MT910XDT-1616

Ratiometric Linear Hall-Effect IC, Analog Output

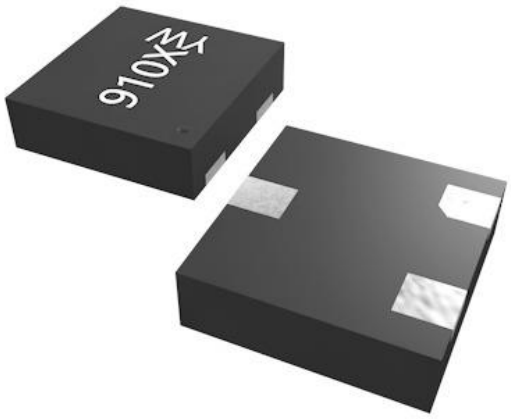
MagnTek | Now Part of NOVOSENSE

1 Product Description

The MT910XDT-1616 device is a linear Hall effect IC that responds proportionally to magnetic flux density. The device can be used for accurate position sensing in a wide range of applications.

The device operates from 3.0V to 5.5V power supplies. When no magnetic field is present, the analog output drives ½ of Vcc. The output changes linearly with the applied magnetic flux density, and four sensitivity options enable maximal output voltage swing based on the required sensing range. North and south magnetic poles produce unique voltages.

The MT910XDT-1616 family provides a variety of packages to customers. DFN1616 for surface mount and RoHS compliant.



2 Features

- BCD Technology
- Factory-programmed
- Ratiometric Rail to Rail Analog Output
- Low-Noise Output
- 3.0~5.5V Operating Vcc Range
- -40℃~150℃ Operating Temperature
- Package Option:
  DFN1616
- Magnetic Sensitivity Option:
  1.00mV/Gs MT9101 Series @Vcc = 3.3V
  1.60mV/Gs MT9102 Series @Vcc = 3.3V
  2.15mV/Gs MT9103 Series @Vcc = 3.3V
  3.15mV/Gs MT9105 Series @Vcc = 3.3V
- RoHS Compliant: (EU)2015/863

3 Product Overview of MT910XDT-1616

Part No.	Description
MT910XDT-1616	DFN1616, tape & reel (3000pcs/bag)

4 Applications

- Home appliances
- Industrial
- Speed Detection
- Position Detection
- Magnetic Encoder
- Ferrous Metal Sensing
- Vibration Sensing
- Weight Sensing

5. Pin Configuration and Functions

	Vcc	Out	GND
DFN1616	1	3	2
Description	Power	Output	Ground

DFN1616
Top-View

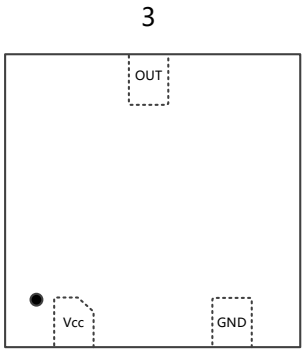


Table of Contents

1 Product Description....1
2 Features....1
3 Product Overview of MT910XDT-1616....1
4 Applications....1
5 Pin Configuration and Functions....1
6 Transfer Characteristics....3
7 Function Description....3
8 Feature Description....3
9 Functional Block Diagram....4
10 Electrical and Magnetic Characteristics....4
10.1 Absolute Maximum Ratings....4
10.2 ESD Ratings....4
10.3 Electrical Specifications....5
10.4 Magnetic Characteristics....6
10.5 Characteristic Performance....7
11 Typical Application Circuit....9
12 Package Material Information....10
12.1 DFN1616 Package Information....11
13 Copy Rights and Disclaimer....12

Reversion History

1 Originally Version

6 Transfer Characteristics

Finure.2 show four sensitivity options enable maximal output voltage swing based on the required sensing range

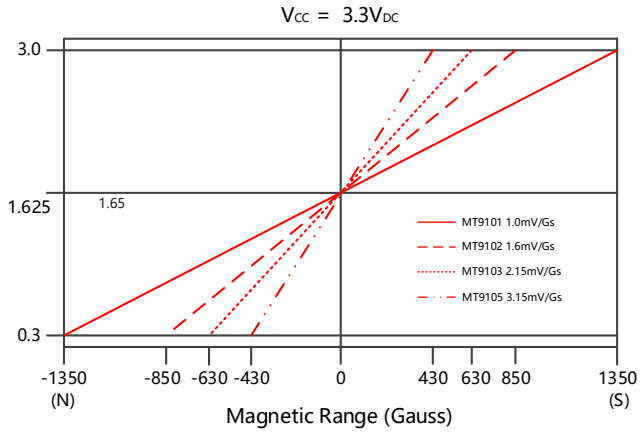


Figure.2 Transfer Characteristics (VCC=3.3V)

7 Function Description

The device produces a linear response when the output voltage is within the specified voltage range. Outside this range, sensitivity is reduced and nonlinear

8 Feature Description

The MT910XDT-1616 device is sensitive to the magnetic field component that is perpendicular to the top of the package

When the magnetic field moving from the left side of the IC to the middle which showed in the left of the Figure.3, the VOUT changing from 0.3 to 1.65V linearity when VCC=3.3V

When the magnetic field located at the middle of the IC which showed in the middle of the Figure.3, the VOUT is 1.65V (1/2 of the VCC=3.3V)

When the magnetic field moving from the middle side of the IC to the right which showed in the right of the Figure.3, the VOUT changing from 1.65 to 3V linearity when VCC=3.3V

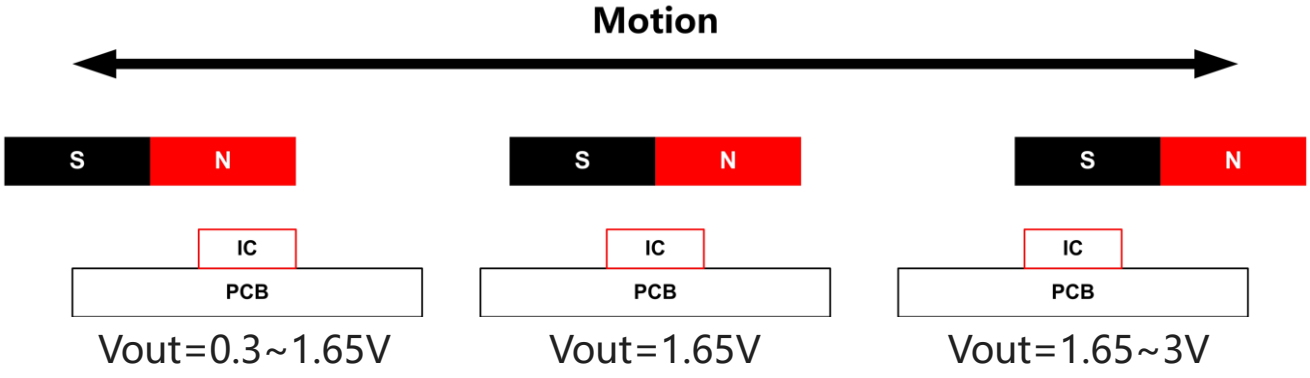


Figure.3 Feature Description

9 Functional Block Diagram

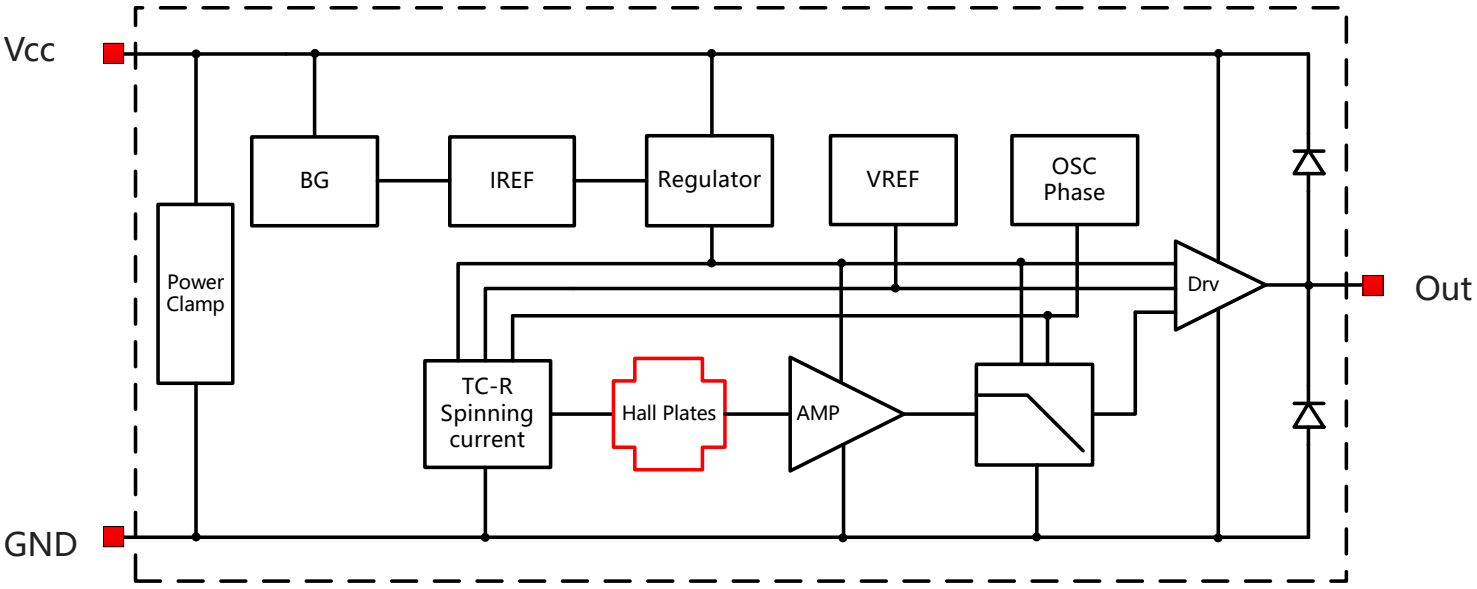


Figure.4 Functional Block Diagram

10 Electrical and Magnetic Characteristics

10.1 Absolute Maximum Ratings

Absolute maximum ratings are limited values to be applied individually, and beyond which the serviceability of the circuit may be impaired. Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

Symbol	Parameters	Min	Max	Units
V_{CC}	Supply Voltage	-	30	V
V_{RCC}	Reverse Battery Voltage	-0.2	-	V
V_{OUT}	Output Voltage	-	30	V
I_{OUT}	Continuous Output Current	-5	5	mA
T_A	Operating Ambient Temperature	-40	150	℃
T_S	Storage Temperature	-40	150	℃
T_J	Junction Temperature	-	165	℃

10.2 ESD Ratings

Symbol		Reference	Values	Unit
V_{ESD}	Human-body model (HBM)	AEC-Q100-002	±3000	V
	Charged-device model (CDM)	AEC-Q100-011	±1000	V

10.3 Electrical Specifications

At T_A=-40~150 ℃, Vcc=3.0V~5.5V (unless otherwise specified)

Symbol	Parameters	Test Condition	Min	Typ	Max	Unit
V_{CC}	Supply Voltage		3.0	-	5.5	V
I_{CC}	Supply Current	V_{CC}=3.3V; B=0	-	6.0	7.0	mA
T_{PO}	Power on Time	$dV_{CC}/dt \geq 5V/us$	-	-	30	us
I_{SINK}	Sink Current	B=0; $V_{OUT}=V_{CC}$	-1.5	-	-	mA
I_{SOURCE}	Source Current	B=0; V_{OUT}=0	-	-	1.5	mA
Bw	Bandwidth		20	30	-	KHz
Fc	Chopper Frequency		-	780	-	KHz
T_{RESP}	Response Time	T_A=25℃	-	15	-	us
T_R	Rise Time	T_A=25℃	-	12	-	us
T_{PD}	Propagation Delay	T_A=25℃	-	5.5	-	us
N_F	Noise	B=0; T_A=25℃	-	1.9	2.6	mG/root(Hz)
		MT9101; T_A=25℃	-	1.46	-	mV_{RMS}
		MT9102; T_A=25℃	-	2.44	-	mV_{RMS}
		MT9103; T_A=25℃	-	3.32	-	mV_{RMS}
		MT9105; T_A=25℃	-	4.88	-	mV_{RMS}
R_{OUT}	Output Resistance	I_{OUT}<=±1.5mA V_{OUT}=2.5V	-	2	4	Ohm
R_L	Output Loading Resistance	I_{OUT}<=1.5mA Output to GND or to V_{CC}	4.7	-	-	Kohm
C_L	Output Loading Capacitance	I_{OUT}<=±1.5mA Output to GND	-	-	10	nF
R_{TH}	Thermal Resistance	DFN1616	-	301	-	℃/W

10.4 Magnetic Characteristics

At T_A=-40~150 ℃, Vcc=3.0V~5.5V (unless otherwise specified)

Symbol	Parameters	Test Condition	Min	Typ	Max	Unit
L_{IN}	Linearity		-1.5	-	1.5	%
V_{NULL}	Quiescent Voltage	V_{CC}=3.3V; B=0 T_A=25℃	1.630	1.650	1.670	V
V_{NULL} (V)	Ratiometry, V_{NULL}		-1.5	-	1.5	%
V_{NULL} (T)	V_{NULL} Variation Over Temperature		-1.5	-	1.5	%
S_{ENS} (T)	S_{ENS} Variation Over Temperature		-10	-	10	%
S_{ENS}	Sensitivity T_A=25℃; Vcc=3.3V	MT9101	0.900	1.000	1.100	mV/Gs
		MT9102	1.464	1.600	1.736	mV/Gs
		MT9103	1.967	2.150	2.333	mV/Gs
		MT9105	2.880	3.150	3.420	mV/Gs
B	Magnetic Field Range T_A=25℃; Vcc=3.3V	MT9101	-	±1350	-	Gs
		MT9102	-	±850	-	Gs
		MT9103	-	±630	-	Gs
		MT9105	-	±430	-	Gs

10.5 Characteristic Performance

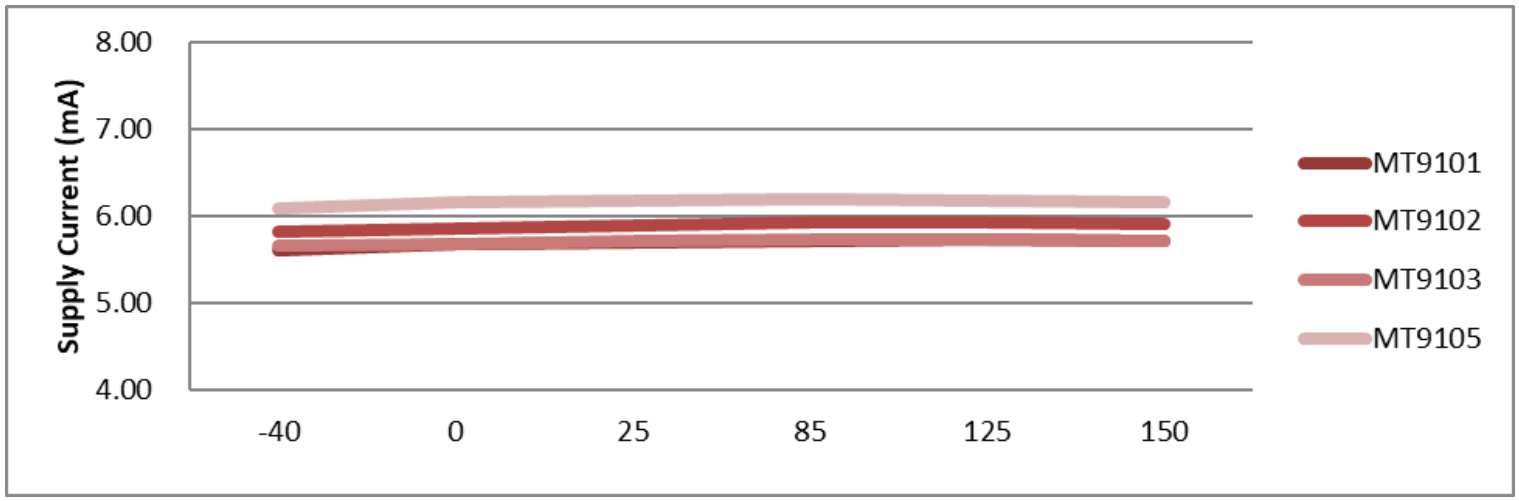


Figure.5 Supply Current vs. Temperature (At Vcc=3.3V)

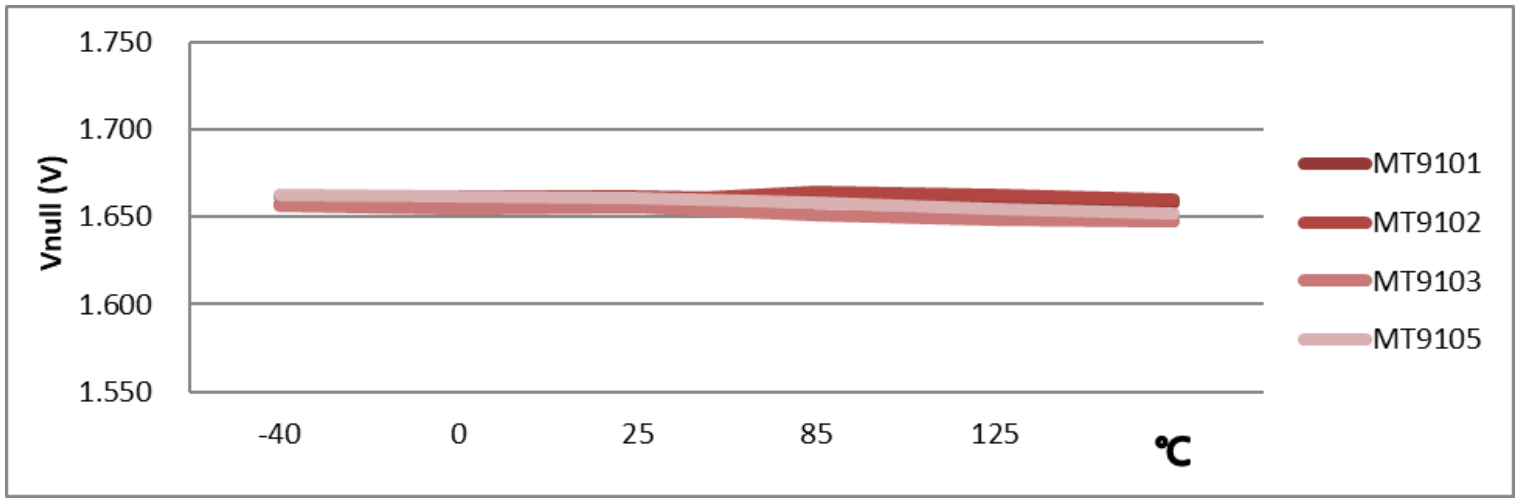


Figure.6 Vnull vs. Temperature (At Vcc=3.3V)

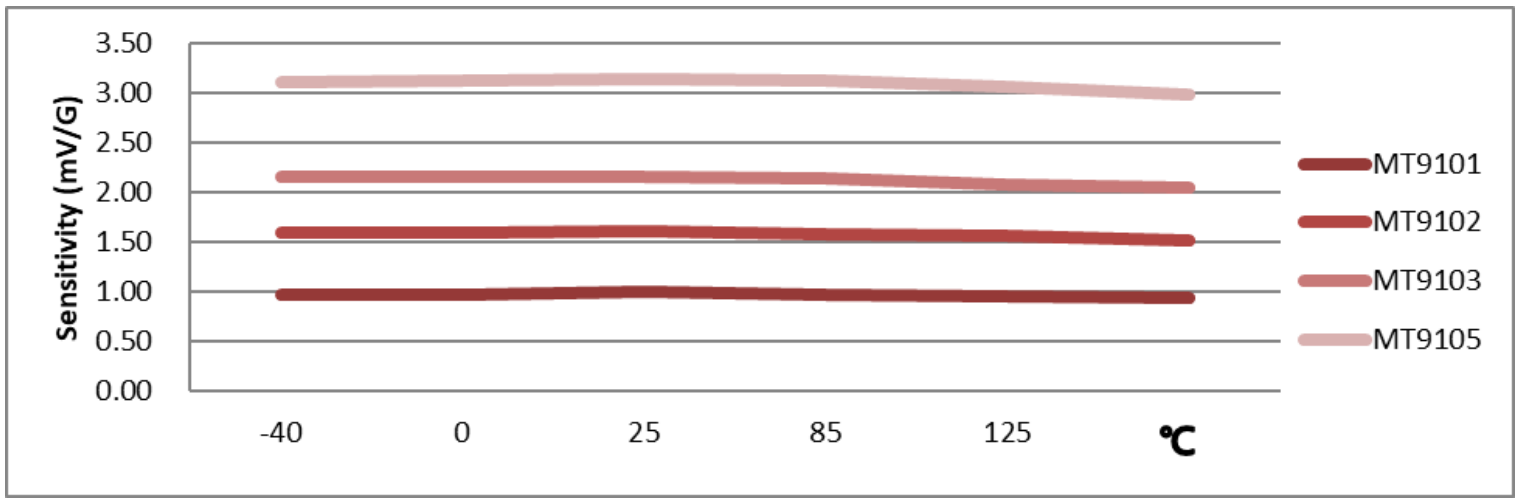


Figure.7 Sensitivity vs. Temperature (At Vcc=3.3V)

10.5 Characteristic Performance (continued)

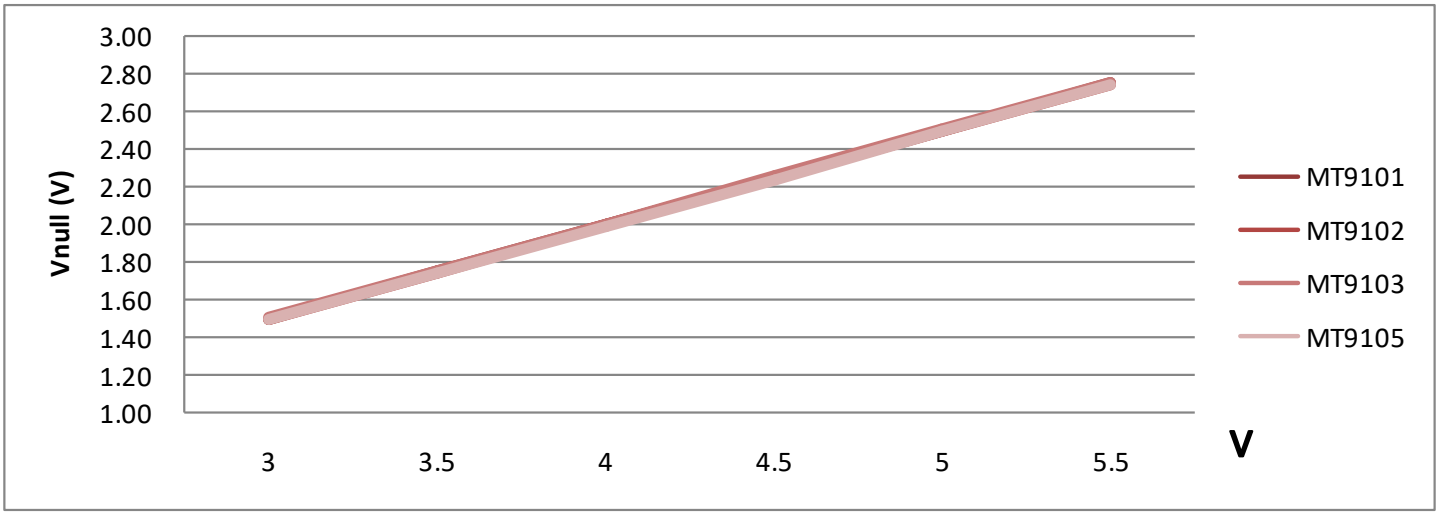


Figure.8 V_{NULL} vs. V_{CC} (At B=0Gs; T_A=25℃)

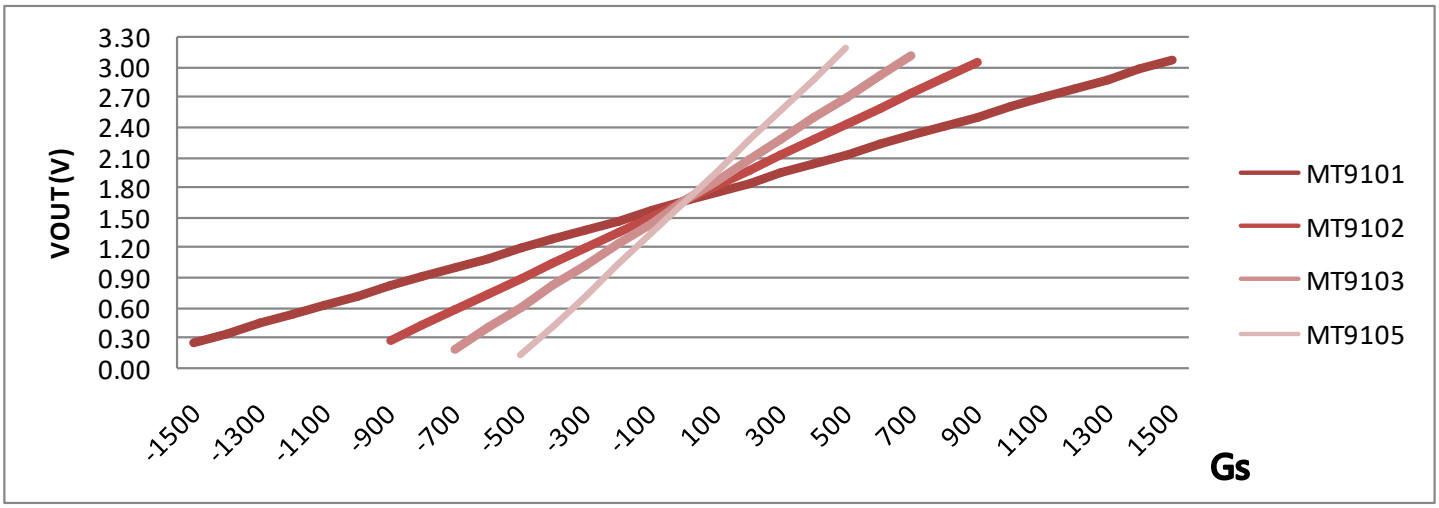


Figure.9 V_{OUT} vs. Magnetic Field (At V_{CC}=3.3V; T_A=25℃)

11 Typical Application Circuit

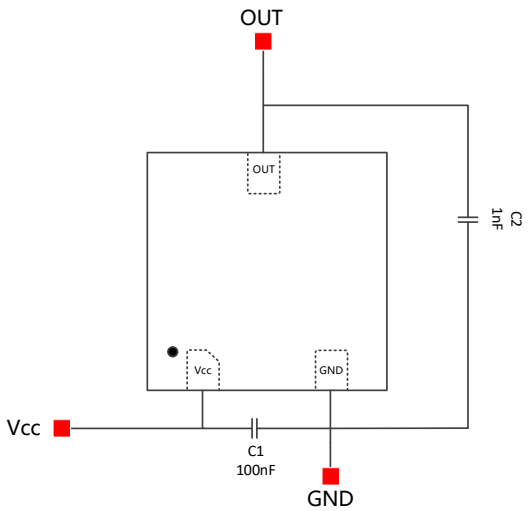


Figure.10 Typical Application Circuit

12 Package Material Information (For Reference Only – Not for Tooling Use)

12.1 DFN1616 Package Information

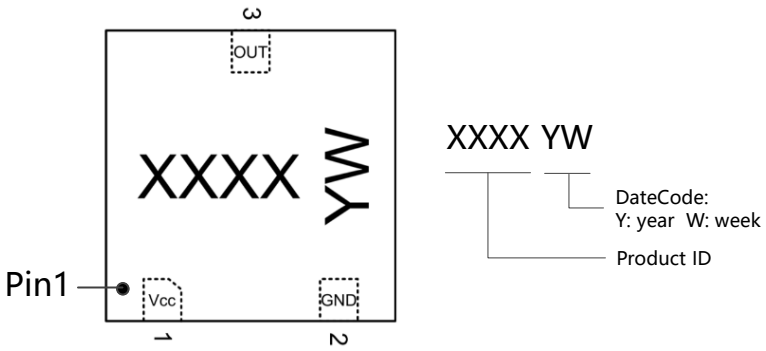
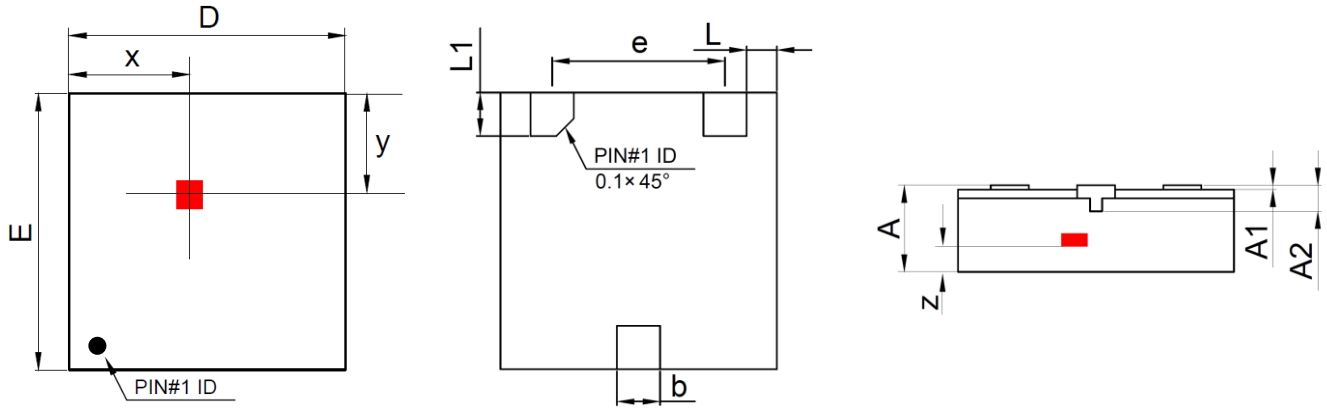


Figure.11 DFN1616 Chip Marking Spec



Top View Bottom View Side View

Figure.12 DFN1616 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.450	0.550	0.018	0.022
A1	0.000	0.050	0.000	0.002
A2	0.150 TYP		0.006 TYP	
L	0.175 TYP		0.007 TYP	
L1	0.200	0.300	0.008	0.012
D	1.550	1.650	0.061	0.065
E	1.550	1.650	0.061	0.065
b	0.200	0.300	0.008	0.012
e	0.950	1.050	0.037	0.041
x	0.800		0.031	
y	0.650		0.026	
z	0.130		0.005	

13 Copy Rights and Disclaimer

1. This document may not be reproduced or duplicated, in any form, in whole or in part without prior written consent of MagnTek . Copyrights © 2019, MagnTek Incorporated.

2. MagnTek reserves the right to make changes to the information published in this document at anytime without notice.

3. MagnTek’ s products are limited for use in normal commercial applications. MagnTek’ s products are not to be used in any device or system, including but not limited to medical life support equipment and system.

For the latest version of this document, please visit our website: www.magntek.com.cn

深圳市满度科技有限公司
Tel:150-1290-5940
Web:www.manduic.com
Email:sales@manduic.com