

User Manual

Product Name: Smart Switch

Model Name: DSW-080

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2022-05-20		New version release	

Approvals

Organization	Name	Title	Date

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1 Introduction

1.1 Purpose& Description

This is a smart switch for the access control and garage door. It's with Zigbee and Bluetooth wireless protocol. User can easily make your access control intercom and garage door control to be smart. It can control your access control and garage door remotely.

And this product can also be used for data transmit function, like RS485 (UART or Modbus) transmit to Zigbee /Bluetooth.

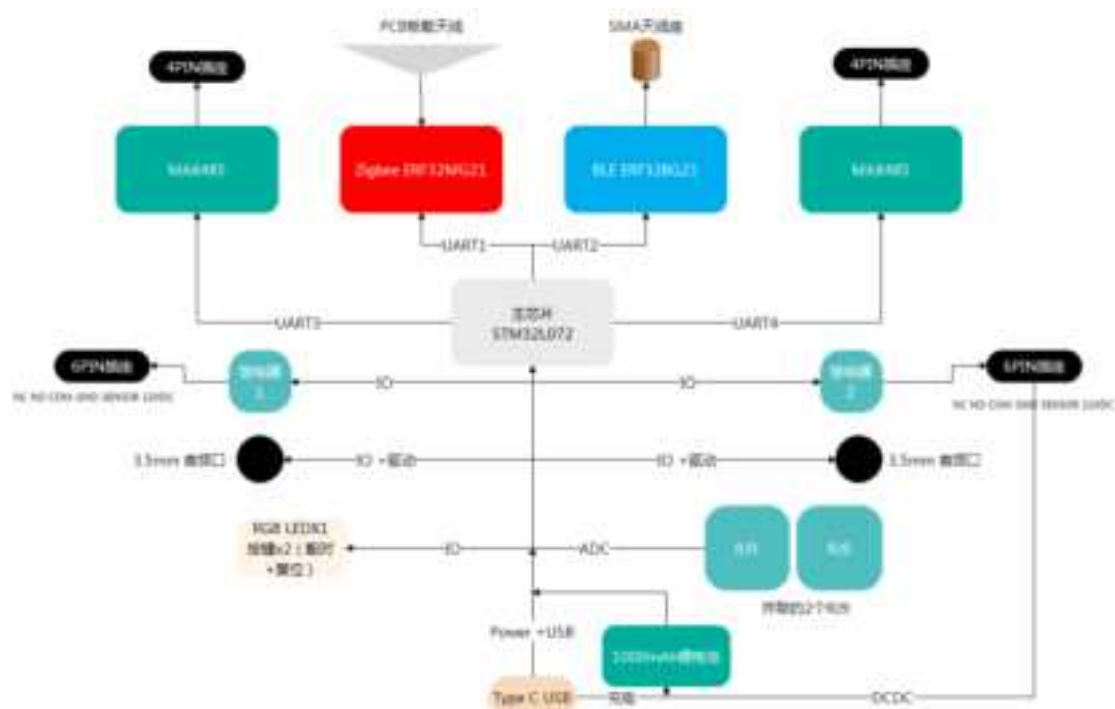
1.2 Product Feature Summary

- Average standby current: <100uA
- Average working current: <45mA
- Support Bluetooth 5.2, with external antenna
- Support Zigbee3.0, can connect to gateway
- Support DC power supply and Li battery backup
- 2 channel Relay switch for access control/garage door control and 2 sensor input I/O for status detect
- 2 ports for electric accessories
- UART or RS485 (Modbus)
- Operation temperature: -10~55°C
- Operation humidity:<90%(NON condition)
- Button: 2 (one for reset function ,and one for pair key)
- LED: 1(RGB)
- Antenna: internal PCB antenna (Zigbee)
- Built-in battery :Li battery ,1000mAh
- Battery life : 3months (it's rechargeable)
- Recharging current: 0.5C
- RTC: support
- Working distance (open field)
Zigbee: >100m
BLE: >70m
- Outline size: 85mm*60mm*23mm
- IP protection: IP20
- Net weight: ~110g

1.3 Application

- Intelligent building
- Smart household and home appliances
- Industrial wireless control
- Home automatic
- Garage smart control
- Environment detect
- Data transmission
- Remote control

1.4 Hardware block



2 Mechanical Requirement

2.1 Drawings



2.2 Outline size



3 Key components

Some key components are shown in the table below

No.	Part No.	Spec	Manufacturer	Remark
1	MCU	APM32F030ZET6	Geehy	
2	Zigbee module	DSM-041	Dusun	
3	485 IC	TP485E	3PEAK	

4 Basic function

4.1 LED blinking and key description

- Status Indicator:
- Fast flashing: 2Hz,Duty50%;slow flashing: 1Hz,Duty50%.

Indicator	Status	Description
Blue	Off	Device is not powered on
	Slow flashing once in 5 seconds	Device is working normally
green	Slow flashing 3 times	Restore factory
	Slow flashing	Pair mode
Red	Slow flashing	Low voltage
	Fast flashing	Shut down
	Always on	Network failure

Note: When the indicator and status lights are working, the power indicator does not work.

- Short press: key time <200mS

4.2 Power-on initialization

When the product is powered on, the Blue indicator flashes slowly for 2 times and then stays on, and the initialization is successful.

4.3 Pairing

After the product is initialized, short press the pairing button once, the device enters the pairing mode, the distribution Green LED indicator flashes quickly, and exits the distribution network status directly after the timeout, the timeout period is 60S.

4.4 Restore factory settings

Press the key for more than 30S, the distribution Green LED flashes 3 times, the device restores the factory

settings and enters the pairing state.

4.5 Button function

Pairing button:

Short press: when the network is not configured, it enters the network configuration state; when the network is configured, it does not respond.

Press key time 8~15S, clear network information;

Press the key for more than 30S, restore factory settings;

Reset button: restart device.

4.6 Power-on default state setting

After the device is powered off, power on again to set the status of the relay after power on. The enumerated values are as follows:

None: Power-off memory, after power-on, the relay keeps the state before power-off.

On: Normally open state; the relay is turned on after power-on again.

Off: Normally closed state, the relay will be disconnected after power-on again.

4.7 Configurable reporting time

The device status reporting time can be set by users according to their own needs, ranging from 1-64800 seconds, and the default is 60 seconds.

4.8 OTA function

The device supports the OTA function, and the device can be upgraded remotely through the gateway. The OTA function requires a digital signature function, and programs other than the device cannot be upgraded.

4.9 Voltage detection

The product has a built-in lithium battery. When the external power supply is cut off, it is powered by the built-in battery. When the voltage is detected to be lower than 3.8V-0.1V, the red LED will flash slowly 3 times, prompting the user to charge. When the voltage is lower than 3.5V-0.1V, the red LEDs will flash fast 6 times, and all functions will be turned off.

5 Electrical Characteristics

5.1 Absolute Electrical

Parameter	Description	Min	Typ	Max	Unit
Ts	Storage temperature	-20	-	70	°C
VBAT	Power-supply voltage	4.5	-	5.5	V
Static electricity voltage (human model)	TAMB-25°C	-	-	8	KV
Static electricity voltage (machine model)	TAMB-25°C	-	-	2	KV

5.2 Normal electrical conditions

Parameter	Description	Min	Typ	Max	Unit
Ta	Working temperature	-10	-	55	°C
VCC	Working voltage	4.75	5.0	5.25	V
VIL	I/O low-level input	-	-	IOVDD*0.3	V
VIH	I/O high-level input	IOVDD*0.7	-	-	V
VOL	I/O low-level output	-	-	IOVDD*0.2	V
VOH	I/O high-level output	IOVDD*0.8	-	-	V

Note: 5VDC from type C USB; 5~12VDC from intercom connection Port

5.3 TX power consumption during constant emission

Working status	Rate	Tx Power/receiver	Average Value	Maximum Value	Unit
Tx	250Kbps	+20dbm	200	206	mA
Tx	250Kbps	+10dbm	62	64	mA
Tx	250Kbps	0dbm	26	28	mA
Rx	250Kbps	Constant receiving	10	12	mA
Rx	250Kbps	Constant receiving	10	12	mA
RX	250Kbps	Constant receiving	10	12	mA

5.4 working current

Working Mode	Working status, Ta=25°C	Average value	Maximum value	unit
EZ mode	The product is in EZ mode.	10	40	mA
Connected and idle	The product is connected to the network	14.2	15	mA
Deep sleep mode	The product in deep sleep mode,	50	-	uA

6 Zigbee RF features

6.1 Zigbee Basic RF features

Parameter	Description
Frequency band	2.405~2.480GHz
Wireless standard	IEEE 802.15.4
Data transmission rate	250Kbps
Antenna type	PCB antenna with a gain of 1.8dBi, option Ipex

6.2 Zigbee Tx performance

Performance during constant transmission

Parameter	Min.	Typ.	Max.	unit
Maximum output power(250Kbps)	-	20	-	dBm
Minimum output power(250Kbps)	-	-30	-	dBm
Output power adjustment step	-	0.5	1	dBm
Output spectrum adjacent-channel rejection ratio	-	-31	-	dBc
Frequency error	-15	-	15	ppm

6.3 Zigbee Rx performance

Rx sensitivity

Parameter	Min.	Typ.	Max.	unit
PER<8%, RX sensitivity(250Kbps)	-102	-101	-99	dBm

7 BT/BLE performance

7.1 Transmitter (BLE)

Parameters	min	Typ	max	Unit
Transmit power	-	6	-	dBm

Gain control step size	-	2	-	dB
RF power control range	-10	-	+12	dBm
Δf_{avg}	240.8	241.2	242	KHz
Δf_{max}	175.7	182.7	183.9	KHz
Drift rate	-	1.5	-	KHz
Offset	-	-4.3	-	KHz

7.2 Receiver (BLE)

Parameters	min	Typ	max	Unit
Sensitivity @30.8% PER	-	-94	-	dBm
Maximum received signal @30.8% PER		-	0	dBm
Out-of-band blocking	30MHz~2000MHz	-	-30	dBm
	2003MHz~2399MHz	-	-35	dBm
	2484MHz~3000MHz	-	-35	dBm
	3000MHz~12.5GHz	-	-30	dBm
Intermodulation		-71		dBm

8 Interface

8.1 RS-485

The interface of the product as below, J1 and J2 is for the control for access control.

Pin No.	J1	J2
1	B	B
2	A	A
3	GND	GND
4	VCC	VCC

8.2 RS-232

The interface of the product as below, J1 and J2 is for the control for access control.

The baud rate is 2400~38400bps, the default is 115200bps;

Start bit: 1bit;

Data bits: 8bits;

Stop bit: 1 bit, 1.5, 2 can be selected, the default is 1 bit

Parity bit: none;

Pin No.	J1	J2
1	RxD	RxD
2	TxD	TxD
3	GND	GND
4	VCC	VCC

8.3 Intercom connect

The interface of the product as below, J1 and J2 is for the control for access control.

IO Level 3.3V

Pin NO.	J1	J2
1	GND	GND

2	Sensor	Sensor
3	NO	NO
4	COM	COM
5	NC	NC
6	VCC	VCC

9 Environmental adaptability

9.1 Climate and environment adaptability

Carry out the climate and environment adaptability test on the product according to the following table. The state should not change during the test. After the test, it should be able to work normally. After the salt spray test, the surface of the metal parts of the electronic anti-theft lock should not be rusted

Item	Test condition	duration	status
High temperature	temperature: $55^{\circ}\text{C}\pm 2^{\circ}\text{C}$	4h	working
Low temperature	temperature: $-10^{\circ}\text{C}\pm 3^{\circ}\text{C}$	4h	working
Constant heat and humidity	temperature: $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ Relative humidity: $90\%\pm 3\%$	48h	working
Salt spray	Concentration of salt solution: $5\%\pm 0.1\%$ Temperature: $35^{\circ}\text{C}\pm 2^{\circ}\text{C}$ Mist absorption time: 15 minutes spray every 45 minutes Salt fog precipitation: $1.0\text{mL}/(\text{h}\cdot 80\text{cm}^2)\sim 2.0\text{mL}/(\text{h}\cdot 80\text{cm}^2)$	48h	Non-working

9.2 Mechanical adaptability

Carry out the mechanical environment adaptability test on the product according to the following table, and it should work normally after the test. The mechanical parts and components in the product are not loose, and the shell is not deformed or damaged.

Item	Test condition	status
Sinusoidal vibration	Frequency range: 10Hz~150Hz Acceleration: 5m/s^2 Vibration direction: X, Y, Z three axes Sweep rate: 1oct/min Number of sweep cycles: 1	working
Free fall drop	height: 1m Geometric faces: 6 Number of drops on each side: 1 Whether to bring packaging: yes	non-working

10 EMC

10.1 Electrostatic discharge immunity

The limit of electrostatic discharge immunity should meet the requirements of test level 3 in GB/T 17626.2-2018. The product should not malfunction during the test and should be able to work normally after the test.

10.2 Electrical fast transient pulse group immunity

The immunity of electrical fast transient pulse group shall meet the requirements of test level 3 in GB/T 17626.4-2018. The product should not malfunction during the test, and it should work normally after the test.

10.3 Surge (impact) immunity

The surge (impact) immunity shall comply with the requirements of test level 3 in GB/T 17626.5-2019. The product should not malfunction during the test, and it should work normally after the test.

11 Reference application

11.1 Garden Door control

DSW-080 can connect to the electric garden door control board through wire, smart control method can be two options, one is Zigbee for long range control, one is Bluetooth for local control.

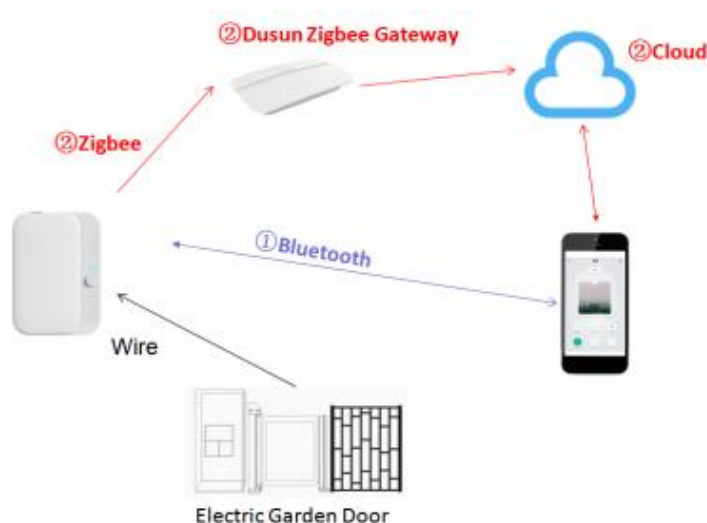
Option ①: DSW-080 will send the data to Dusun Zigbee gateway through Zigbee and sync the data to the cloud, user can use the access control app on the mobile phone to control the electric garden door open.

Option ②: Mobile phone with app can scan the Bluetooth signal in the near, the DSW-080 is always in activity status, the app will be automatic connect the DSW-080, user can control the garage door by the mobile phone.

Remark: After entering the administrator mode, the mobile app can connect to DSW-080 via Bluetooth, and DSW-080 will send the secret key to the mobile app.

DSW-080 will always be in the broadcasting state when it is not connected. When the user holds the authorized mobile app close to it, it will connect and exchange the secret key.

Whether to open the door automatically depends on the logic of the mobile app.



11.2 Garage Door control

DSW-080 can connect to the garage door control board through wire, smart control method can be two options, one is Zigbee for long range control, one is Bluetooth for local control.

Option ①: DSW-080 will send the data to Dusun Zigbee gateway through Zigbee and sync the data to the cloud, user can use the access control app on the mobile phone to control the garage door open.

Option ②: Mobile phone with app can scan the Bluetooth signal in the near, the DSW-080 is always in activity status, the app will be automatic connect the DSW-080, user can control the garage door by the mobile phone.

Remark: After entering the administrator mode, the mobile app can connect to DSW-080 via Bluetooth,

and DSW-080 will send the secret key to the mobile app

DSW-080 will always be in the broadcasting state when it is not connected. When the user holds the authorized mobile app close to it, it will connect and exchange the secret key.

Whether to open the door automatically depends on the logic of the mobile app.



11.3 Intercom control

Can connect the phone to DSW-080 through a flat cable, and then connect DSW-080 to the network to realize remote control of the phone and remote real-time access to the status of the call.

DSW-080 can be set as a Zigbee router, some Zigbee sensor and devices can connect to it.



Remark:

GND and SENSOR is for detect the action of bell ring , NO and COM is used for open the door. NC normal not to be used

VCC can connect to the power supply of the intercom, in common , the voltage will be from 5VDC to 12VDC

The circuits and interfaces of different brands of intercom are different, so needed to confirm which ports are connected correctly.

Step 1: Find the GND port

Connect the multimeter and activate the mode to measure DC voltage.

Connect the black wire to the COM terminal of the multimeter and the red wire to the V,Ω,mA.

Test all possible combinations between the terminals of the intercom strip until the multimeter shows the highest positive voltage.

If the voltage is negative, invert the connection of the cables: connect the red where the black and the black where the red.

Connect the DSW-080 GND output to the terminal where the black cable of the multimeter is connected.

Remark :If there is a corresponding logo on the intercom circuit board, generally GND or Common Ground represents GND

Step 2:Find the Sensor port

Measure DC voltage mode on the multimeter and connect the black wire to GND terminal.

Connect the red lead from the multimeter to each of the terminals on the intercom. It will show constant tension. If, when the doorbell button is pressed, the voltage differential varies markedly, that is the sensor terminal.

Step 3:Find the COM and NO port

Generally, NO and COM are the two ends of the door open button.

Use the beep of the multimeter to find the terminal that is completely short-circuited to the two ends of the door open button. These two terminal can be used to connect the NO and COM ports of DSW-080.

Remark : If cannot find a terminal that is completely short-circuited to the two ends of the door open button, you can directly connect COM and NO to both ends of the door open button. But in this case you need a soldering iron tool to achieve

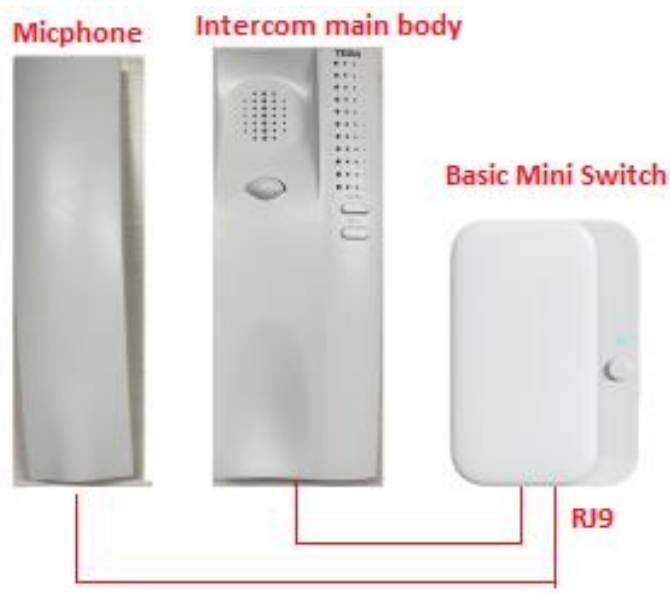
If the intercom door open button is a touch type button, you can choose an electric accessory to connect to the J3 interface of DSW-080. This accessory will be described in detail in the instructions for use.

● Call function connection (traditional intercom)

Traditional intercom are generally analog microphones. Connect the intercom as shown below:

1. Unplug the microphone, then connect the intercom main body and microphone to smart switch respectively.

In this way, smart switch can receive and transmit call audio data from the RJ9 interface, and then use Bluetooth to communicate with the gateway to achieve remote calls.



- Call function connection (Digital intercom)

For digital phones, we need to use an accessory (sound pickups), the pickups has a noise reduction microphone and speaker function, supports USB audio protocol, the connection diagram is as follows,

1. Connect the output port -Type C of the sound pickups to the power supply port of the smart switch
2. Connect the power supply port-USB of the pickup to the 5VDC adapter for the power supply of the pickup and smart switch.

Note: Install the sound pickups as close to the intercom as possible.

Similarly, the smart switch get the audio data of the call from the USB port, and communicates the data with the gateway via Bluetooth to achieve the remote call function.



11.4 Door access control

DSW-080 can connect to the door button via wire. Mobile phone with app can scan the Bluetooth signal in the near, the DSW-080 is always in activity status, the app will be automatic connect the DSW-080, User can control the door by the mobile phone

Remark : After entering the administrator mode, the mobile app can connect to DSW-080 via Bluetooth, and DSW-080 will send the secret key to the mobile app

DSW-080 will always be in the broadcasting state when it is not connected. When the user holds the authorized mobile app close to it, it will connect and exchange the secret key.

Whether to open the door automatically depends on the logic of the mobile app.



11.5 Thermostat control

Connect the DSW-080 to the thermostat via RS485, and connect DSW-080 to the gateway via Zigbee. Users can remotely control



12 Installation

12.1 3M adhesive stickers

Step1: Select the adhesive tape to stick to the back of the device, and tear off the adhesive tape on the back of the beacon sensor;

Step2: Just stick the product to the surface of the object;



12.2 Fixing with expansion screw

The screw size:M3*25 Quantity:4pcs

Step1: Drill holes in the corresponding positions of the wall, and plug the expansion cap into the hole punching positions of the wall;

Step2: Place the Cradle in the corresponding position and fix it with expansion screws;

Step3 : Place the product into the cradle.



12.3 Extension of the antenna

The antenna can be replaced with an extendable antenna, suitable for areas with poor RF signal, the antenna wire can be up to 2 meters, and can be adsorbed on metal materials.



13 Certification

Products comply with SRRC、CCC、 CE、 RoHS、 FCC。

14 Marking, packaging, transportation and storage

14.1 Logo

The packaging box should have the following marks:

- a) Product name, specification model, quantity, volume, quality, warning signs, name and address of the manufacturer;
- b) Trademark name, registered trademark pattern;
- c) Production date: year, month, day;
- d) Adopt the technical standard number.

14.2 Packaging

8.2.1 The packaging materials should be clean, dry, and acid-alkaline should meet the packaging requirements of neutral materials.

8.2.2 The product is equipped with the required accessories, and is accompanied by product instructions and conformity marks.

8.2.3 The outer packaging should have sufficient strength to ensure that the product is not damaged or scratched during transportation.

14.3 Transportation

The packaged products should be able to ensure the safety in the transportation of cars, trains, airplanes and ships. The transport packaging should meet the requirements for shipping.

14.4 Storage

The product should be stored in a warehouse with dry air and no corrosive gas around it, and it should be protected from moisture or rain. Place it in an environment above 20cm from the ground.

15 FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm from your body.