Triple Track Magnetic Reader Hardware Decode IC

Description

HCM8003 is designed for application in magnetic strip card reader system .It will recover clock and data signals from an F/2F data stream generated from a magnetic head. HCM8003 will function for data rates from 200 to 15,000 bits per second. Acquisition and tracking of the data within this range is automatical.

Features

- **Triple track F/2F decoder with, very few external component.**
- **Wide operating power supply: DC 3 ~ 5.5V**
- **Data processing rate: 200 ~ 15,000 bps per track**
- **Acceptable amplitude from 10% to 200% of ISO reference voltage**

Application

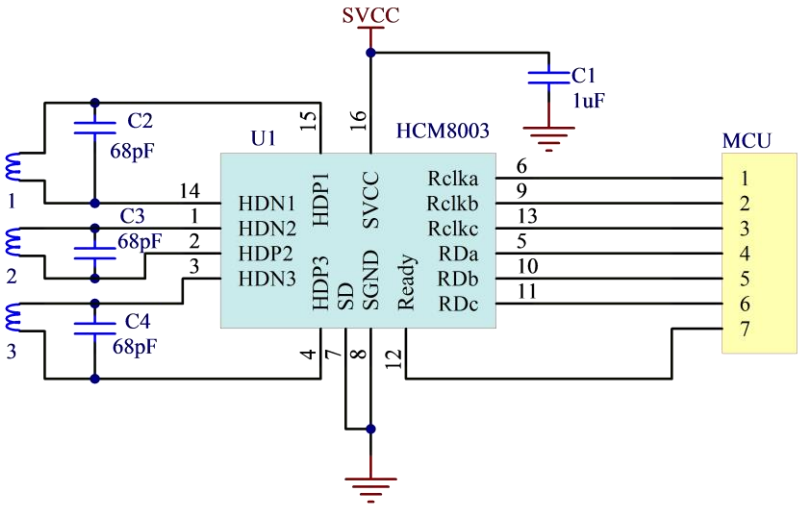
- **POS Terminal Equipment**
- **Magcard Access Control System**
- **Identification**

Ordering information

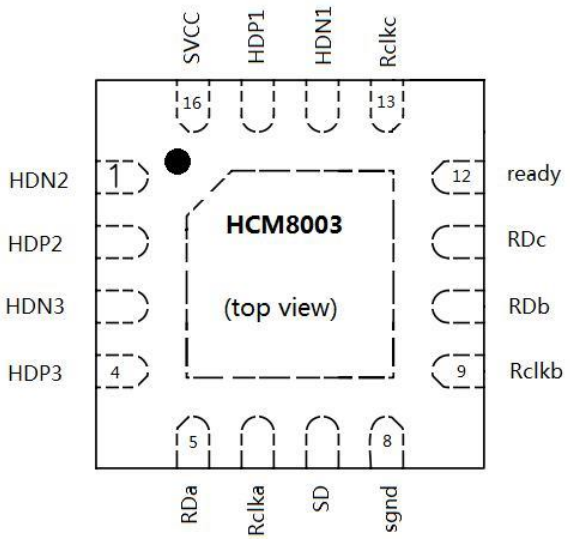
Package	QFN16（4x4x0.75）
XXYY	Date code
XXXXXX	Wafer batch number

Top view

Typical Application



Pin Configuration and Function



NO.	NAME	TYPE	DESCRIPTION
1	HDN1	I	Amplifier input terminal **N**
2	HDP2	I	Amplifier input terminal **P**
3	HDN3	I	Amplifier input terminal **N**
4	HDP3	I	Amplifier input terminal **P**
5	RDa	O	Read data output
6	Rclka	O	Read clock output
7	SD	I	Chip enabled when **SD=0**(low)
8	SGND	p	Ground
9	Rclkb	O	Read clock output
10	RDb	O	Read data output
11	RDc	O	Read data output
12	Ready	O	Card loading signal output
13	Rclkc	O	Read clock output
14	HDN1	I	Amplifier input terminal **N**
15	HDP1	I	Amplifier input terminal **P**
16	SVCC	P	Power supply

Absolute Maximum Ratings

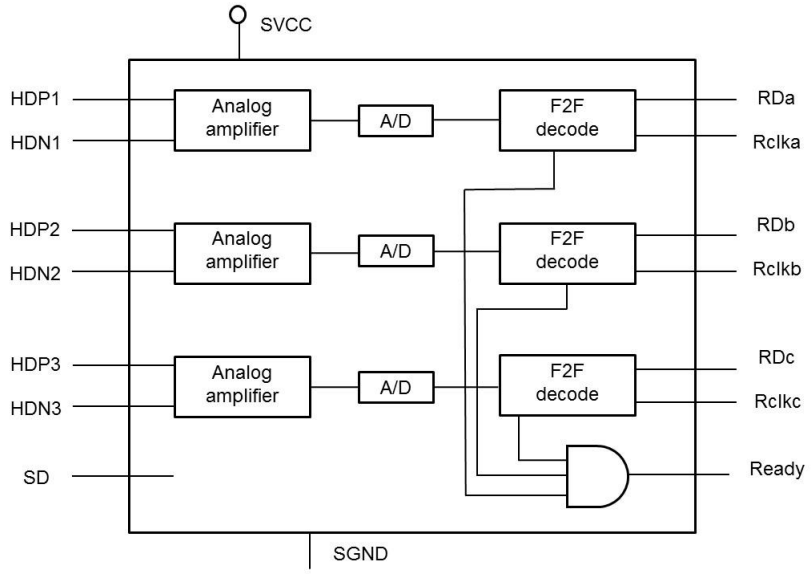
Symbol	Parameter	Value	Unit
VCC	Power	**7**	**V**
Vin	Input voltage	**7**	**V**
Tstg	Storage temperature	**-65 ~ +150**	**℃**
Tj	Junction temperature	**150**	**℃**
Topr	Operating temperature	**-40~+85**	**℃**
ESD	ESD （HBM）	**± 2**	**KV**

Electrical Characteristics

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

Symbol	Description	Test condition	Value			Unit
			MIN	TYPE	MAX	
VCC	Power supply voltage		**3**	**-**	**5.5**	**V**
IOH	HIGH-level output current		**-**	**-**	**-7**	**mA**
IOL	LOW-level output current		**-**	**-**	**6**	**mA**
VOH	HIGH-level output voltage	**IOH=-1.0mA**	**4**	**-**	**-**	**V**
VOL	LOW-level output voltage	**IOL=1.0mA**	**-**	**-**	**0.4**	**V**
Rin	Input impedance		**-**	**100**	**-**	**kΩ**
Tr	Signal output rise time		**-**	**-**	**110**	**ns**
Tf	Signal output fall time		**-**	**-**	**210**	**ns**

Functional Block Diagram



HCM8003 is consisted by three major blocks at each channel:

- **Amplify block**

This block amplifies and filters the signal read from the magnetic reader head, rejects common mode noise and detects signal peaks. It also includes protection circuit to protect the component.

And latches onto the data rate and performs the recovery of individual bits from the **F/2F** data stream.

- **A/D converter block**

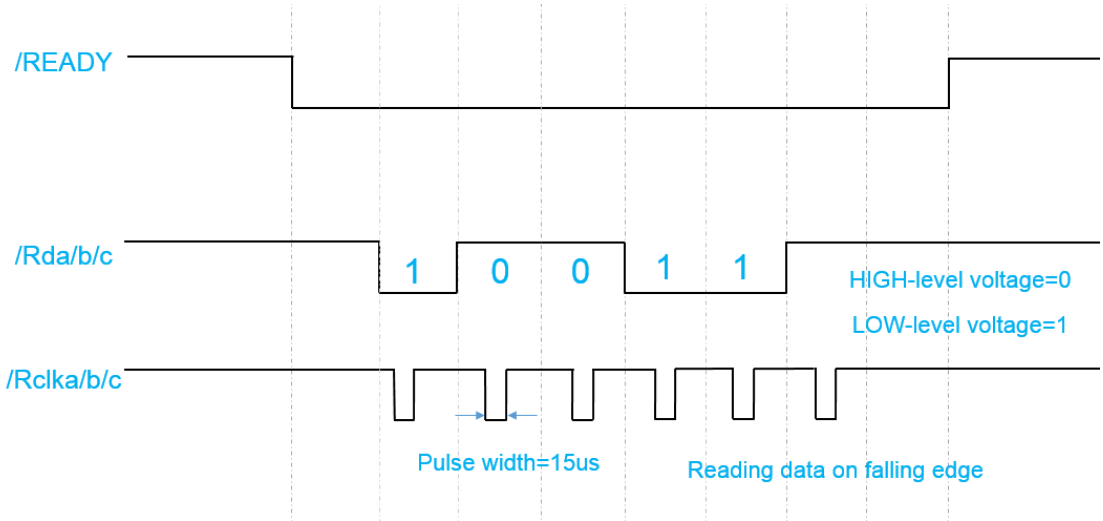
The input analog signal amplified by the amplifier, it will be converted to digital **F/2F** signal by the **A/D** converter. The clock recover to.

- **F2F decode block**

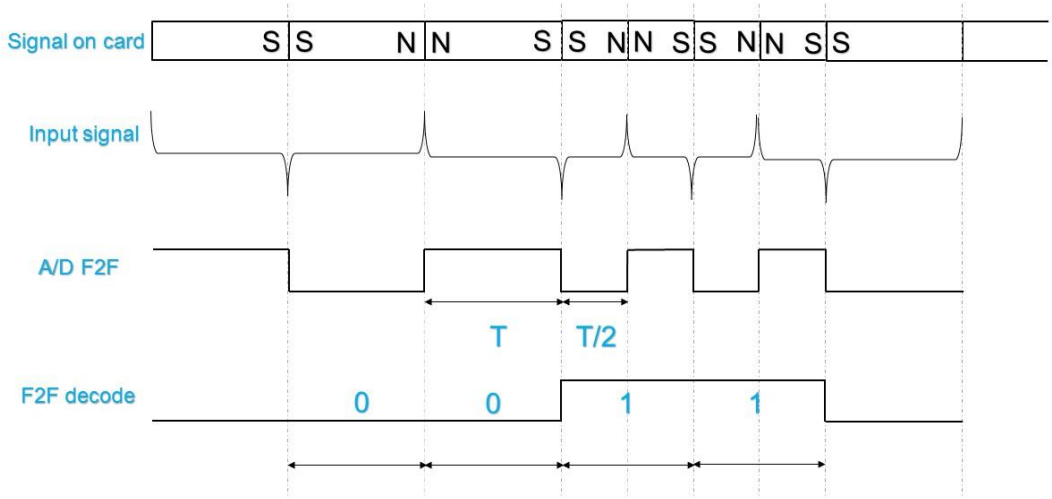
The digital F2F signal decoded the as **1** or **0** data and the clock recovered too.

Functional Description

1. Output Timing



2. Operation Description

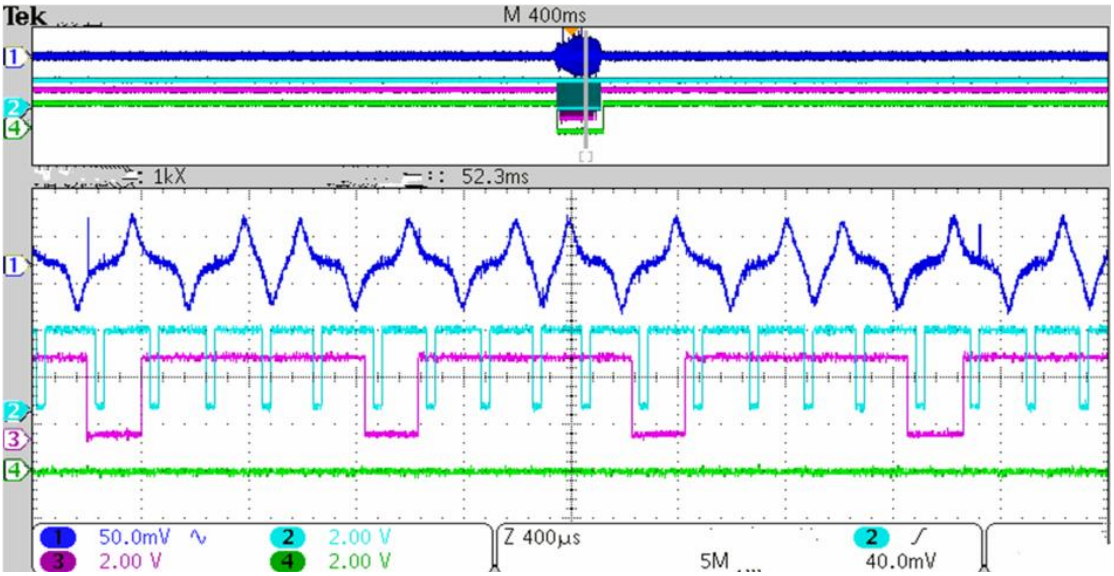


Decoded principle

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. This signal called **F2F** signal. And it will be decoded into **1** and **0** bit data by the decoded circuit.

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**.

3. The analog output signal and digital output signal from **HCM8003** are shown below.



Channel 1: Input signal come from the magnetic reader.
Channel 2: Pin **RcIka/b/c** signal, recovered by the **F/2F** decoder
Channel 3: Digital output data signal.
Channel 4: Pin **Ready** signal .

3. The data rates of **HCM8003** 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 **HCM8003** on or off. While **SD** is low (**SD**=**0**), **HCM8003** is enabled; when **SD** is high (**SD**=**1**), **HCM8003** will be shut down .The **SD** can be from **MCU** or directly connected to **GND**. If it is floated, **HCM8003** is in shut-down mode.
2. The bottom pad of the package should be connect to **GND**.
4. For the unused track, please shorten **HDP** and **HDN**.
5. 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 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 **HCM8003**. The smaller cap, the higher sensitivity.

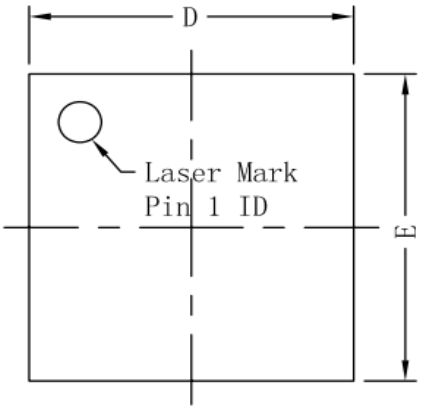
Symbol	Parameter
C1	Capacitor ，**1uF** （Low **ESR**）
C2、**C3**、**C4**	Capacitor，**68pF**

6. On **PCB** layout board，the magnetic strip card reader system should be put far away from the **DC-DC** power and any noisy signal.
7. All pins are mainly used for system debugging. It is recommended to lead out on **PCB**.

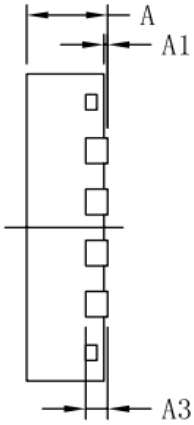
Package Outline

QFN16（4x4x0.75_0.65）

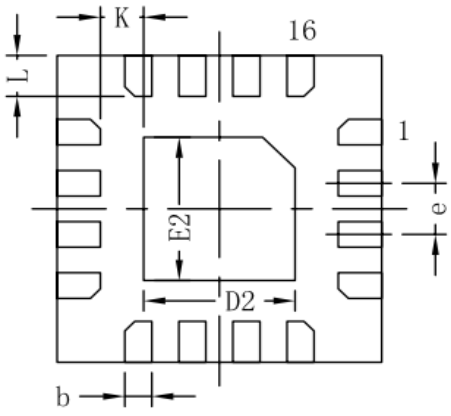
Size / Mark	Min	TYPE	Max	Unit	Size / Mark	Min	TYPE	Max	Unit
A	0.70	0.75	0.80	mm	E2	2.1	2.2	2.3	mm
A1	-	-	0.05	mm	e	0.65 TYPE			mm
A3	0.203REF			mm	K	0.2	-	-	mm
b	0.2	0.25	0.3	mm	L	0.3	0.4	0.5	mm
D	3.9	4.0	4.1	mm					
E	3.9	4.0	4.1	mm					
D2	2.1	2.2	2.3	mm					



Top View



Side View



Bottom View