HIGH SENSITIVITY MICROPOWER UNIPOLAR HALL-EFFECT SWITCH

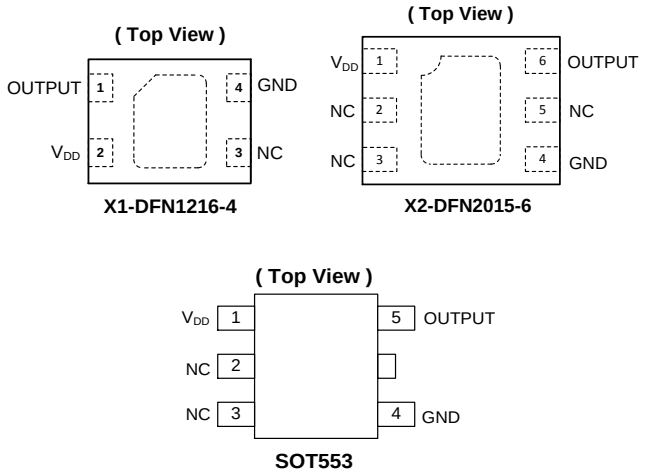
NEW PRODUCT

Description

The AH3360 is a high sensitivity micro power unipolar hall effect switch IC with internal pull-up and pull-down capability. Designed for battery powered consumer such as cellular phones and portable PCs to home appliance and industrial equipment, the average supply current is only 4.3μA at 1.85V. To support portable equipment, the AH3360 can operate over the supply range of 1.6V to 3.6V, and uses a hibernating clocking system to minimize the power consumption. To minimize PCB space, the AH3360 is available in small and low profile SOT553, X1-DFN1216-4 and X2-DFN2015-6 packages.

The output is activated with a south pole of sufficient magnetic field strength. When the magnetic flux density (B) perpendicular to the package is larger than operate point (B_{OP}), the output will be turned on (pulled low) and held until B is lower than release point (B_{RP}). The output will remain off when there is no magnetic field.

Pin Assignments



Features

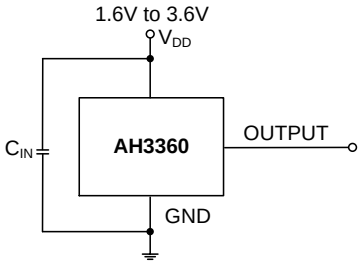
- Unipolar Operation (South Pole to Part Marking Side)
- Supply Voltage of 1.6V to 3.6V
- High Sensitivity
- Micro Power Operation
- Chopper Stabilized Design Provides:
  - Superior Temperature Stability
  - Minimal Switch Point Drift
  - Enhanced Immunity to Physical Stress
- No External Pull-Up Resistors Required
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- High ESD Capability of 8kV Human Body Model
- Small and Low Profile X1-DFN1216-4, X2-DFN2015-6 and SOT553 Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

- Open and Close Detect for Cellular Phones
- Holster or Cover Detect for Cellular Phones and Tablet PCs
- Cover or Display Switch in Portable PCs
- Digital Still, Video Cameras and Handheld Gaming Consoles
- Docking Station Detect
- Door, Lids and Tray Position Switches
- Level, Proximity and Position Switches
- Contact-Less Switches in Home Appliances and Industrial Applications

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 100nF typical.

NEW PRODUCT

Pin Descriptions (Note 5)

Package: X1-DFN1216-4

Pin Number	Pin Name	Function
1	OUTPUT	Output Pin
2	V_{DD}	Power Supply Input
3	NC	No Connection (Note 5)
4	GND	Ground Pin

Package: X2-DFN2015-6

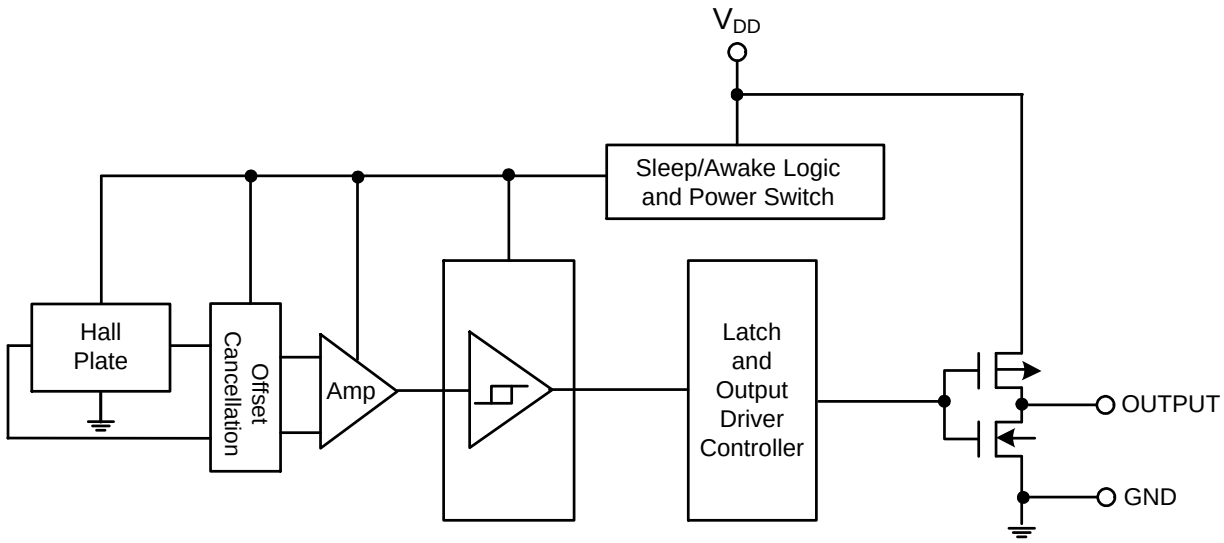
Pin Number	Pin Name	Function
1	V_{DD}	Power Supply Input
2	NC	No Connection (Note 5)
3	NC	No Connection (Note 5)
4	GND	Ground Pin
5	NC	No Connection (Note 5)
6	OUTPUT	Output Pin

Package: SOT553

Pin Number	Pin Name	Function
1	V_{DD}	Power Supply Input
2	NC	No Connection (Note 5)
3	NC	No Connection (Note 5)
4	GND	Ground Pin
5	OUTPUT	Output Pin

Note: 5. NC is “No Connection” pin and is not connected internally. This pin can be left open or tied to ground.

Functional Block Diagram



NEW PRODUCT

Absolute Maximum Ratings (Note 6) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter		Rating	Unit
V_{DD}	Supply Voltage (Note 7)		6	V
V_{DD_REV}	Reverse Supply Voltage		-0.3	V
I_{OUTPUT}	Output Current (Source and Sink)		3	mA
B	Magnetic Flux Density		Unlimited	
P_D	Package Power Dissipation	X1-DFN1216-4, X2-DFN2015-6	230	mW
		SOT553	230	mW
Ts	Storage Temperature Range		-65 to +150	°C
T_J	Maximum Junction Temperature		+150	°C
ESD HBM	Human Body Model (HBM) ESD Capability		8	kV

Notes: 6. 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.

7. The absolute maximum V_{DD} 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.

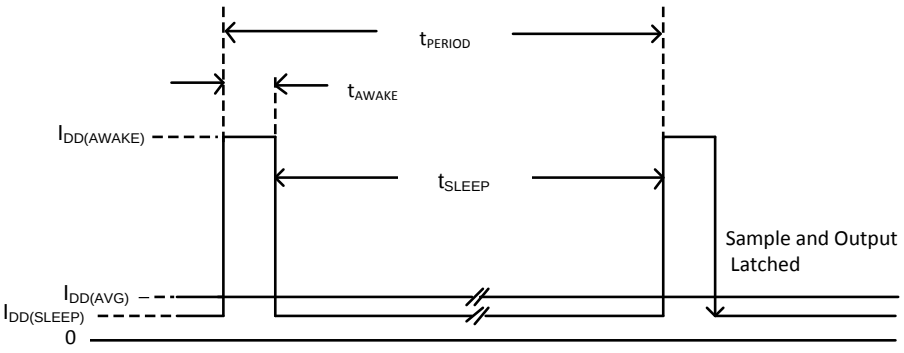
Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Rating	Unit
V_{DD}	Supply Voltage	Operating	1.6V to 3.6V	V
T_A	Operating Temperature Range	Operating	-40 to +85	°C

Electrical Characteristics (@T_A = +25°C, V_{DD} = 1.85V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	Output Low Voltage (On)	I_{OUT} = 1mA	—	0.1	0.2	V
V_{OH}	Output High Voltage (Off)	I_{OUT} = -1mA	V_{DD}-0.2	V_{DD}-0.1	—	V
I_{OFF}	Output Leakage Current	V_{OUT} = 3.6V, Output off	—	< 0.1	1	µA
$I_{DD(AWAKE)}$	Supply Current	During 'awake' period, T_A = +25°C, V_{DD} = 3V	—	2.1	—	mA
$I_{DD(SLEEP)}$		During 'sleep' period, T_A = +25°C, V_{DD} = 3V	—	2.5	—	µA
$I_{DD(AVG)}$	Average Supply Current	T_A = +25°C, V_{DD} = 1.85V	—	4.3	8	µA
		T_A = +25°C, V_{DD} = 3.6V	—	7.2	13	µA
t_{AWAKE}	Awake Time	(Note 8)	—	50	100	µs
t_{PERIOD}	Period	(Note 8)	—	50	100	ms
D.C.	Duty Cycle	—	—	0.1	—	%

Note: 8. When power is initially turned on, the operating V_{DD} (1.6V to 3.6V) must be applied to guaranteed the output sampling. The output state is valid after the second operating cycle (typical 100ms).



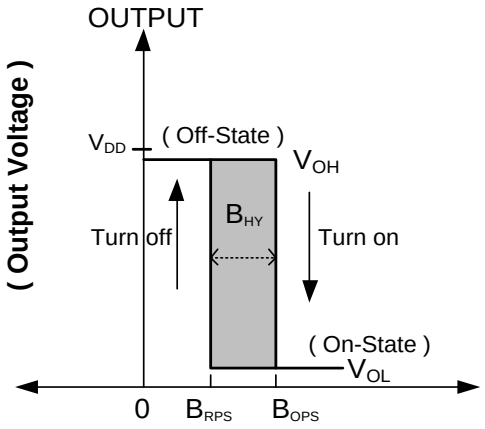
NEW PRODUCT

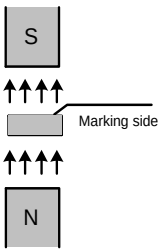
Magnetic Characteristics (Notes 9 and 10) (@T_A = +25°C, V_{DD} = 1.85V, unless otherwise specified.)

(1mT=10 Gauss)

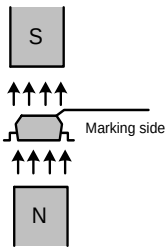
Symbol	Characteristics	Test Condition	Min	Typ	Max	Unit
B_{OPS} (South Pole to Part Marking Side)	Operation Point	T_A = +25°C	16	30	42	Gauss
		T_A = -40°C to +85°C	14	30	46	
B_{RPS} (South Pole to Part Marking Side)	Release Point	T_A = +25°C	11	20	35	
		T_A = -40°C to +85°C	9	20	39	
B_{HY} (|Bopx|-|Brpx|)	Hysteresis (Note 11)	T_A = +25°C	5	10	15	
		T_A = -40°C to +85°C	3	10	17	

Notes:
9. Typical data is at T_A = +25°C, V_{DD} = 1.85V.
10. Maximum and minimum parameters values over operating temperature range are not tested in production, they are guaranteed by design, process control and characterization. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.
11. Maximum and minimum hysteresis is guaranteed by design and characterization.





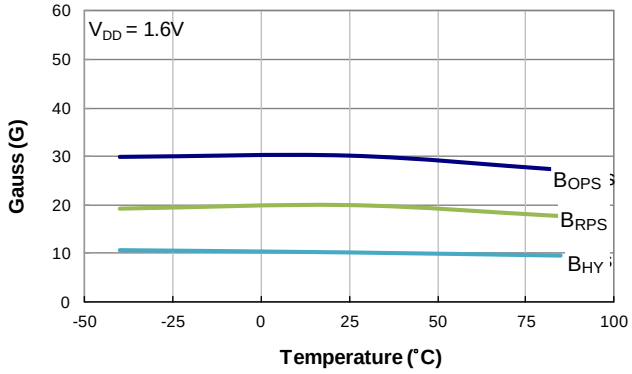
(X1-DFN1216-4 and X2-DFN2015-6)



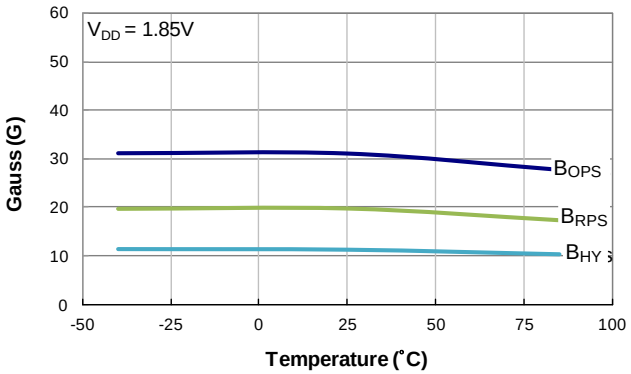
(SOT553)

NEW PRODUCT

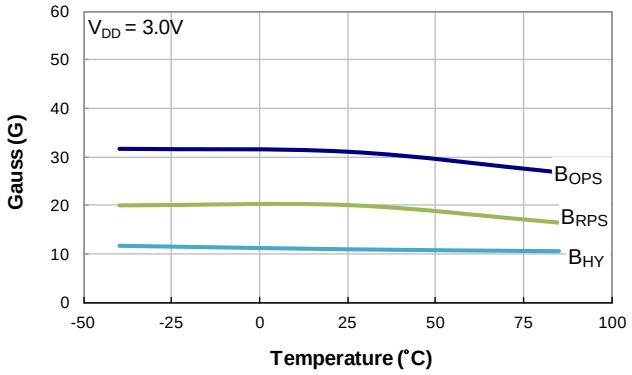
Typical Operating Characteristics



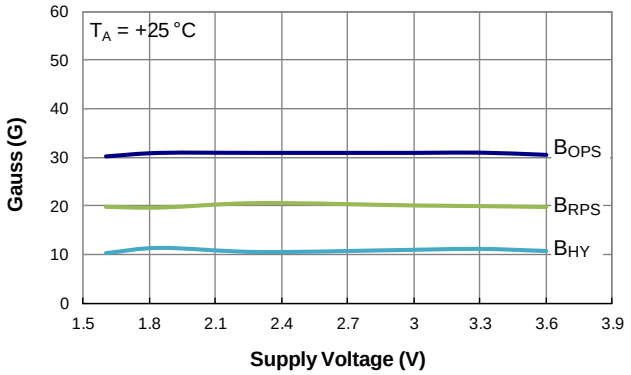
Switch Points vs Temperature



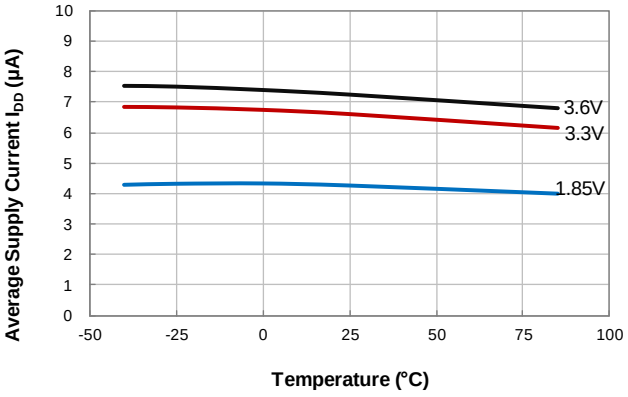
Switch Points vs Temperature



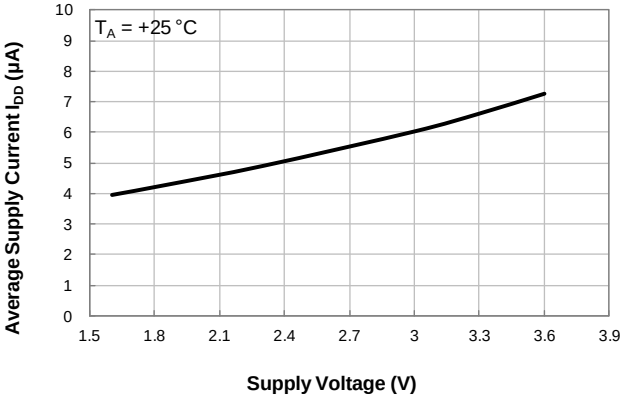
Switch Points vs Temperature



Switch Points vs Supply Voltage



Average Supply Current vs. Temperature



Average Supply Current vs. Supply Voltage

NEW PRODUCT

Ordering Information

AH3360 - XXX - X

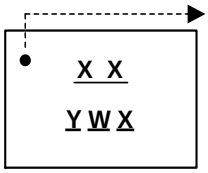
Package	Packing
FA : X1-DFN1216-4 FT4: X2-DFN2015-6 Z : SOT553	7 : Tape & Reel

Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
AH3360-FA-7	FA	X1-DFN1216-4	3000/Tape & Reel	-7
AH3360-FT4-7	FT4	X2-DFN2015-6	3000/Tape & Reel	-7
AH3360-Z-7	Z	SOT553	3000/Tape & Reel	-7

Marking Information

(1) Package Types: X1-DFN1216-4 and X2-DFN2015-6

(Top View)

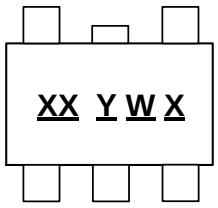


Pin 1 Indicator
XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green

Part Number	Package	Identification Code
AH3360-FA-7	X1-DFN1216-4	KZ
AH3360-FT4-7	X2-DFN2015-6	NZ

(2) Package Type: SOT553

(Top View)



XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1~26 week;
a to z : 27~52 week; z represents
52 and 53 week
X : Internal code

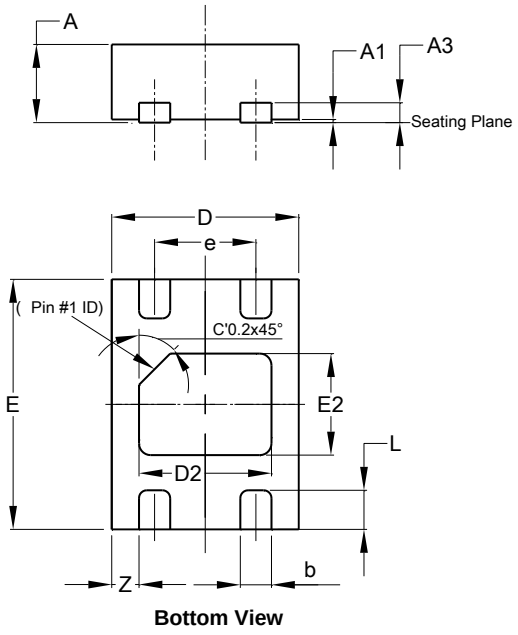
Part Number	Package	Identification Code
AH3360-Z-7	SOT553	KZ

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

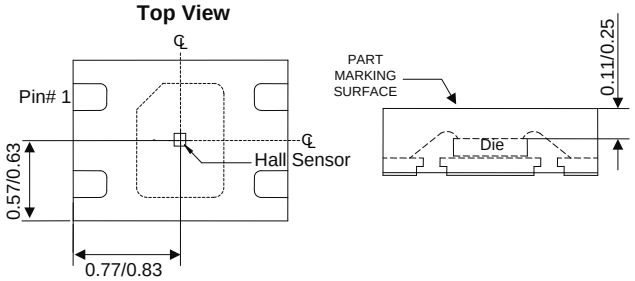
Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: X1-DFN1216-4



Bottom View

X1-DFN1216-4			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.53	0.50
A1	0.00	0.05	0.02
A3	--	--	0.13
b	0.15	0.25	0.20
D	1.15	1.25	1.20
D2	0.75	0.95	0.85
E	1.55	1.65	1.60
E2	0.55	0.75	0.65
e	-	-	0.65
L	0.20	0.30	0.25
Z	-	-	0.175
All Dimensions in mm			



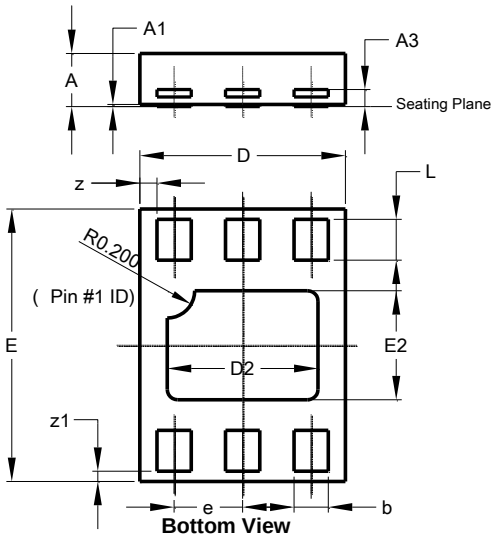
Sensor Location

NEW PRODUCT

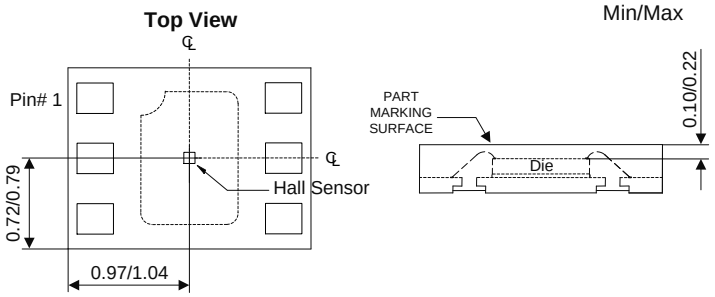
Package Outline Dimensions (continued) (All dimensions in mm.)

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

(2) Package Type: X2-DFN2015-6



X2-DFN2015-6			
Dim	**Min**	**Max**	**Typ**
A	0.375	0.40	0.390
A1	0	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.45	1.575	1.50
D2	1.00	1.20	1.10
e	-	-	0.50
E	1.95	2.075	2.00
E2	0.70	0.90	0.80
L	0.25	0.35	0.30
Z	-	-	0.125
Z1	-	-	0.075
All Dimensions in mm			



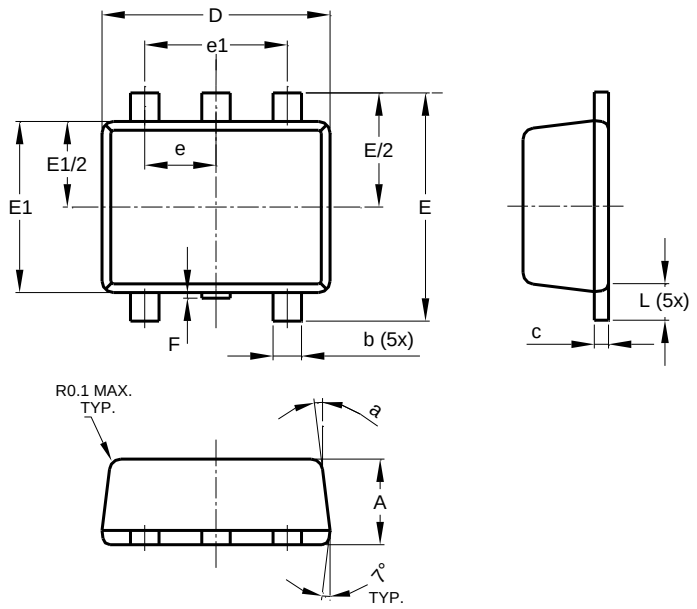
Sensor Location

NEW PRODUCT

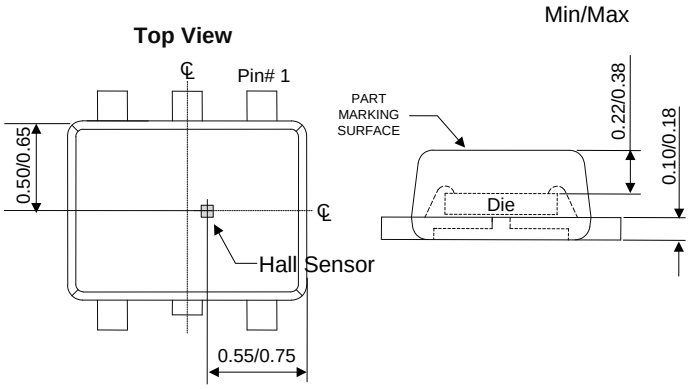
Package Outline Dimensions (continued) (All dimensions in mm.)

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

(3) Package Type: SOT553



SOT553			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.62	0.60
b	0.15	0.30	0.20
c	0.10	0.18	0.15
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	0.50 BSC		
e1	1.00 BSC		
F	0.00	0.10	—
L	0.10	0.30	0.20
a	6°	8°	7°
All Dimensions in mm			



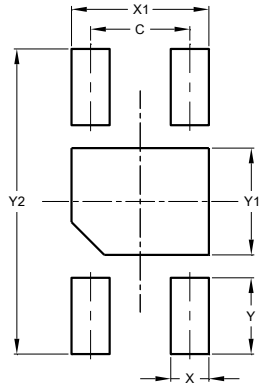
Sensor Location

NEW PRODUCT

Suggested Pad Layout

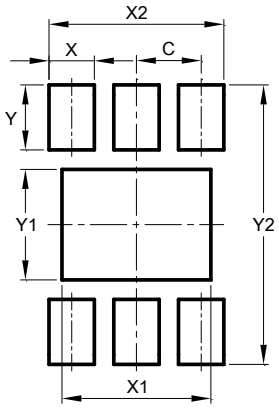
Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: X1-DFN1216-4



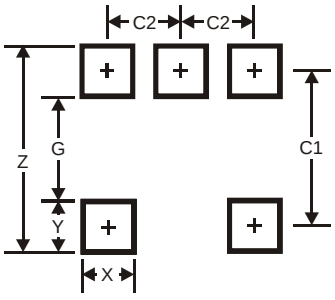
X1-DFN1216-4	
Dimensions	**Value**
C	0.65
X	0.25
X1	0.90
Y	0.50
Y1	0.70
Y2	2.00
All Dimensions in mm	

(2) Package Type: X2-DFN2015-6



X2-DFN2015-6	
Dimensions	**Value**
C	0.500
X	0.350
X1	1.150
X2	1.350
Y	0.500
Y1	0.850
Y2	2.150
All Dimensions in mm	

(3) Package Type: SOT553



SOT553	
Dimensions	**Value**
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5
All Dimensions in mm	

NEW PRODUCT

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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