

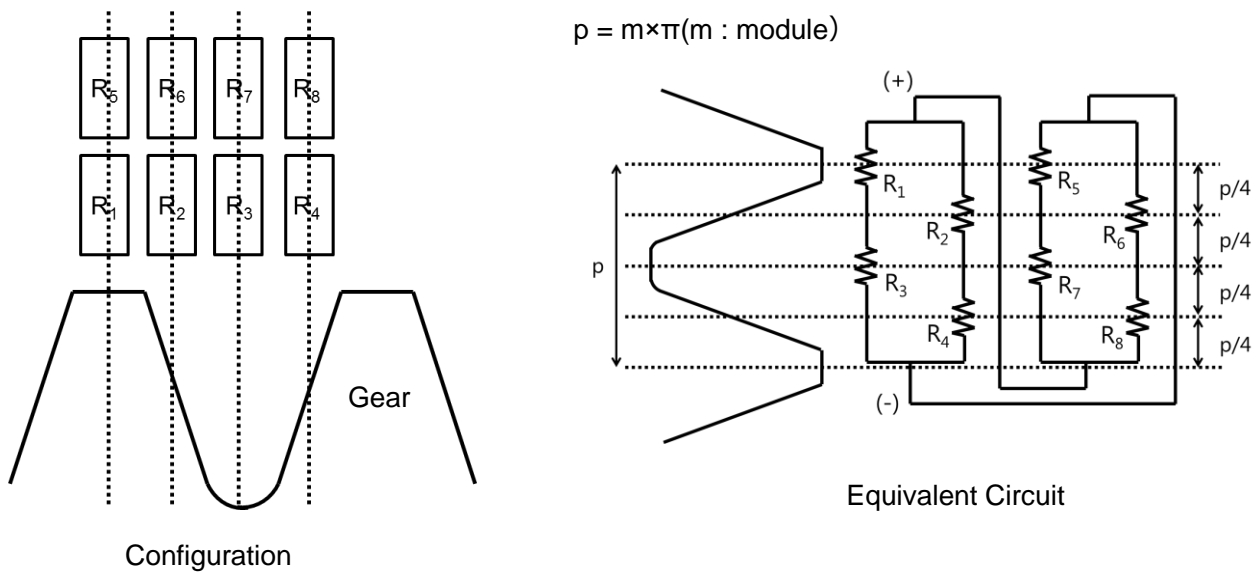


MS0083

Semiconductor Magnetoresistive Element

Semiconductor Magnetoresistive Element Composition

MS0083 generates differential A+/A-, B+/B- phase analog output voltages by combining module $m=0.8$ gear and bias magnet.



Application

Motor control application (AC servo motor, robot, CNC spindle motor etc.)

Since the analog output voltages produced by SMRE show sine/cosine waves with little distortion corresponding to gear rotation, it is possible to transform the voltages to angle of gear rotation with high resolution over the 20bit by electrical interpolation. It is suitable for high accuracy motor control application and other.

Feature

- Design optimized for 64 to 128 teeth gears of $m=0.8$
 - In $B=0T$, $R_3 < R_1$, $R_2 < R_4$ ($R_7 < R_5$, $R_6 < R_8$), offset voltage is decrease combining gear and bias magnet
- Outputs of analog voltage of ideal sine/cosine wave
- Differential outputs of A+/A- and B+/B- phase

Pin out



1. A-
2. A+
3. VIN
4. B+
5. GND
6. B-

*A+ and A- are differential signal.

*B+ and B- are differential signal.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Junction Temperature	T_j	-50	150	°C	
Storage Temperature	T_{stg}	-50	150	°C	

WARNING: Operation beyond these limits may cause permanent damage to the device. Even if it does not lead to destruction, reliability and life may be adversely affected. Normal operation is not guaranteed at these extremes.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Temperature	T_a	-40		125	°C	
Max. Input Power	PD			450	mW	$T_a=25^\circ\text{C}$

WARNING: Electrical and magnetic characteristics are not guaranteed when operated beyond these conditions.

Magnetic & Electrical Characteristics

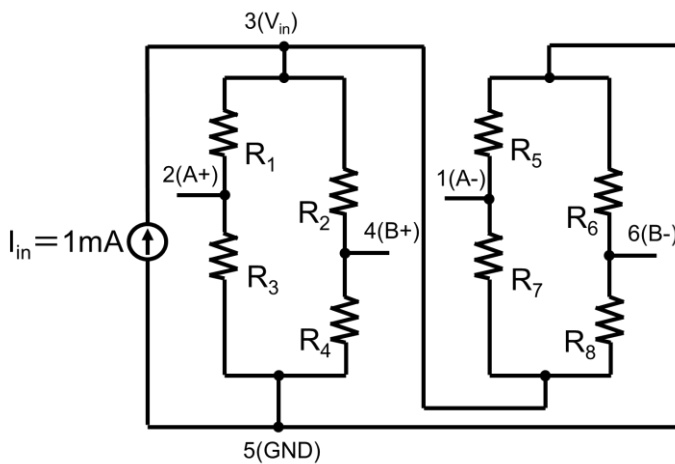
Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Input Resistance	$R_{in}(0)$	$I_{in}=1mA$ $B=0T$	290		480	Ω	*1
Input Resistance Change Ratio	$\Delta R_{in} / R_{in}$	$I_{in}=1mA$ $B=0/0.45T$	130			%	*2
Phase-A+/B- Voltage	$V_{A+}(0)$ $V_{B-}(0)$	$V_{in}=5V$, $B=0T$	2.430		2.490	V	*3
Phase-A-/B+ Voltage	$V_{A-}(0)$ $V_{B+}(0)$	$V_{in}=5V$, $B=0T$	2.510		2.570	V	*3
Phase- A+/B- Voltage	$V_{A+}(B)$ $V_{B-}(B)$	$V_{in}=5V$, $B=0.45T$	2.440		2.480	V	*4
Phase- A-/B+ Voltage	$V_{A-}(B)$ $V_{B+}(B)$	$V_{in}=5V$, $B=0.45T$	2.520		2.560	V	*4

Unit T means Tesla. (1T=10kGauss)

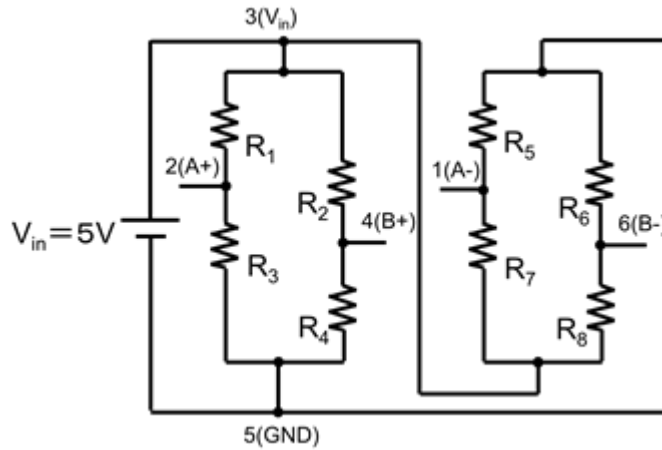
*1 $R_{in}(0)$: Resistance between 3(V_{in}) and 5(GND) in $B=0T$.

*2 $\Delta R_{in} / R_{in} = (R_{in}(B) - R_{in}(0)) / R_{in}(0)$ $R_{in}(B)$: $B=0.45T$



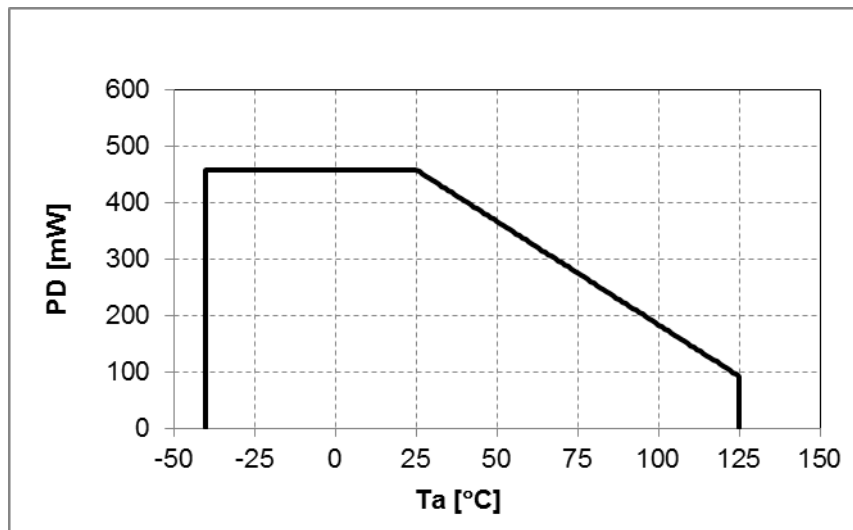
Measurement circuit of $R_{in}(0)$, $\Delta R_{in} / R_{in}$

- *3 $V_{A+}(0)$: Output Voltage of 2(A+) with $3(V_{in})=5V$ and $B=0T$
 $V_{A-}(0)$: Output Voltage of 1(A-) with $3(V_{in})=5V$ and $B=0T$
 $V_{B+}(0)$: Output Voltage of 4(B+) with $3(V_{in})=5V$ and $B=0T$
 $V_{B-}(0)$: Output Voltage of 6(B-) with $3(V_{in})=5V$ and $B=0T$
- *4 $V_{A+}(B)$: Output Voltage of 2(A+) with $3(V_{in})=5V$ and $B=0.45T$
 $V_{A-}(B)$: Output Voltage of 1(A-) with $3(V_{in})=5V$ and $B=0.45T$
 $V_{B+}(B)$: Output Voltage of 4(B+) with $3(V_{in})=5V$ and $B=0.45T$
 $V_{B-}(B)$: Output Voltage of 6(B-) with $3(V_{in})=5V$ and $B=0.45T$



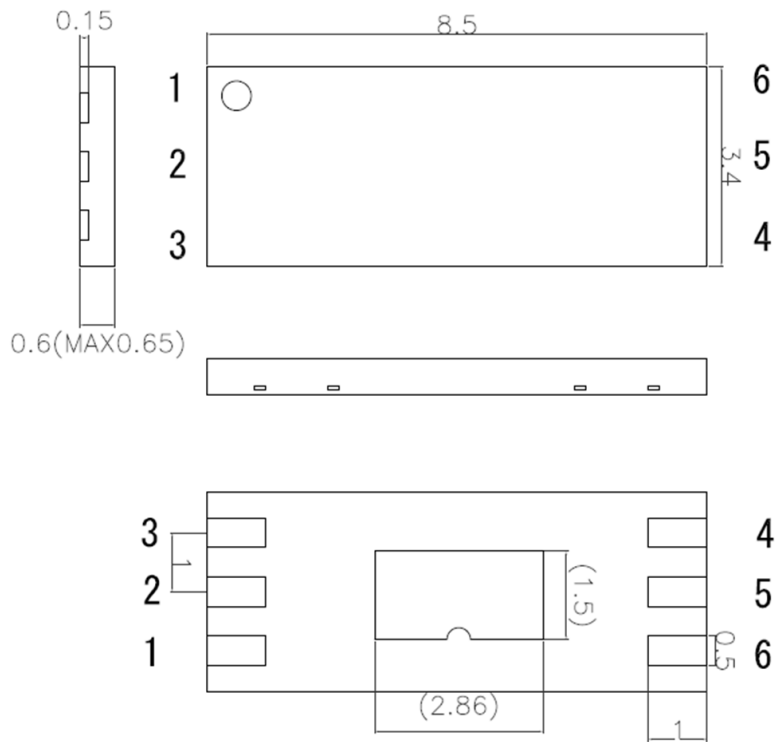
Measurement circuit of $V_{A+}(0)$, $V_{B+}(0)$, $V_{A-}(0)$, $V_{B-}(0)$, $V_{A+}(B)$, $V_{B+}(B)$, $V_{A-}(B)$, $V_{B-}(B)$

Power Dissipation



Package Information

Unit: mm



Material of terminals: Copper alloy

Material of plating: Sn 100%

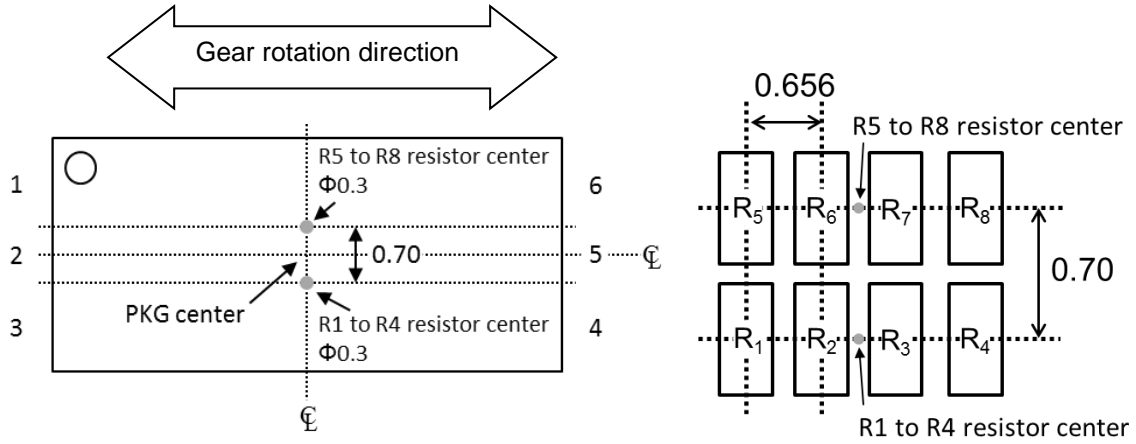
*Halogen free

Note1) The tolerance of dimensions with no mention is ± 0.1 mm.

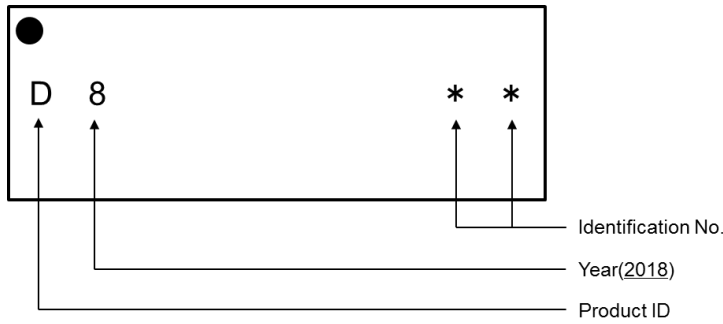
Note2) The metal portions on the package side (support lead) and the center metal area (1.5mm \times 2.86mm) on the package bottom should be isolated from the external circuit and the other support lead. Also, soldering is prohibited.

Resistor Positioning and Alignment (reference)

Unit: mm



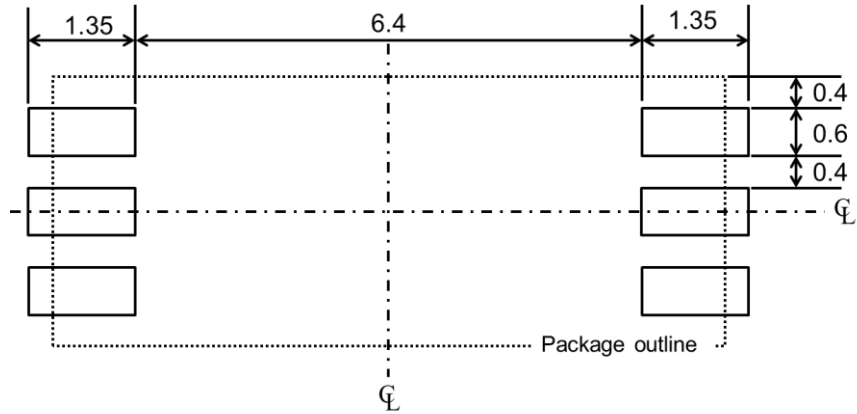
Marking



Mark	Product ID	Mark	Corresponding Year
1		0	2020
2		1	2021
3		2	2022
4		3	2023
5		4	2024
6		5	2025
7		6	2026
8		7	2027
9		8	2018
0		9	2019
A			
B			
C			
D	MS0083		

Recommended Land Pattern (reference)

Unit: mm



RoHS Compliance

MS0083 is compliant with RoHS Directive 2002/95/EC.

Revision History

Date (Y/M/D)	Revision	Reason	Page	Contents
2018/09/11	00	-	-	First edition

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