Double Track Magnetic Reader Head Signal Processing IC

Description

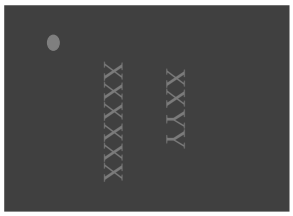
The HCM4002 is a double track magnetic reader head signal processing IC, designed for application in magnetic strip card reader system. The data rates of HCM4002 range from 200 to 15,000 bits per second. Acquisition and tracking of the data within this range is automatically. The amplitude voltage from 10% to 200%, which is meet ISO standard can be read. The SD pin can shut down HCM4002 so that the power consumption will be reduced lower and it provides a convenient way to share BUS with the smart card reader IC HCM8035.

Features

- Very few external components
- CMOS machining
- Wide operating power supply: DC 3V ~ 5.5V
- Quiescent current：2mA
- Double track F/2F decoder

Ordering information

Package		DFN2*3-8L
Mask	XXYY	Date code
	XXXXXX	Wafer batch number

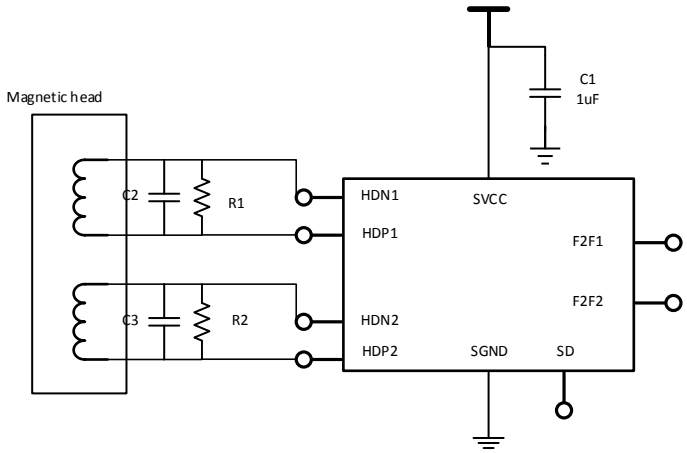


Top view

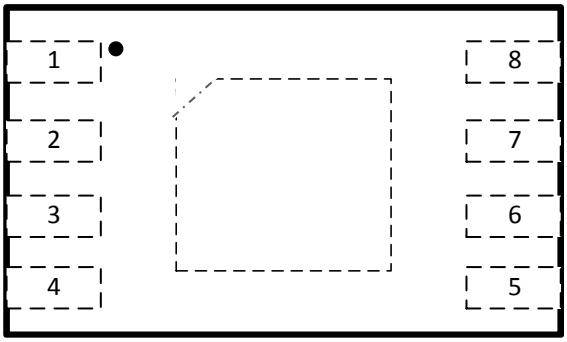
Application

- **POS Terminal Equipment**
- **Magcard Access Control System**

Typical Application



Pin Configuration and Function



Top view

NO.	Name	Type	Description
1	HDP2	I	Differential input
2	HDN2	I	Differential input
3	SD	I	While SD=1,HCM4002 enters shut down mode
4	F2F2	O	Channel 2 digital output
5	F2F1	O	Channel 1 digital output
6	SVCC	P	Power Supply
7	HDP1	I	Differential input
8	HDN1	I	Differential input
The bottom pad	SGND	P	Ground

Absolute Maximum Ratings

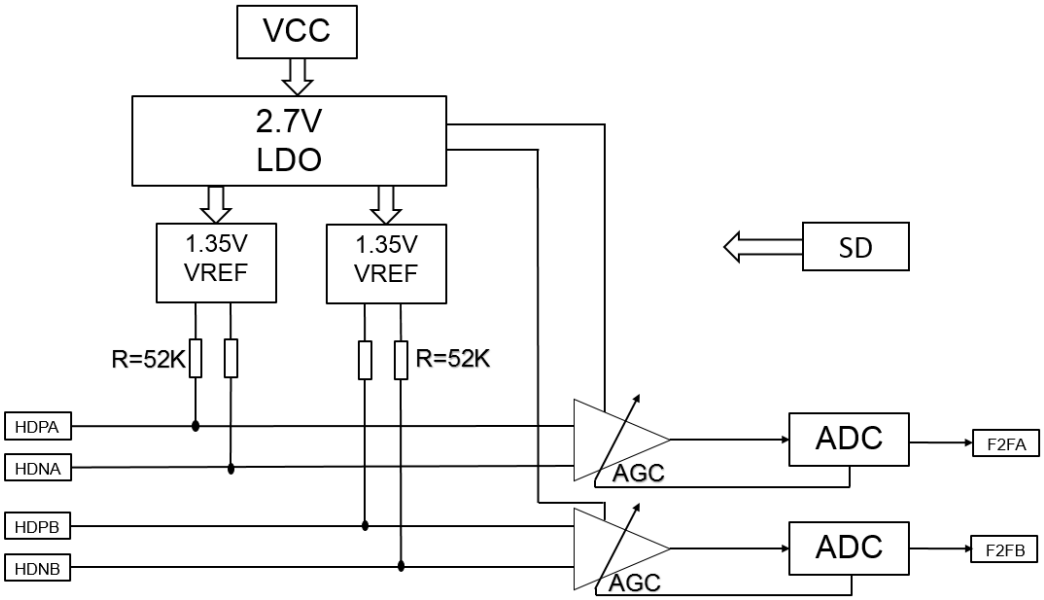
Symbol	Parameter	Value	Unit
VCC	Power	7	V
Vout	Output voltage	7	V
Vin	Input voltage	7	V
Tstg	Storage temperature	-65 ~ +150	℃
Tj	Junction temperature	150	℃
ESD	ESD （HBM）	± 2	KV

Electrical Characteristics

Test condition：T=25ºC，VCC=3.3V,unless otherwise specified.

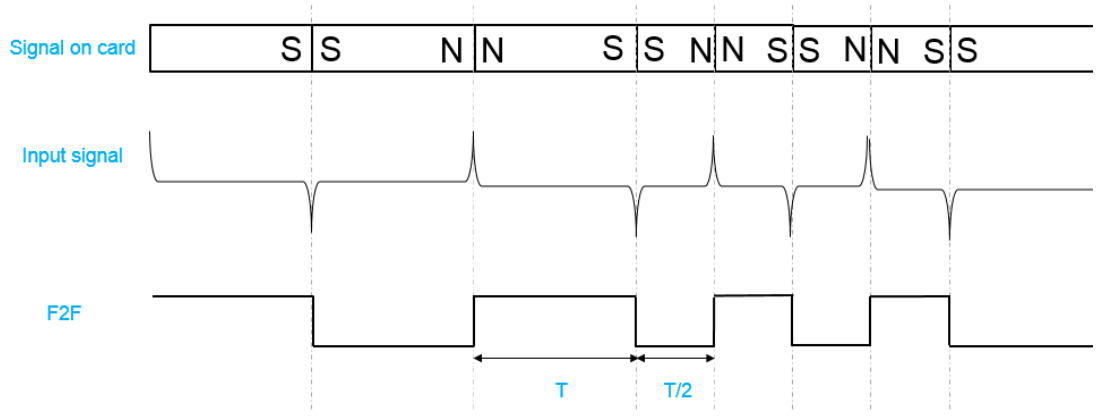
Symbol	Description	Test condition	Value			Unit
			MIN	TYPE	MAX	
Supply						
ICC	Working current	SD=0		4		mA
ISB	Shut down current	SD=1			5	uA
VCC	Power supply voltage		3		5.5	V
Amplifier						
Fc	Cut-off frequency	0dB gain		6		MHz
Vn	Input noise	1K~20KHz		20		uV
VA	Gain（Automatic gain control，default maximum）	Max		50		dB
		Min		6		dB
		Gain ranger		54		dB
Rin	Input impedance			50		kΩ
Vincom	Common mode input voltage		0.1		1.2	V
Vindif	Differential mode input range			200		mV
Vos	Input Offset Voltage		-0.4	0	0.4	mV
Comparator						
VOH	High-level output voltage	5mA load		VCC-0.4		V
VOL	Low-level output voltage	5mA load		0.4		V
Digital output F2FA/B/C						
RF2F	F2F 1/2 Output impedance	SD=1		HIGH Impedance		

Functional Block Diagram



Functional Descriptions

1. Operation Description

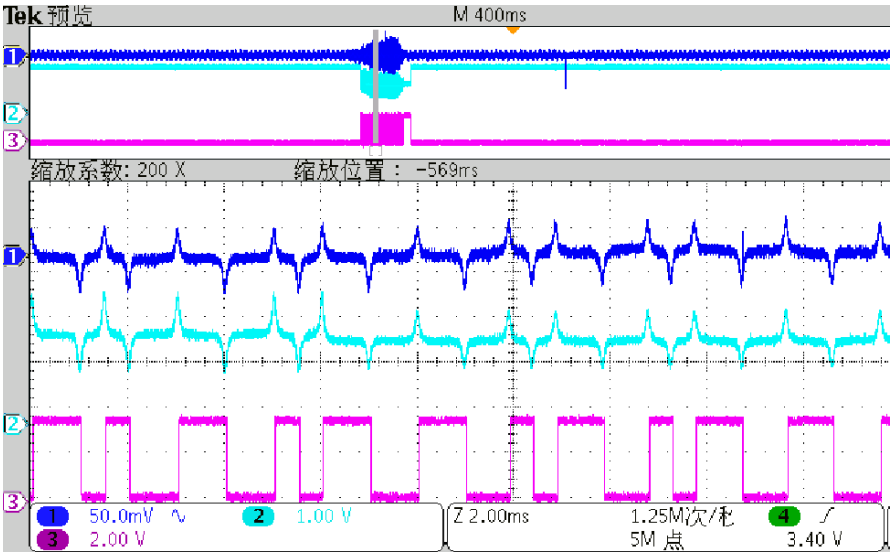


Coded format

The first amplifier includes an **AGC** circuit to amplify and filter out the signal from the magnetic reader head. The common-mode noise are eliminated and the signal peaks are detected. After the **AGC** amplifier,the **AMP** signal is generated and send to the second amplifier. Then going through this **ADC** circuit, the analog signal will be convert to digital signal.

What is F2F signal: There are couple frequencies in **F2F** signal, F represents **0**, **2F** represents **1**. In terms of time unit, single **T** stands for **0**, double half-T stands for **1**. The **F2F** signal will be send to **MCU** and decoded into bit data by the specific software.

2. The analog output signal and digital output signal from **HCM4002** are shown below.



Channel 1: Input signal come from the magnetic reader head.
Channel 2: AMP signal, come from the **AGC** pre-amplifier， which is the first amplifier.
Channel 3: F2F signal is generated through **ADC**.

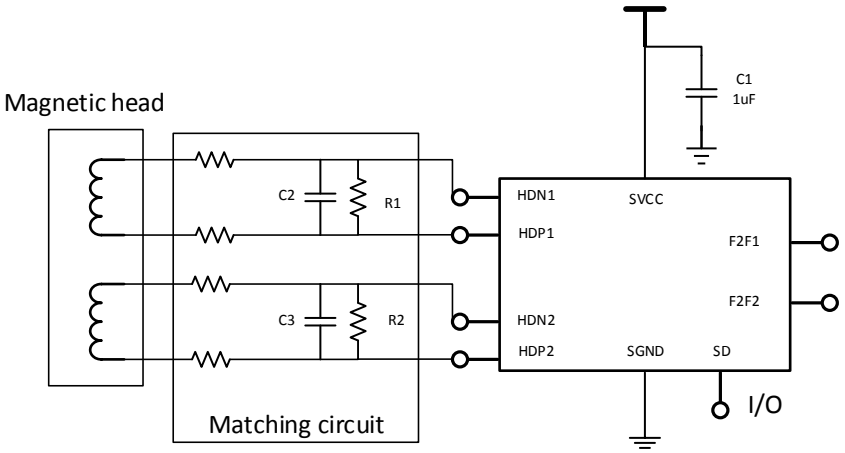
3. The data rates of **HCM4002** range from 200 to 15,000 bits per second. Acquisition and tracking of the data within this range is automatically. The amplitude voltage from 10% to 200%, which is meets with **ISO** standard can be read.

Application Notes

1. The pin SD voltage is able to turn **HCM4002** on or off. While **SD** is low (SD=**0**), **HCM4002** is enabled; when SD is high (SD=**1**), **HCM4002** will be shut down .The SD can be from **MCU** or directly connected to **GND**. If it is floated, **HCM4002** is in shut-down mode.
2. The bottom pad of the package is power ground， should be connect to **GND**.
3. For the unused track, please shorten **HDP** and **HDN**.
4. A recommended **BOM** is shown below. Cap C1 is used for bypassing noise for power supply. A cap of 1**uF** is recommended. According to the practical application of the system, capacitor and resistor connected between **HDN** and **HDP** is able to adjust the input impedance. For this capacitor, a cap of 68**pF** is recommended. Its exact value can be optimized according to the magnetic reader. By the way, this capacitor can impact on sensitivity of **HCM4002**. The smaller cap, the higher sensitivity.

Symbol	Parameter
C1	Capacitor ， 1uF （Low **ESR**）
C2、C3	Capacitor，68pF
R1、R2	Resistor，500Ω

5. On **PCB** layout board，the magnetic strip card reader system should be put far away from the **DC-DC** power and digital signal layout.
6. The practical application of the system need matching circuit to adjust different magnetic head. A recommended application circuit shows below:

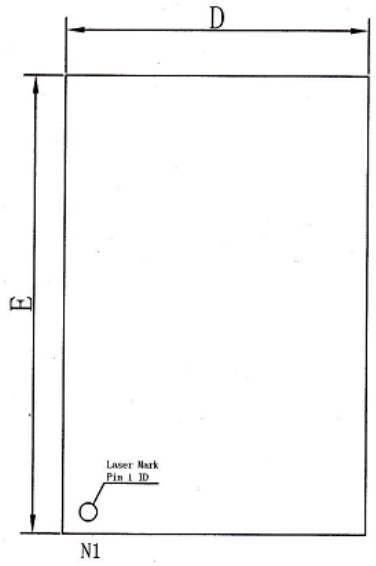


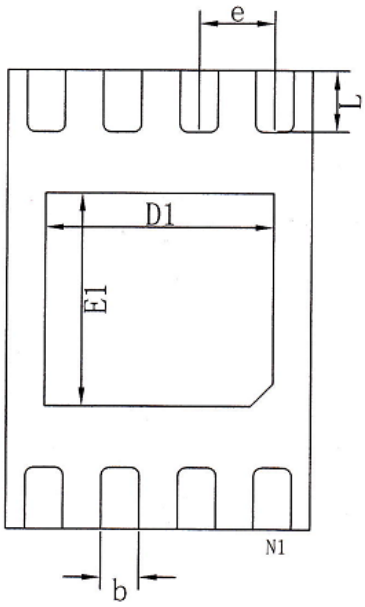
Note：1. According different application system need adjust matching circuit parameter.
2. Please offer magnetic head sample if you need our technology support.

Package Outline

DFN2*3-8L

Size / Mark	Min(mm)	Max(mm)	Size / Mark	Min(mm)	Max(mm)
A	0.50	0.60	E1	1.30	1.50
A1	-	0.05	e	0.50 TYPE	
b	0.20	0.30	L	0.30	0.50
D	1.95	2.05			
E	2.90	3.05			
D1	1.40	1.60			





bottom view