Triple Track Magnetic Reader Head Signal Processing IC

Description

The HCM4003 is a triple track magnetic reader head signal processing IC, designed for application in magnetic strip card reader system. The data rates of HCM4003 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 HCM4003 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
- Triple track F/2F decoder

Ordering information

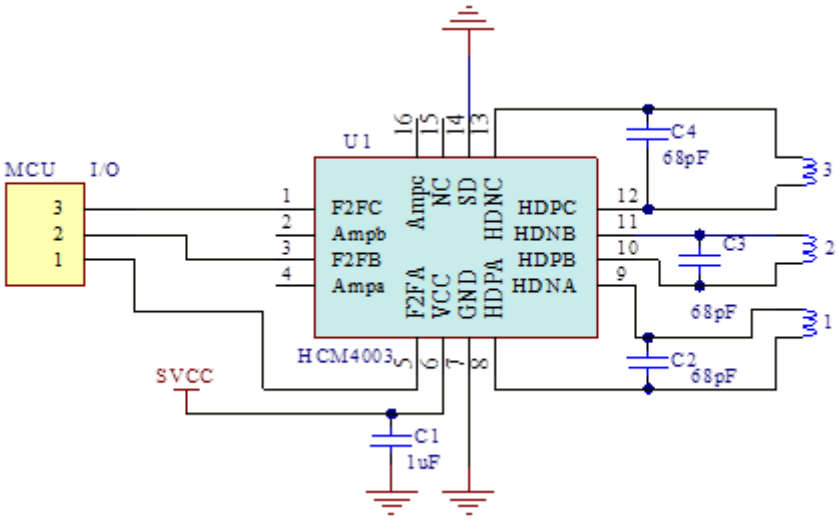
Package	QFN16（3x3x0.75_0.5）
XXYY	Date code
XXXXXX	Wafer batch number

Top view

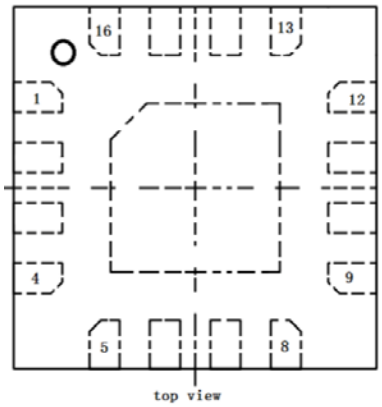
Application

- POS Terminal Equipment
- Magcard Access Control System

Typical Application



Pin Configuration and Functions



NO.	NAME	TYPE	DESCRIPTION
1	F2FC	O	C Track digital output
2	AMPb	I	B Track amplifier output
3	F2FB	O	B Track digital output
4	AMPa	O	A Track amplifier output
5	F2FA	O	A Track digital output
6	VCC	P	Power Supply
7	GND	P	Ground
8	HDPA	I	A track amplifier input（+）
9	HDNA	I	A track amplifier input（-）
10	HDPB	I	B track amplifier input（+）
11	HDNB	I	B track amplifier input（-）
12	HDPC	I	C track amplifier input（+）
13	HDNC	I	C track amplifier input（-）
14	SD	I	While SD=1,HCM4003 shut down
15	NC		
16	AMPc	O	C Track amplifier output

Absolute Maximum Ratings

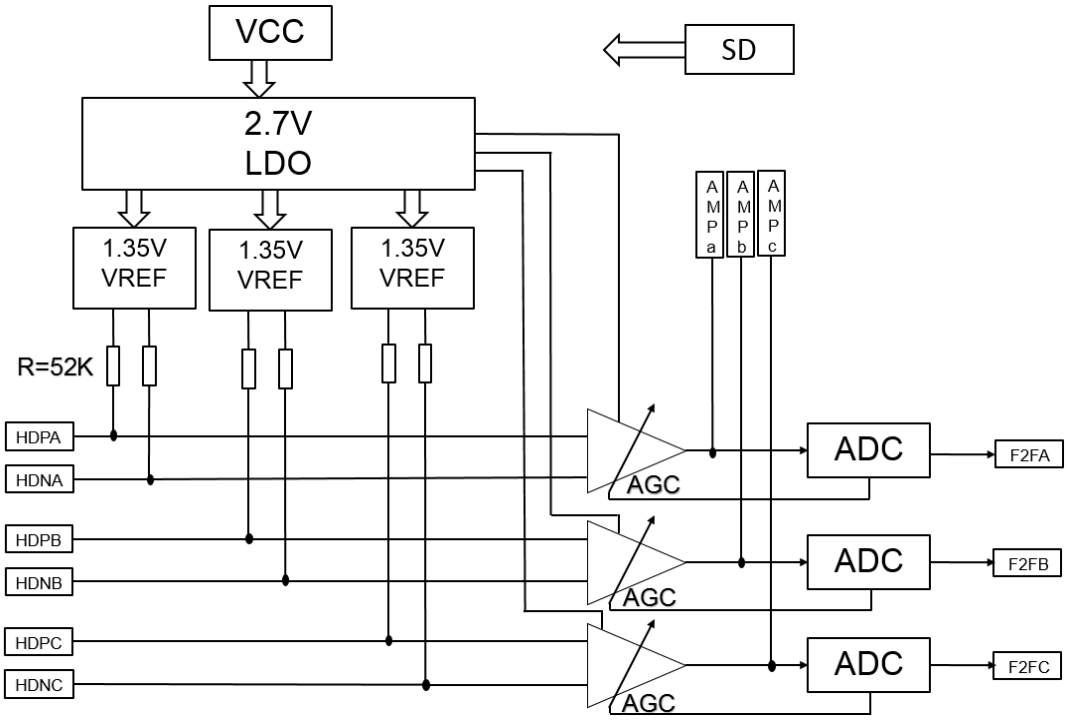
Symbol	**Parameter**	Value	Unit
VCC	Power	7	V
Vout	Output voltage	7	V
Vin	Input voltage	7	V
Tstg	Storage temperature	-65 ~ +150	℃
Tj	Junction temperature	150	℃
ESD	ESD （HBM）	± 2	KV

Electrical Characteristics

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

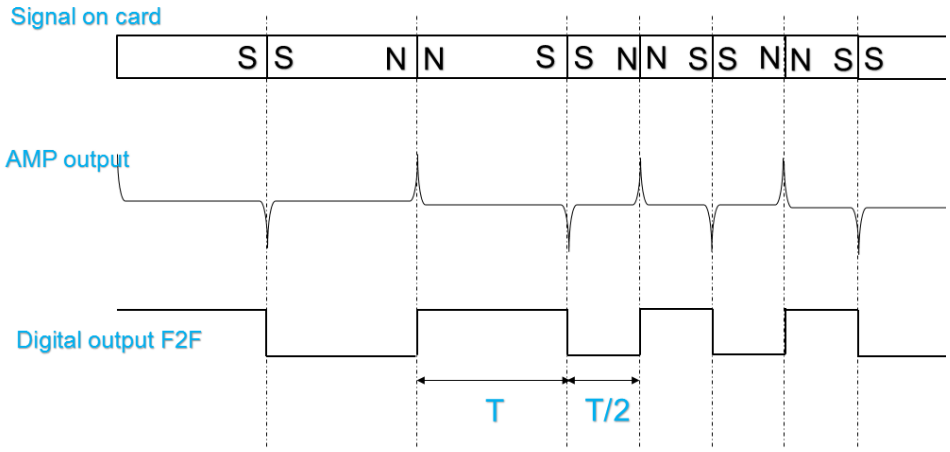
Symbol	Description	Test condition	Value			Unit
			MIN	TYPE	MAX	
Supply						
ICC	Working current	SD=0		2		mA
ISB	Shut down current	SD=1			5	uA
VCC	Power supply voltage		3		5.5	V
Amplifier						
Fc	Cut-off frequency	0dB gain		6		MHz
Vn	Input noise	1K~20KHz		20		uV
VA	Gain （Automatic gain control , default 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 A/B/C Output impedance	SD=1		HIGH Impedance		

Functional Block Diagram



Functional Descriptions

1. **Operation Description**



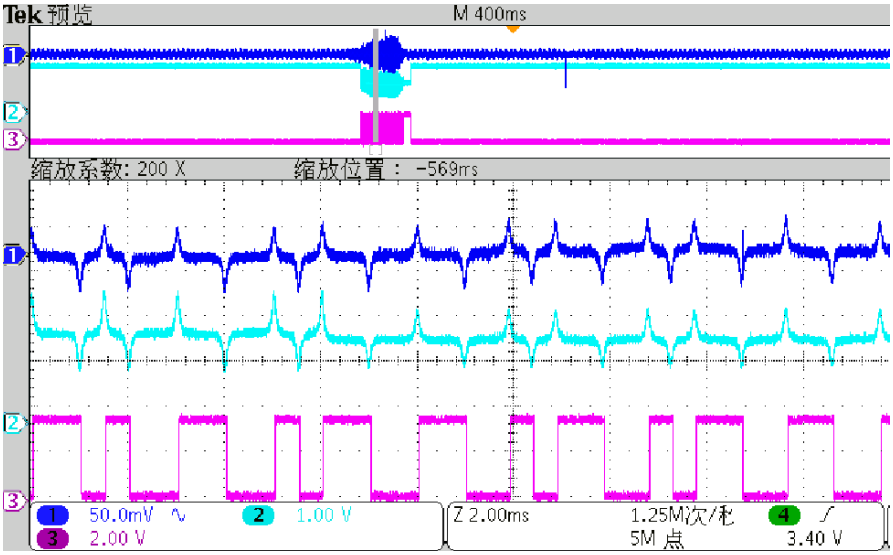
Coded format

The first amplifier concludes an AGC circuit to amplifies and filters the signal read from the magnetic reader head, rejects common mode noise and detects signal peaks.After the AGC amplifier,the AMP signal is generated and send to the second amplifier,through this

comparator ,the analog signal will be convert to digital signal.

Make the provision: the frequency is F and the byte is T as the long data unit,the frequency is 2F and byte is T as the short data unit.This signal defined F2F signal. Then the F2F signal will be send to MCU,the signal will be decoded by the specific software.

2. The practical signal of HCM4003 show 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. AMP signal through the comparator than the F2F signal is generated and send out as the output signal.

3. The data rates of HCM4003 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.

Application Notes

1. The voltage of SD pin decide the state of HCM4003 is shut down or not .While SD is low(SD=0),HCM4003 is enabled; when SD is high(SD=1),HCM4003 will be shut down .The control signal from the I/O port which provided by MCU, or the directly way is the SD pin contact to GND.
2. At the bottom of the packaging welding plate should be connect to GND.
3. For the excess track, please put HDP and HDN interconnection.
4. A recommended BOM is shown below. Cap C1 is a power filter, the recommended value is 1uF. According to the practical application of the system, parallel capacitor between the differential mode input **HDN** and **HDP** is able to adjust the input impedance, for this capacitor ,an ideal value recommended is **68pF**.And machining the different magnetic reader head has different value be chose for the good performance .This capacitor can reduce the sensitivity of the signal . The smaller capacitor value is, the higher sensitivity are of the signal.

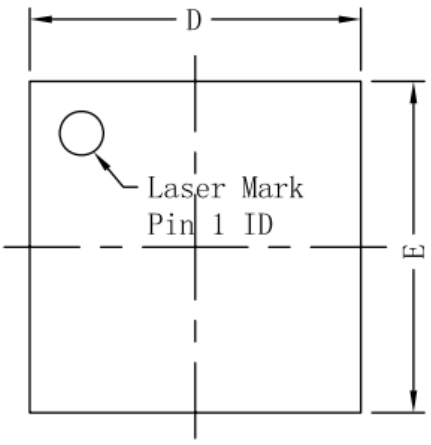
Symbol	Parameter
C1	Capacitor , 1uF （Low ESR）
C2、C3、C4	Capacitor, 68pF

5. On PCB layout board，the magnetic strip card reader system should be stay away from the DC-DC power and other power supply system.
6. Although the AMP pins are useless, the test points designed for those pins on PCB is a convenient way for system debug. In the other hand, those AMP test points is not necessary.

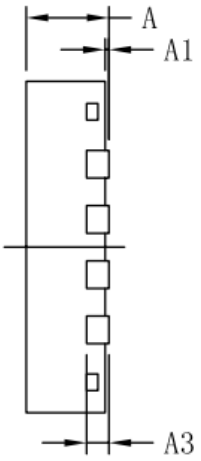
Package Outline

QFN16（3x3x0.75_0.5）

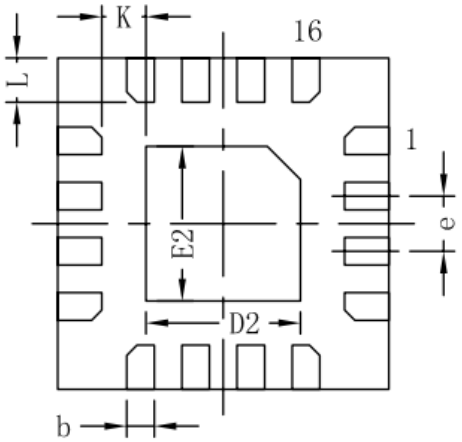
Size / Mark	Min(mm)	Max(mm)	Size / Mark	Min(mm)	Max(mm)
A	0.7	0.8	E2	1.55	1.75
A1	-	0.05	e	0.5 TYPE	
A3	0.203REF		K	0.2	-
b	0.2	0.3	L	0.3	0.5
D	2.9	3.1			
E	2.9	3.1			
D2	1.55	1.75			



Top View



Side View



Bottom View