

# Smart power switch

## Engineering Specifications

### ( ZEN15 Z-Wave 800 )

V 2.0

The Switch can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network. The Switch is a security Z-Wave device (S2), so a security enabled controller is needed for take full advantage of all functionally for the Switch.

#### Features:

- Power on the Switch.
- Add device into your Z-Wave network if necessary.
- Connect load to the device, make sure the load does not exceed 1800W.
- Set the connected device to ON if necessary.
- Click Z button to turn off the switch manually, once the Smart Switch is turned off, the RGB LED indicator will turn Pink.
- The Switch Support Smart Start.
- New 800 chip for batter performance than ever.
- Support new features for Z-Wave Long Range, including 4x wireless range, 10x node scalability for larger network.
- Supporting firmware OTA.

## 1 Technical Specifications

Communication Protocol	Z-Wave
Z-Wave Radio Frequency	US: 908.40MHz, 908.42MHz, 916.00MHz
Z-Wave LR Radio Frequency	912.00 MHz(default channel) 920.00 MHz(back up channel)
Wireless Range	More than 1000m outdoors About 40m indoors (depending on building materials)
Power Supply	120VAC,60Hz

Rated Load Current	15A MAX
Power Consumption	≤1.5W
Power Output	1800W
Storage Environment	-20°C - 60°C, 0%~80% non-condensing
Operating Temperature	-10°C -40°C

## 2 Z-Wave Specifications

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SDK Library	libZWaveSlave
Explorer Frame Support	Yes
Routing	Yes
SmartStart	Yes
Device Type	Binary Switch
Basic Device Class	BASIC_TYPE_ROUTING_SLAVE
Generic Device Class	GENERIC_TYPE_SWITCH_BINARY
Specific Device Class	SPECIFIC_TYPE_NOT_USED
Role Type	Always On Slave (AOS)

## 3 Familiarize yourself with Switch

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## 4 Security and non-Security features of Switch

This device is a security enabled Z-Wave Plus™ product that is able to use encrypted Z-Wave Plus messages to communicate to other security enabled Z-Wave Plus products.

When a node includes into a S2 Z-Wave network, the node supports S2 unauthenticated class, S2 authenticated and so do the supported CCs.

This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

### 4.1 Supported Security Levels

- SECURITY\_KEY\_S0\_BIT
- SECURITY\_KEY\_S2\_AUTHENTICATED\_BIT
- SECURITY\_KEY\_S2\_UNAUTHENTICATED\_BIT

## 4.2 Commands List

Command Classes	Version	Required Security Class
COMMAND_CLASS_ZWAVEPLUS_INFO_V2	2	None
COMMAND_CLASS_TRANSPORT_SERVICE_V2	2	None
COMMAND_CLASS_SECURITY_2_V1	1	None
COMMAND_CLASS_SUPERVISION_V1	1	None
COMMAND_CLASS_APPLICATION_STATUS_V1	1	None
COMMAND_CLASS_BASIC	3	Highest granted Security Class
COMMAND_CLASS_SWITCH_BINARY_V2	2	Highest granted Security Class
COMMAND_CLASS_CONFIGURATION_V4	4	Highest granted Security Class
COMMAND_CLASS_ASSOCIATION_V2	2	Highest granted Security Class
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V1	3	Highest granted Security Class
COMMAND_CLASS_VERSION_V2	3	Highest granted Security Class
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	Highest granted Security Class
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	Highest granted Security Class
COMMAND_CLASS_POWERLEVEL_V1	1	Highest granted Security Class
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V5	5	Highest granted Security Class
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3	3	Highest granted Security Class
COMMAND_CLASS_INDICATOR_V3	3	Highest granted Security Class
COMMAND_CLASS_SCENE_ACTUATOR_CONF_V1	1	Highest granted Security Class
COMMAND_CLASS_SCENE_ACTIVATION_V1	1	Highest granted Security Class

## 5 All functions of each trigger

### 5.1 SmartStart

SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR Code present on the product with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity.

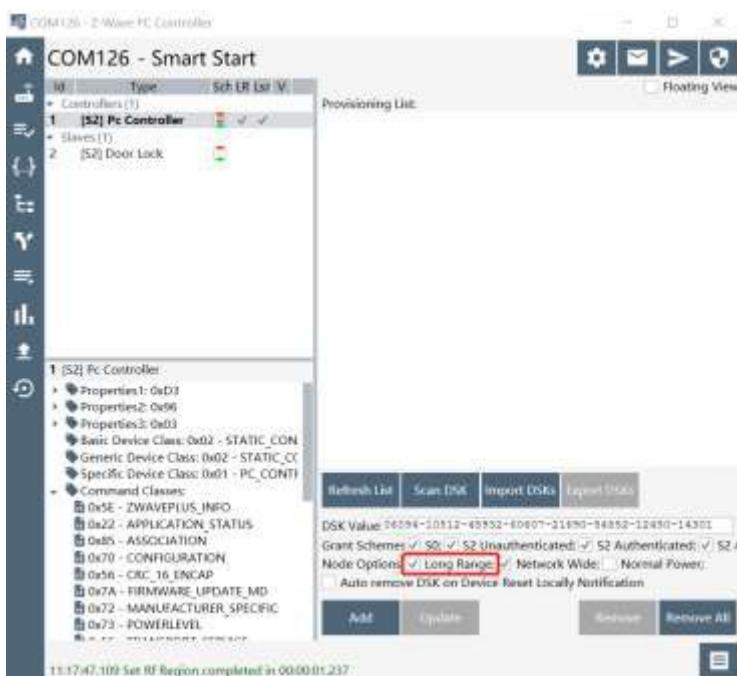
### Add the Switch into the Z-Wave network via Smart Start (**SmartStart Inclusion**):

- a. Add Switch DSK into the primary controller Smart Start Provisioning List (If you don't know how to do this, refer to its manual, DSK usually print on the main body).
- b. Reconnect the power supply.
- c. The Switch will send "Z-Wave protocol Command Class" frame to start Smart Start Inclusion.

#### Note:

Z-Wave Long Range device can only support be included via SmartStart.

Extract the DSK from end device and paste it into the DSK Value in PC Controller, make sure the 'Long Range' option is ticked.



In the scanning process when using US\_LR frequency, the end device will switch between 2 PHY setups, the classic US PHY and the LR PHY with both LR channels active. When the inclusion of end device starts, it will settle on using the PHY that was used by the controller for inclusion. In other words, during learn mode, a end node that support LR will send SmartStart Prime on both classic Z-Wave and Z-Wave LR PHY, both request are send up to the host on the controller and it is the host's responsibility to determine which PHY is used for inclusion.

The controller doesn't do channel scanning the same way as in end device. The controller will scan 4 channels, including 3 classic Z-Wave channels 9.6/40/100 kbps and 1 LR channel, using US\_LR frequency will scan at 912 MHz while using US\_LR\_BACKUP will scan at 920 MHz during startup.

The active LR channel can be switch at runtime.

## 5.2 Short press Config Button three times

### Add the Switch into the Z-Wave network (**Manual Inclusion**):

- a. Power on your Switch, set your Z-Wave controller into add/inclusion mode.

- b.** Triple click the Z-button, RGB LED indicator should blink fast in blue.
- c.** Smart Switch should be recognized and included into the Z-Wave network.

**Remove Switch from a Z-Wave network (Manual Exclusion):**

- a.** Power on your Switch, and let the Z-Wave primary controller into remove/exclusion mode.
- b.** Triple click the Z button.
- c.** RGB LED indicator will blink orange till the removing process is completed, than the indicator will keep orange for 3 seconds.

### 5.3 Press and hold Config Button 20 seconds

**Reset Switch to factory default:**

Press and hold the Z button for more than 20 seconds. If holding time more than 20seconds, the RGB LED indicator will keep yellow for 2 seconds, which means resetting is complete.

Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

### 5.4 Power Indication

Smart Switch's RGB LED indicator will show different light colors when it connects loads with different power. There are 8 light color indications:

- Pink** - Smart Switch's output is OFF.
- Blue** - 0~300W.
- Cyan** - 300~600W.
- Green** - 600~900W
- Yellow** - 900~1200W
- Red** - 1200~1500W
- Purple** - 1500~1800W
- Purple blink** - exceeds 1800W

### 5.5 Testing Z-Wave Network Range

Smart Switch RGB LED indicator can signal its communication quality with the Z-WAVE main controller.

To start testing: press and hold the Z button for 6 to 9 seconds, release when the RGB LED indicator turns to violet.

**Blink in green** - Smart Switch establishes a direct communication with the main controller, and is still under checking.

**Keep green** - The green light should last about 2 seconds, which means the direct communication is stable.

**Blink in orange** - Smart Switch can communicate with the main controller in intermediate radio transmit power level, and is still under checking.

**Keep orange** - The communication quality is moderate.

**Keep Red** - The communication is failed.

## 5.6 Hardware Version

Ten digit represent the main version, and single digit represents the sub version. For example:

Version Number	main version	sub version	Description
10	1	0	1.0
23	2	3	2.3
99	9	9	9.9

# 6 Special Rule of Each Command

## 6.1 Basic Command Class

Basic CC is maps to Switch Binary CC

## 6.2 Z-Wave Plus Info Report Command Class

**Z-Wave Plus Version:** 0x02

**Role Type:** 0x05 (ZWAVEPLUS\_INFO\_REPORT\_ROLE\_TYPE\_SLAVE\_ALWAYS\_ON)

**Node Type:** 0x00 (ZWAVEPLUS\_INFO\_REPORT\_NODE\_TYPE\_ZWAVEPLUS\_NODE)

**Installer Icon Type:** 0x0700 (ICON\_TYPE\_GENERIC\_ON\_OFF\_POWER\_SWITCH)

**User Icon Type:** 0x0700 (ICON\_TYPE\_GENERIC\_ON\_OFF\_POWER\_SWITCH)

## 6.3 Association Command Class

The Switch supports 1 association groups and max 5 nodes.

Grouping Identifier	Max Nodes	Send Commands
Group 1(Lifeline)	0x05	<b>1. Basic Report.</b> Switch will send Basic Report(Configurable) when Switch status changed. <b>2. Switch Binary Report.</b> Switch will send Basic Report(Configurable) when Switch status changed. <b>4. Device Reset Locally Notification.</b> Config Button is press and hold for 20 seconds <b>5. Indicator Report.</b> Receiving Indicator Set will trigger this CC.

## 6.4 Indicator Command Class

The Receptacle support the Indicator Command Class, version 3 and support the Indicator

ID 0x50 (Identify) and Properties ID 0x03, 0x04 and 0x05

## 6.5 Configuration Set Command

Smart Switch offers a wide variety of advanced configuration settings. Below parameters can be accessed from main controllers configuration interface.

Par #	Name	Size	Range	Description	Default
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20	Overload protection	1	0/1	Smart Switch keep detecting the load power, once the AC current exceeds 16.5A for more than 5s, Smart Switch's relay will turn off. 0 - The function is disabled 1 - The function is enabled.	1
21	Setting device status after power failure	1	0/1/2	Define how the Plug reacts after the power supply is back on. 0 - Smart Switch memorizes its state after a power failure. 1 - Smart Switch does not memorize its state after a power failure. Connected device will be on after the power supply is reconnected. 2 - Smart Switch does not memorize its state after a power failure. Connected device will be off after the power supply is reconnected.	0
24	Notification when Load status change	1	0/1/2/3/4	Smart Switch can send notifications to association device (Group Lifeline) when state of Smart Switch's load change. 0 - The function is disabled. 1 - Send Basic report. 2 - Send Basic report only when Load condition is not changed by ZWAVE Command. 3 - Send Switch Binary report. 4 - Send Switch Binary report only when Load condition is not changed by ZWAVE Command.	1
27	Indicator modes	1	0/1	After Smart Switch being included into a Z-Wave network, the RGB LED indicator will indicate the situation of load. 0 - The Smart Switch will work in Power indication mode (Point VII). 1 - The Smart Switch will work in Power indication mode (Point VII) for 5 seconds, when the state of	0

				Smart Switch's load changed. RGB LED indicator will turn off if there is no more switch action in 5 seconds.	
151	Threshold of power report	2	0~65535	<p>Power threshold to be interpreted, when the change value of load power exceeds the setting threshold, the Smart Switch will send meter report to association device (Group Lifeline).</p> <p>Available settings: 0-65535 (0-65535W)</p> <p>0 - The function is disabled.</p>	50
152	Percentage threshold of power report	1	0~255	<p>Power percentage threshold to be interpreted, when change value of the load power exceeds the setting threshold, the Smart Switch will send meter report to association device (Group Lifeline).</p> <p>Available settings: 0-255 (0-255%)</p> <p>0-The function is disabled.</p>	10
171	Power report frequency	4	0~2678400	<p>The interval of sending power report to association device (Group Lifeline).</p> <p>Available settings: 1-2678400 (1-2678400s)</p> <p>0 - The function is disabled.</p>	30
172	Energy report frequency	4	0~2678400	<p>The interval of sending energy report to association device (Group Lifeline).</p> <p>Available settings: 1-2678400 (1-2678400s)</p> <p>0 - The function is disabled.</p>	300
173	Voltage report frequency	4	0~2678400	<p>The interval of sending voltage report to association device (Group Lifeline).</p> <p>Available settings: 1-2678400 (1-2678400s)</p> <p>0 - The function is disabled.</p>	0

174	Electricity report frequency	4	0~2678400	The interval of sending electricity report to association device (Group Lifeline). Available settings: 1-2678400 (1-2678400s) 0 - The function is disabled.	0
30	Enable manual control	1	0/1	Enable manual control 0 – disable 1 - enable	1
31	Enable Z-Wave turn ON	1	0/1	Enable Z-Wave turn on (Basic set 、 Switch Binary set 、 Scene Activation set,) 0 – disable 1 - enable	1
32	Enable Z-Wave turn OFF	1	0/1	Enable Z-Wave turn off (Basic set 、 Switch Binary set 、 Scene Activation set,) 0 – disable 1 - enable	1
33	Enable Automatic turn ON	1	0~99	Enable Automatic turn ON 0- disable 1-99 (minutes), when Z-Wave/manually turn off, it will automatically turn on after this preset time.	0
34	Enable Automatic turn OFF	1	0~99	Enable Automatic turn off 0-disable 1-99 (minutes), when Z-Wave/manually turn on, it will automatically turn off after this preset time.	0

35	Delay Turn-On of the relay after power outage	1	0-600	Delay Turn-On of the relay after power outage value 0 - disabled (default) value 1-600 (range in seconds)	0
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## 7 FCC Warning

### FCC Warning Statement:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. 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 complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

### RF Exposure Statement:

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm the radiator your body. This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.