CC6211E

Unipolarity, Micropower Hall Effective Switch

FEATURES

- Wide operating voltage，3 ~ 5.5V
- Micro power
- Fast reaction speed，operating frequency at 11Hz
- Operating with North or South pole
- Superior temperature stability
- Extremely Low Switch-point Drift
- ESD（HBM）2kV
- Small package size

APPLICATION

- Instrumentation
- PDA
- Laptop

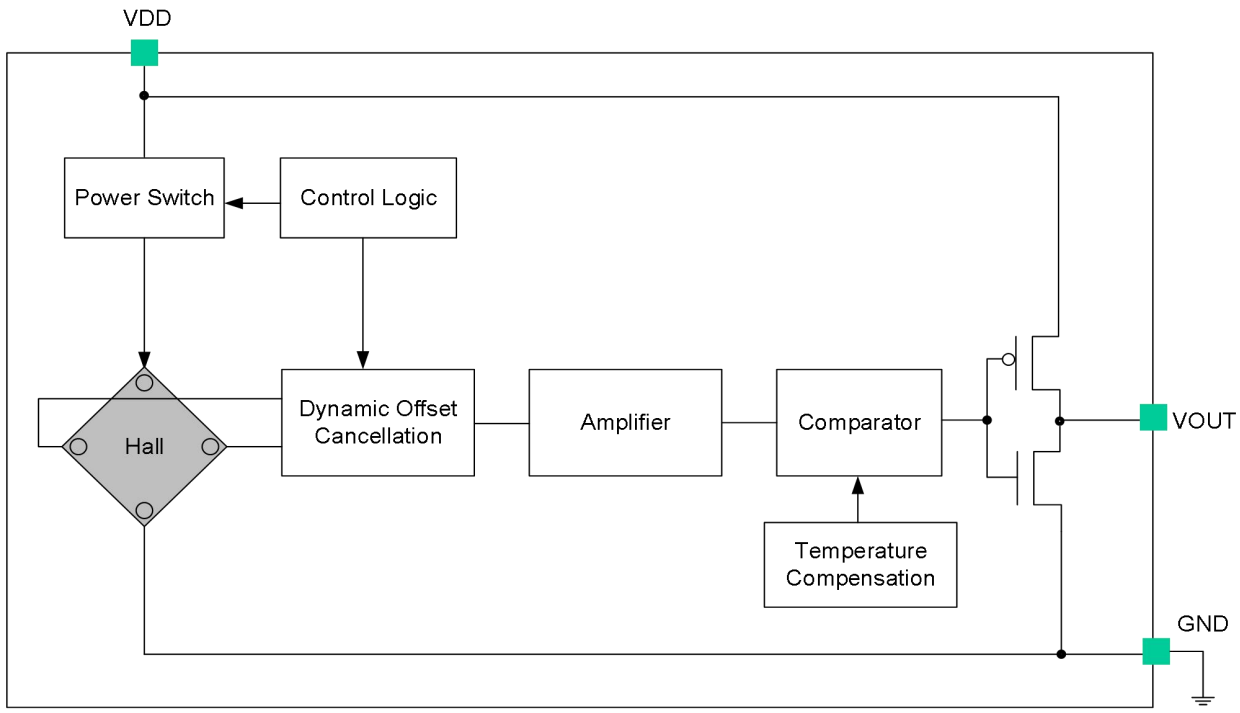
GENERAL DESCRIPTION

CC6211E is a micropower, ultra sensitive and unipolarity hall effect switch sensing device.

CC6211E internal circuitry includes Hall lamellae, voltage regulator modules, signal amplification processing modules, dynamic offset cancellation modules, latching modules, and CMOS output stages. Due to the use of advanced Bi-CMOS process in the CC6211E, the overall optimized circuit structure makes the product obtain extremely low input error feedback. The product uses dynamic offset cancellation technology, which can eliminate offset voltages caused by package stresses, thermal stresses, and temperature gradients, and improve device consistency.At the same time, the product adopts a miniaturized packaging process, which makes the product has more extremely high performance and market advantages.

CC6211E is available in SOT23-3， TSOT23-3， TO-92S， DFN1010-4L， DFN1216-4L， SOT553 packages. The operating temperature is -40°C to 85°C。

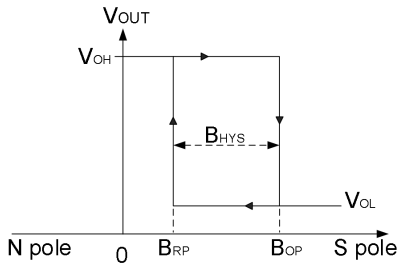
FUNCTION BLOCK DIAGRAM



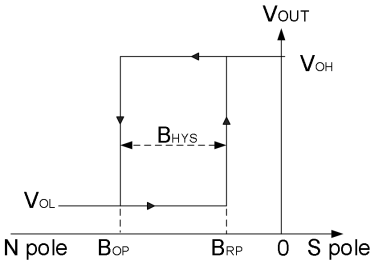
ORDERING INFORMATION

Part No.	Package Code	Packing Form
CC6211ETO	TO-92S	bulk，1000 pcs/bulk
CC6211EST	SOT23-3	tape reel，3000 pcs/reel
CC6211ETST	TSOT23-3	tape reel，3000 pcs/reel
CC6211EDN1010	DFN1010-4L	tape reel，5000 pcs/reel
CC6211EDN1216	DFN1216-4L	tape reel，4000 pcs/reel
CC6211ES5	SOT553	tape reel，3000 pcs/reel

OUTPUT VOLTAGE VS. MAGNETIC POLE



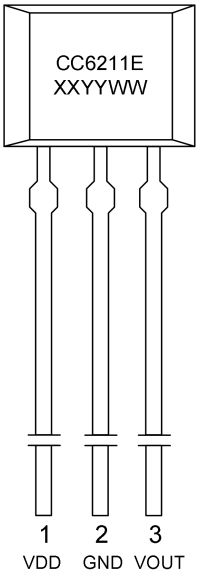
CC6211ETO & CC6211EDN& CC6211ES5



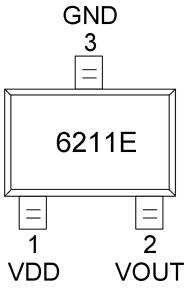
CC6211EST&CC6211ETST

Note: magnetic field is on the mark side

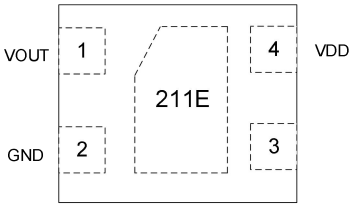
PIN CONFIGURATIONS



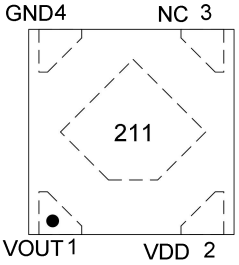
TO-92S



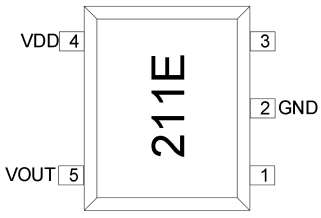
SOT23-3 / TSOT23-3



DFN1216-4L



DFN1010-4L



SOT553

Pin Name	PIN NO.					FUNCTION
	TO-92S	SOT23-3/TSOT23-3	DFN1010-4L	DFN1216-4L	SOT553	
VDD	1	1	2	4	4	Supply Voltage
GND	2	3	4	2	2	Ground
VOUT	3	2	1	1	5	Output
NC	-	-	3	3	1,3	Suspended

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{DD}	-0.3~5.5	V
Magnetic Flux Density	B	unlimited	Gs
Junction Temperature	T_A	-40 ~ 85	°C
Storage Temperature	T_S	-50 ~ 160	°C
ESD(HBM)		2	kV
Wet Sensitivity Level		MSL3	

Note: Do not exceed the maximum rating when applied to prevent damage. Long time working at the maximum rated value may affect the device reliability.

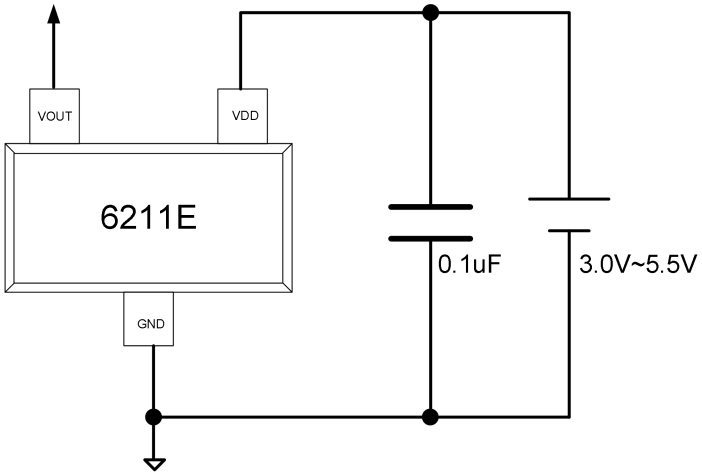
ELECTRICAL PARAMETERS (V_{DD}=3.5V @ 25°C room temperature, unless specified otherwise)

Parameter	Symbol	Condition	Min.	Typ.	Max	Unit
Supply Voltage	V_{DD}	-	2.5	-	5.5	V
Output High Voltage	V_{OH}	$I_{OUT(SOURCE)}$ = 0.5mA	V_{DD}-0.2	-	-	
Output Low Voltage	V_{OL}	$I_{OUT(SINK)}$ = 0.5mA	-	-	0.2	
Average Current	$I_{DD(AVG)}$	VOUT pin suspended	-	3	-	uA
Supply Current(EN)	$I_{DD(EN)}$		-	1.2	-	mA
Supply Current(DIS)	$I_{DD(DIS)}$		-	3	-	uA
Output Source Current	$I_{OUT(SOURCE)}$		-	-	0.5	mA
Output Sink Current	$I_{OUT(SINK)}$		-	-	0.5	mA
Awake Time	T_{AWAKE}		-	15	-	us
Period	T_{PERIOD}		-	85	-	ms
Duty Cycle	D.C.		-	0.018	-	%

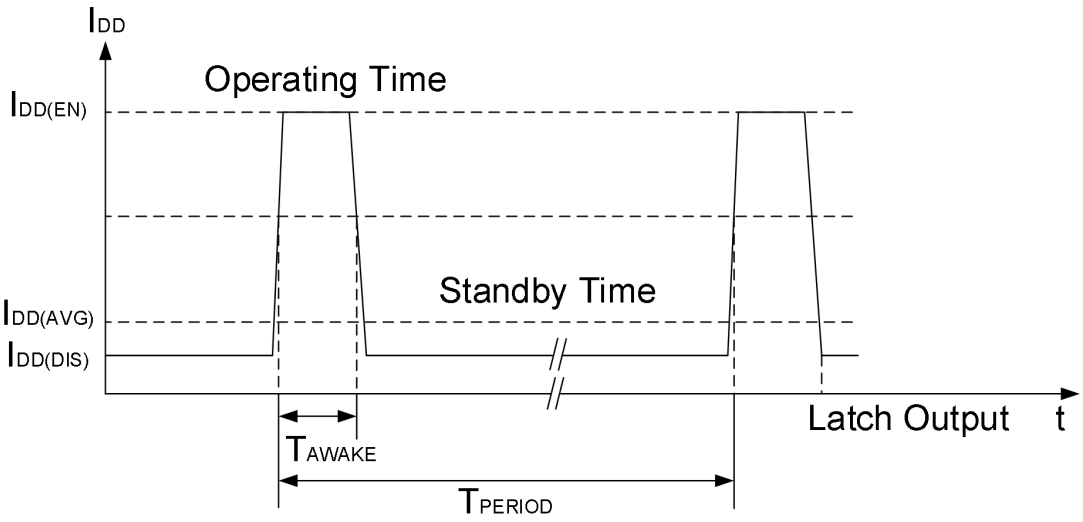
MAGNETIC SPECIFICATIONS

Parameter	Symbol	Condition	Min.	Typ.	Min.	Unit
Operating Point	B_{OP}	V_{DD}=3.5V @ T_a=25°C	26	33	40	Gs
Release Point	B_{RP}	V_{DD}=3.5V @ T_a=25°C	14	21	28	Gs
Hysteresis	B_{HYS}	V_{DD}=3.5V @ T_a=25°C	6	12	18	Gs

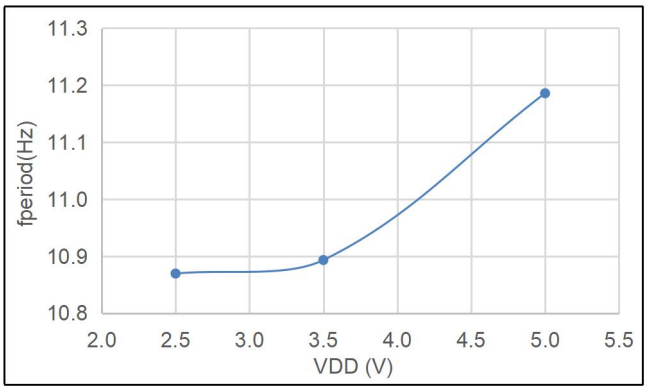
TYPICAL APPLICATION CIRCUIT



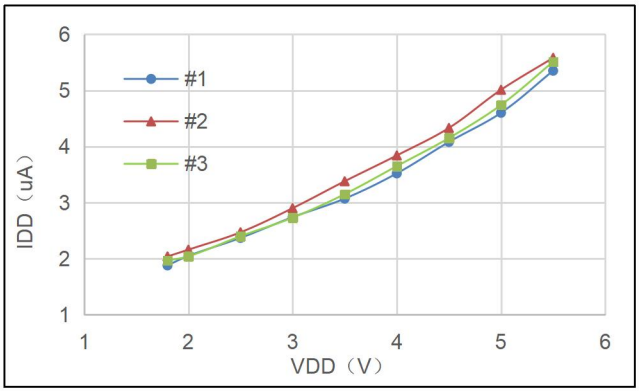
WORKING SEQUENCE DIAGRAM



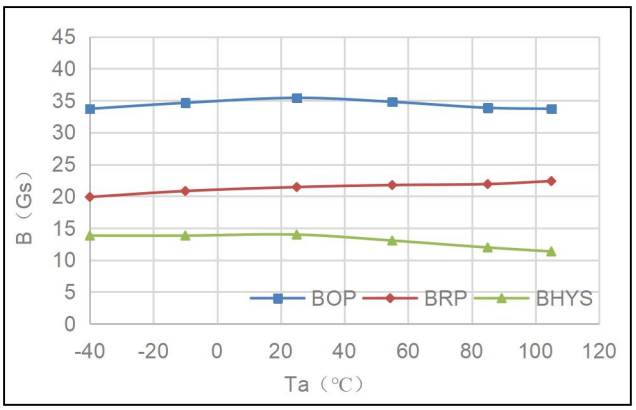
CURVE & WAVEFORM (V_{DD}=3.5V @ 25°C room temperature, unless specified otherwise)



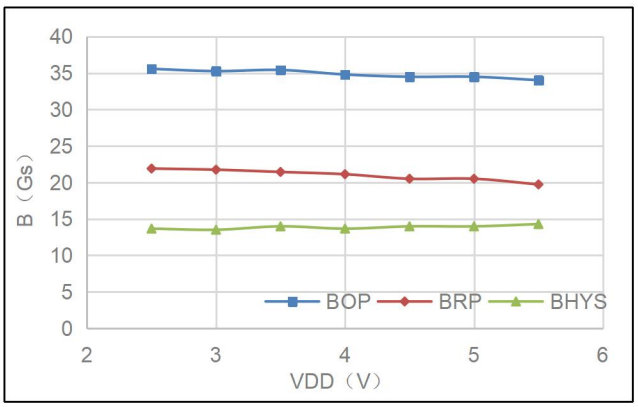
f period vs. V_{DD}



$I_{DD(AVG)}$ vs. V_{DD}



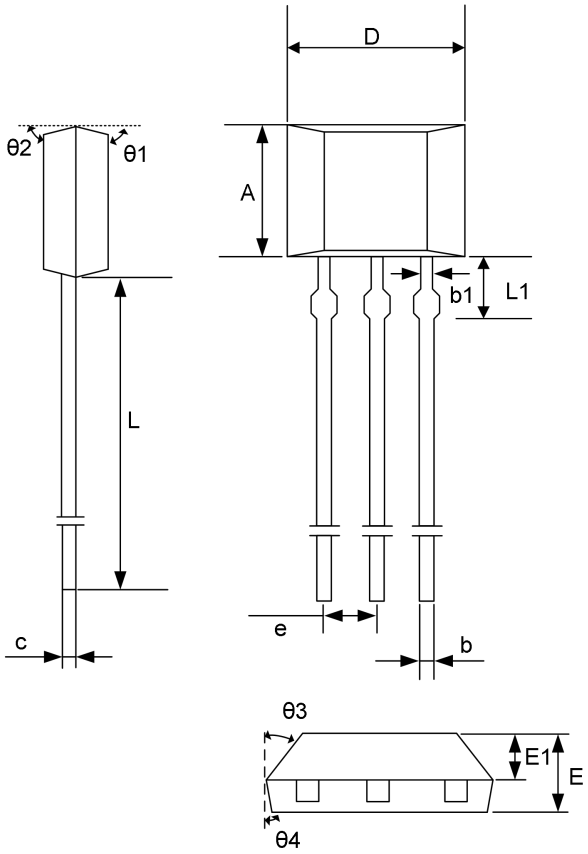
B_{OP}&B_{RP} vs. T_A



B_{OP}&B_{RP} vs. VDD

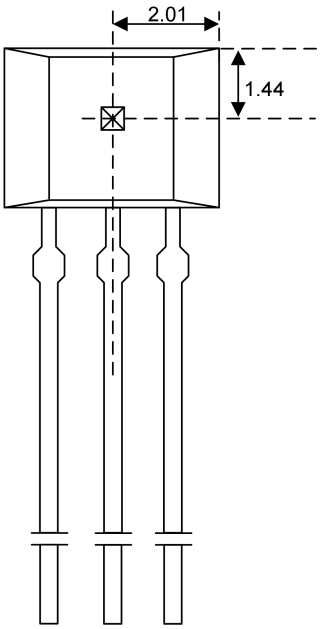
PACKAGE INFORMATION

(1) TO-92S Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	2.90	3.00	3.10
b	0.35	0.39	0.56
b1	-	0.44	-
c	0.36	0.38	0.51
D	3.9	4.0	4.1
e	1.27BSC		
E	1.42	1.52	1.62
E1	-	0.75	-
L	13.5	14.5	15.5
L1	-	1.6	-
θ1	-	6°	-
θ2	-	3°	-
θ3	-	45°	-
θ4	-	3°	-

Hall Plate Location



Notes:

All dimensions are in millimeters

Marking:

1st Line: CC6211E- Name of the device

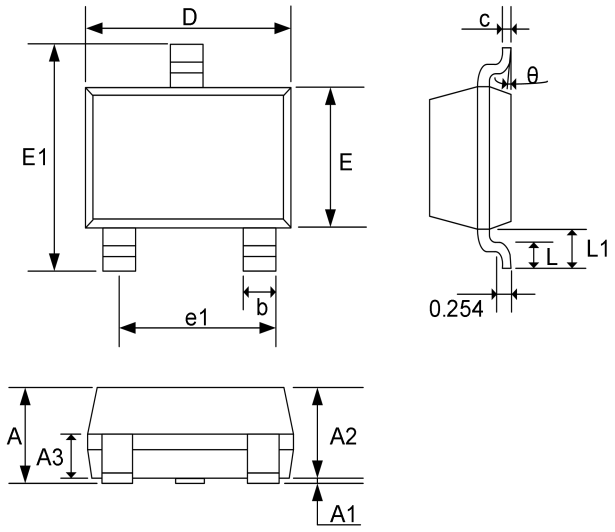
2nd Line: XXYYWW

XX - code

YY - assembly year (last 2 digits)

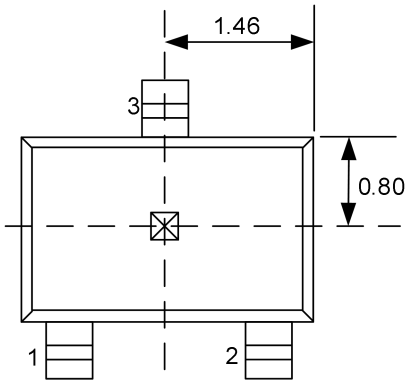
WW - production batch number

(2) SOT23-3 Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	-	-	1.35
A1	0.04	0.08	0.12
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.37	0.40	0.43
c	0.11	0.16	0.21
D	2.77	2.90	3.07
E	1.40	1.60	1.80
E1	2.70	2.85	3.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.55
L1	0.55	0.65	0.75
θ	0°	-	8°

Hall Plate Location



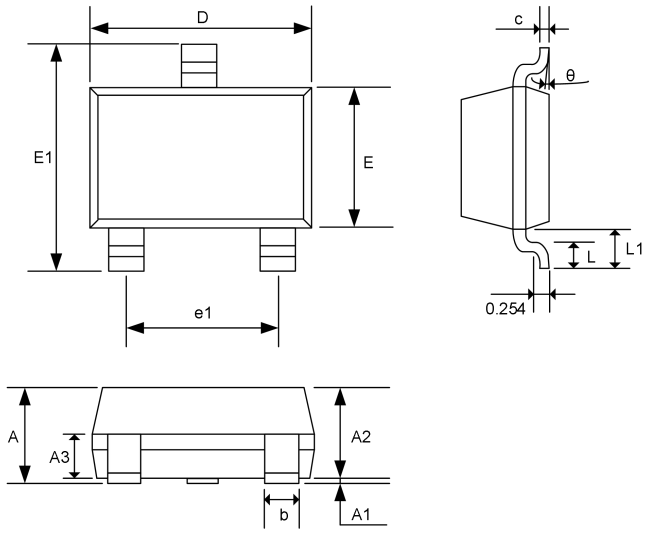
Notes:

All dimensions are in millimeters

Marking:

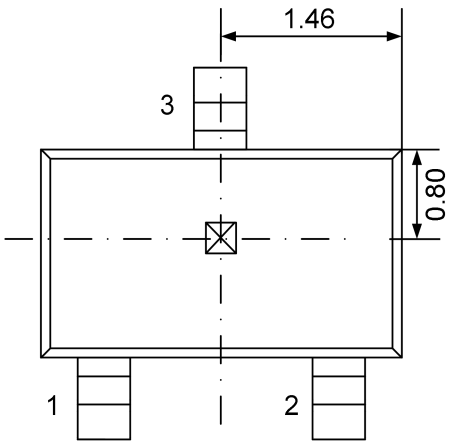
1st Line: 6211E

(3) TSOT23-3 Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	0.70	0.80	0.90
A1	0.04	0.08	0.12
A2	0.70	0.75	0.80
A3	0.40	0.45	0.50
b	0.35	0.43	0.50
c	0.11	0.16	0.20
D	2.82	2.92	3.02
E	1.60	1.65	1.70
E1	2.65	2.80	2.95
e1	1.80	1.90	2.00
L	0.35	0.90	0.55
L1	0.50	0.60	0.70
θ	0°	-	8°

Hall Plate Location



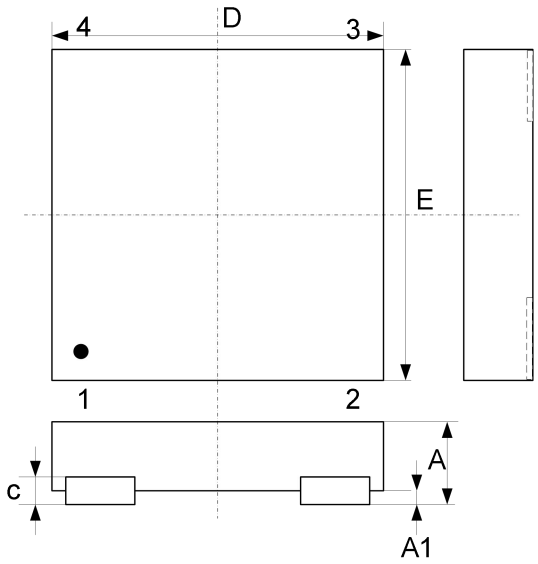
Notes:

All dimensions are in millimeters

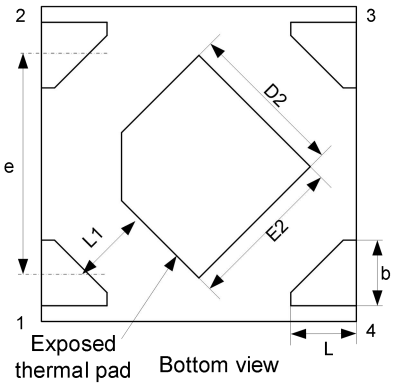
Marking:

1st Line: 6211E

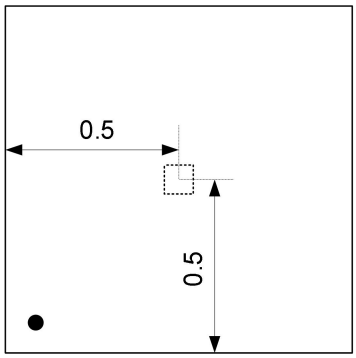
(4) DFN1010-4L Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	0.32	0.37	0.41
A1	0.00	0.02	0.05
b	0.18	0.23	0.28
c		0.102REF	
D	0.95	1.00	1.05
D2	0.43	0.48	0.53
e		0.65BSC	
E	0.95	1.00	1.05
E2	0.43	0.48	0.53
L	0.20	0.25	0.30
L1		0.205REF	



Hall Plate Location



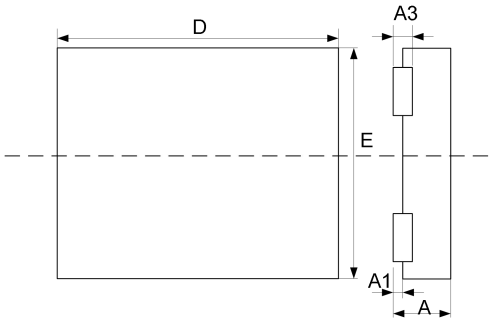
Notes:

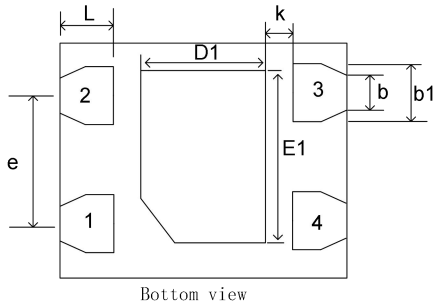
All dimensions are in millimeters

Marking:

1st Line: 211

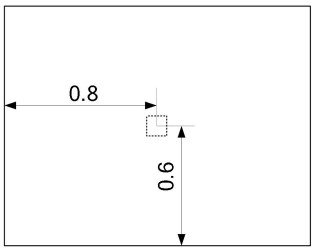
(5) DFN1216-4L Package





Symbol	Millimeter		
	Min.	Typ.	Max.
A	0.5	-	0.6
A1	0.00	-	0.05
A3		0.152	
D	1.5	-	1.7
E	1.1	-	1.3
D1	0.56	-	0.76
E1	0.7	-	0.9
b	0.25	-	0.35
b1	0.175	-	0.275
e		0.6	
L	0.15	-	0.25
K	0.2	-	-

Hall Plate Location



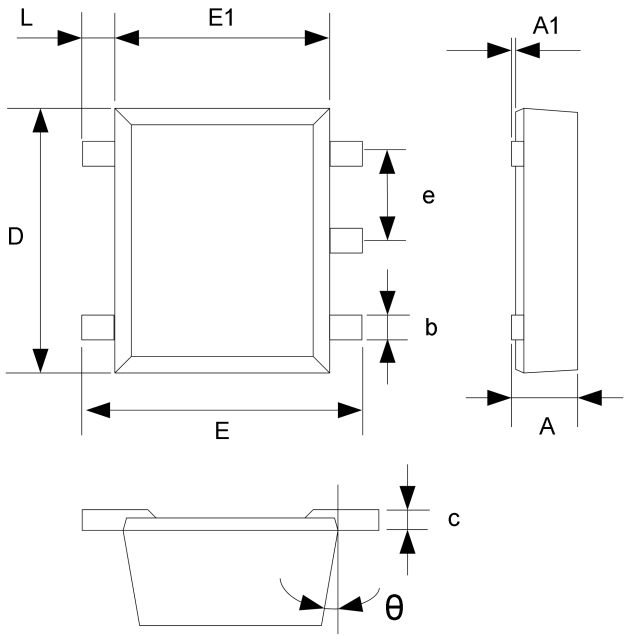
Notes:

All dimensions are in millimeters

Marking:

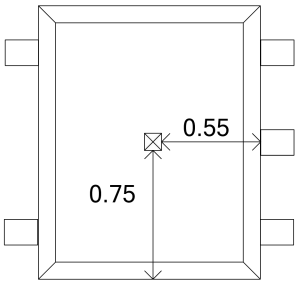
1st Line: 211E

(6) SOT553 Package



Symbol	Millimeter	
	Min.	Max.
A	0.525	0.600
A1	0.000	0.050
e	0.450	0.550
c	0.090	0.160
D	1.500	1.700
b	0.170	0.270
E1	1.100	1.300
E	1.500	1.700
L	0.100	0.300
θ	7°REF	

Hall Plate Location



Notes:

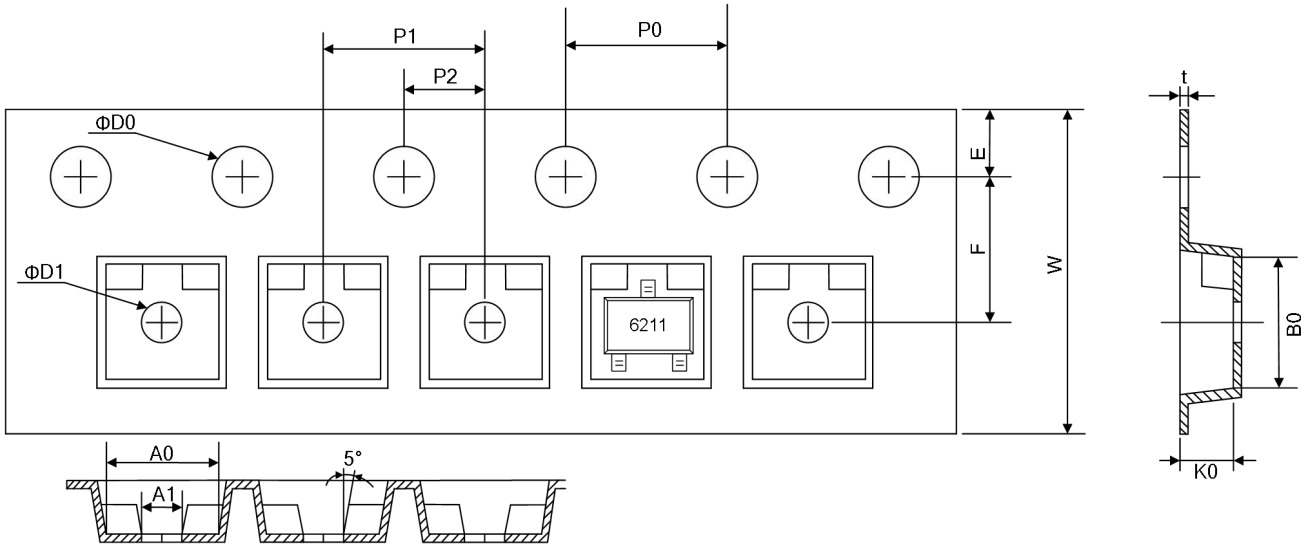
All dimensions are in millimeters

Marking:

1st Line: 211E

INFORMATION OF TAPING & PACKAGING

Tape of SOT23-3/TSOT23-3

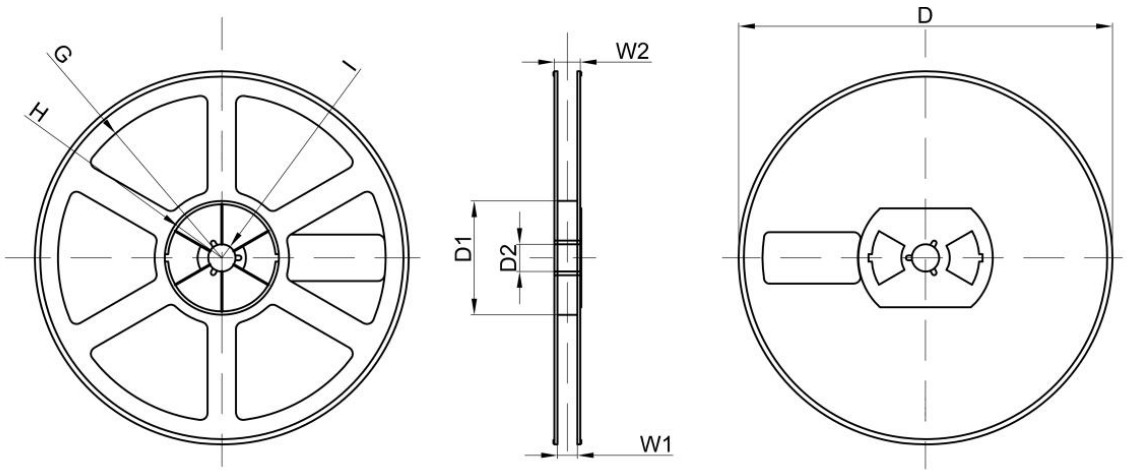


Symbol	Millimeter		
	Min.	Typ.	Max.
W	7.90	8.00	8.10
E	1.65	1.75	1.85
F	3.40	3.50	3.60
D0	1.40	1.50	1.60
D1	0.90	1.00	1.10
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
t	0.20	0.25	0.30
A0	3.15	3.20	3.25
A1	0.85	0.95	1.05
B0	3.20	3.25	3.30
K0	1.27	1.32	1.37
10*P0	39.80	40.00	40.20

Note:

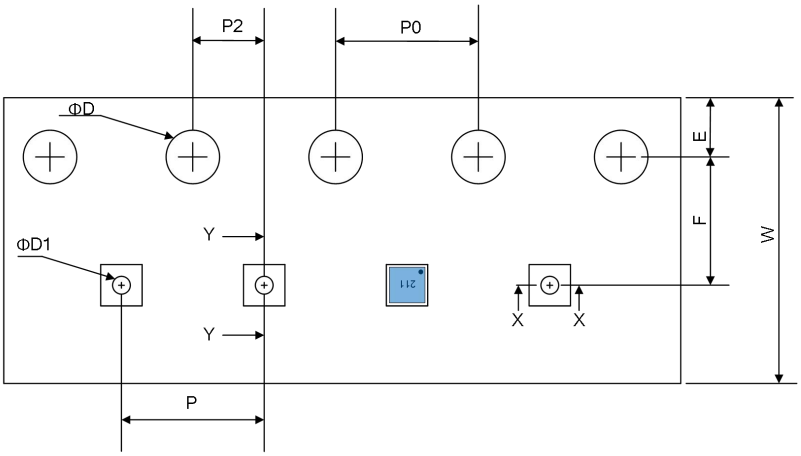
50 ± 2 grids in front and 105 ± 2 grids in back of each tape reel.

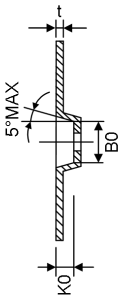
Reel of SOT23-3/TSOT23-3



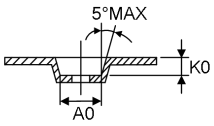
Symbol	Millimeter		
	Min.	Typ.	Max.
D	-	Φ178	-
D1	-	54.40	-
D2	-	13.00	-
G	-	R78.00	-
H	-	R25.60	-
I	-	R6.50	-
W1	-	9.50	-
W2	-	12.30	-

Tape of DFN4L





SECTION Y-Y



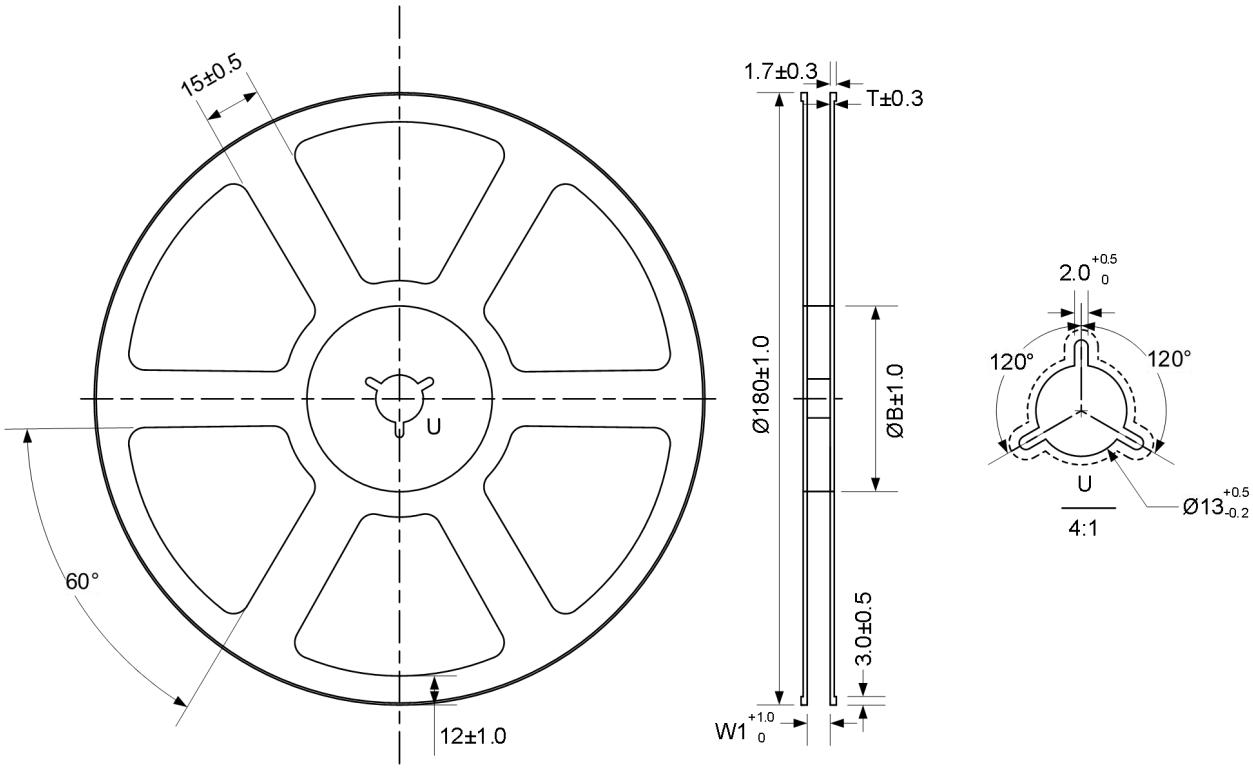
SECTION X-X

Symbol	Millimeter		
	Min.	Typ.	Max.
E	1.65	1.75	1.85
F	3.45	3.50	3.55
P2	1.95	2.00	2.05
D	1.40	1.50	1.60
D1	0.45	0.50	0.55
P0	3.90	4.00	4.10
W	7.90	8.00	8.30
P	3.90	4.00	4.10
A0	1.11	1.16	1.21
B0	1.11	1.16	1.21
K0	0.48	0.53	0.58
t	0.23	0.25	0.27
10*P0	39.80	40.00	40.20

Note:

30±2 grids in front and 140±2 grids in back of each tape reel.

Reel of DNF1010-4L

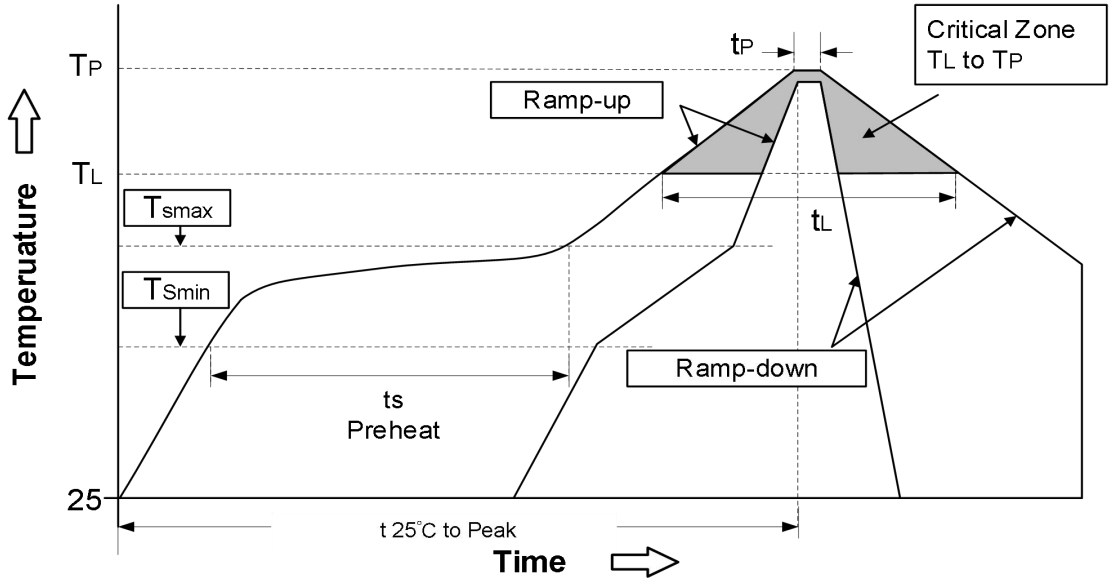


Basis size of Reel(mm)			
Applicable Carrier Band Width	B	W1	T
8	54.5	8.6	15

RECOMMENDED WELDING CONDITIONS

Welding Conditions of SOT23-3/TSOT23-3

1、Reflow weld temperature curve



2、Reflow weld temperature setting

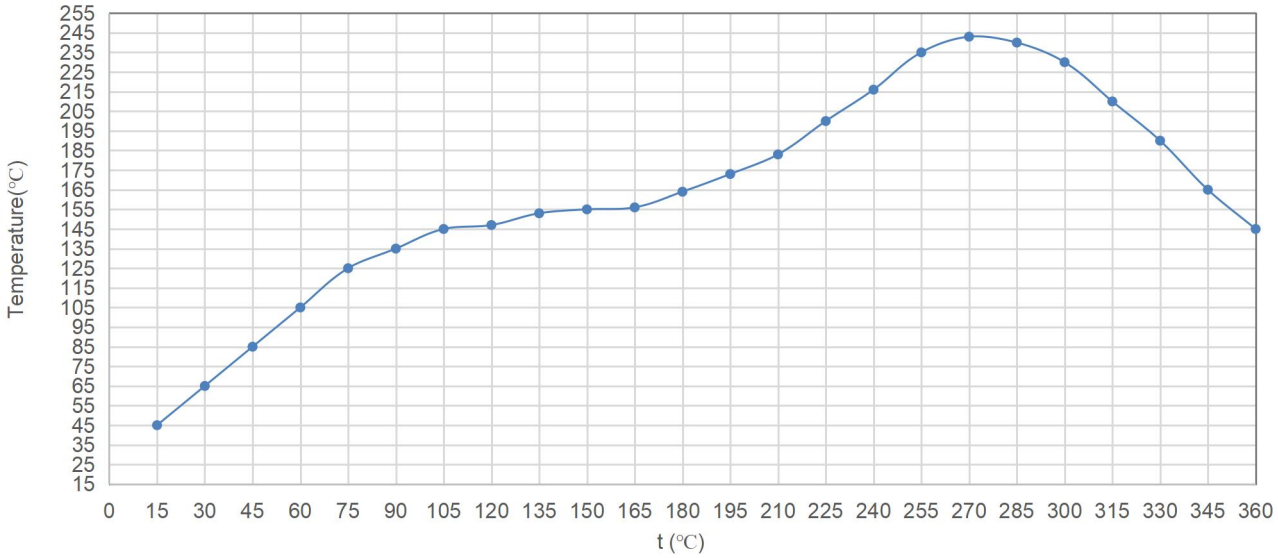
Distribution Feature	Packaging thickness<2.5mm, and Packaging volume<350mm^3
Average tilt rise rate（T_L to T_p）	Max. Of 3°C/s
Preheat -Min. temperature（T_{smin}） -Max. temperature（T_{smax}） -Time（Min. To Max）（t_s）	 100°C 150°C 60-120 s
T_{smax}-T_L tilt rise rate	
Keep the above time -Temperature（T_L） -Time（t_L）	 183°C 60-150s
Peak temperature(T_p)	260 +0/-5°C
Time within 5°C of the actual peak temperature（t_p）	20-40s
Tilt drop rate	Max. Of 6°C/s
Time to the peak temperature at 25°C	Max. Of 6 minutes

3、Manual welding conditions

Manual welding conditions	260°C/10s

Welding Conditions of DFN4L

1、Reflow weld temperature curve

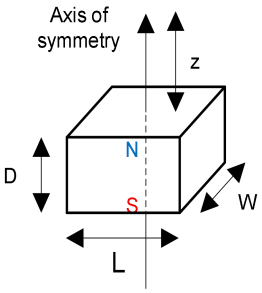


2、Reflow weld temperature setting

Peak temperature	245～252°C
Minimum welding temperature	240°C
Maximum warming rate	3°C/s
Maximum cooling rate	-4°C/s
heating-up time at 150°C	135s
heating-up time from 150°C to 200°C	75s
heating-up time from 25°C to 200°C	210s
heating-up time from 200°C to 217°C	15s
Time when temperature above 217°C	70s
Total time of temperature Between 217~255°C	35～40s
Total time of temperature above 255°C	0

FLUX DENSITY OF PERMANENT MAGNET AT SOME POINT IN THE AXIAL DIRECTION VS. PERMANENT MAGNET SHAPE

Cuboid permanent magnet



$$B = \frac{B_r}{\pi} \times [arctan\left(\frac{LW}{2z\sqrt{4z^2 + L^2 + W^2}}\right) - arctan\left(\frac{LW}{2(D+z)\sqrt{4(D+z)^2 + L^2 + W^2}}\right)]$$

B_r: residual flux density, depending on the model number of the permanent magnet. The unit is T.

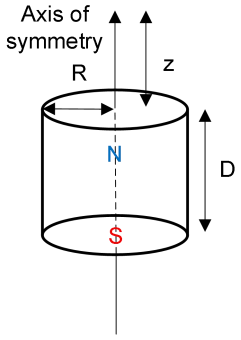
z: The distance from the symmetry axis of the permanent magnet to the surface of the permanent magnet (z >0). The unit is m.

L: the length of the cuboid. The unit is m.

W:the width of the cuboid. The unit is m.

D: thickness / height of the cuboid. The unit is m.

Cylinical permanent magnet



$$B = \frac{B_r}{2} \times \left(\frac{D+z}{\sqrt{R^2 + (D+z)^2}} - \frac{z}{\sqrt{R^2 + z^2}}\right)$$

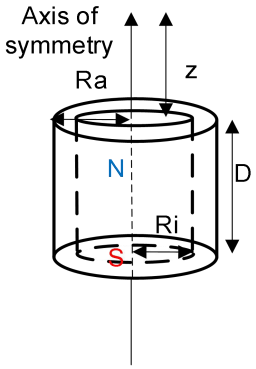
B_r: residual flux density, depending on the model number of the permanent magnet. The unit is T.

z: The distance from the symmetry axis of the permanent magnet to the surface of the permanent magnet (z >0). The unit is m.

D: thickness / height of the cylinder. The unit is m.

R:the radius of the cylinder. The unit is m.

Cycloid permanent magnet



$$B = \frac{B_r}{2} \times [\frac{D+z}{\sqrt{{R_a}^2 + (D+z)^2}} - \frac{z}{\sqrt{{R_a}^2 + z^2}} - (\frac{D+z}{\sqrt{{R_i}^2 + (D+z)^2}} - \frac{z}{\sqrt{{R_i}^2 + z^2}}))]$$

B_r: residual flux density, depending on the model number of the permanent magnet. The unit is T.

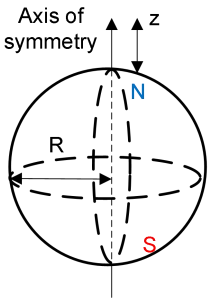
z: The distance from the symmetry axis of the permanent magnet to the surface of the permanent magnet (z >0). The unit is m.

D: thickness / height of the annulus. The unit is m.

R_a: Outer ring radius. The unit is m.

R_i: Internal circle radius. The unit is m.

Spherical permanent magnet



$$B = \frac{2B_r}{3}\frac{R^3}{(R+z)^3}$$

B_r: residual flux density, depending on the model number of the permanent magnet. The unit is T.

z: The distance from the symmetry axis of the permanent magnet to the surface of the permanent magnet (z >0). The unit is m.

R: the radius of the sphere. The unit is m.

CrossChip

CrossChip Microsystems Inc. was founded in 2013, is a national high-tech enterprise, engaged in integrated circuit design and sales. The company has strong technical strength, has more than 60 kinds of patents, mainly used in Hall sensor signal processing, with the following product lines:

- ✓ High precision linear Hall sensor
- ✓ All kinds of Hall switches
- ✓ Single phase motor drive
- ✓ Single chip current sensor
- ✓ AMR Magnetoresistance sensor
- ✓ Isolation drive class chip

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