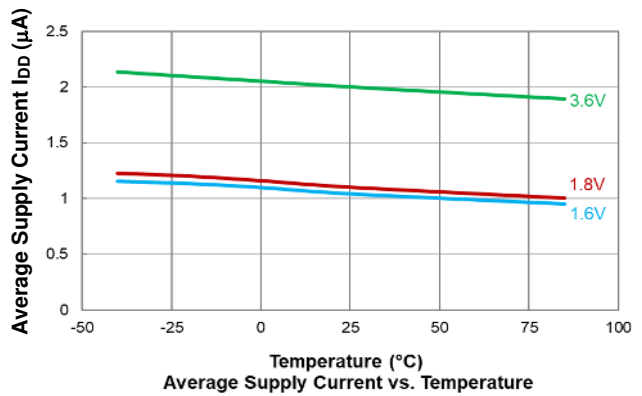
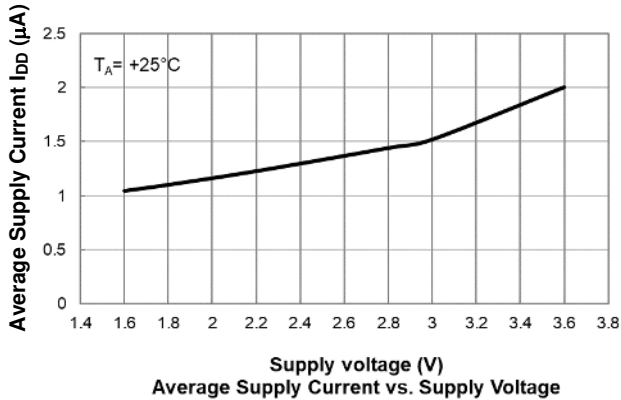
NEW PRODUCT

**Typical Operating Characteristics**

**Output Switch Operate and Release Points (Magnetic Thresholds)**

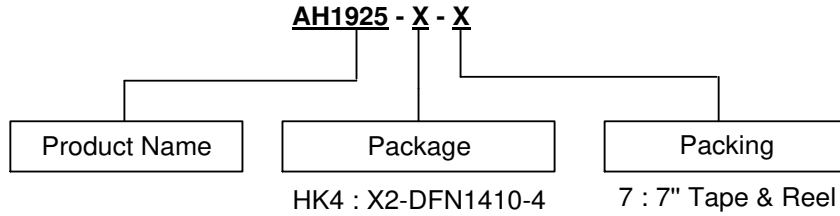


**Average Supply Current**



NEW PRODUCT

**Ordering Information**

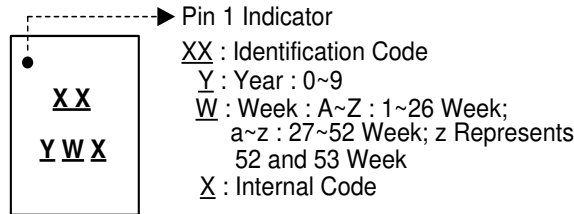


Part Number	Package Code	Package Name	7" Tape and Reel	
			Quantity	Part Number Suffix
AH1925-HK4-7	HK4	X2-DFN1410-4	4000/Tape & Reel	-7

**Marking Information**

(1) Package Type: X2-DFN1410-4

( Top View )

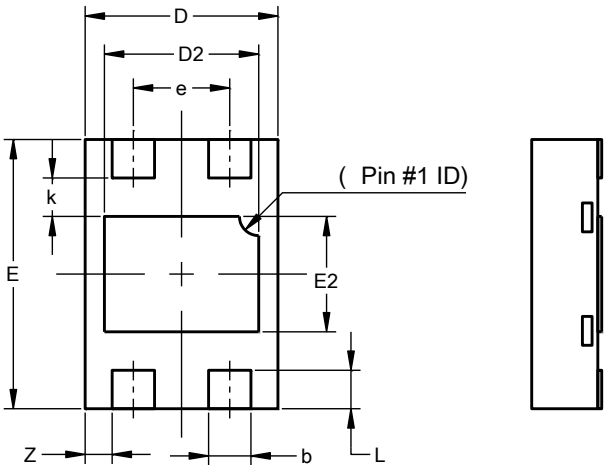
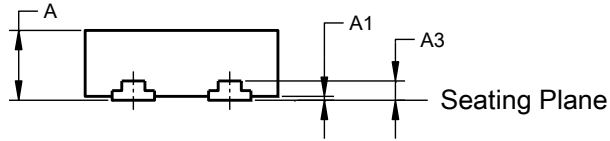


Part Number	Package	Identification Code
AH1925-HK4-7	X2-DFN1410-4	FU

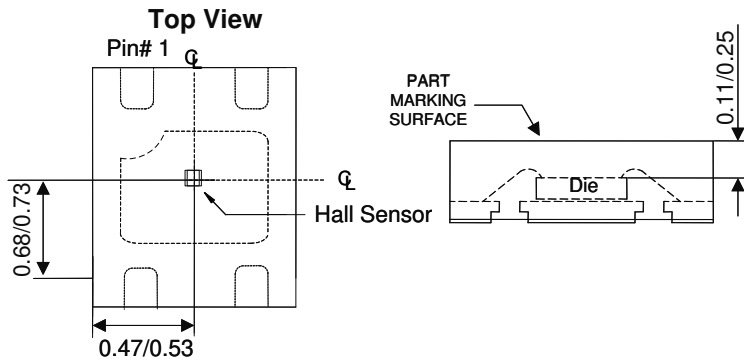
**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

1. Package Type: X2-DFN1410-4



X2-DFN1410-4			
Dim	Min	Max	Typ
A	--	0.40	0.37
A1	0.00	0.05	0.02
A3	--	--	0.100
b	0.17	0.27	0.22
D	0.95	1.05	1.00
D2	0.70	0.90	0.80
E	1.35	1.45	1.40
E2	0.50	0.70	0.60
e	0.50BSC		
k	--	--	0.20
L	0.15	0.25	0.20
z	--	--	0.14
All Dimensions in mm			



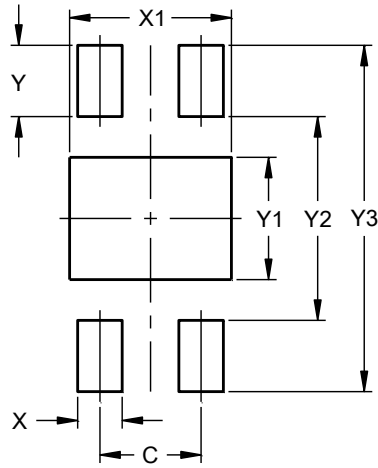
Sensor Location

NEW PRODUCT

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### 1. Package Type: X2-DFN1410-4



Dimensions	Value (in mm)
C	0.50
X	0.22
X1	0.80
Y	0.35
Y1	0.60
Y2	1.00
Y3	1.70



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