T&J ELECTRIC (SINGAPORE) PTE LTD

Company Registration No: 200205797Z
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 13th October 2015

Subject: Mifare Keycard Switch

Introduction:

- RFID (Radio Frequency Identification) is a technology that uses electromagnetic fields to identify objects in proximity and a contactless way. There are 2 elements in RFID communications: the RFID module and an RFID card.
- The RFID card is fundamentally a contactless memory storage device, where the memory is divided into sectors and blocks with security mechanisms. It need passcode to access its stored data.
- Mifare RFID provides 15 different data sectors and each sector is individually passcode protected. So it allows different service to share one card.
- For example, the card can be used for door lock, keycard switch, lift access, and even as access control for different area in the hotel. Different vendors with their given passcode can only read their authorized sector on a card.
- In a hotel guest room application, an RFID module shall install at the back of keycard switch. When guest places a keycard into the card slot, RFID module shall read the data. If data is valid, the power to room is activated. In addition, RFID module can also distinguish what type of card. E.g. guest card, maid card, and etc.

RFID hotel guest card Requirements:

1. Compatible NXP (Philips) Mifare RFID card, 13.56MHz
2. Passcode to access data sector of the card memory to verify a valid guest card.

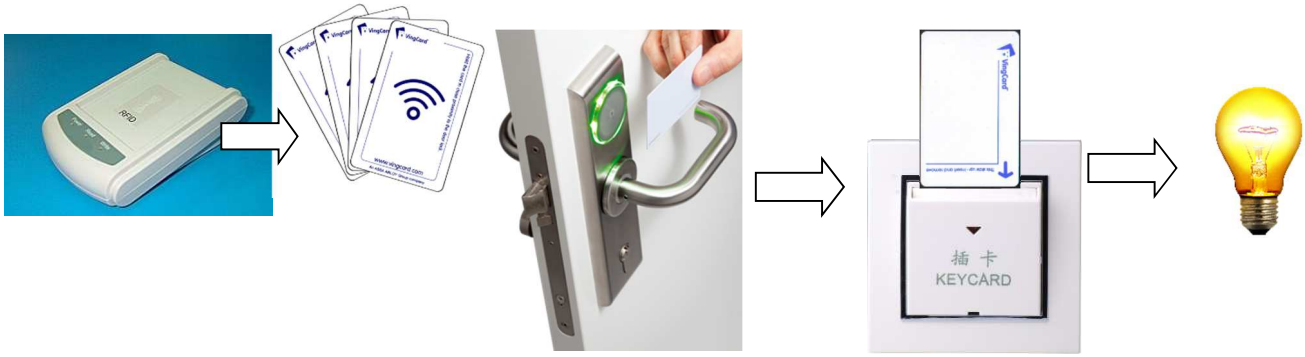
T&J ELECTRIC (SINGAPORE) PTE LTD

Company Registration No: 200205797Z
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 13th October 2015

Subject: Mifare Keycard Switch

Hotel RFID Keycard implementation:



Hotel Front Desk Card Encoder → Guestroom Lock System → Insert Keycard → Lights On

1. The RFID Keycard for each guest room is issued by the hotel Front Desk. Each Keycard is encoded in a data format that is compatible to their guest room lock system, which the hotel guest could open the door to the assigned room.

2. In order for T&J Keycard switch to detect the correct card is inserted in the slot. The card must be assigned a data sector for T&J so that T&J Keycard switch can read the data from the card.

3. The information required:
   i) If card is encoded by door-lock company or hotel management system:
      a) Data sector number and its access passcode
      b) Data format for “type of card” and “valid card”

   OR:

   ii) If T&J provides a SDK for encoding the card:
      a) Data sector number assigned to T&J

T&J ELECTRIC (SINGAPORE) PTE LTD

Company Registration No: 200205797Z
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 13th October 2015

Subject: Mifare Keycard Switch

Other T&J Keycard switches

T&J has developed a type of RFID Keycard switch which don't read any data sector stored on the card but detect the inserted is a RFID operated at 125KHz or 13.56MHz. For detail product information, please refer to Technical Memo: TM-020055 (Radiance Keycard switches).

Appendix A: Mifare 1K RFID card memory organization:

		Byte Number within a Block															
Sector	Block	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Description
15	3	Key A						Access Bits				Key B						Sector Trailer 15
	2																	Data
	1																	Data
	0																	Data
14	3	Key A						Access Bits				Key B						Sector Trailer 14
	2																	Data
	1																	Data
	0																	Data
:	:																	
:	:																	
:	:																	
1	3	Key A						Access Bits				Key B						Sector Trailer 1
	2																	Data
	1																	Data
	0																	Data
0	3	Key A						Access Bits				Key B						Sector Trailer 0
	2																	Data
	1																	Data
	0																	Manufacturer Block

1. A Mifare 1K card has 1024 bytes of internal memory capacity, divided into 16 sectors (Sector 0 to 15).
2. Each sector is composed of 4 blocks (0 to 3), and each block is composed of 16 bytes (0 to 15).
3. Block 3 in each sector is called the sector trailer, it stores the 2 Keys/passcodes (Key A is mandatory)

T&J ELECTRIC (SINGAPORE) PTE LTD

Company Registration No: 200205797Z
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 13th October 2015

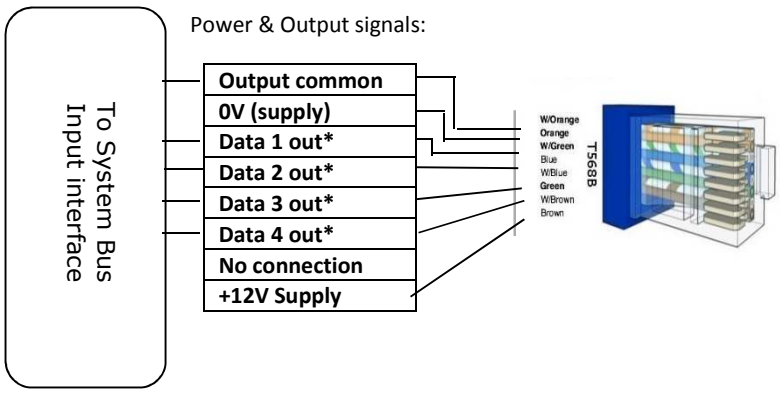
Subject: Mifare Keycard Switch

---

and Access Bits (access conditions).

4. Access Bits are to control the access (read, write, increment, decrement, etc.) to the rest of the 3 blocks in the sector.
5. Sector 0, Block 0 is called the Manufacturer Block, the content (such as Unique Identifier –UID) is written by the chip manufacturer, and can never be modified (read-only).

Appendix B: T&J Mifare RFID Keycard Switch wiring and data format



Lavina range: DL-JC-KT9

Wiring diagram for T&J Mifare keycard switch

1. Given access to Sector 15 , with the sector passcode: “FFFFFF”
2. Also given that the type of card data is located in Block 0, Byte no. 0
3. The type of card is encoded as:
   “G” 47_{hex} –> Guest
   “O” $4F_{hex}$ –> Housekeeping
   “C” 43_{hex} –> Emergency

T&J ELECTRIC (SINGAPORE) PTE LTD

Company Registration No: 200205797Z
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 13th October 2015

Subject: Mifare Keycard Switch

4. RFID Keycard switch data line outputs:

Data Read:	Data 1:	Data 2:	Data 3:	Data 4:	Remarks:
Cannot read	OFF	OFF	OFF	OFF	Not a valid card
Data is: 47_{hex}	ON	ON	OFF	OFF	Guest card
Data is: $4F_{hex}$	ON	OFF	ON	OFF	Housekeeping card
Data is: 43_{hex}	ON	OFF	OFF	ON	Emergency card
Any other data	OFF	OFF	OFF	OFF	Not a valid card

5. RFID Keycard memory location:

Sector 15				
Block 0				
Byte no. 0	Byte no. 1 ~ 4	Byte no. 5 ~ 6	Byte no. 7 ~14	Byte no. 15
(Type of card)	(Card No.)*	(Room No.)*	(Not used)	(Not used)
"G" (47 $_{Hex}$)				
"O" (4F $_{Hex}$)				
"C" (43 $_{Hex}$)				

*Optional: if this information is needed or provided