Dimmer Engineering Specifications

V1.8

Version History

NO.	Version	Date	User	Description
1	V1.0	2020.05.04	Eric	Created
2	V1.1	2020.05.20	Eric	Update Reset description
3	V1.2	2020.05.29	Eric	Add Z-Wave Specifications section section 2 Update product photos section 3 Add Supported Security Levels section 4.1 Update Commands List section 4.2 Update SmartStart section 5.1 Update Basic Command Class section 6.1 Add Z-Wave Plus™ Info Command Class section 6.3
4	V1.3	2020.06.01	Eric	Update LED indicate
5	V1.4	2020.06.09	Eric	Update section 4/5/6
6	V1.5	2020.06.17	Eric	Include a trademark symbol in the first use of “Z-Wave” Update all “Smart Start” to “SmartStart” Add “DSK:” Add NOTE “A number of limitations with respect to Security S2” Delete S0 Support
7	V1.6	2020.06.29	Eric	Include a trademark symbol in the first use of “Z-Wave Plus” Add long press function
8	V1.7	2020.07.03	Eric	Correct the version of ‘COMMAND_CLASS_SWITCH_MULTILEVEL’ to be V2
9	V1.8	2020.07.08	May	Correct “Smart Start” in page 6 to “SmartStart”

The Dimmer is a Multilevel Switch device based on Z-Wave™ routing slave library of V6.82.01. This Dimmer integrated Z-Wave communication module to connect with Z-Wave gateway.
The Dimmer 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 Dimmer is a security Z-Wave device (S2), so a security enabled controller is needed for take full advantage of all functionally for the Dimmer.
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.

Features:

- AC output dimmer by manual or Z-Wave command.
- LED indicates the working status.
- Supporting repeater role.

1 Hardware Specifications

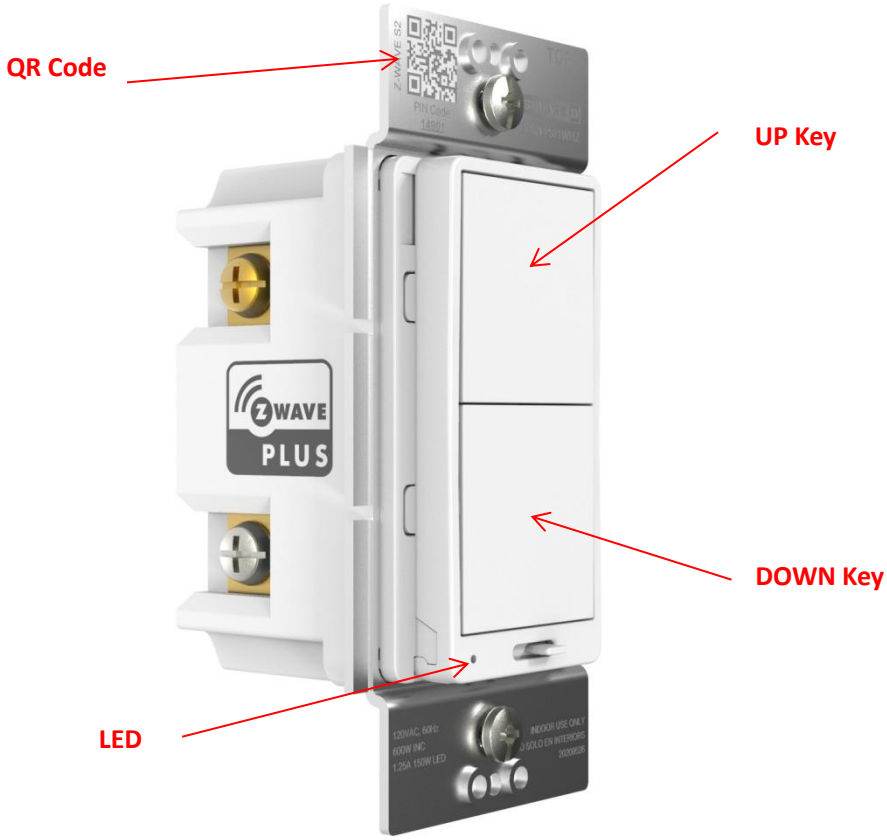
Wireless Protocol	Z-Wave
Radio Frequency	908.42MHz(US)
Communication Distance	40m(LOS)
Modulation Mode	FSK(BFSK/GFSK)
Rated load current	~34mA
Voltage(V)	120V +/-10%, 60Hz
Dimensions(mm)	103mm*51mm*44.5mm

2 Z-Wave Specifications

SDK Version	6.82.01
SDK Library	slave_routing_ZW050x
Explorer Frame Support	Yes
Routing	Yes
SmartStart	Yes
Device Type	Light Dimmer Switch
Basic Device Class	GENERIC_TYPE_SWITCH_MULTILEVEL
Generic Device Class	SPECIFIC_TYPE_POWER_SWITCH_MULTILEVEL

Role Type	Always On Slave (AOS)

3 Familiarize yourself with Dimmer



4 Security and non-Security features of Dimmer

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.

Note: A number of limitations are unfortunately necessary with respect to Security S2 due to lack of external NVM:

- All key classes supported but only one can be active after inclusion (add).
- Slave routing based devices will when entering Sleep mode save the “Most Recently Used” (MRU) S2 SPAN entry in critical RAM. The MRU S2 SPAN entry are restored on power up if a valid S2 SPAN entry resides in critical RAM.
- S2 Public-Private key pair resides in Protocol part of NVR and written to NVR at production. Refer to [22] for details.

- Cannot send S2 multicast but do support S2 multicast receive.

4.1 Supported Security Levels

- SECURITY_KEY_S2_AUTHENTICATED_BIT
- SECURITY_KEY_S2_UNAUTHENTICATED_BIT

4.2 Commands List

Supported 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_SWITCH_MULTILEVEL _V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_METER_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_CONFIGURATION_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_VERSION_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_POWERLEVEL_V1	1	S2 Authenticated/Unauthenticated

5 All functions of each trigger

5.1 SmartStart

Trigger	Description
PowerOn	**Dimmer is not on the Z-Wave network:** **1.** The Dimmer led will slow blink 3 minutes. **2**. Add for inclusion(**SmartStart Inclusion**) Add the Dimmer DSK into the primary controller SmartStart Provisioning List (If your controller does not support SmartStart inclusion, please refer to the manual for your controller for non-SmartStart inclusion.). **a)** Power cycle once for Dimmer. **b)** The Dimmer will send “Explorer Auto inclusion” frame to start

	SmartStart inclusion. **c)** Wait a moment, the Dimmer should be added to the controller. Then the Dimmer led will keep on 1 minute when it has been included into the network. Otherwise, the Dimmer led will slow blink 3 minutes. In which case you need to repeat the process from step a. Note: The Dimmer has a DSK string, you can key in first five digit to increment SmartStart process, or you can scan QR code. The QR co de can be found on the Dimmer. Ex: DSK: 65286-19008-32952-20593-44872-18102-41266-46651 The Dimmer will Start SmartStart Inclusion when it is removed from a Z-Wave network. **Dimmer is on the Z-Wave network:** **1.** The Dimmer's led will keep on 1 minute. **2.** The Dimmer will send INIF.

5.2 UP Key

Key Trigger	Description
Press once	**1. Short press:** Open the Load; **Long press: Dim up the load.** **2.** Send Switch Multilevel Report to lifeline.
Short press 2times (within 1second)	Send Basic Set 0xFF to association group 2
Short press 3 times (within 1.5second)	**Dimmer is not on the Z-Wave network:** **1.** The Dimmer led will fast blink, and send node info frame. **2.** Add the Switch into the Z-Wave network **(Manual Inclusion):** **a)** Set the Z-Wave network main controller into inclusion mode. **b)** Short press 3 times UP or DOWN key, the Dimmer led will fast blink. **c)** Wait a moment, the Dimmer should be added to the controller. Then the Dimmer led will keep on 1 minute when it has been included into the network. Otherwise, the Dimmer led will slow blink 3 minutes. In which case you need to repeat the process from step a.

	Dimmer is on the Z-Wave network: **1.** The Dimmer led will fast blink, and send node info frame. **2**. Remove the Switch from a Z-Wave network **(Manual exclusion)**: **a)** Assuming Dimmer was added to controller and was power on. **b)** Set the Z-Wave network main controller into removing mode. **c)** Short press 3 times UP or DOWN key, the Dimmer led will fast blink. **d)** Wait a moment, and then the Dimmer led will slow blink 3 minutes when it has been removed from the network. Otherwise, the Dimmer led will keep on 1 minute. In which case you need to repeat the process from step b.
Short press 3 times + 1 times hold:10-15 Seconds	**Reset the device to factory default:** 1. Short press 3 times + 1 times hold the UP or DOWN key for 10 seconds, and the Dimmer led will fast blink within 10 seconds. 2. The Dimmer led will keep solid when Press and hold the UP or DOWN key more than 10 seconds, and the Dimmer led will fast blink 3s to indicate reset success when released UP or DOWN key. It will send “Device Reset Locally Command”. Otherwise please repeat step 1. Note： 1. Please use this procedure only when the network primary controller is missing or otherwise inoperable. 2. Reset the Dimmer to factory default settings will sets the Dimmer to not in z-wave network state; delete the Association setting and restore the Configuration setting to the default.

5.3 DOWN key

Up Key Trigger	Description
Press once	**1. Short press:** Close the Load; **Long press:** Dim down the load; **2.** Send Switch Multilevel Report to lifeline.
Short press 2times (within 1second)	Send Basic Set 0x00 to association group 2
Short press 3 times (within 1.5second)	**Dimmer is not on the Z-Wave network:** **1.** The Dimmer led will fast blink, and send node info frame. **2.** Add the Switch into the Z-Wave network **(Manual Inclusion):** **a)** Set the Z-Wave network main controller into inclusion mode. **b)** Short press 3 times UP or DOWN key, the Dimmer led will fast blink. **c)** Wait a moment, the Dimmer should be added to the controller. Then the Dimmer led will keep on 1 minute when it has been included into the network. Otherwise, the Dimmer led will slow

	blink 3 minutes. In which case you need to repeat the process from step a. **Dimmer is on the Z-Wave network:** **1.** The Dimmer led will fast blink, and send node info frame. **2**. Remove the Switch from a Z-Wave network **(Manual exclusion)**: **a)** Assuming Dimmer was added to controller and was power on. **b)** Set the Z-Wave network main controller into removing mode. **c)** Short press 3 times ON or OFF key, the Dimmer led will fast blink. **d)** Wait a moment, and then the Dimmer led will slow blink 3 minutes when it has been removed from the network. Otherwise, the Dimmer led will keep on 1 minute. In which case you need to repeat the process from step b.
Short press 3 times + 1 times hold:10-15 Seconds	**Reset the device to factory default:** 1. Short press 3 times + 1 times hold the UP or DOWN key for 10 seconds. The Dimmer led will keep on. 2. When released UP or DOWN key the Dimmer led will fast blink 3s to signal reset success. It will send “Device Reset Locally Command”. Otherwise please repeat step 1. Note： 1. Please use this procedure only when the network primary controller is missing or otherwise inoperable. 2. Reset the Dimmer to factory default settings will sets the Dimmer to not in z-wave network state; delete the Association setting and restore the Configuration setting to the default.

6 Special Rule of Each Command

6.1 Basic Command Class

Basic Set = 255 maps to Multilevel Switch Set = 255
Basic Set = 0 maps to Multilevel Switch Set = 0
Basic Set = 1-99 maps to Multilevel Switch Set = 1-99
Basic Get/Report maps to Multilevel Switch Get/Report

6.2 Association Command Class

The Dimmer supports 2 association groups.

Grouping Identifier	Max Nodes	Send Commands
Lifeline	0x05	1. Switch Multilevel Report 2. Meter Report 3. Device Reset Locally.
Group2	0x05	Basic set

Group 1: Lifeline

Description: Members of this group will receive unsolicited messages related to the status of the Dimmer.

Switch Multilevel Report:

Changings of load caused by user action or receiving of Switch Multilevel Set or Basic Set CC will trigger this cc.

Meter Report:

Power or energy changings will trigger this cc.

Device Reset Locally:

Short press 3 times + long press the Dimmer UP/DOWN Key fot more than 10 seconds will trigger this cc

Group 2: AssGroupSet

Description: Sends Basic set to associated devices, when short press 2 times the Dimmer UP/DOWN Key.

6.3 Z-Wave Plus Info Command Class

Parameter	Value
Z-Wave Plus Version	V1
Role Type	ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
Node Type	ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE
Installer Icon Type	ICON_TYPE_GENERIC_LIGHT_DIMMER_SWITCH(0x0600)
User Icon Type	ICON_TYPE_GENERIC_LIGHT_DIMMER_SWITCH(0x0600)

6.4 Configuration Set Command Class

#	Name	Size	Range	Description	Default
1	LED indicator Status	1	0-1	Synchronization of load power and LED indicator. 0: Power On, LED off, means that the power and the LED are in the different state. 1: Power On, LED On, means that the power and the LED are in the same state.	1