Read Only Contactless 125KHz ID IC-TK4100

Ren Jinquan

Description

TK4100 is a CMOS integrated circuit for use in 125KHz read only RFID cards. It is compatible with EM format. The circuit is powered by external coil in an alternating magnetic field, and via one of coil terminal to get its clock from this field. The other coil teminal turns on and off the modulation current, the chip will send back the 64 bits of information contained in a factory pre-programmed memory array. TK4100 chips data modulating and transmission is coded by Manchester modulation format. The programming of the chip is performed by laser fusing of polysilicon links in order to store a unique code on each chip. The continuous output data string contain 9"1"headers, 40bits, 14bits parity and 1 stop bit. No requirement of buffer capacitor for low power consumption of logic control core. Only an external coil is needed to obtain the chip function. A parallel resonance capacitor of 74 pF is also integrated.

Features

- 64 bit memory array laser programmable
- On chip voltage limiter
- Full wave rectifier on chip
- Large modulation depth due to a low impedance modulation device
- Very small chip size convenient for implantation
- On chip 480PF resonance capacitor
- On chip supply buffer capacitor
- Operating frequency 100 - 150 kHz, typical frequency: 125KHz
- Low power consumption

Operation

Menchester modulation coding (Type code, data rate is RF/64). Only if the chip produce at both ends of external coil AC induced voltage ≥3.5Vpp and the clock rate is 125KHz, it will start working. Operation range is$-40\sim+85℃$.

Data Format

The EM4100 contains 64 bits divided in four groups of information. 9 bits are used for the header（The header is composed of the 9 first bits which

are all mask programmed to "1".）, 40 data bits(8 factory information bits + 32 data bits), 14 row and column parity bits (10 row parity bits and 4 column parity bits) and 1 stop bit.

Information transmission from TK4100 chip to reader and PC, firstly is 9 header bits, and then 8 factory information or revision code, last one is 32 data bits. There are 15 check and stop bits use for tracking 40 data bits, including manufacturer information, shown as table1. For example, when each binary bit from the chip shown as table 2, every data bit, including check bits, of byte like as table 3.

Table 3：Check list of 40 datas/HEX

B0–B8	B9–	B14–	B19–	B24–	B29–
9 个 1	100 01	01001	11000	00101	10100
Header	8	4	C	2	A
B34–	B39 –	B44–	B49–	B54–	B59
01100	111 01	00011	10010	01010	11010

From RS232 acess of reader or PC obtaining 10 groups data of ASCII code (no 9 header bits, all check bits and stop bits), they are 38, 34, 43, 32, 41, 36, 45, 31, 39, 35. The chip of 10 bits in HEX unique serial number code is 84C2A6E195, and decrypt to the

decimal value is 570201399701. When the serial number code of this card is printing,using decimal value of 10 bits as serial number code to spray pringting for convenience counting. The max of this serial number repeat data area is several billions groups, perfectly meeting the encrypt requirement. If use factory version serial number, decimal code has 12 to 13 bits. No repeat serial number have billions groups.

According to different application and manage system, its serial number can be limited in decimal code of 5 to 8 bits by reader. That's easy for management with a small system. The system once needs to increase card number, the operation parts of reader has to update even change it, or it will not be able to rise and get a coincident code. That's because limited by reader system only read the low code and can not read the high code.

Application

▲ ID Card
▲ Animal Tag
▲ Read only memory in identify serial number
▲ Automatic Management
▲ Industial Production

Ever card used TK4100 chips shown as below. Due to the small volume of chip and antenna, it is easier to embed in a small and thin tag and key card. It is A widely using as ID card, information tag, goods tag, package, animal tag, shool cards and metal tag etc. Only those who can use the serial number to identify the main object attributes can use it!

Tabble 1　Read Only Data Format Fig

1	1	1	1	1	1	1	1	1		9 Header

8 Version or Factory Info				
D00	D10	D01	D11	P0
D02	D12	D03	D13	P1

32 Datas					
D20	D30	D40	D50	P2	10 Row Parity Bits
D60	D70	D80	D90	P3	
D21	D31	D41	D51	P4	
D61	D71	D81	D91	P5	
D22	D32	D42	D52	P6	
D62	D72	D82	D92	P7	
D23	D33	D43	D53	P8	
D63	D73	D83	D93	P9	

4 Column Parity Bits | PC0 PC1 PC2 PC3 | S0 | Stop Bit

Tabble 2　Read Only Data Format Fig

1	1	1	1	1	1	1	1	1		9 Header

8 Version or Factory Info

1	0	0	0	1
0	1	0	0	1

32 Datas | 10 Row Parity Bits

1	1	0	0	0
0	0	1	0	1
1	0	1	0	0
0	1	1	0	0
1	1	1	0	1
0	0	0	1	1
1	0	0	1	0
0	1	0	1	0

4 Column Parity Bits | 1 1 0 1 | 0 | Stop Bit