

DATA SHEET

HGPRDT005A

ALPSALPINE ALPSALPINE CO., LTD.

HEAD OFFICE
1-7, YUKIGAYA-OTSUKA-MACHI, OTA-KU, TOKYO, 145-8501, JAPAN
PHONE +81(3)3726-1211 FAX +81(3)3728-1741
NAGAOKA PLANT
1-3-5, HIGASHITAKAMI-MACHI, NAGAOKA-CITY, NIIGATA-PREF, 940-0006, JAPAN
PHONE +81 258-24-4111 FAX +81 258-24-4110

This specification is subject to change without notice.

List of Contents

1	Product Description	製品説明	3
1.1	Overview	概要	3
1.2	Target Appliations	ターゲットアプリケーション	3
2	Functional Description	機能説明	4
2.1	Pin Configuration	ピン配置	4
2.2	Pin Description	ピン機能	4
2.3	Block Diagram	ブロックダイアグラム	4
3	Specifications	仕様	5
3.1	Application Circuit	アプリケーション回路	5
3.2	Absolute Maximum Ratings	絶対最大定格	5
3.3	Recommended Operating Conditions	推奨動作条件	6
3.4	Basic Characteristics	基本特性	6
3.5	Magnetc Characteristics	磁気特性	7
4	Package Information	パッケージ情報	8
4.1	Package Outline	外形図	8
4.2	Footprint	フットプリント	8
4.3	Distance between Chip and Package	チップ/パッケージ間距離	9
4.4	Package Marking	捺印	9
4.5	Structure	構造	10
5	Packing Specifications	梱包仕様	11
5.1	Packing Information	梱包情報	11
6	Precautions When Handling Magnetic Sensor	製品お取り扱い時の注意	12
6.1	Storage Environment	保管環境	12
6.2	Long-term Storage	長期保管	12
6.3	ESD	静電気ESD	12
7	Legal Disclaimer	法的放棄声明	13
Appendix			
A1	List of Figures	図のリスト	14
A2	List of Tables	表のリスト	14
A3	Revision History	改定履歴	15

1 Product Description 製品説明**1.1 Overview 概要**

ALPS Product No.	HGPRDT005A
Characteristic	Pitch Free Encoder
Package type	SOT-23
Supply Voltage	3.0 to 30 V
Supply Current	3mA
Interface	Open Drain Output
Temperature	-40 to 140 deg.C

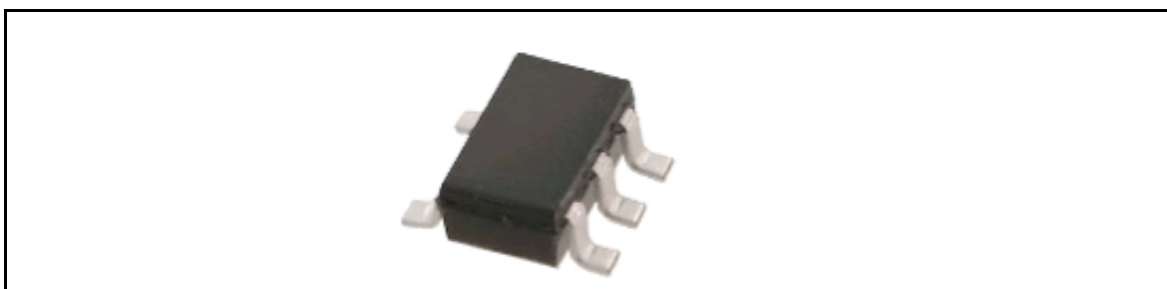


Figure 1-1 Image of HGPRDT005A in the SOT-23-5 Package

1.2 Target Appliations ターゲットアプリケーション

Automotive
Industrial
Building Automation
Office Automation
Home Appliance

2 Functional Description 機能説明

2.1 Pin Configuration ピン配置

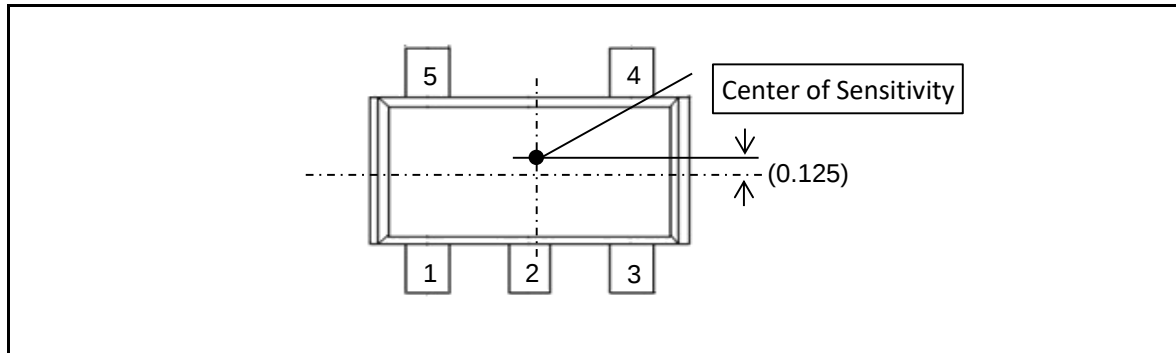


Figure 2-1 Pin Configuration and Center of Sensitive Area

2.2 Pin Description ピン機能

Table2-1 Pin Description

Pin No.	Symbol	Function
1	OUT2	Output2
2	GND	Ground
3	NC	No Connection
4	VDD	Supply voltage
5	OUT1	Output1

2.3 Block Diagram ブロックダイアグラム

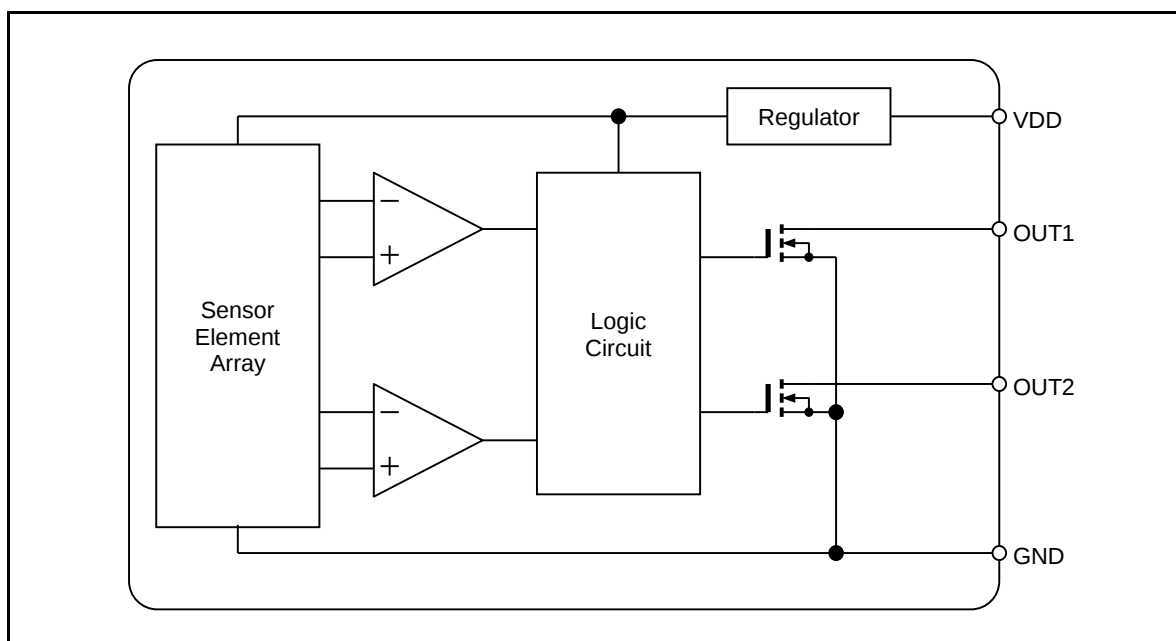


Figure 2-2 Functional Block Diagram

3 Specifications 仕様

3.1 Application Circuit アプリケーション回路

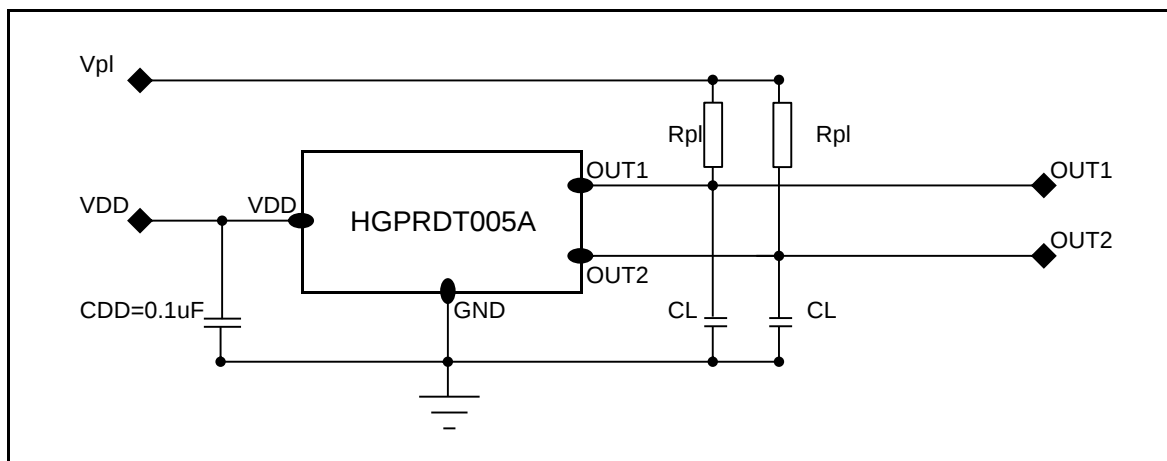


Figure 3-1 Application Circuit Example

3.2 Absolute Maximum Ratings 絶対最大定格

Table3-1 Absolute Maximum Rating Parameters

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Supply Voltage	VDD	-0.3	-	40	V	
Pull-up Voltage	Vpl	-0.3	-	40	V	
Output Current	Isink	-	-	30	mA	
Operating Temperature	Top	-40	-	120	deg.C	VDD =30V
		-40	-	140	deg.C	VDD =9V
Storage Temperature	Tst	-40	-	150	deg.C	
Magnetic Field	Hmax	-	-	200	mT	

[note]

The maximum rating is the value that must not be exceeded it even if it is momentary. There is a possibility of the breakdown and/or destruction when this value is exceeded.

最大定格とは、たとえ瞬間的であっても超えてはならない値であり、この値を超えた場合、故障・破壊の可能性があります。

Even if it is use within the maximum rating, continuous use on a high stress (high temperature and high superimposed voltage/large current drive, etc.) might spoil the product reliability.

最大定格内の使用であっても高負荷(高温および高電圧印加／大電流駆動etc.)での連続使用は製品の信頼性を低下させる恐れがあります。

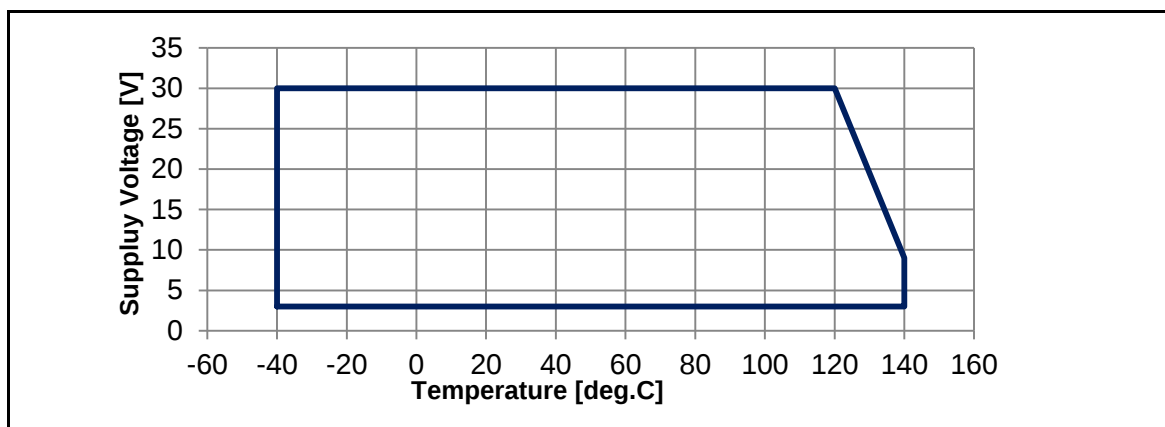


Figure 3-2 Operating Range about Supply Voltage and Temperature

3.3 Recommended Operating Conditions 推奨動作条件

Table3-2 Recommended Operating Conditions Parameters

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Supply Voltage	VDD	3	12	30	V	see Figure3-1
Pull-up Voltage	Vpl	3	5	30	V	
Output Current	Isink	-	-	10	mA	
Pull-up Resistance	Rpl	3	3.3	30	kOhm	
Load Capacitance	CL	10	30	1000	pF	
Bypass capacitor	CDD	0.1	-	-	μF	Required
Magnetic Field	Hop	5	-	60	mT	Horizontal field

3.4 Basic Characteristics 基本特性

Table3-3 General Electrical Characteristics

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Supply Current	IDD	-	3	5	mA	
Output Saturation Voltage	Vsat	-	-	0.4	V	VDD=12V Isink=10mA
Output Voltage	Vout	VOH	Vpl-0.1	-	V	"Hi" Level
		VOL	-	Vsat	V	"Lo" Level
Duty Ratio	D	40	50	60	%	see Fig.3-2
Phase Difference	Pdiff	75	90	105	deg.	see Fig.3-2

[note]

Unless otherwise specified, measurement condition is as follows.

VDD=12V, Vpl=5V, Rpl=3.3kΩ, CL=30pF, T=25deg.C with application circuit described in Figure3-3.

A magnet with 2 poles shall be rotated ideally on the top of sensor package.

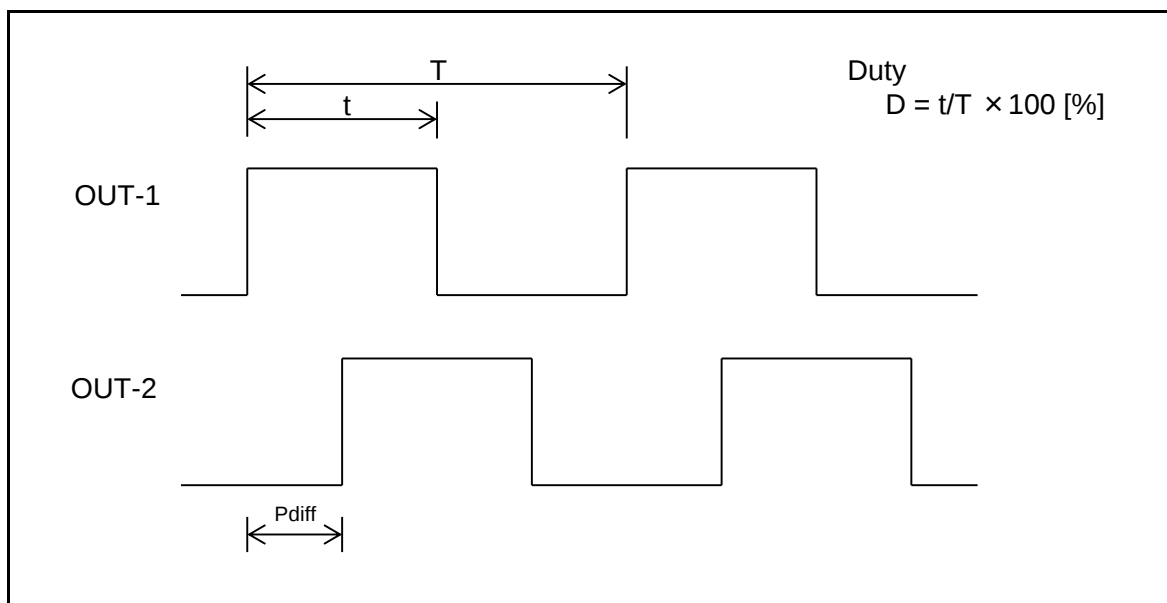


Figure 3-3 Duty and Phase Difference

3.5 Magnetic Characteristics 磁気特性

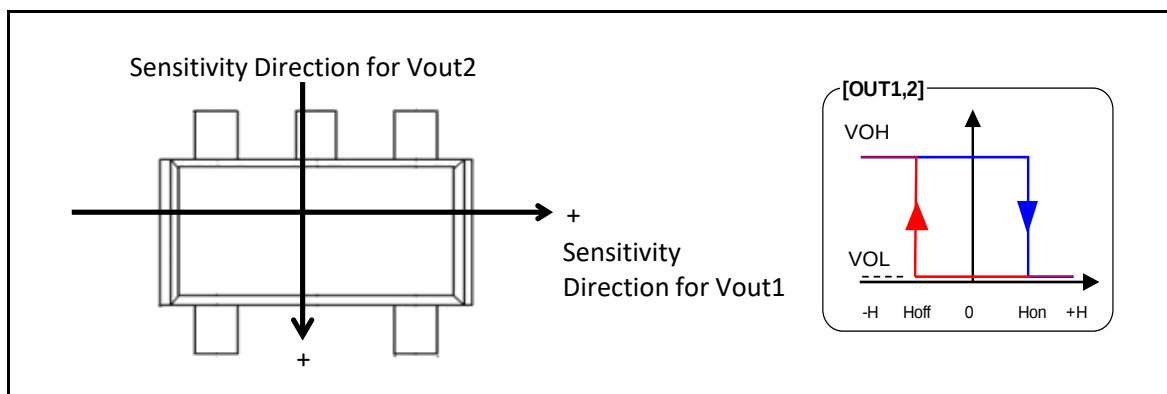


Figure 3-4 Definition of Sensitivity Direction

Table3-4 Operating Magnetic Field

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Operating Magnetic Field	Hon	-	0.8	(1.6)	mT	25deg.C
	Hoff	(-1.6)	-0.8	-	mT	
	Hhys	-	1.6	-	mT	

[note]

In case of applying magnetic field only sensor sensitivity direction for each

4 Package Information パッケージ情報

4.1 Package Outline 外形図

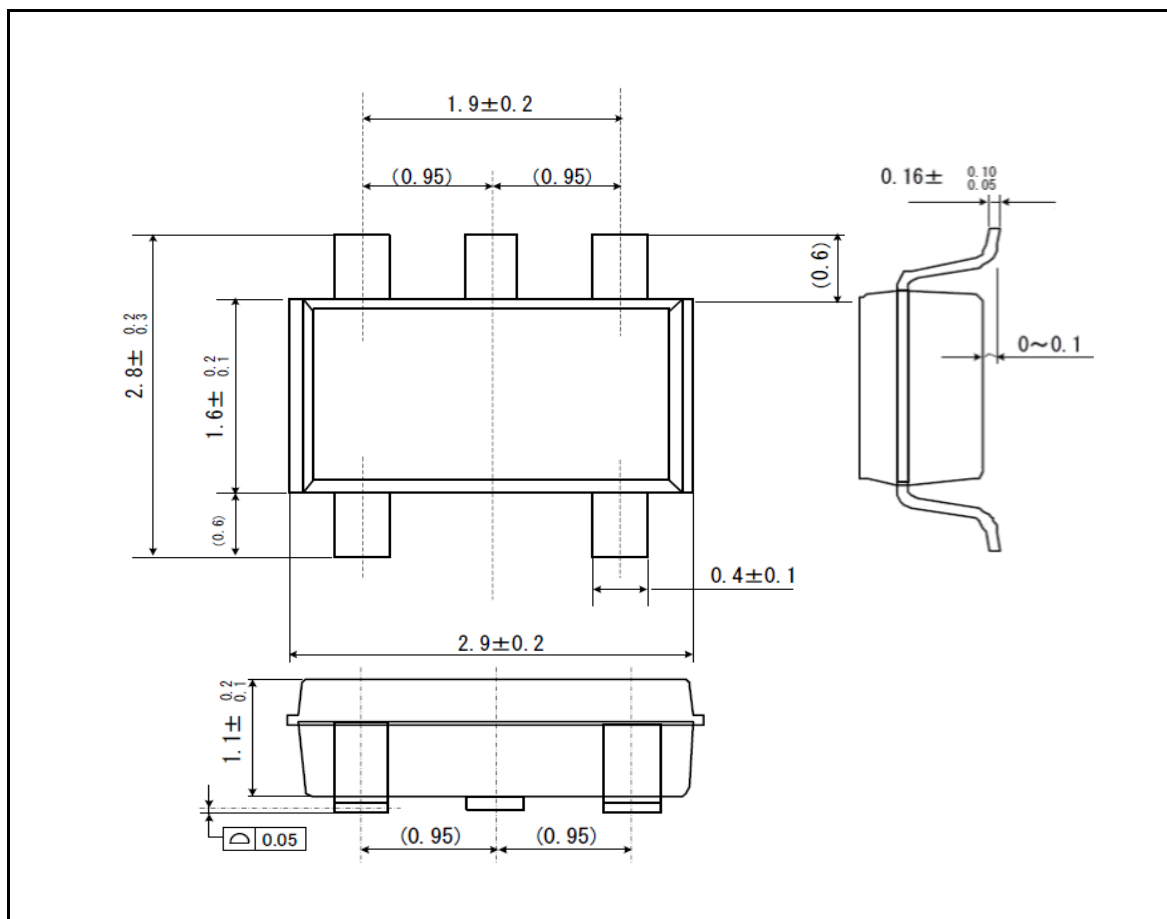


Figure 4-1 Package Outline (All dimensions in mm)

4.2 Footprint フットプリント

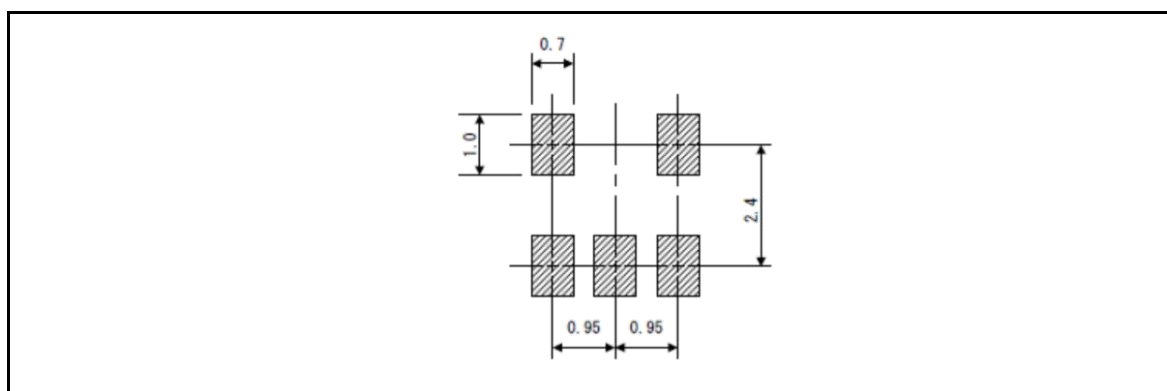


Figure 4-2 Footprint

4.3 Distance between Chip and Package チップ/パッケージ間距離

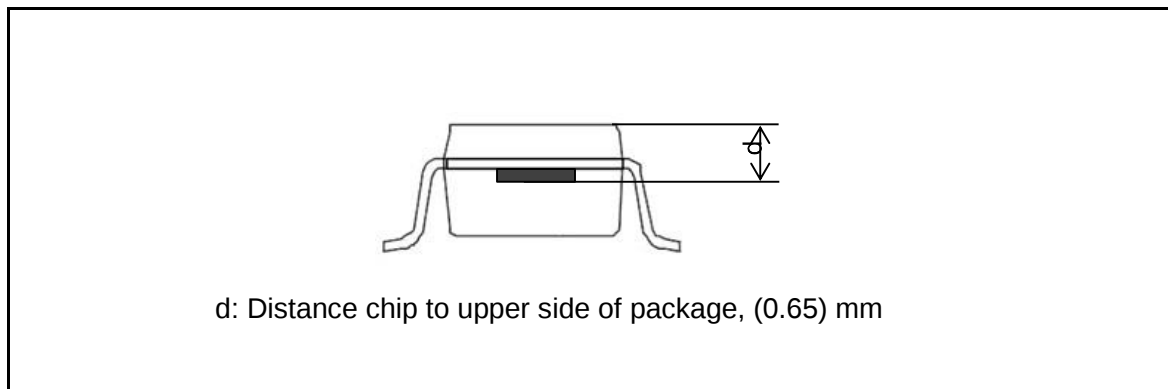


Figure 4-3 Distance between chip and package

4.4 Package Marking 捺印

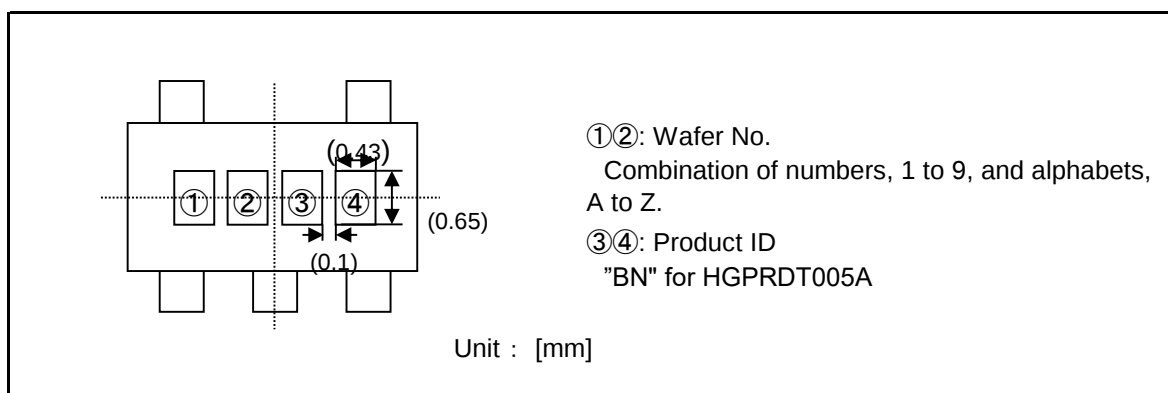


Figure 4-4 Marking of HGPRDT005A

4.5 Structure 構造

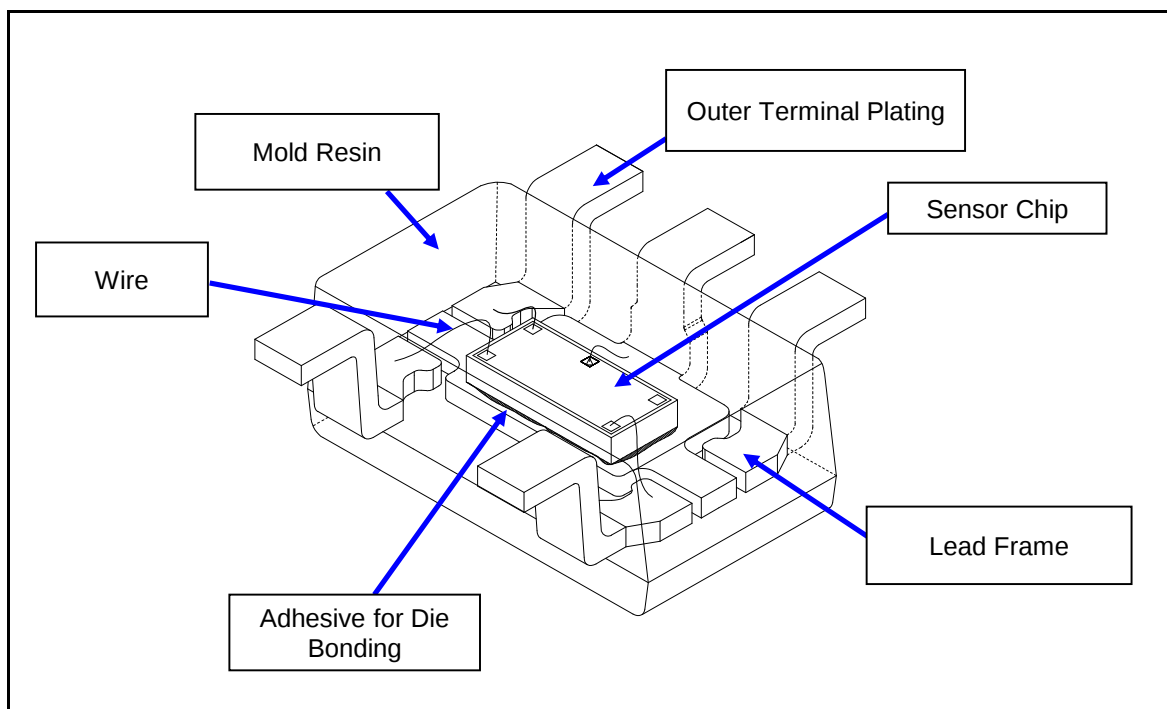


Figure 4-5 Internal Structure

Table 4-1 Components

Process	Parts Name	Materials
Die Mount	Sensor Chip	Si
	Adhesive for Die Bonding	Silver Paste
	Lead Frame	Cu, Ag-Plating
Wire Bonding	Wire	Au
Molding	Mold Resin	Epoxy Resin
Terminal Plating	Outer Terminal Plating	Sn-Bi

5 Packing Specifications 梱包仕様

5.1 Packing Information

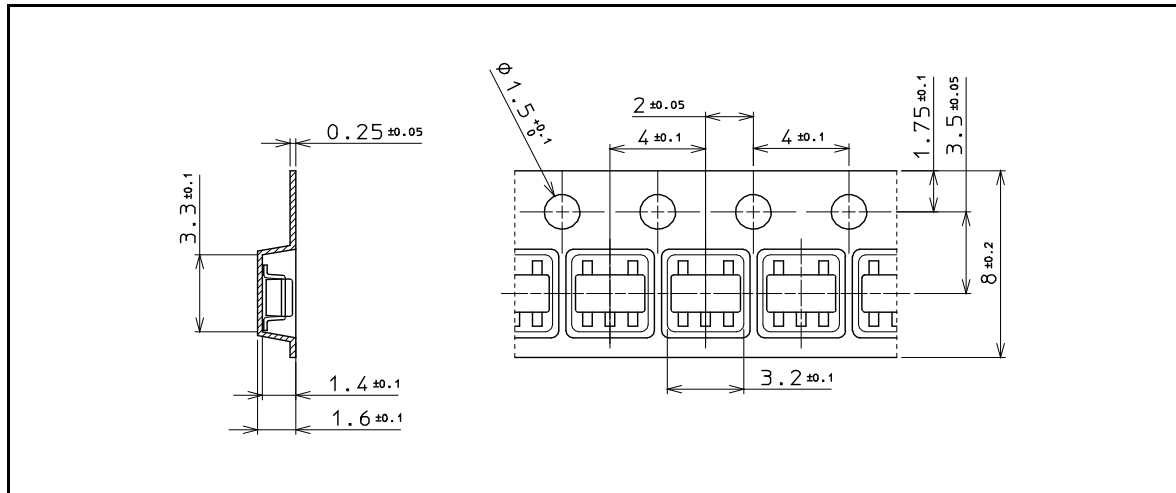


Figure 5-1 Packing of the HGPRDT005A in a tape

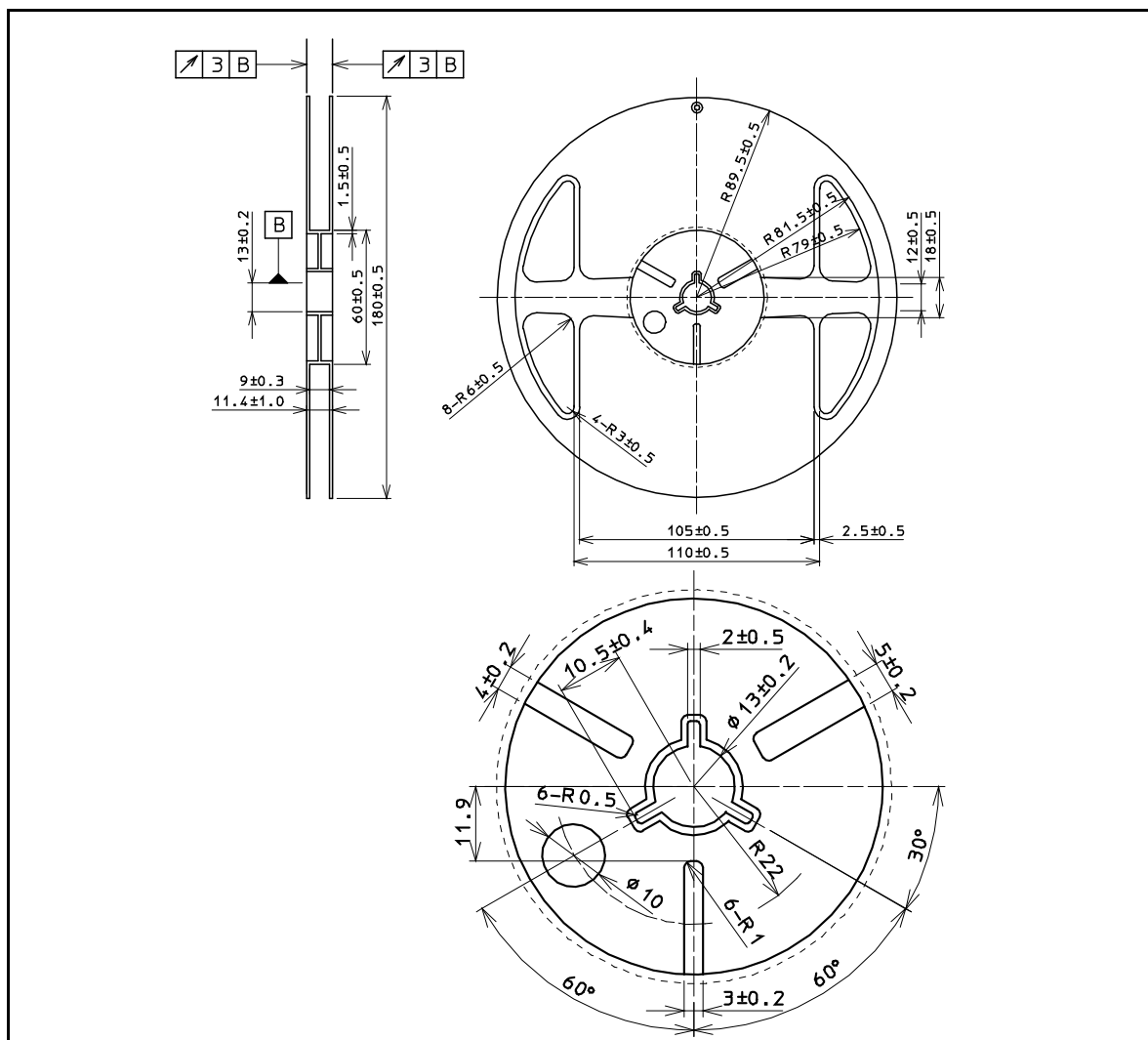


Figure 5-2

6 Precautions When Handling Magnetic Sensor 製品お取り扱い時の注意

6.1 Storage Environment 保管環境

Products should be stored at an appropriate temperature and humidity (Recommended storage condition). Keep products away from chlorine and corrosive gas. There is a thing that influences product features when keeping it in an improper environment.

適切な温度・湿度環境(推奨保管条件)で保管していただけるようお願いします。また、塩素や腐食性のあるガスも避けるようお願いします。不適切な環境で保管した場合は、製品特性に影響する事があります。

6.2 Long-term Storage 長期保管

Long-term storage may result in poor lead solder ability and degraded electrical performance even under proper conditions. For those part that stored more than 1 year, solder ability should be checked before use. For storage longer than 1 year, it is recommended to store in nitrogen atmosphere. Oxygen in atmosphere oxidant leads of products and lead solder ability get worse.

適切な保管環境でも長期に保管した場合は、リード端子の半田付け性が悪くなったり、電気特性が不良になる場合がありますので、長期保管した場合は、半田付け性や電気特性をご確認の上、ご使用下さい。保管が長期(1年以上)に及ぶ場合は、窒素雰囲気中での保管をお勧めします。大気中で保管されますと、大気中の酸素により素子のリード部分が酸化され、リード端子の半田付け性が悪くなります。

6.3 ESD 静電気ESD

Every products has built in ESD protect circuit, however it may break if over ESD applied to this circuit. Please take measure for ESD when handle the products. Conducted container is recommended for product conveyance and packing instead of plastic container. Please connect ground line and use non high voltage leakage, when using soldering iron or external measurement circuit.

全ての端子に接続されたICについて静電気保護回路を内蔵していますが、その能力を超える静電気が加わった場合には破壊されることがありますので、製品を取り扱う場合には十分な静電気対策を実施してください。包装・運搬容器はプラスチック製を極力避け、導電容器をご使用ください。また製品のハンドリングについても十分に考慮してください。(リストストラップの使用等)はんだごてや測定回路などは高電圧リークのないものを、必ずアースを取ってご使用ください。

7. LEGAL DISCLAIMER

1. 国内外の輸出関連法規により規制されている製品の輸出に際しては、同法規を遵守の上、必要な許可、手続き等をとってください。

For the export of products which are controlled items subject to foreign and domestic export laws and regulations, you must obtain approval and/or follow the formalities of such laws and regulations.

2. 軍사용途又はテロ等の反社会活動目的では、当製品を一切使用しないでください。
また、最終的にそれら用途・目的で使用されるおそれがある法人・団体・個人等へも当製品を一切供給しないでください。

Products must not be used for military and/or antisocial purposes such as terrorism, and shall not be supplied to any party intending to use the products for such purposes.

3. 当製品は、特に用途を指定していないかぎり、本来、AV、家電、事務機、情報機器、通信機器、アミューズメント機器等の一般電子機器用に設計、製造されたものです。
したがって、原子力制御機器、宇宙・航空機で運行にかかわる機器等の用途では一切使用しないでください。

上記の使用禁止の用途以外で、医療機器、防犯機器、防災機器、海底用機器等の高度の安全性・信頼性を必要とする機器でのご使用の際は、弊社営業担当迄ご相談いただくか、またはセットでの十分な適合性の確認を行っていただいた上で、フェールセーフ設計、保護回路、冗長回路、誤動作防止設計、延焼対策設計等のセットでの安全対策設計を設けてください。

Unless provided otherwise, the products have been designed and manufactured for application to equipment and devices which are sold to end-users in the market, such as AV (audio visual) equipment, home electric equipment, office and commercial electronic equipment, information and communication equipment or amusement equipment. The products are not intended for use in, and must not be used for, any application of nuclear equipment, driving control equipment for aerospace or any other unauthorized use.

With the exception of the above mentioned banned applications, for applications involving high levels of safety and liability such as medical equipment, burglar alarm equipment, disaster prevention equipment and undersea equipment, please contact an Alps sales representative and/or evaluate the total system on the applicability. Also, implement a fail-safe design, protection circuit, redundant circuit, malfunction protection and/or fire protection into the complete system for safety and reliability of the total system.

4. 車載対応製品以外の製品を車載用にご使用される場合は、事前に弊社へご相談ください。

Before using products which were not specifically designed for use in automotive applications, please contact an Alps sales representative.

Appendix

A1 List of Figures 図のリスト

Figure 1-1	Image of HGPRDT005A in the SOT-23-5 Package	3
Figure 2-1	Pin Configuration and Center of Sensitive Area	4
Figure 2-2	Functional Block Diagram	4
Figure 3-1	Application Circuit Example	5
Figure 3-2	Operating Range about Supply Voltage and Temperature	6
Figure 3-3	Duty and Phase Difference	7
Figure 3-4	Definition of Sensitivity Direction	7
Figure 4-1	Package Outline (All dimensions in mm)	8
Figure 4-2	Footprint	8
Figure 4-3	Distance between chip and package	9
Figure 4-4	Marking of HGPRDT005A	9
Figure 4-5	Internal Structure	10
Figure 5-1	Packing of the HGPRDT005A in a tape	11
Figure 5-2	Reel Dimensions	11

A2 List of Tables 表のリスト

Table2-1	Pin Description	4
Table3-1	Absolute Maximum Rating Parameters	5
Table3-2	Recommended Operating Conditions Parameters	6
Table3-3	General Electrical Characteristics	6
Table3-4	Operating Magnetic Field	7
Table 4-1	Components	10

Appendix

A3 Document Revision History 改定履歴

Datasheet Rev.	Date	Note
01	Sep.03, 2015	First release
01-1	Oct.05, 2015	Changed to "Duty Ratio" from "Duty" in Table 3-3
01-2	Mar.04, 2016	Modified in Table3-1, Table3-2, Table3-3 and Figure 4-3. Added Section3-5 and Section 4-5
01-3	Jun.23, 2017	Correction of errors in Table3-2
02	Feb.08, 2019	Change company name to ALPSALPINE