Distributed By: 955 Industrial Road, San Carlos, CA, 94070 USA
GMW Associates PHONE: +1 650-802-8292 FAX: +1 650-802-8298 EMAIL: sales@gmw.com WEB: www.gmw.com

EQ-732L
Linear Hall IC

Features

- Analog output voltage proportional to the magnetic flux density
- Magnetic sensitivity 40mV/mT (typ.)
- Supply voltage from 3.0V to 5.5V at single power supply
- Operating temperature range from -40°C to 100°C
- Ratio-metric analog output
- 3pin single in-line package (SIP), Halogen free
- Quick response 1μs (typ.)
- Low output noise voltage 3mVp-p

Operational Characteristics

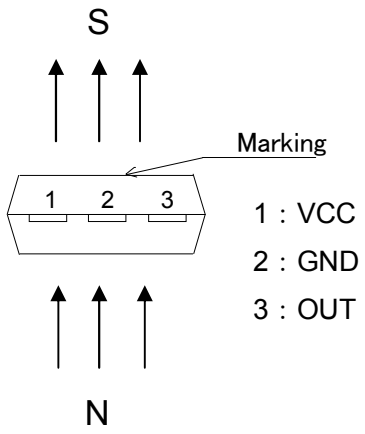


Figure 1.Definition of sensitivity direction

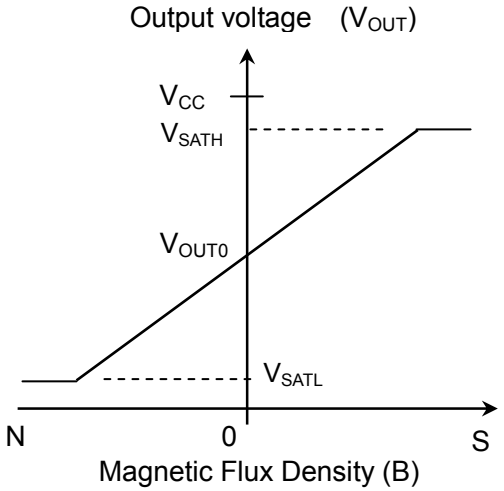


Figure 2.Output characteristics

Block Diagram

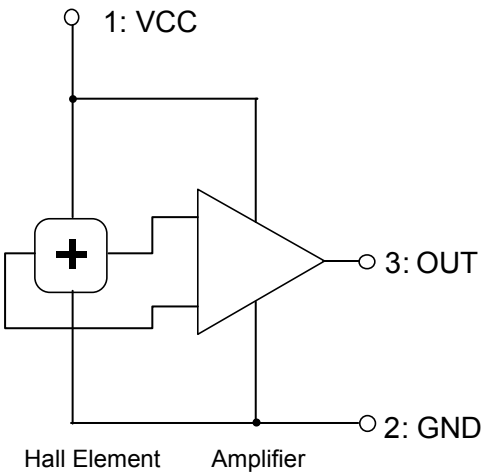


Figure 3.Block diagram

Pin/Function

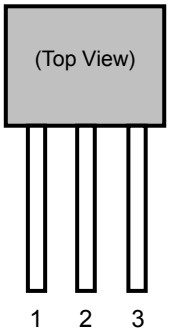


Figure 4.Pin-out diagram

Table 1. Description of pin name and function

Pin No.	Pin Name	Function
1	VCC	Power supply pin
2	GND	Ground pin
3	OUT	Output pin

Absolute Maximum Ratings

Table 2. Absolute maximum ratings (T_A = 25°C)

Parameter	Symbol	Min.	Max.	Unit
Supply voltage	V_{CC}	−0.3	+6.0	V
Output current	I_{OUT}	-1.2	+1.2	mA
Ambient temperature	T_A	−40	+100	°C
Storage temperature	T_{STG}	−40	+125	°C

Note) Stresses beyond these listed values may cause permanent damage to the device.

Recommended Operating Conditions

Table 3. Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	3.0	5.0	5.5	V
Output current	I_{OUT}	−1.0		1.0	mA
Load capacitance	C_L			1000	pF

Electrical & Magnetic Characteristics

Table 4. Electrical & Magnetic Characteristics (T_A = 25°C, V_{CC} = 5V unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	I_{CC}	B = 0mT with no load		9	12	mA
Magnetic sensitivity (*1)	V_h	B = 0、±37mT with no load	34	40	46	mV/mT
Quiescent voltage	V_{OUT0}	B = 0mT	2.4	2.5	2.6	V
Linearity (*2)	ρ	B = 0mT (I_{OUT} = 0mA) B = ±45mT (I_{OUT} = ±1mA)	−0.5		0.5	%F.S.
Output saturation voltage H (*3)	V_{SATH}	I_{OUT} = −1mA	V_{CC}−0.3		V_{CC}	V
Output saturation voltage L (*3)	V_{SATL}	I_{OUT} = 1mA	0		0.3	V
Ratiometry sensitivity error (*4)	V_{h-R}	B = 0、±37mT with no load	−3		3	%
Ratiometry quiescent voltage error (*4)	V_{OUT0-R}	B = 0mT	−3		3	%

(Note: 1mT = 10G)

(*1) See Characteristic Definitions section.
(*2) See Characteristic Definitions section.
(*3) Guaranteed by design.
(*4) Specified only in case Vcc=3.0V, and 5.5V. See Characteristic Definitions section.

Input Voltage Range

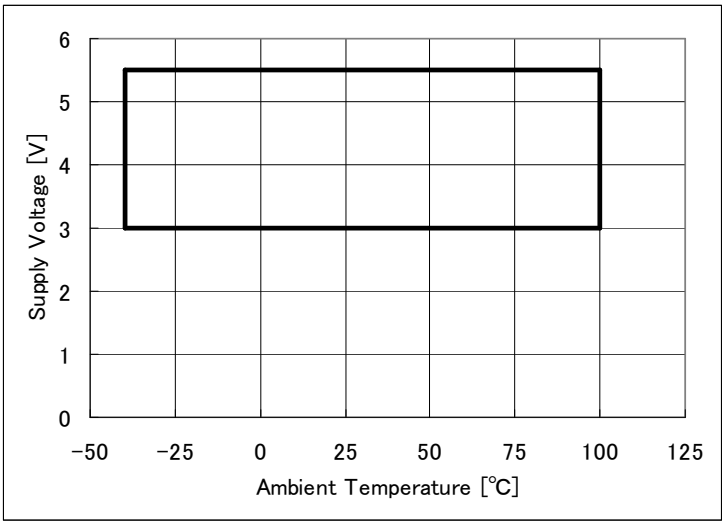


Figure 5.Input voltage range

Typical Characteristics

The following values are for reference only.

＜Electrical Characteristics＞

Table 5. Typical Electrical Characteristics (T_A = 25°C, V_{CC} = 5V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Response time	t_{RES}	Rising; Input magnetic field 90% → Output voltage 90% Falling; Input magnetic field 10% → Output voltage 10% (1~2μs Input magnetic field rising/falling) C_L = 1000pF		1		μs
Rise time	t_{RISE}	Output voltage 10% → 90% (1~2μs Input magnetic field rising/falling) C_L = 1000pF		3		μs
Fall time	t_{FALL}	Output voltage 90% → 10% (1~2μs Input magnetic field rising/falling) C_L = 1000pF				
Reaction time	t_{REAC}	Rising; Input magnetic filed 10% → Output voltage 10% Falling; Input magnetic field 90% → Output voltage 90% (1~2μs Input magnetic field rising/falling) C_L = 1000pF		0.3		μs
Bandwidth	f_T	at −3dB C_L = 1000pF		190		kHz
Output noise	V_{Np-p}			3		mVp-p

(Note: 1mT = 10G)

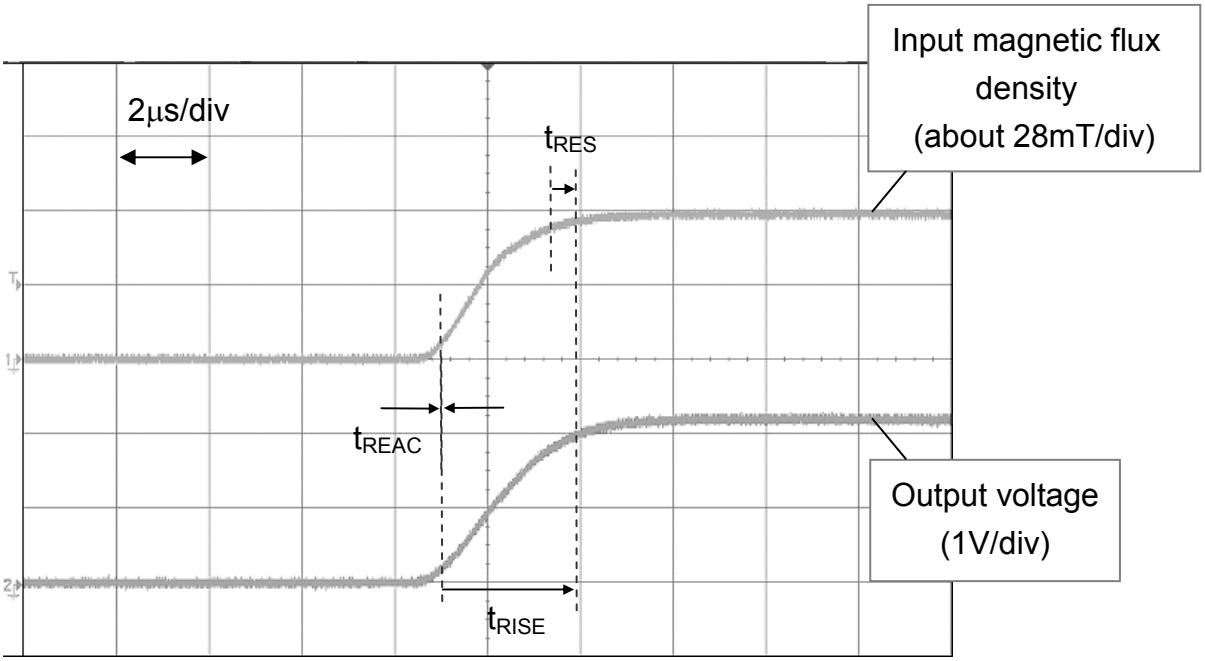


Figure 6.Example of step response

<Temperature Characteristics >

V_{CC} = 5V

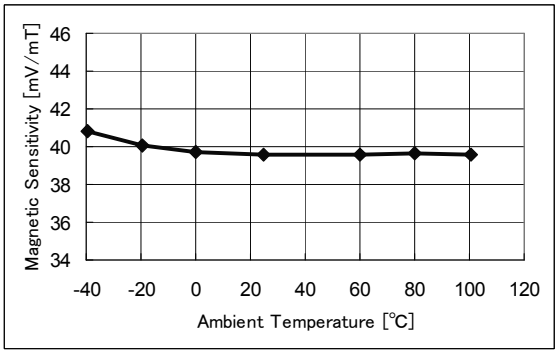


Figure 7.Magnetic sensitivity

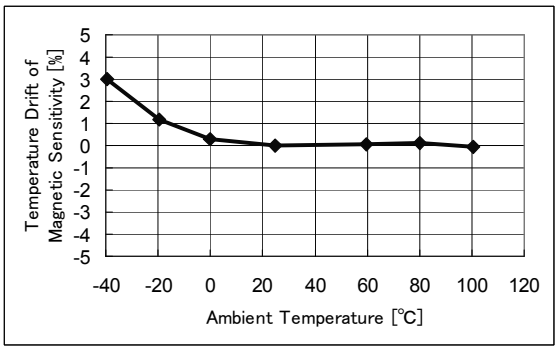
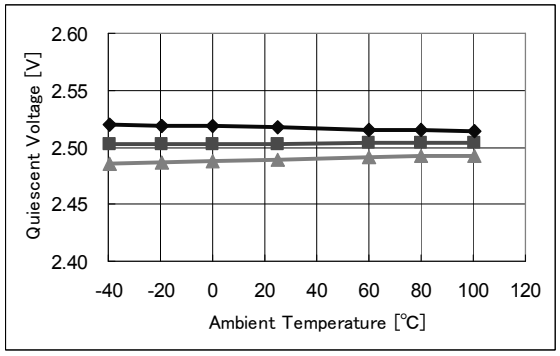
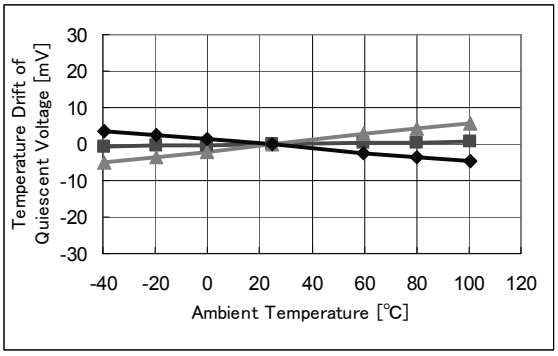


Figure 8. Temperature Drift of Magnetic Sensitivity (Based on T_A = 25°C)



n=3

Figure 9.Quiescent Voltage



n=3

Figure 10.Temperature Drift of Quiescent Voltage (Based on T_A = 25°C)

<Output Characteristics>

T_A = 25°C, V_{CC} = 5V

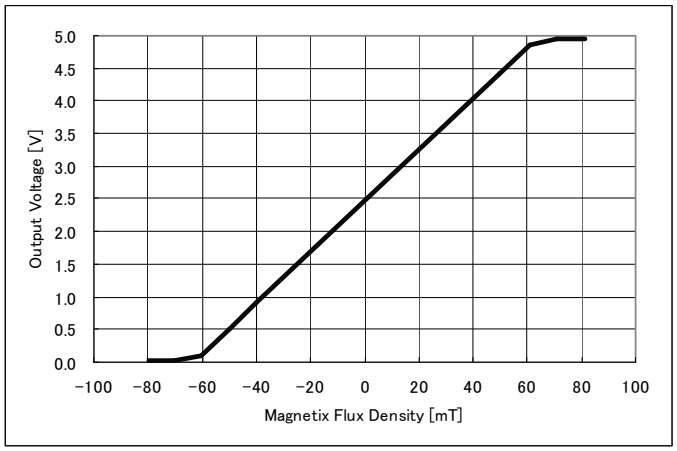


Figure 11.Output characteristics

Characteristic Definitions

(1) Magnetic sensitivity V_h (mV/mT)

Magnetic sensitivity is defined as the slope of the least square regression line of three points in magnetic-electric transformation relation; Quiescent voltage V_{OUT0}, V_{OUT} (+B), V_{OUT} (−B) (B is defined in condition in electrical characteristics table).

(2) Linearity ρ (%F.S.)

Linearity is defined as the ratio of a error voltage against full scale (F.S.). Where error voltage is calculated as the difference of three points (described below) from the straight line described in definition (1) Magnetic sensitivity. The three points are; Quiescent voltage V_{OUT0}, V_{OUT} (+B) and V_{OUT} (−B) (B is defined in condition in electrical characteristics table, and I_{OUT} for each V_{OUT} are defined in measurement condition shown below).

<Measurement Condition>

0mT applied : I_{OUT} = 0mA

+BmT applied : I_{OUT} = +1.0mA（Flow out from output ）

−BmT applied : I_{OUT} = −1.0mA（Flow into output）

$$\rho = \frac{Vout(B) - \{Vh \times B + Vint\}}{Vout(+B) - Vout(-B)} \times 100$$

Where full scale (F.S.) is defied as V_{OUT} (+B) − V_{OUT} (−B), and V_{int} is y-intercept of the line described in definition (1) Magnetic sensitivity.

(3) Ratiometry sensitivity error $V_{h\text{-}R}$ (%) **and Ratiometry quiescent voltage error** $V_{OUT0\text{-}R}$ (%)

Ratiometry error is defined as the ratio of the variation of magnetic sensitivity and quiescent voltage at 3V and 5V as shown in following equations.

$$V_{h\text{-}R} = \frac{\frac{Vh(V_{CC}=3V)}{Vh(V_{CC}=5V)} - \frac{3}{5}}{\frac{3}{5}} \times 100 \qquad V_{OUT0\text{-}R} = \frac{\frac{V_{OUT0}(V_{CC}=3V)}{V_{OUT0}(V_{CC}=5V)} - \frac{3}{5}}{\frac{3}{5}} \times 100$$

(4) Response time t_{RES} (μs)

Response time is defined as the time from 90% reach point of input magnetic field in rise up (10% reach point in fall down) to the 90% reach point of output voltage in rise up (10% reach point in fall down), under a pulse magnetic field input (see Figure .12).

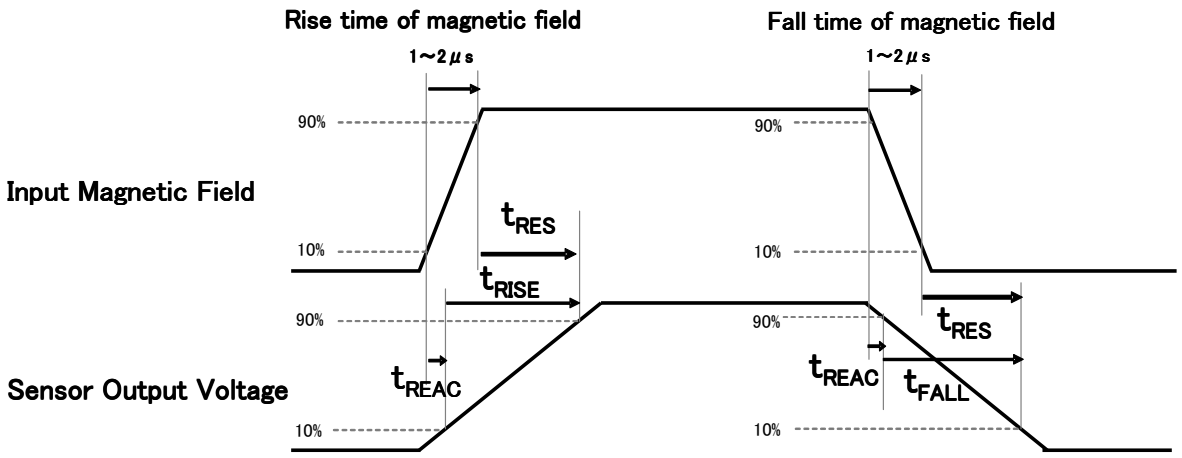
(5) Rise time t_{RISE} **and Fall time** t_{FALL} (μs)

Rise time is defined as the time from 10% reach point to 90% reach point of output voltage, under a pulse magnetic field input (see Figure .12).

Fall time is defined as the time from 90% reach point to 10% reach point of output voltage, under a pulse magnetic field input (see Figure .12).

(6) Reaction time t_{REAC} (μs)

Response time is defined as the time from 10% reach point of input magnetic field in rise up (90% reach point in fall down) to 10% reach point of output voltage in rise up (90% reach point in fall down), under a pulse magnetic field input (see Figure .12).



Note) Rise time and fall time of input pulse magnetic field is 1~2μs.

Figure 12.Relations of the input magnetic field and t_{RES}、t_{RISE}、t_{FALL}、t_{REAC}

Package Outline

（Unit：mm）

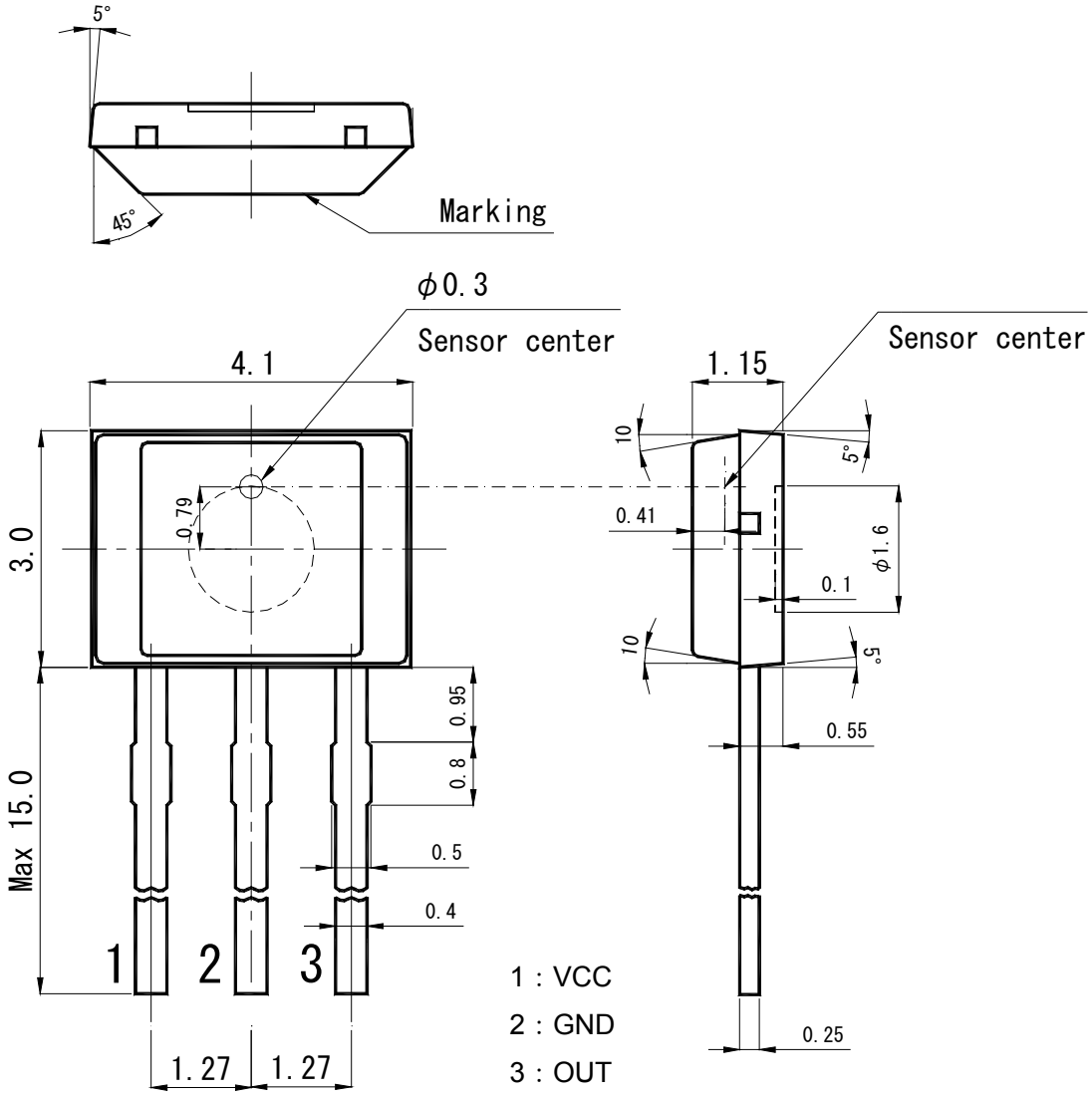


Figure 13.Package outline

Note 1) The center of the sensor is located within the ϕ0.3mm circle.
Note 2) Tolerances of dimension otherwise noted is ±0.1mm.
Note 3) The metal portions on the package side (support lead) are connected to the internal circuits. The support lead should be isolated from the external circuit and the other support lead.

Package type	:	SIP
Material of terminals	:	Cu
Material of plating for terminals	:	Sn 100%
Plating thickness	:	10μm (typ.)

Marking

Marking is performed by laser.

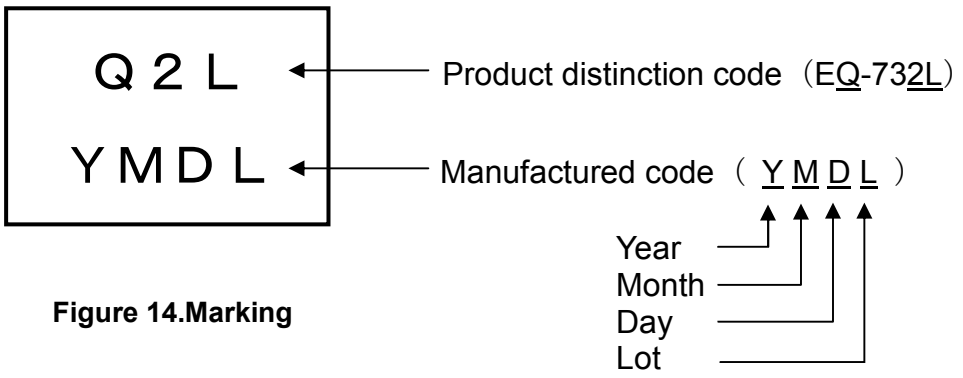


Figure 14.Marking

Recommended External Circuit

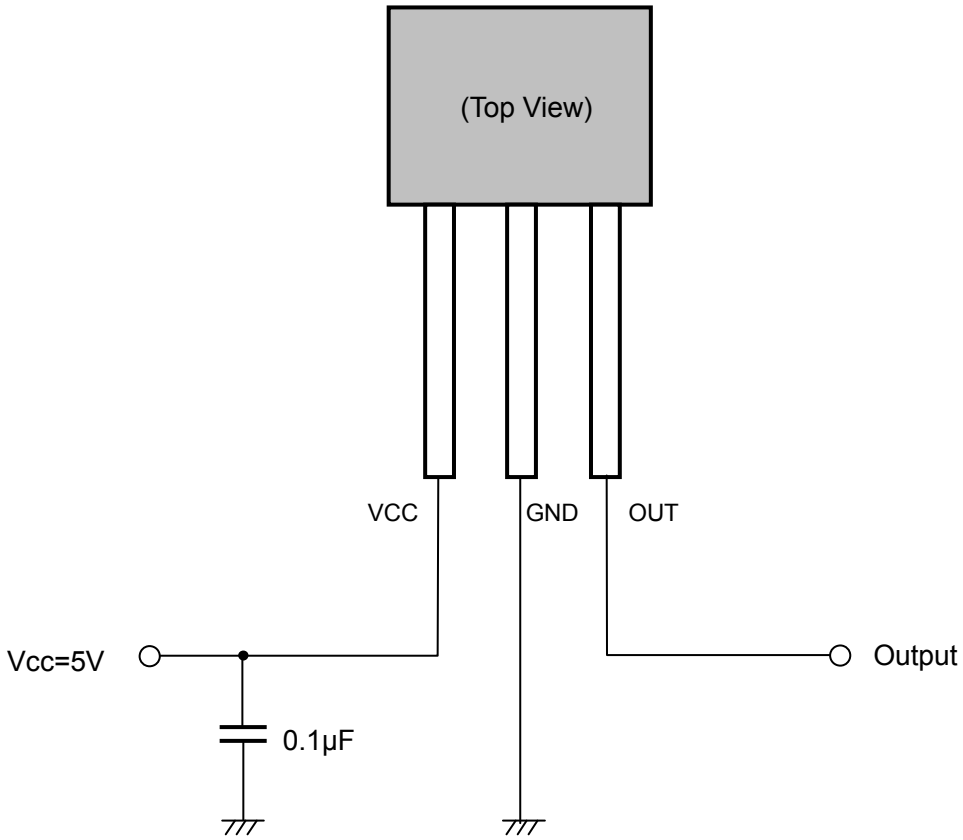


Figure 15.Recommended external circuit

IMPORTANT NOTICE

- These products and their specifications are subject to change without notice.
  When you consider any use or application of these products, please make inquiries the sales office of Asahi Kasei Microdevices Corporation (AKM) or authorized distributors as to current status of the products.
- Descriptions of external circuits, application circuits, software and other related information contained in this document are provided only to illustrate the operation and application examples of the semiconductor products. You are fully responsible for the incorporation of these external circuits, application circuits, software and other related information in the design of your equipments. AKM assumes no responsibility for any losses incurred by you or third parties arising from the use of these information herein. AKM assumes no liability for infringement of any patent, intellectual property, or other rights in the application or use of such information contained herein.
- Any export of these products, or devices or systems containing them, may require an export license or other official approval under the law and regulations of the country of export pertaining to customs and tariffs, currency exchange, or strategic materials.
- AKM products are neither intended nor authorized for use as critical components$_{Note1)}$ in any safety, life support, or other hazard related device or system$_{Note2)}$, and AKM assumes no responsibility for such use, except for the use approved with the express written consent by Representative Director of AKM. As used here:

  Note1) A critical component is one whose failure to function or perform may reasonably be expected to result, whether directly or indirectly, in the loss of the safety or effectiveness of the device or system containing it, and which must therefore meet very high standards of performance and reliability.

  Note2) A hazard related device or system is one designed or intended for life support or maintenance of safety or for applications in medicine, aerospace, nuclear energy, or other fields, in which its failure to function or perform may reasonably be expected to result in loss of life or in significant injury or damage to person or property.
- It is the responsibility of the buyer or distributor of AKM products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the above content and conditions, and the buyer or distributor agrees to assume any and all responsibility and liability for and hold AKM harmless from any and all claims arising from the use of said product in the absence of such notification.