Smart Switch 7

ZWA023-A

Engineering Specifications

This product 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.

1 Library and Command Classes

1.1 Embedded SDK

v7.12.2

1.2 Device Type

Root Device:

Device Type: Binary Switch
Generic Type: Switch Binary
Specific Type: Not Used

Endpoint 1:

Device Type: Binary Switch
Generic Type: Switch Binary
Specific Type: Not Used

Endpoint 2:

Device Type: Color Switch
Generic Type: Switch Multilevel
Specific Type: Color Tunable Multilevel

1.3 Role Type

Always On Slave (AOS): ROLE_TYPE_SLAVE_ALWAYS_ON (0x05)

1.4 Command Class

Root Device:

Command Class	Version	Not added	Non-secure	Securely added	
				Non-secure CC	Secure CC

			added		
Z-Wave Plus Info	2	Support	Support	Support	
Basic	2	Support	Support		Support
Binary Switch	2	Support	Support		Support
Multilevel Switch	4	Support	Support		Support
Color Switch	3	Support	Support		Support
Association	2	Support	Support		Support
Association Group Information	3	Support	Support		Support
Multi Channel Association	3	Support	Support		Support
Multi Channel	4	Support	Support		Support
Clock	1	Support	Support		Support
Scene Activation	1	Support	Support		Support
Scene Actuator Configuration	1	Support	Support		Support
Application Status	1	Support	Support	Support	
Meter	5	Support	Support		Support
Configuration	4	Support	Support		Support
Notification	8	Support	Support		Support
Transport Service	2	Support	Support	Support	
Version	3	Support	Support		Support
Manufacturer Specific	2	Support	Support		Support
Device Reset Locally	1	Support	Support		Support
Indicator	3	Support	Support		Support
Powerlevel	1	Support	Support		Support
Security 0/2	1	Support	Support	Support	
Supervision	1	Support	Support	Support	
Firmware Update Meta Data	5	Support	Support		Support

Endpoint1:

Command Class	Version	Not added	Non-secure added	Securely added	
				Non-secure CC	Secure CC
Basic	2	Support	Support		Support
Binary Switch	2	Support	Support		Support
Association	2	Support	Support		Support
Association Group Information	3	Support	Support		Support
Multi Channel Association	3	Support	Support		Support

Meter	5	Support	Support		Support
Scene Activation	1	Support	Support		Support
Scene Actuator Configuration	1	Support	Support		Support
Notification	8	Support	Support		Support
Security 0/2	1	Support	Support	Support	
Supervision	1	Support	Support	Support	

Endpoint 2:

Command Class	Version	Not added	Non-secure added	Securely added	
				Non-secure CC	Secure CC
Basic	2	Support	Support		Support
Multilevel Switch	4	Support	Support		Support
Color Switch	3	Support	Support		Support
Association	2	Support	Support		Support
Association Group Information	3	Support	Support		Support
Multi Channel Association	3	Support	Support		Support
Security 0/2	1	Support	Support	Support	
Supervision	1	Support	Support	Support	

2 Z-Wave™ Network Operation

Functions	Action Button	Description
Add[1]	Tap one time	***To Add this device into an existing Z-Wave network if your controller does not support SmartStart:*** 1. Power on the device, the power led will blink blue slowly. 2. Let the Primary Controller into inclusion mode (If you don’ t know how to do this, refer to its manual) 3. Press the action button one time and the led will be a solid yellow status. It indicates the device has enter learn mode. 4. If added successful, the power led will flash white -> green -> white -> green (at a rate of 250ms per each color change) for 2 seconds.

Remove[1]	Tap two times	***To Remove this device from an existing Z-Wave network*:** 1. Power on the device. 1. Let the Primary Controller into exclusion mode (If you don't know how to do this refer to its manual) 2. Press the action button two times and the led will be a solid purple status. It indicates the device has enter learn mode. 3. If removed successful, the blue led will blink slowly.
RF Quality Test	Hold for 5~9s	1. Power on the device and make sure it has been included into the Z-Wave network. 2. Press and hold the button for 5 seconds, when the cyan led on release the button. At this mode, the device will send 100 frames to remote device to diagnostic network quality. 3. After the test, if >= 97 frames receive ACK, the green led will turn on 2 seconds. This indicates the network is Good. 4. If >=90 frames receive ACK, the yellow led will turn on 2 seconds. This indicates the network is OK. 5. If < 90 frames receive ACK, the red led will turn on 2 seconds. This indicates the network is Bad.
Factory Reset	Hold for 15~20s	1. Make sure the device has been powered. 2. Press and hold the button for 15 seconds. When the red led flash, the device will enter factory reset mode. 3. If reset successful, the blue led will blink slowly. Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

1) This device must be used in conjunction with a Security0/2 Enabled Z-Wave Controller in order to fully utilize all implemented functions.

3 Button Action and LED Indicator

Action (second)	**Press down Action Button**	**Release Action Button**
Tap 1 time [0.04, 1)	Solid yellow status	Turns on a solid yellow status, If a new node id is assigned to this device, the yellow LED will keep solid until whole network processing is complete (or entering. If successful, the LED will flash white -> green -> white -> green (at a rate of 250ms per each color change) for 2 seconds. After 2 seconds have finished, use typical paired status LED indicators for ON/OFF status from parameter #1. If parameter 32 is set to 0, this will be used to cancel the alarm. See parameter 30,31,32 for more information.
Tap 2 times [0.04, 1)	Purple LED keeps on for 2	If exclusion is successful, the LED should pulse blue

	seconds and then off	color slowly. If parameter 32 is set to 1, this will be used to cancel the alarm. See parameter 30,31,32 for more information.
Tap 4 times[0.04, 2)	NA	If parameter 32 is set to 2, this will be used to cancel the alarm. See parameter 30,31,32 for more information.
Press and hold [1, 2)	Turn LED off	
Press and hold [2, 5)	Solid orange status	LED revert back to LED state based on network state. If parameter 32 is set to 4, this will be used to cancel the alarm. See parameter 30,31,32 for more information.
Press and hold [5, 9)	Solid cyan status	See RF quality test mode.
Press and hold [9, 15)	Solid red status	Reset accumulated kWh to 0 (without the need for Meter Reset)
Press and hold [15, 20)	Red color will blink on and off at a rate of 200ms for 2 seconds and then pulse blue color if removed	Reset to factory default. Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.
Press and hold [20, 22)	NA	NA
Press and hold [22, ∞)	Pulses blue color slowly	NA

4 Association Groups

The device supports 3 association groups and every group supports max 5 associated nodes.
Group 1 is lifeline group, all nodes associated in this group will receive the messages sent by device through lifeline. Group 2/3 are controlling groups. Group2 acts as a re-transmit group, when basic set/switch binary set/scene activation set are received, they are also sent to the associated nodes. Group3 is an alert group, when watt detected above the parameter6’ s setting, a Scene Activation Set Command will be sent.

When Basic CC/Switch Binary CC are used to control this device or sent through association groups to control other associated nodes, the variable will be phased as the follow ways:
0x01~0x063/0xff means On, 0x00 means Off, other values will be ignored.

The Command Class supported by each association group is shown in the tablebelow:

Root Device:

ID	Name	Nodes	Profile	Description
1	Lifeline	5	General: Lifeline	**Device Reset Locally:**

				When factory reset. **Notification Report (Type=0x08, Event=0x08):** When over load detected. **Basic Report:** When switch state changed. See parameter 42 for more information. **Switch Binary Report:** When switch state changed. See parameter 42 for more information. **Switch Multilevel Report:** Issued when multilevel switch value of the indicator light has changed. **Switch Color Report:** Issued when a color component level of the indicator has changed. **Meter Report:** Issued periodically according to the parameter 23,24,25,26 or above the threshold. **Clock Report:** Issued per hour. **Indicator Report:** Issued when the indicator light changed.
2	Retransmit	5	General: NA	Mirror of endpoint 1, group2
3	Alert	5	Meter: Electric	Mirror of endpoint 1, group3

Endpoint 1:

ID	Name	Nodes	Profile	Description
1	Lifeline	0	General: Lifeline	Mirror of root device, but without node count.
2	Retransmit	5	General: NA	When these commands are received, they will be re-transmitted to the associated nodes. **Basic Set:** **Switch Binary Set:** **Scene Activation Set:**
3	Alert	5	Meter: Electric	**Scene Activation Set:** Triggered when watt above parameter6’ s setting.

Endpoint 2:

ID	Name	Nodes	Profile	Description
1	Lifeline	0	General: Lifeline	Mirror of root device, but without node count.

5 Basic Command Map

Endpoint	Basic Command	Mapped Command
1	Basic Set (Value)	Binary Switch Set (Target Value)
	Basic Report (Current Value, Target Value, Duration)	Binary Switch Report (Current Value, Target Value, Duration)
2	Basic Set (Value)	Multilevel Switch Set (Value)
	Basic Report (Current Value, Target Value, Duration)	Multilevel Switch Report (Current Value, Target Value, Duration)

6 Meter

The meter command class is used to read accumulated consumption meter values in the device. The default scale value is kWh(0x00) in Electric meter and the default rate type is Import(0x01).

Meter Type	Scale	Description
Electric meter	kWh	Default scale, the report interval can be configured by param24.
	W	The report interval can be configured by param23.
	V	The report interval can be configured by param25.
	A	The report interval can be configured by param26.

7 Notification

Notification Type	Notification Events	Description
Power Management (0x08)	State idle	Idle
	Over-current detected (0x06)	Detected current bypass 15A.
	Over-voltage detected (0x07)	Detected voltage bypass the maximum allowed voltage, see parameter 11 for more information.
	Over-load detected (0x08)	Power load bypass the maximum allowed

		power, see parameter 10 for more information.

8 Manufacturer Information

Parameter	Value
Manufacturer ID 1	0x03
Manufacturer ID 2	0x71
Product Type ID 1	0x01
Product Type ID 2	0x03
Product ID 1	0x00
Product ID 2	0x17

9 Configuration

User can change the default settings by the below configuration parameters. After device reset, all these parameters will be set to their default values.

Properties:

R=Readable, W=Writable, S=Signed Integer, U=Unsigned Integer, E=Enumerated, B=Bit filed

(Param 1) LED Setting

This parameter is used to change the reaction of LED setting.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x01	1	0/1/2	2	R/W/E

0 - Disable LED completely. LED will only be used for network operation indicator, such as inclusion, exclusion, factory reset.

1 - Turn on between particular times only (act as night light). The default color is red, color can be changed by Color CC.

2 - Display On/Off Status. The default color is white at 50% lightness. Color can be changed by Color CC.

(Param 2) Night Light On Time

This parameter is used to configure the Night Light on time. User can use Color CC to change the Night Light color(default Red). Only useful when parameter 1 is set to 1.

Parameter Number	Size (Byte)	Available Settings	Default value	Property

0x02	4	0xRRHHMMSS	0x00180000	R/W/U

RR = Reserved

HH = Hours

MM = Minutes

SS = Seconds

Default = 0x00180000 means 6pm.

(Param 3) Night Light Off Time

This parameter is used to configure the Night Light off time. Only useful when parameter 1 is set to 1.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x03	4	0xRRHHMMSS	0x00060000	R/W/U

RR = Reserved

HH = Hours

MM = Minutes

SS = Seconds

Default = 0x00060000 means 6am.

(Param 4) LED Blink Duration

Set the duration of blink, unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x04	1	0~255	0	R/W/U

0 - indicates that it is not blinking

1~255 - set the duration

(Param 5) LED Blink Speed

Set amount of blinks per second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x05	1	1~24	5	R/W/U

i.e. If set to 5, it should blink 5 times per second.

(Param 6) Send Alert When In Use

Send alert when in use. A Scene Activation Set command will be sent when energy draw is above this setting value.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x06	2	0~3000	100	R/W/U

0 - disable

1~3000 - enable, unit W

(Param 7) Plug Always On

Prevents the plug from being turned off via its button.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x07	1	0/1/2	0	R/W/E

0 - the plug will operate as normal and can be turned on or off.

1 - the button on the plug will be disabled for on and off commands, but still work for network inclusion and exclusion.

2 - the plug will ignore any commands to turn it off and it will ignore any use of the button (but still work for network inclusion and exclusion)

(Param 8) Power Out Action

Set the plug’ s action in case of power out.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x08	1	0/1/2	0	R/W/E

0 - last status

1 - power on

2 - power off

(Param 9) Group3 Scene Id

Set the scene id when Scene Activation Set Command sent through group3. Refer parameter 6 for more information.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x09	1	1~255	255	R/W/U

(Param 10) Over-load Protection

Turn off switch when current of load connected bypasses the maximum allowed power regardless of always on setting. Unit W.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x0A	2	0~1800 (US)	1800 (US)	R/W/U

0 - disable overload protection

1~1800 - When watt detected above this setting value, the switch will be turned off immediately. And an over-load

notification will be sent.

(Param 11) Over-voltage Protection

This parameter is used to set the over-voltage protect value, unit V.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x0B	1	0~255	255 (EU/AU) 135 (US)	R/W/U

0 - disable over-voltage protection

1~94 - The device will set value to 95 instead.

95~255 - When voltage detected above this setting value, the switch will be turned off immediately. And an over-voltage notification will be sent.

(Param 19) Threshold Check Time

Set the period of threshold check. Unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x13	1	0~255	5	R/W/U

0 - disable all threshold settings

1~255 - set in seconds on how fast device checks for threshold settings

(Param 20) kWh Report Threshold

Energy kWh threshold reporting enable/disable. Unit kWh.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x14	2	0~10000	100	R/W/U

(Param 21) Watt Report Threshold

Threshold setting for Watt for inducing automatic report.Unit W.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x15	2	0~2500	0	R/W/U

(Param 22) Current Report Threshold

Threshold settings for current for inducing automatic report. Unit A.

Parameter Number	Size (Byte)	Available Settings	Default value	Property

0x16	1	0~150 (US) 0~130 (EU/AU)	0 (EU/AU/US)	R/W/U

(Param 23) Watt Automatic Report Time

Set the automatic report time of Watt. Unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x17	2	0~65535	600	R/W/U

(Param 24) kWh Automatic Report Time

Set the automatic report time of kWh. Unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x18	2	0~65535	600	R/W/U

(Param 25) Voltage Automatic Report Time

Set the automatic report time of Voltage. Unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x19	2	0~65535	600	R/W/U

(Param 26) Current Automatic Report Time

Set the automatic report time of Current. Unit second.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x1A	2	0~65535	600	R/W/U

(Param 30) Alarm Settings

Determines if alarms are enabled in Switch, and what Switch will react to which alarms.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x1E	1	0/1/2/4/8/16/32/64/128	0	R/W/B

Supported Notification Type and Notification Event				
Setting	**Notification Type (Value)**		**Notification (Value)**	
1	Smoke Alarm	0x01	State idle	0x00
			Smoke detected (location provided)	0x01
			Smoke detected	0x02
2	CO Alarm	0x02	State idle	0x00
			Carbon monoxide detected (location provided)	0x01
			Carbon monoxide detected	0x02
4	CO2 Alarm	0x03	State idle	0x00
			Carbon dioxide detected (location provided)	0x01
			Carbon dioxide detected	0x02
8	Heat Alarm	0x04	State idle	0x00
			Overheat detected (location provided)	0x01
			Overheat detected	0x02
16	Water Alarm	0x05	State idle	0x00
			Water leak detected (location provided)	0x01
			Water leak detected	0x02
32	Access Control	0x06	State idle	0x00
			Window/door is open	0x16
			Window/door is closed	0x17
64/128	Home Security	0x07	State idle	0x00
			Intrusion (location provided)	0x01
			Intrusion	0x02
			Motion detection (location provided)	0x07
			Motion detection	0x08

0 - disable all alarm settings

1 - smoke alarm

2 - CO alarm

4 - CO2 alarm

8 - Heat alarm

16 - Water alarm

32 - Access Control (DW Sensor open)

64 - Home Security (intrusion)

128 - Motion Sensor trigger

(Param 31) Alarm Response

Enabled by Alarm Settings, and determines what the switch does in the case an alarm is triggered.

Parameter Number	Size (Byte)	Available Settings	Default value	Propert

				y
0x1F	1	0~255	0	R/W/U

0 - disable, no reaction to alarm settings

1 - Switch is ON

2 - Switch is OFF

3~255 - Sets rate at which Switch turns ON and OFF in seconds. (i.e. If set to 3, then Switch will turn ON in 0.3 seconds, and then turn OFF in 0.3 seconds in a cycle until user disables the alarm manually. If set to 255, then it will cycle every 25.5 seconds)

(Param 32) Alarm Disable Setting

Determines the method of disabling the alarm of the device.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x20	1	0/1/2/4/5~255	1	R/W/U

0 - Can be disabled by 1 tapping Switches action button once.

1 - Can be disabled by 2 tapping Switches action button within 1 second.

2 - Can be disabled by 4 tapping Switches action button within 2 seconds.

4 - Can be disabled by pressing and holding Switches action button about 4 seconds.

5~255 - Sets the duration of the alarm in seconds (i.e Sets this setting to 50, the alarm state of the switch will disable after 50 seconds)

(Param 40) Automatic Off Timer

Acts as auto off after as soon as the switch turns ON, setting is set in seconds.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x28	4	0~86400	0	R/W/U

0 - no auto off with timer

1~86400 - seconds

(Param 41) Automatic On Timer

Acts as auto on after as soon as the switch turns OFF, setting is set in seconds.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x29	4	0~86400	0	R/W/U

0 - no auto on with timer

1~86400 - seconds

(Param 42) Report Command Setting

Which report will be sent to lifeline group when the output state is changed.

Parameter Number	Size (Byte)	Available Settings	Default value	Property
0x2A	1	0/1/2	2	R/W/E

0 - Send nothing

1 - Send Basic Report

2 - Send Switch Binary Report

10 Security Network

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.

The device supports the security function with S0 and S2 encrypted communication. The device will auto switch to the security mode when the device included with a security controller. In the security mode, the commands will use security and security2 command class wrapped to communicate with others, otherwise the device will not response any commands.

This device supports security levels are listed in below table:

Security Levels	Support (Yes/No)
SECURITY_KEY_S0	Yes
SECURITY_KEY_S2_UNAUTHENTICATED	Yes
SECURITY_KEY_S2_AUTHENTICATED	Yes
SECURITY_KEY_S2_ACCESS	No

11 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. You can find the QR code on the bottom of the product, like this:

PIN: XXXXX

And the DSK information will be shown like this:
DSK: XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX

12 Specifications

Power Supply	AC90~250V, 50/60Hz
Max Amperage	Max 15A
Max Wattage	1800W (US)
Max Standby Power	0.8W
Power LED	RGB LED
Communication Frequency	868.40MHz, 869.85MHz (EU) 908.40MHz, 916.00MHz (US)
Communication Range	Up to 100m indoors (depending on the building structure) and 80m for outdoor open fields.
Communication Certification	Z-Wave Plus v2 with SmartStart
Operational Temperature	0 - 40℃ / 32 - 104℉
Operating Humidity	8% to 80%

13 Revision History

13.1 Version 0.1

Initial @20190501

13.2 Version 0.2

Change SDK version to v7.11.1 @20190801

13.3 Version 0.3

Modify some mistake description about reset operation @20191011

13.4 Version 0.4

Change Z-Wave SDK version to v7.12.1. Modify some description about param. @20191031

13.5 Version 0.5

Add model number.@20191118

13.6 Version 0.6

Replace param11 to over-voltage protection. Modify some parameters’ description. @20191122

13.7 Version 0.7

Add parameter9, parameter255 and group3. @20191126

13.8 Version 0.8

Add new notification state. Update to sdk v7.12.2 @20191127

13.9 Version 0.9

Update version @20191225

13.10 Version 1.0

Delete Param43 and Change font @20200111

13.11 Version 1.1

Add property filed for parameter and delete param255. @20200202

13.12 Version 1.2

Modify Param11’s description and add DSK for SmartStart description. @20200227