

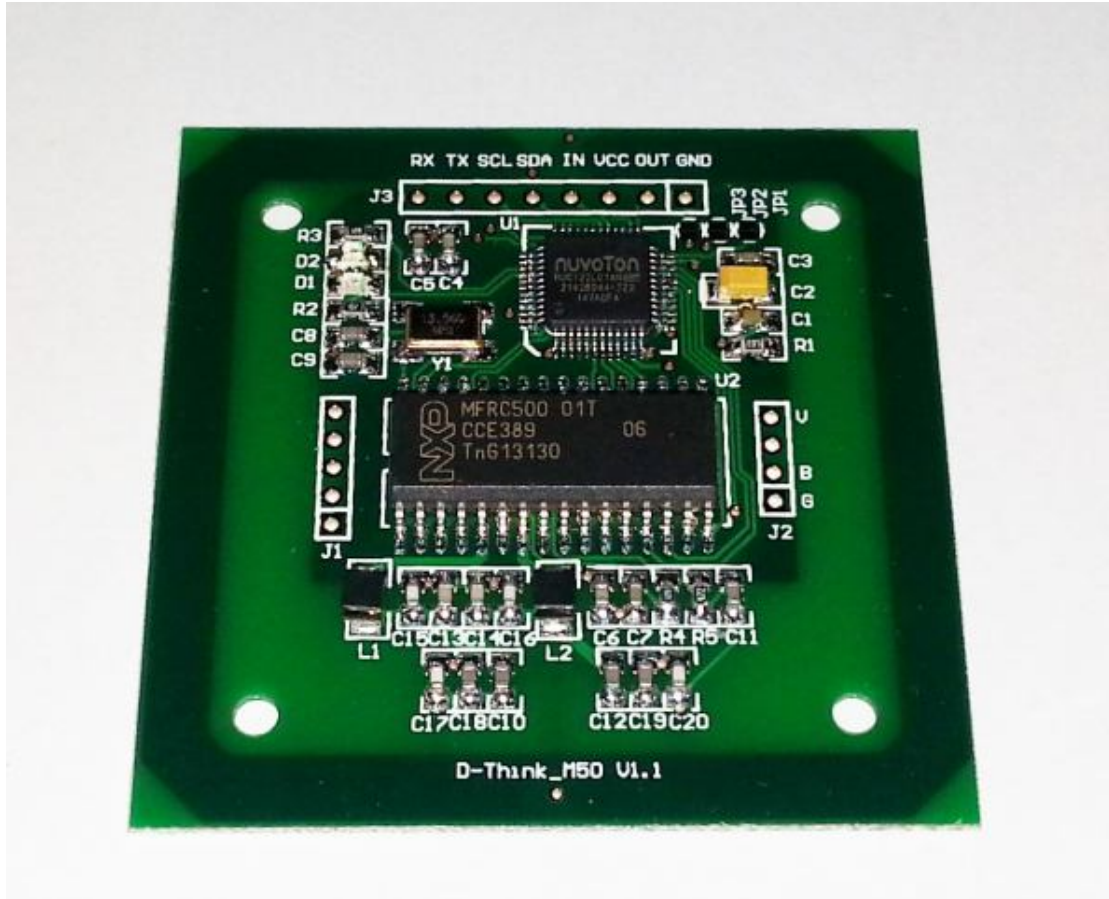
**13.56MHz Reader/Writer**

**D-Think M50**

**DataSheet**

**Version 1.1**

**Augu 2013**



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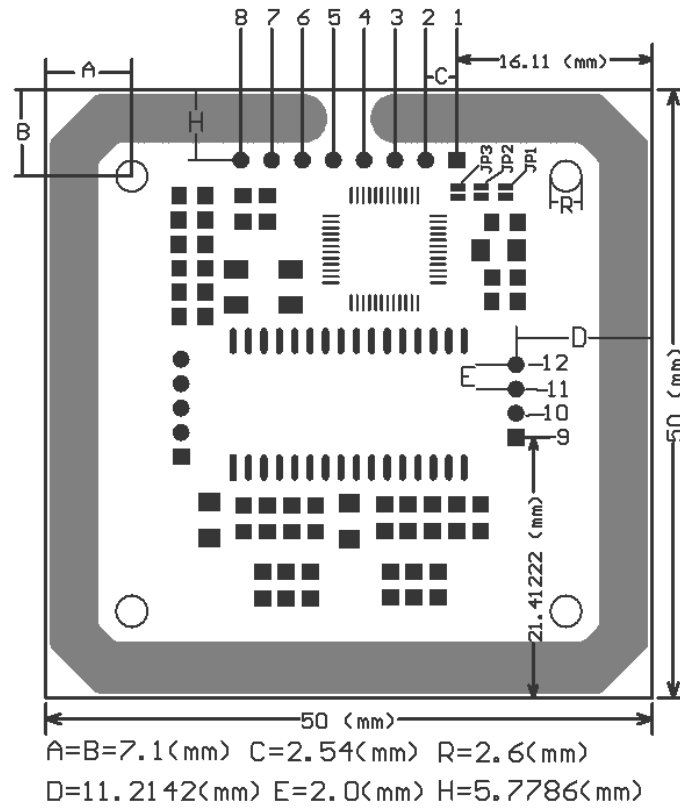


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## 1. GENERAL INFORMATION

- ◇ Protocols: ISO15693
- ◇ UART(TTL)、 I2C or USB(Virtual Com) interface,the hardware configuration.
- ◇ I2C communication rate: 0–400KHz
- ◇ Integrated antenna
- ◇ DC4.5V ~ DC5.5V VDD Operating
- ◇ Maximum 150MA Working Current, sleep mode Less than 1 mA(Except USB interface)
- ◇ Size: 50 x 50 x3.6 mm
- ◇ Operating frequency: 13.56MHz
- ◇ Operating distance: Reach 100mm Depending on the label and different
- ◇ Operating Temperature Range: -20°C ~ +50°C
- ◇ Storage Temperature Range: -25°C ~ +60°C

## 2. Hardware dimensions and pin Information



Number	Name	Type	Explanation
1	GND	Power	Power ground
2	OUT	O	
3	VCC	Power	Power supply (DC4.5V~5.5V)
4	IN	I	Low level wake-up module
5	I2C_SDA	I/O	I2C SDA
6	I2C_SCL	I	I2C SCL
7	UART_TX/USB _D-	I/O	UART TX or USB D-
8	UART_RX/US B_D+	I/O	UART RX or USB D+
9	G	Power	Power ground
10	B	O	External passive buzzer (Frequency:2731Hz)
11	NC	NC	NC
12	V	Power	Power supply

**3. Interface configuration (1: Disconnect the connection point,  
0 :Connection point)**

JP2	JP1	Interface
0	0	USB_VCOM
0	1	I2C
1	0	NONE
1	1	UART



**4. Communication Protocol**

**4.1 UART, USB\_VCOM**

**4.1.1 Receives the command format (PC to send)**

Header + Length + Device identifier code + Command + Parameters + Checksum

Header: 2BYTE,0xAABB

Length: 2BYTE,Identification from the device identifier code to check word, The first byte is valid,Second byteis reserved 0

device identifier code:

2BYTE, device identification module responds only consistent with its own device ID or device ID is 0x0000 (Broadcast) command

Command: 2BYTE, Identifies the coding command functions

Parameters:Command packets (can be empty)

Checksum:1BYTE, Device identification to the parameter byte by byte XOR

Note: In addition to the command header and checksum word outside, if the data in a byte 0xAA, and thereafter shall be followed by a 0x00, length word unchanged.

**4.1.2 Back Command Format (PC receives)**

Header + Length + Device identifier code + Command + Status + Parameters + Checksum

Header: 2BYTE,0xAABB

Length: 2BYTE,Identification from the device identifier code to check word, The first byte is valid,Second byteis reserved 0

device identifier code:

2BYTE, Module device identifier code

Command: 2BYTE, Identifies the coding command functions

Status : 1BYTE,00 = Command OK, Nonzero = Command failure

Parameters:Command packets (can be empty)

Checksum:1BYTE, Device identification to the parameter byte by byte XOR

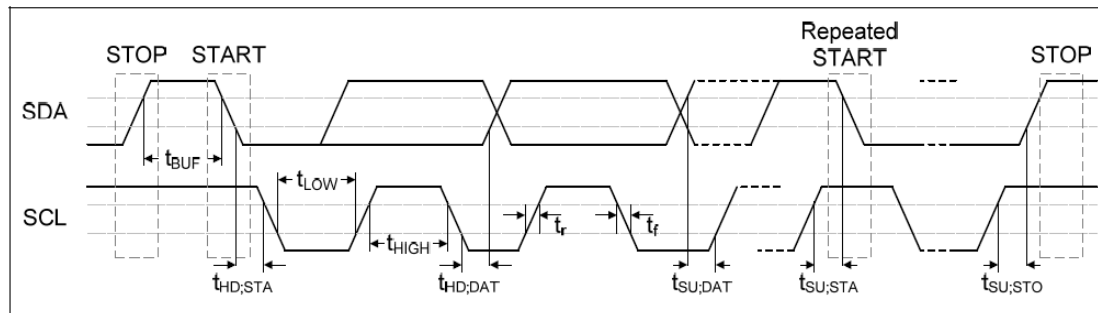
Note: In addition to the command header and checksum word outside, if the data in a byte 0xAA, and thereafter shall be followed by a 0x00, length word unchanged.

## 4.2 I2C

### 4.2.1 Clock and data transmission

I2C is a two-wire, bidirectional serial bus that provides a simple and efficient way to achieve the exchange of data between devices, the standard I2C is a multi-master bus including collision detection and arbitration to prevent two or more masters attempt to control the bus simultaneously data corruption occurs, serial, bi-directional 8-bit data transfer.

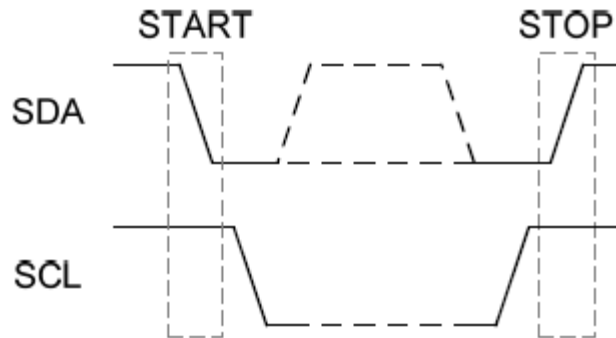
Data communication between the master and slave clock line SCL SDA data line control to achieve a byte a byte synchronous transmission, each byte is 8 bits long, an SCL clock pulse is transmitted one bit of data, the data from the highest bit MSB transfer begins, each transferred byte followed by an acknowledge bit, each bit in the SCL high sampling; therefore, SDA line while SCL is low only when you can change in SDA while SCL is high stable when SCL is high transition on SDA as a command (START or STOP). refer to the diagram I2C bus timing.



Start signal (START): When the bus is idle, the description is not initiated by the bus master transfer request (SCL and SDA lines are high), the host can send a START signal to initiate the transfer request when the SCL line is high, SDA line signal from high to low, marking the start signal is generated on the bus, the new transmission can start.

Stop signal (STOP): Host sent to the bus stop signal the end of the data transfer when the SCL line is high, SDA line from low to high, is the stop signal.





Slave address transmission: START signal is transmitted immediately after the first byte is the slave address, which is a 7-bit slave address plus a R / W bit, R / W bit controls the direction of signal transmission from the machine. System no two slaves have the same address, only to be addressed from the opportunity to host the 9th SCL clock cycle will be set low SDA as a response.

Data Transfer: When the slave address is successfully identified, can be based on R / W determined by the direction of the start byte by byte data transmission, each transmitted byte is followed by a ninth clock cycle the response.

#### 4.2.2 Device Address

00010110,  
00110110,  
01010110 or  
01110110,

You can choose one of four addresses.

#### 4.2.3 Receives the command format

Start + device address + Length + Device identifier + Command + Parameter

Start: 1bit, I2C communication start flag

device address:

1BYTE, High seven bit for the slave address, the least significant bit is read-write flag

Length: 1BYTE, Identification from the device identifier code to check word, The first byte is valid, Second byte is reserved 0

device identifier:

2BYTE, device identification module responds only consistent with its own device ID or device ID is 0x0000 (Broadcast) command

Command: 2BYTE, Identifies the coding command functions

Parameters: Command packets (can be empty)

#### 4.2.4 Back Command Format

(Start + device address +) Length + Device identifier + Command + Status + Parameter

Start: 1bit, I2C communication start flag

device address:

1BYTE, High seven bit for the slave address, the least significant bit is read-write flag

Length: 1BYTE, Identification from the device identifier code to check word,  
The first byte is valid, Second byte is reserved 0

device identifier:

2BYTE, Module device identifier code

Command: 2BYTE, Identifies the coding command functions

Status : 1BYTE, 00 = Command OK, Nonzero = Command failure

Parameters: Command packets (can be empty)

**4.2.5 Command format error or busy**

When there is the following:

1 length byte = 0,

2 slave device identifier (including) to the actual number of bytes command parameter ≠ word length,

3 module is busy working with labels such as modules communicate;

Deemed command format error or busy, then return data (device address is recognized immediately after) as a byte whose value is 0.

**5. Detailed command**

**5.1 Command List**

Type	No.	Code	Explanation
<b>S Y S T E M</b>	1	0101	Initialize Serial Port
	2	0201	Specify device identifier
	3	0301	Read device identifier
	4	0401	Get RF_READER type and product snr
	5	0601	Beep
	6	0701	Manage LED
	7	0801	Manage Protocol
	8	0C01	Manage RF Transmittal
	9	0411	The module into sleep
	10	0312	Set USB_VCOM port number
	1	0010	ISO15693_Inventory(multiple cards)
	2	0110	ISO15693_Inventory(Single card)

I S O 1 5 6 9 3	3	0210	ISO15693_Stay_Quiet
	4	0310	ISO15693_Select
	5	0410	ISO15693_Reset_To_Ready
	6	0510	ISO15693_Read
	7	0610	ISO15693_Write
	8	0710	ISO15693_Lock_Block
	9	0810	ISO15693_Write_AFI
	10	0910	ISO15693_Lock_AFI
	11	0A10	ISO15693_Write_DSFD
	12	0B10	ISO15693_Lock_DSFD
	13	0C10	ISO15693_Get_System_Information
	14	0D10	ISO15693_Get_Block_Security



## 5.2 System command

### 1. Initialize Serial Port

Command code: 0x0101

Parameters: 00=4800

01=9600

02=14400

03=19200

04=28800

05=38400

06=57600

07=115200

Remarks: After the initial power-on module default baud rate 19200

Answer data: NONE

### 2. Specify device identifier

Command code: 0x0201

Parameters: 2 BYTE device identification

Remarks: Module responds only consistent with its own device ID or device ID is 0x0000 (Broadcast) command

Answer data: NONE

### 3. Read device identifier

Command code: 0x0301

Parameters: NONE

Answer data: 2 BYTE device identification

Remarks: So the command is generally used broadcast mode (0x0000), so use this

command should ensure that the system does not have the same two or more device identification modules in parallel, otherwise the reading device identifier may be wrong.

#### 4. Get RF\_READER type and product snr

Command code: 0x0401

Parameters: NONE

Answer data: F\_READER type and product snr

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#### 5. Beep

Command code: 0x0601

Parameters: 1 BYTE beep time, unit 10MS

Answer data:NONE

#### 6. Manage LED

Command code: 0x0701

Parameters: 00 = Extinguish

01 = Red light

02 = Green light

03 = Meanwhile bright

Remarks: Module power red light, green light after about 0.5S, indicating successful initialization module, if the red light indicates that the module has failed to initialize. Initialization successful LED color control by an external command, or in active operation mode when the sensor to label label red light.

Answer data:NONE

#### 7. Manage Protocol

Command code: 0x0801

Parameters: 1 BYTE

type = 'A': Set as TYPE\_A mode

type = 'B': Set as TYPE\_B mode

type = 'r': Set as AT88RF020 card mode

type = 's': Set as ST card mode

type = 'l': Set as ISO15693 mode

Answer data:NONE

#### 8. Manage RF Transmittal

Command code: 0x0C01

Parameters: 00 = off

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Nonzero = ON

Remarks: After the antenna module power is off, do the " Manage Protocol " command antenna automatically.

Answer data:NONE

9. The module into sleep

Command code: 0x0411

Parameters: NONE

Answer data:NONE

Remarks: I2C communication interface when no answer.

10. Set USB\_VCOM port number

Command code: 0x0312

Parameters: 1 BYTE, 0 ~ 99, the module set up to 100 port number.

Answer data:NONE

### **5.3 ISO15693 command**

1. ISO15693\_Inventory(multiple cards)

Command: 0x0010

Parameters:NONE

Answer data: 9 Byte as a group, each structure: 1 Byte DSFID + 8 Byte UID

2. ISO15693\_Inventory(Single card)

Command: 0x0110

Parameters:NONE

Answer data:9 Byte : 1 Byte DSFID + 8 Byte UID

3.StayQuiet (ISO15693\_Stay\_Quiet )

Command: 0x0210

Parameters: 8 Byte UID

Answer data: NONE

4.Select (ISO15693\_Select)

Command: 0x0310

Parameters: 8 Byte UID

Answer data: NONE

5.ResetToReady (ISO15693\_Reset\_To\_Ready)

Command: 0x0410

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Parameters: 1 Byte model + 8 Byte UID

Answer data: NONE

6.Read (ISO15693\_Read)

Command: 0x0510

Parameters: 1 Byte model + 8 Byte UID + 1 Byte starting block number + 1 Byte blocks

Answer data: Data read

7.Write (ISO15693\_Write)

Command: 0x0610

Parameters: 1 Byte model + 8 Byte UID + 1 Byte block number + 4 Byte write data

Answer data: NONE

8.LockBlock (ISO15693\_Lock\_Block)

Command: 0x0710

Parameters: 1 Byte model + 8 Byte UID + 1 Byte block number

Answer data: NONE

9.WriteAFI (ISO15693\_Write\_AFI)

Command: 0x0810

Parameters: 1 Byte model + 8 Byte UID + 1 Byte write data

Answer data: NONE

10.LockAFI (ISO15693\_Lock\_AFI)

Command: 0x0910

Parameters: 1 Byte model + 8 Byte UID

Answer data: NONE

11.WriteDSFID (ISO15693\_Write\_DSFID)

Command: 0x0A10

Parameters: 1 Byte model + 8 Byte UID + 1 Byte write data

Answer data: NONE

12.LockDSFID (ISO15693\_Lock\_DSFID)

Command: 0x0B02

Parameters: 1 Byte model + 8 Byte UID

Answer data: NONE

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13. GetSysInfo (ISO15693\_Get\_System\_Information)

Command: 0x0C10

Parameters: 1 Byte model + 8 Byte UID

Answer data: 1 Byte ? ( 0x0F ) + 8 Byte UID + 1 Byte DSFID + 1 Byte AFI + 3  
Byte ? ( 0x1B 0x03 0x01 )

14. GetBlockSecurity (ISO15693\_Get\_Block\_Security)

Command: 0x0D10

Parameters: 1 Byte model + 8 Byte UID + 1 Byte starting block number + 1 Byte  
blocks

Answer data: N Byte locked state, each corresponding to a 1 byte, zero is not locked, the lock  
nonzero

**5.4 Command Example**

Host send command: Get RF\_READER type and product snr

Header	Length	Identifier	Command	Parameters	Checksum
AABB	0500H	0000H	0401H	NONE	05H

Command operation successful return

Header	Length	Identifier	Command	Status	Parameters	Checksum
AABB	1600H	1112H	0401H	00H	See table below	0E

Parameters

HEX	44 2D 54 68 69 6E 6B 20 4D 35 30 20 56 31 2E 30
ASCII	“D-Think M50 V1.0”

Command fails to return

Header	Length	Identifier	Command	Status	Parameters	Checksum
AABB	0600H	1112H	0401H	0A	NONE	0C

**Revision history**

Version	Date	Author	Modify description
V1.1	2013-8-3	jin	Create