

# NS2U Zigbee Module

## User Manual and Specifications

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## Revision History

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# Overview

## About

This manual serves as a guide through the process of installing the Zigbee Coordinator (ZC) and the dimmer, and establishing solid wireless connection between the two. The topics covered in this manual include connecting, communication, configuring, status monitoring and updating the firmware of both the dimmer and the coordinator.

## Outline

**Getting Started** describes the primary function of the equipments. It is recommended for users to be aware of the contents described in this section before proceeding.

**Coordinator Configuration** introduces users to the process of configuring the coordinator.

**Dimmer Configuration** provides a brief introduction on how to install and set the dimmer.

**Firmware Update** guides users through the process of updating the firmware of the coordinator and dimmer.

**Example** provides onsite installation examples to guide users in their own installations.

# Getting Started

This section will briefly explain the individual roles and functions of the coordinator and dimmer, how they work together to enable lighting control and the terminology used to describe the hardware.

## Coordinator

The Coordinator comes with a high performance 400 Mhz Embedded Systems CPU, enabling stable connection and maintenance over multiple dimmers and sensors via the Zigbee communication protocol. In total, up to 128 dimmers and sensors can be maintained and the status of every connected device is reported to the ns2u in real-time. The degree of illumination of LED equipments is controlled in real-time and immediately responds to changes reported by ambient light and motion sensors subordinate to the coordinator.



Equipment	Description	Note
LED (Zigbee)	On while communicating with external equipments	
LED (RDY)	Flickers every 0.5 seconds under stable conditions	
Antenna	5 dB, Zigbee antenna	
LAN	RJ45 (10/100Mbps)	
Reset Button	Restores default settings, resets the coordinator. Hold for 5 seconds for reset, 10 seconds for factory.	
Power Socket	DC 12VDC 1A Adapter	
Power TB	DC 12VDC 1A Terminal Block (In case the power socket disconnects due to vibration).	

## Dimmer

Dimmers connected to LED lighting are able to control the dimming value (up to 23 different dimming values) of the LED via the Zigbee communication module. The dimmer transmits its operational status to the coordinator.



Equipment	Description	Note
Dip Switch	Set the Device Type, Channel, PAN ID, Address of the dimmer	
Antenna	2 dB, Zigbee antenna	
Power Connector	DC 24~48 VDC, connect with LED light	

## Dimmer + Sensor

Primary functions remain the same, but these devices are able to connect with sensors as well. They are classified as either ambient light or motion sensors. If the sensor value changes (as a result of detecting motion, or changes in external lighting environment), the coordinator is notified immediately. Use the 4 pin connector to connect the sensor with the dimmer.



Equipment	Description	Note
Dip Switch	Set the Device Type, Channel, PAN ID, Address of the dimmer.	
Antenna	2 dB, zigbee antenna	
Power Connector	DC 24~48 VDC, connect to LED light	
Sensor Connector	Connector intended to connect the sensor (ambient light, motion) with the dimmer.	

## Ambient Light Sensor

When connected to a dimmer, detects the lighting in its proximity and transmits the value to the dimmer every 3 seconds. Dimmers connect with sensors via the RS-232 port.



Equipment	Content	Note
Power/ 4 Pin Connector	Refers to both the power cable and the four pin connector.	

## Motion Sensor

When connected to a dimmer, reports any motion detected to the dimmer. Connects with the dimmer via the RS-232 port.



Equipment	Content	Note
Power/4 Pin Connector	Refers to both the power cable and the four pin connector.	

# Coordinator Configuration

This section explains the Coordinator's functions and settings in detail.

## General Information

The coordinator can be accessed via the ns2u or via Telnet, SSH to change settings. For changes made through the ns2u, refer to the ns2u manual. The following section will guide users in making adjustments via Telnet. Upon opening a new coordinator, the settings will be set to default value.

Content	Default	Notes
IP Address	192.168.0.245	
Subnet Mask	255.255.255.0	
Gateway Address	192.168.0.254	
Listen Socket No	4001	
Username	ns2u	Username for accessing the coordinator via Telnet/SSH
Password	9999	Password for accessing the coordinator via Telnet/SSH
Channel No	26	Range 11 ~ 26 (channel 11 = 0 on the wifi network)
PAN ID	3	IDs assigned to differentiate between multiple ZC. Not permitted to share channels. One PAN ID per building. Range (0 ~ 3)
Power Level	0	Zigbee Power Level (0~18), 0 represents the highest level
Repeat count	10	The frequency of identical packets sent via wireless transmission. (1 ~ 10)
Packet Interval	4	Transmission interval between packets in msec
Illumination Mode	Auto	Auto, Manual
Motion Mode	Auto	Auto, Manual
Arbitrary Mode	Auto	Auto, Manual
Polling Interval	30 sec	Determines the interval in which the coordinator confirms the status of subordinate dimmers (6 ~ 60).

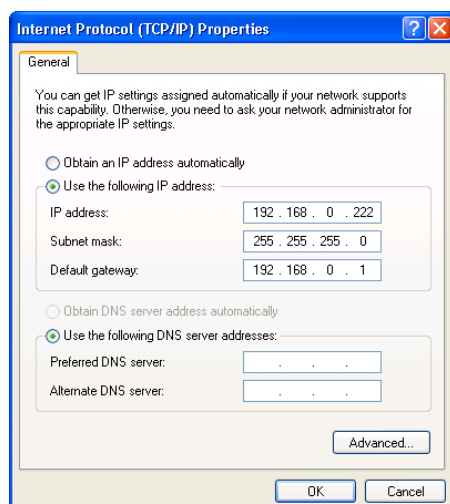
Motion Dimming Off-Timer	20 sec	Determines how long motion dimming value should be maintained by dimmers subordinate to the motion group after detecting motion before switching 'off'. Range (5 ~ 255 sec)
Motion Dimming	22	Select a dimming value between 0~22 Represents the value reflected upon detecting movement
Illumination Dimming Table	0 = 22 1 = 19 2 = 16 3 = 13 4 = 10 5 = 7 6 = 4 7 = 0	The ambient light sensor has 8 levels (0~7), with each level being assigned a different dimming value (0~22) based on relativity (I.E. level 0 must have the highest dimming value, 7 the lowest). By default, if illumination level is 0 (pitch dark), the dimming value will be 22 (brightest value). If illumination level is 7 (broad daylight), the dimming value will be 0 (dimmiest value). The dimming table and its corresponding values can be reconfigured to suit the needs of the end users.
Ambient light Table	9 * 130	Up to 9 ambient light groups can be registered under a single coordinator. Each group allows a maximum of 3 sensors and 127 dimmers, with a minimum requirement of one sensor and dimmer per group.
Motion Table	6 * 7	Register the motion sensor and subordinate devices here. The dimmer reports motion to the ZC which responds immediately by turning the sensor and its subordinate devices 'on'. Up to 6 motion groups can be assigned to a ZC, with a maximum of 1 motion sensor and up to 6 subordinate devices per group.
Arbitrary Table	6*30	Dimmers not registered under a ambient light or motion group can be registered under an arbitrary group at the user's discretion.  Once a dimming value is assigned to the group via the ns2u group properties, the value will be fixed and cannot be changed until another dimming value is assigned to the entire group.  Up to 6 groups can be registered. A maximum of 29 dimmers can be registered under a single arbitrary group.

Router Table	3 * 5	<p>Register the router and the address of its subordinate nodes. Up to three routing groups can be assigned to a single coordinator. A maximum of a single router a 4 nodes can be registered within a single group. Nodes may face up to 0.4 seconds delay in response to changes in dimming value.</p> <p>If subordinate nodes do not receive a single packet from the router, it will change its communication point from the router to the coordinator.</p>
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## Coordinator Network Config. and TELNET(SSH) Access

The coordinator requires an RJ45 Ethernet port to connect to the network and supports speeds of 10 and 100Mbps. The coordinator's LAN port supports MDIX and works regardless of whether it is a Cross or Direct LAN cable. Connect the other side of the cable to a 'hub switch' or an equipment that enables internet access.

Please refer to the example below and configure the IP address.



In the example above, the IP address is temporarily set as 192.168.0.222 . Please bear in mind that it may be risky to share the same IP address as the coordinator.

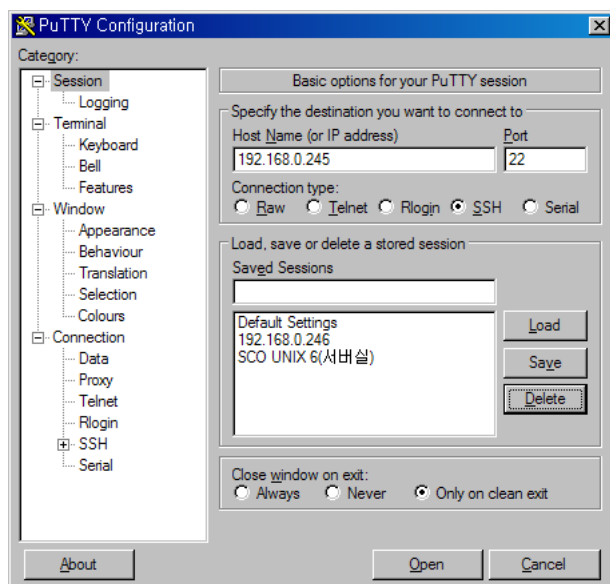
## What is Putty?

Putty is free telnet and SSH client.

Download Link: <http://tartarus.org/~simon/putty-snapshots/x86/putty.exe>

If the URL above does not work, please search with the term "Putty" on Google.

Utilizing the same IP settings as above, run PUTTY to access the coordinator as shown below.



The User ID and Password are **NS2U** and **9999** respectively.

We will now proceed to change the network settings via the 'def command'.

Type def and press enter for a list of def commands with explanations. When utilizing def to change settings, the changes are not applied immediately. After inputting the desired changes, always reset the coordinator for the changes to be reflected. The coordinator's settings can be adjusted by accessing the coordinator via telnet or SSH and utilizing the def command.

## Check Configurations

Command	Explanation
def	Lists every possible def command.
def view	Lists settings and information regarding the coordinator.

def factory	Default settings are restored. This means that the saved settings on the ns2u data source screen will be lost. Effective upon resetting the Coordinator.
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## Network Settings

Command	Default	Explanation
def line [ip/dhcp]	Static IP	Configuring the IP address required for network access.
def ip <IP Address>	192.168.0.245	Displays current IP address. If Line Type is Static IP, input the IP address. If Line Type is DHCP current IP is displayed (Unable to change).
def mask <Subnet mask>	255.255.255.0	Displays current Subnet mast address. If Line Type is Static IP, input the subnet mask. If Line Type is DHCC, display current Subnet Mask (Unable to change).
def gateway <Gateway address>	192.168.0.1	Displays current Gateway address. If Line Type is Static IP, input the Gateway address. If Line Type is DHCC, display current Gateway address (Unable to change).
def dns <IP Address>	168.126.63.1	Configure IP address of Domain Name Service.
def telnet <enable/disable>	Disable	Enable/Disable access to Telnet.
def port <Socket No>	4001	Admin socket intended connect to coordinator via the Ns2u server.
def username <string>	ns2u	Username for accessing Telnet/SSH (max. 15 characters).
def password <string>	9999	Password for accessing Telnet/SSH (max. 15 characters).

## Group and Zigbee Settings

Command	Default	Explanation
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def chanid <11 ~ 26>	26	Assign a channel ID for communication with dimmers.
def panid <0 ~ 3>	3	Assign a PAN ID for communication with dimmers.
def lmode <auto, manual>	Auto	Set the operation mode for the ambient light group. Under auto mode, the ambient light sensor will actively control the dimming value of the group. The ambient light group will be passive in manual mode. and thus will only respond to direct orders issued via the coordinator.
def mmode <auto, manual>	Auto	Set the operation mode for the motion group. Under auto mode, the motion sensor will automatically control the dimming value of the group on detecting motion. In manual mode, the group will be passive and thus will only respond to direct orders issued via the coordinator.
def amode <auto, manual>	Auto	Set the operation mode for the arbitrary group. The dimming value assigned to the arbitrary group is maintained in Auto mode (even when another value is set via ns2u). In manual mode, the fixed dimming value designated over the group will not be maintained. The dimming value will only be adjusted by directly issuing orders via the ns2u.
def polltime <6 ~ 200 sec>	30	Set the polling interval to check the status of subordinate dimmer.
def repeatcnt <1 ~ 30>	10	Set the frequency of packets sent.
def packetinterval <2ms ~ 255 msec>	4	Adjust the packet interval between the coordinator and dimmer.
def dimmVal <0 ~ 31>	22	Refers to the dimming value applied on detecting motion.

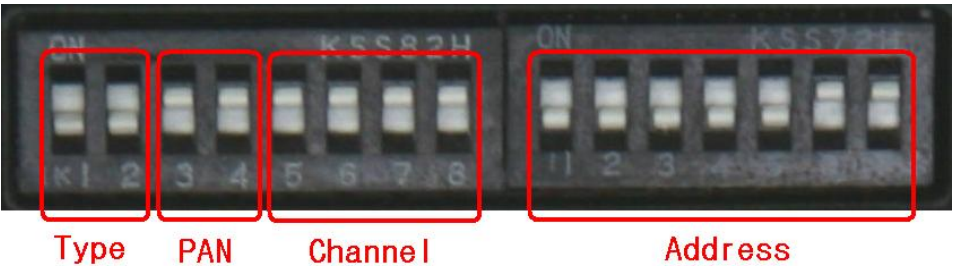
def keepTime <5 ~ 255>	20	The length of time the dimming value on detecting motion is maintained by the motion group before switching off.
def lightlevel	22,19,16,13,10,7,4,0	<p>The ambient light sensor has 8 levels (0~7), with each level being assigned a dimming value (0~22) based on relativity (I.E. level 0 must have the highest dimming value, 7 the lowest). By default, if illumination level is 0 (pitch dark), the dimming value will be 22 (brightest value). If illumination level is 7 (broad daylight), the dimming value will be 0 (dimmiest value). The dimming table and its corresponding values can be reconfigured to suit the needs of the end users.</p> <p>The light level can be assigned as shown below.</p> <p>Def lightlevel &lt;2219161310070400&gt;</p> <p>The first number corresponds with illumination level 0, meaning the dimming level 22 has been assigned to it.</p>
def addMotion	N/A	<p>Def addmove &lt;Table_no&gt; &lt;Motion ID=Dimmer IDs&gt;</p> <p>Table ID : 1 ~ 6, with 6 tables in total</p> <p>Motion ID : Register one sensor(Hex 2 char)</p> <p>dimmer ID : Register a maximum of 6 (Hex 2 char)</p> <p>example&gt; def addmove 1 10=112a2b2c</p> <p>Register 10 as the motion sensor and 11,2a,2b,2c as subordinate devices.</p>
def addroute	N/A	<p>Def addroute &lt;Table_no&gt; &lt;Route ID=Dimmer IDs&gt;</p> <p>Table ID : 1 ~ 3, with 3 tables in total</p> <p>Router ID : Register one router(Hex 2 char)</p> <p>dimmer ID : Register a maximum of 4 (Hex 2 char)</p> <p>example&gt; def addroute 1 10=112a2b2c</p> <p>Register 10 as router and 11,2a,2b,2c as nodes.</p>
def addillumination	N/A	<p>Def addillu &lt;Table_no&gt; &lt;illumination ID=Dimmer IDs&gt;</p> <p>Table ID : 1 ~ 9, 9 tables in total</p> <p>illumination ID : Register up to 3 sensors (Hex 2 char)</p> <p>dimmer ID : Maximum 127 (Hex 2 char)</p>

		<p>example&gt; def addillumination 1 102030=112a2b2c</p> <p>Register 10,20,30 as ambient light sensors and 11,2a,2b,2c as subordinate devices.</p>
def addarbitrary	N/A	<p>Def addarbi &lt;Table_no&gt; &lt;Light Level=Dimmer IDs&gt;</p> <p>Table ID : 1 ~ 6, 6 tables in total</p> <p>Light Level : dimming value (Hex 2 char)</p> <p>dimmer ID : Maximum 29 (Hex 2 char)</p> <p>example&gt; def addarbit 1 05=112a2b2c</p> <p>Register arbitrary table 1, set dimming value as 5 and 2a,2b,2c as subordinate devices.</p>
def delMotion	N/A	<p>Delete target motion group.</p> <p>Example) def delmove 1</p> <p>Motion group 1 will be deleted.</p>
def delroute	N/A	<p>Delete target router group.</p> <p>Example) def delroute 1</p> <p>Router group 1 will be deleted.</p>
def delillumi	N/A	<p>Delete target ambient light group.</p> <p>Example) def delillumi 1</p> <p>Ambient light group 1 will be deleted.</p>
def delarbit	N/A	<p>Delete target arbitrary group.</p> <p>Example) def delarbit 1</p> <p>Arbitrary group 1 will be deleted.</p>



# Dimmer Configuration

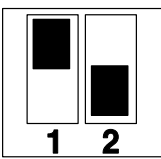
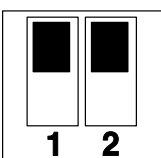
Dimmers connected to LED lights allow control over lighting. Please refer to the LED Installation guide for further information. This section will walk users through the process of setting the dipswitch. There are 8 switches on the left hand side, 7 on the right. See picture below for a visual illustration.



## Type

The dimmer's primary function will depend on how the device type is configured. There are four different device types, which are ambient light sensor, motion sensor, dimmer and motion dimmer. The type is adjusted by the two switches on the left, with values ranging from 0 ~ 3.

Dimmer (Non-motion)		Type 00 refers to every dimmer apart from those subordinate to a movement sensor group. For example, if the dimmer is part of an ambient light group and the sensor's dimming value changes, the LED light's dimming value will respond by reflecting the change in dimming value.  The default dimming value (e.g. upon switching on) of this device is 10. Recommended for rooms where a fixed dimming value has to be maintained for a lengthy period.
Dimmer (Motion)		Subordinate dimmers to the motion sensor that respond by lighting up when the motion sensor detects movement. By default, the initial dimming value upon turning on the light is 0. Usually installed in hallways, the group brightens on detecting motion and switches off after a fixed period of time (this can be adjusted via the ns2u).

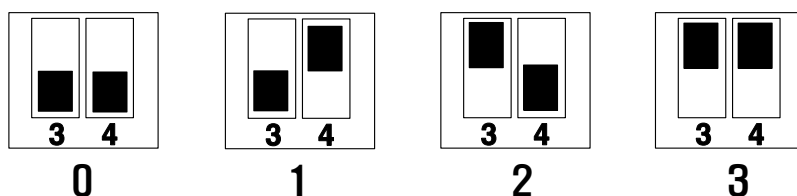
Ambient light Sensor		Dimmers connected to ambient light sensors will immediately report changes in the external lighting environment to the coordinator.
Motion Sensor		Dimmers connected to movement sensors will immediately report motion to the coordinator.

## PAN

The PAN ID is set to enable stable communication between the coordinator and the dimmer.

For the coordinator and dimmer to communicate correctly, both the PAN ID and channel must be identical. If the same channel must be shared between multiple coordinators, setting a different PAN ID makes this possible. If a different PAN ID is assigned, but two coordinators share the same channel, they are physically on the same frequency, which increases the likelihood of conflict between the coordinators.

The PAN ID of the dimmers must be identical to the PAN ID of the coordinator. Coordinators are capable of communicating across a distance of 100m. If another coordinator is installed within the vicinity, a different channel must be assigned to that coordinator. The PAN ID's dipswitch positioning is the 3rd and 4th switch to the left. PAN ID ranges from 0 ~ 3 and up to 4 different PAN ID's can be set.

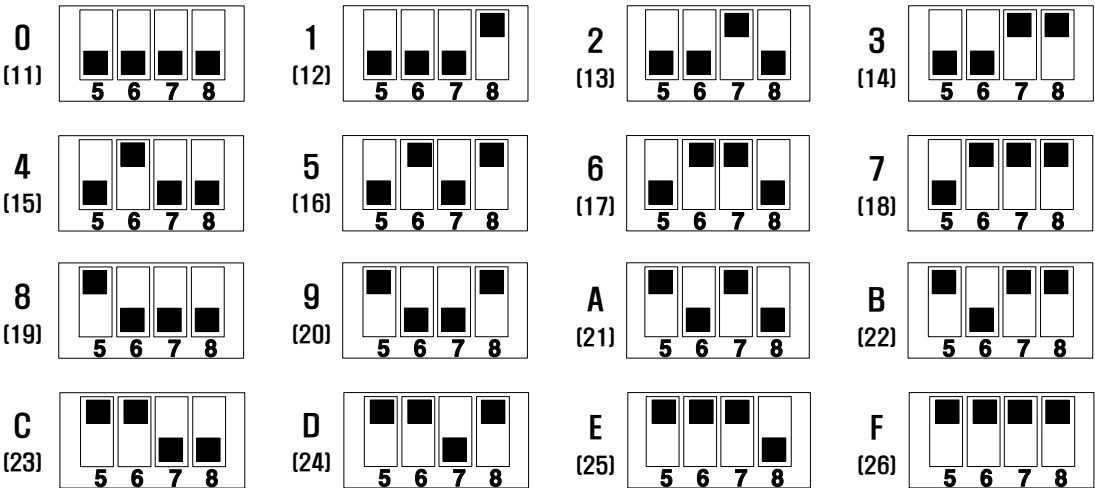


## Channel

Enables communication between the coordinator and dimmer. Both the PAN ID and channel must be identical for the coordinator and dimmer to communicate correctly. Coordinators are capable of communicating across a distance of 100m. If another coordinator is installed within












































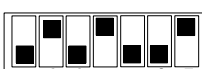






















the vicinity, a different channel must be assigned to that coordinator (it is best if the designated channel is 2 channels apart from the other coordinator's channel). Located on the left (see diagram on pg 18), the values range from 0x00 ~ 0x0f (0 ~ 15 in 10 bit) and up to 16 different channels can be set. The dipswitch value 0 refers to channel 11. If the dipswitch value is 0x0f, the channel is set to 26.





















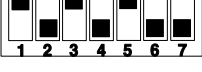
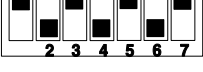





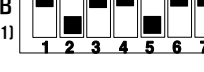
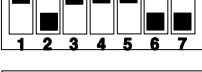
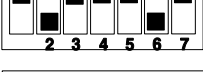
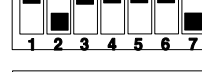
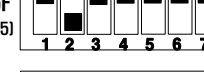
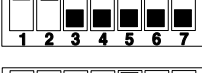
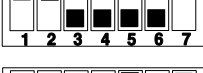

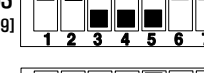
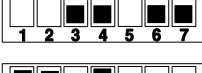
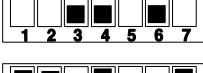

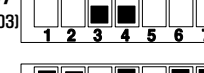




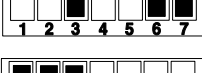
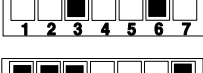
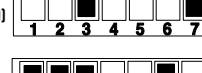

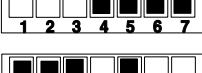
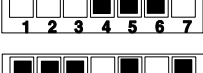
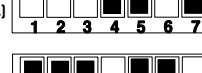
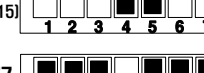
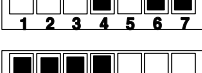
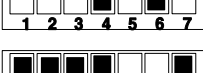


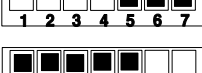



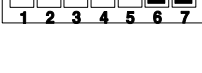
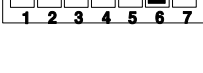
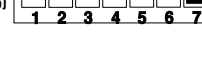
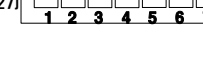


Figures inside [ ] refers to the channel number.

# Address

Refers to the unique ID given to dimmers for differentiating between individual dimmers and communicating with the coordinator. On the right hand side of the dipswitch, the dimmer's address can be set (places 5,6,7,8. Refer to diagram on page 18). Values range from 0x00 ~ 0x7f ( 0 ~ 127 in 10 bit). Up to 128 dimmers can be assigned to a single coordinator.

00 (0)		01 (1)		02 (2)		03 (3)	
04 (4)		05 (5)		06 (6)		07 (7)	
08 (8)		09 (9)		0A (10)		0B (11)	
0C (12)		0D (13)		0E (14)		0F (15)	
10 (16)		11 (17)		12 (18)		13 (19)	
14 (20)		15 (21)		16 (22)		17 (23)	
18 (24)		19 (25)		1A (26)		1B (27)	
1C (28)		1D (29)		1E (30)		1F (31)	
20 (32)		21 (33)		22 (34)		23 (35)	
24 (36)		25 (37)		26 (38)		27 (39)	
28 (40)		29 (41)		2A (42)		2B (43)	
2C (44)		2D (45)		2E (46)		2F (47)	
30 (48)		31 (49)		32 (50)		33 (51)	
34 (52)		35 (53)		36 (54)		37 (55)	
38 (56)		39 (57)		3A (58)		3B (59)	
3C (60)		3D (61)		3E (62)		3F (63)	

40 (64)		41 (65)		42 (66)		43 (67)	
44 (68)		45 (69)		46 (70)		47 (71)	
48 (72)		49 (73)		4A (74)		4B (75)	
4C (76)		4D (77)		4E (78)		4F (79)	
50 (80)		51 (81)		52 (82)		53 (83)	
54 (84)		55 (85)		56 (86)		57 (87)	
58 (88)		59 (89)		5A (90)		5B (91)	
5C (92)		5D (93)		5E (94)		5F (95)	
60 (96)		61 (97)		62 (98)		63 (99)	
64 (100)		65 (101)		66 (102)		67 (103)	
68 (104)		69 (105)		6A (106)		6B (107)	
6C (108)		6D (109)		6E (110)		6F (111)	
70 (112)		71 (113)		72 (114)		73 (115)	
74 (116)		75 (117)		76 (118)		77 (119)	
78 (120)		79 (121)		7A (122)		7B (123)	
7C (124)		7D (125)		7E (126)		7F (127)	

# Firmware Upgrade

The network module responsible for communicating with the ns2u server of the coordinator. The coordinator is comprised of two different modules. The network module communicates with the ns2u, and the Zigbee coordinator modules communicates with the dimmer. The dimmer and coordinator's module are independent of one another and therefore run on different firmware.

## Network Module Upgrade

Currently, the firmware is named “ **sbx\_yyyymmdd**” . (yyyymmdd refers to 'year', 'month', 'date')

Copy the firmware file to C drive root and follow the instructions below to upload the firmware via FTP.

Go to Start → Run and input the IP address of the coordinator (as shown below in red).

The example below demonstrates how to update the coordinator using the default IP address.

**ftp 192.168.0.245**

```

Connected to 192.168.0.245.
220 (vsFTPd 2.0.5)
User (192.168.0.245:(none)): ns2u
331 Please specify the password.
Password: 9999 → After inputting password, not visible on
screen
230 Login successful.
ftp> bin → Change to binary mode
200 Switching to Binary mode.
ftp> hash → Transmitting process is marked by #
Hash mark printing On ftp: (2048 bytes/hash mark) .
ftp> prompt → Skip confirmation process
Interactive mode Off .
ftp> cd /flash → Move Coord. firmware to designated
location
250 Directory successfully changed.
ftp> lcd / → Move to the location of the firmware

```

```
C:\(check)
Local directory now C:\.
ftp>
ftp> mdelete sbc* → Delete previous firmware
200 Switching to Binary mode.
250 Delete operation successful.
ftp>
ftp> put sbc_yyyymmdd → Upload the firmware to be upgraded with
200 PORT command successful. Consider using PASV.
150 Ok to send data.
##### → Confirm Upload (# will show upon
completion)
226 File receive OK.
ftp: xxxxx bytes sent in 0.00Seconds xxxxxx Kbytes/sec.
ftp> ls → Check list to ensure that firmware has been
successfully uploaded
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
ed_system.cfg
sbc_yyyymmdd- → Ensure that the firmware has been
uploaded
zc_config.cfg
226 Directory send OK.
ftp: 44 bytes received in 0.00Seconds 44000.00Kbytes/sec.
ftp>
ftp> bye → Exit FTP
```

After walking through the process above, reset the coordinator to run the newly installed firmware.

## Upgrading the Zigbee Module

Both the Zigbee Coordinator and dimmer can be upgraded 'over the air' (OTA) via the wireless communication protocol. Please refer to our detailed walkthrough titled "OTA-Upgrade-User\_Guide" for further reference. For example, the coordinator's firmware file is named "Coordinator\_Hxxx". (xxx refers to the version of the firmware ranging from 000 ~ 999)

In the case of dimmers, the firmware is named "Dimmer.Hxxx".



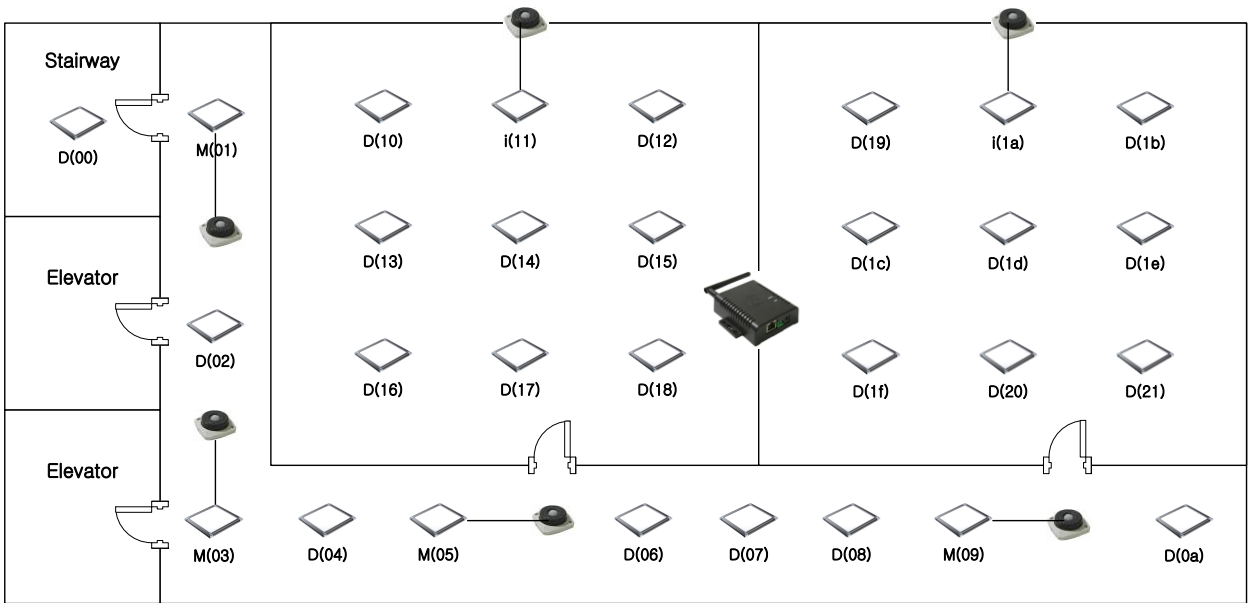
# Example

The location of the coordinator should be designated to a position central to every subordinate dimmer. It is recommended for dimmers to be visible and be placed under 50 meters from this position.

In most cases, dimmers are likely attached to the ceilings, therefore it is important to consider carefully when selecting the channel for the coordinator and its subordinate devices. Before selecting a channel, it is imperative to examine other WIFI, blue tooth, or networks that run on 2.4 Ghz frequency in order to determine the channel with the least amount of traffic Testing the channel before fixing the dimmer onto the ceiling is recommended.

If more than one coordinator is installed on site, it is essential to ensure that there is no overlap in the usage of channels, and a minimum of a 2 channel gap is maintained between each coordinator. In extreme circumstances where it is impossible to assign different channels to the coordinator due to heavy WIFI usage, assign different PAN IDs between different coordinator and its subordinate devices.

## Installation Floor Plan



## Coordinator Settings

Channel	11
PAN	0
IP Address	192.168.0.245
Ambient light Group	1 = 11 → 10, 12, 13, 14, 15, 16, 17, 18 2 = 1a → 19, 1b, 1c, 0c, 1d, 1e, 1f, 20, 21
Motion Group	1 = 01 → 02 2 = 03 → 04, 05 3 = 05 → 06, 07, 08 4 = 09 → 06, 07, 08, 0a
Arbitrary Group	1 = 00

## Modify Coordinator Settings

Go to Start → Cmd and input the text below ("telnet 192...").

The example below will demonstrate how to update the default IP address of the coordinator.

**telnet 192.168.0.245**

```

Ns2u login: ns2u
Password: 9999
#
#def ip address 192.168.0.245           → Reboot Coord. after changing IP address
#def channel 11                         → Channel setting
#def pan 0                             → PAD ID setting
#def addillumi 1 11=1012131415161718
#def addillumi 2 1a=191b1c1d1e1f2021
#
#def addmove 1 01=02
#def addmove 2 03=0405
#def addmove 3 05=060708
#def addmove 4 09=0607080a
#
#def addarbit 1 16=00                   → Add 0x16 (22) to the arbitrary group 1.
Illumination level is set to 0.
#
#kt cody                               → Restart Zigbee Coordinator

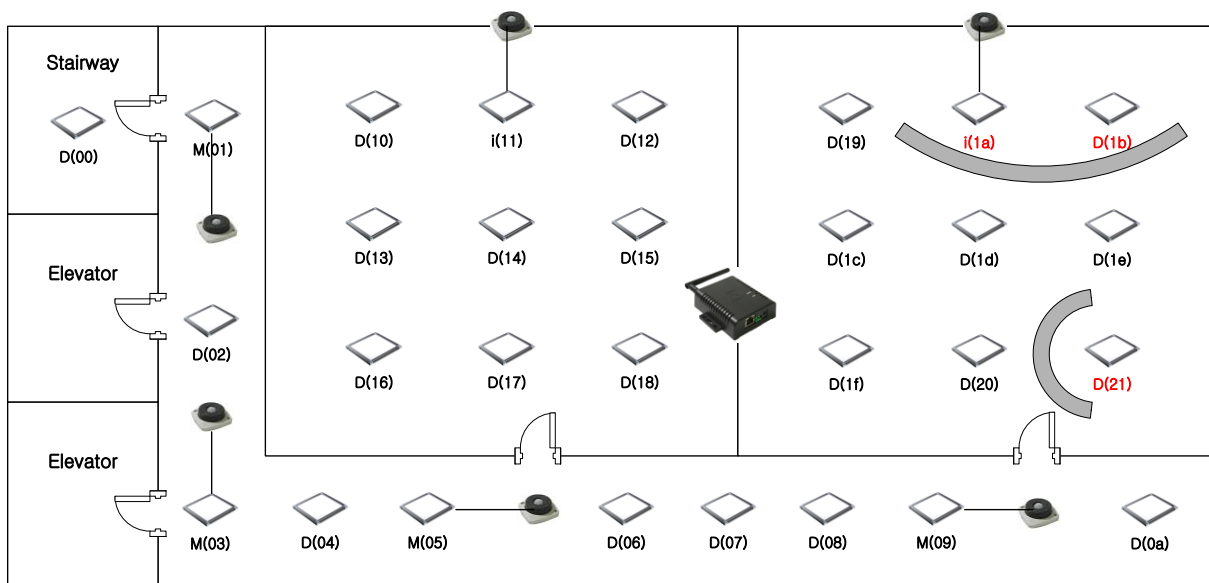
```

## Dimmer Dipswitch Configuration

Channel	11
PAN	0
Address	00 ~ 21
Type	Dimmer-Sensor (Motion) 01, 03, 05, 09
	Dimmer-Sensor (illumination) 11, 1a
	Dimmer (illumination) 00, 10, 12, 13, 14, 15, 16, 17, 18, 19, 1b, 1c, 0c, 1d, 1e, 1f, 20, 21
	Dimmer (Motion) 02, 04, 05, 06, 07, 08, 0a

## Router Configuration Example

If a specific dimmer fails to communicate with the coordinator, it is possible to communicate with that device by assigning a nearby dimmer as a router and placing the device that is 'out of reach' as a subordinate node. The diagram below is a perfect example in which routers can be utilized. On the top right hand corner, the LEDs 1a, 1b, 21 fails to communicate with the nearby coordinator due to the wall between the LED and the coordinator.



In this case, nearby dimmers that are communicating flawlessly with the coordinator such as 19 and 1e, can be selected as a router to reach out to the otherwise unreachable devices.

To create a router group, access telnet and follow the instructions below.

```
#
#def addroute 1 09=1a1b      → Designate 09 as the first router. Set 1a, 1b as subordinate
                               nodes.
#
#def addroute 2 1e=21        → Designate 1e as the second router. Set 21 as
                               subordinate node.
#
#kt cody                     → Restart Zigbee Coordinator
#
```

# Motion Sensor

## 1. Environmental requirements

Parameter	Min	Typ.	Max	Unit
Operation temperature	-20		70	°C
Storage temperature	-30		85	°C
Operation Humidity	0		85	%
Storage Humidity	0		95	%

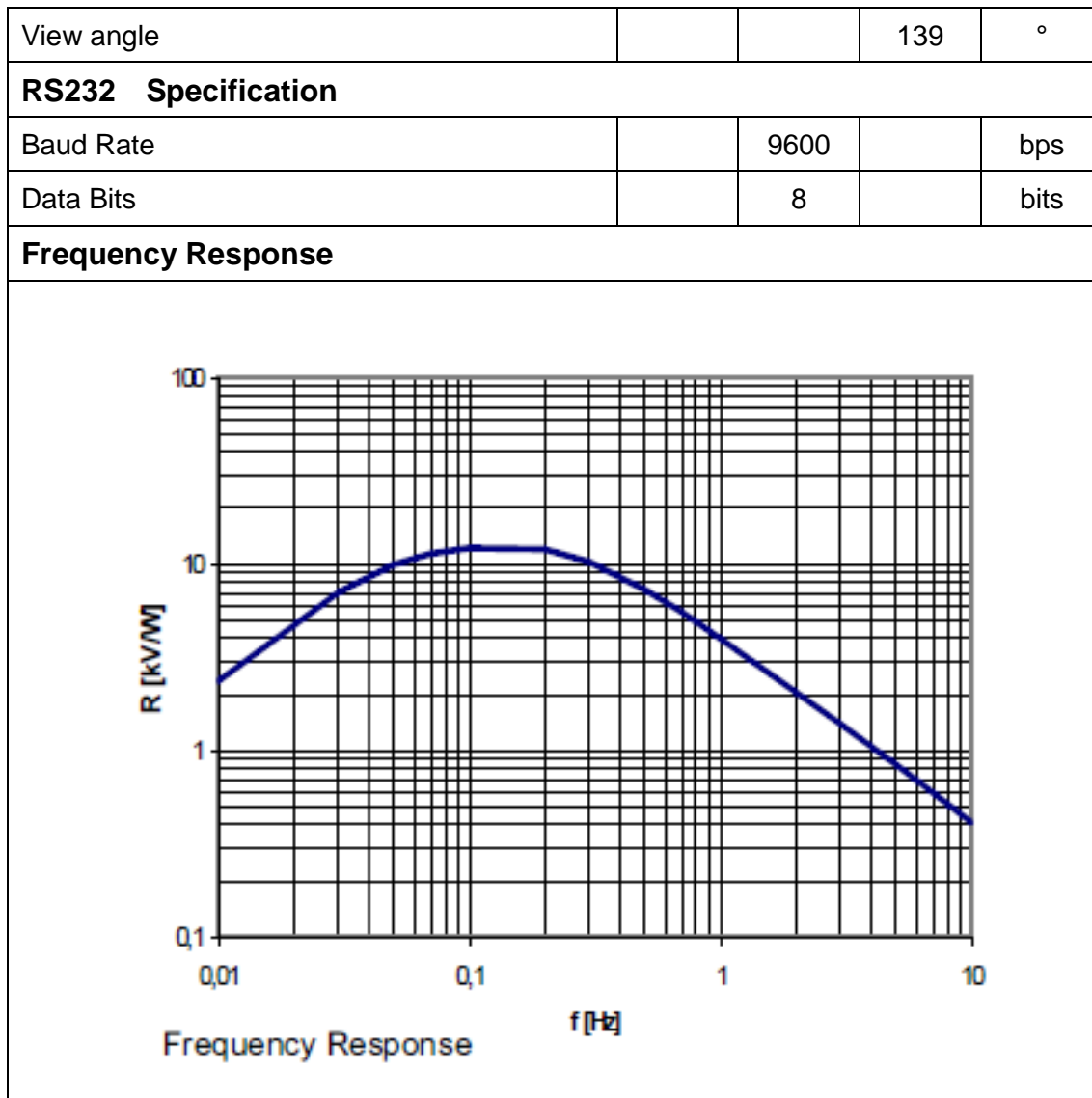
## 2. Power requirements

Parameter	Min	Typ.	Max	Unit
Supply Voltage		7	10	V
<b>Current consumption</b>				
Normal Condition (Condition: at 25°C, V_IN=7V)		15		mA

## 3. Electrical Specification

(Condition: at 25°C, V\_IN=7V)

Parameter	Min	Typ.	Max	Unit
<b>Sensor Specification</b>				
Element size		2x1		mm <sup>2</sup>
Responsivity (100 °C, 1Hz)	3300	4000		V/W
Match		1	10	%
Noise (25°C, 0,3,...10Hz)		20	20	uVpp
Offset Voltage (Rs=47KΩ,25°C)	0.2		1.55	V
Output Impedance (47KΩ Load Res.)		5	10	KΩ



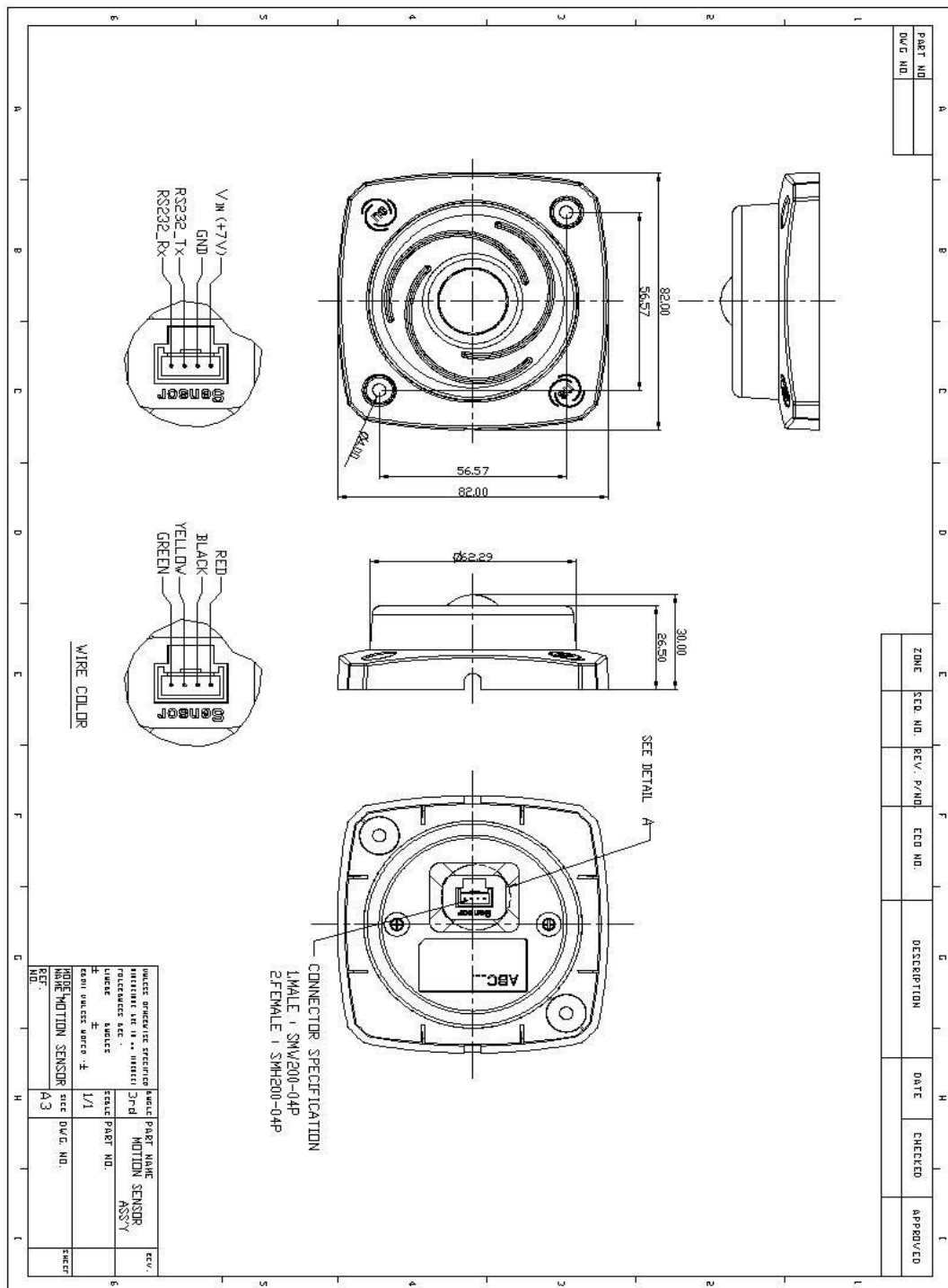
#### 4. Serial Communications

Communications standard : RS232

Parameter	Min	Typ.	Max	Unit
Baud Rate		9600		bps
Data Bits		8		bits

## 5. Physical characteristics

### 5.1 Dimension & Pin Description



## 5.2 Measurements

Dimensions	US measurements	Metric Measurements
Weight (oz/g)	1.6800	47.64
Length (in/mm)	3.2283	82.00
Width (in/mm)	3.2283	82.00

## 5.3 Pin Assignments

Pin Name	Description
GND	System Ground
Vout	Output DC Voltage (+7V)
RS232_Tx	RS232 transmit Data port
RS232_Rx	RS232 receive Data port

## 6. Standard certifications

### 6.1 FCC INFORMATION

This device complies with part 15 of the FCC Rules.

## 7. Warranties

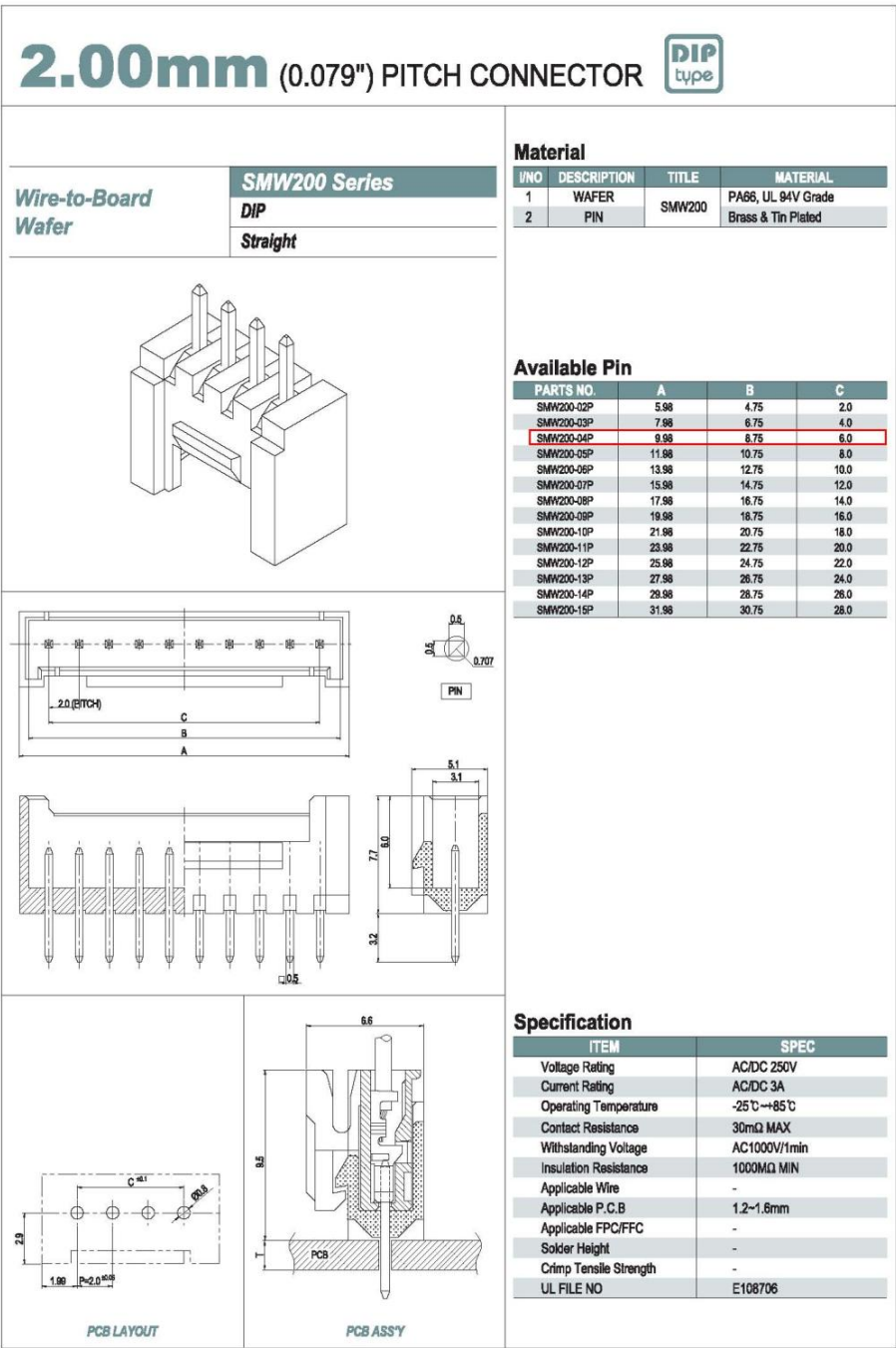
This device is warranted to the original purchaser for a period of five years from the date of original purchase against all defects in materials and workmanship. This limited warranty is void if the unit is abused, modified, installed improperly, or if the housing and/or serial numbers have been removed. There are no express warranties covering this product other than those set forth in this warranty. All express or implied warranties for this product are limited to the above time. We are not liable for damages arising from the use, misuse, or operation of this product.

## 8. MTBF

Parameter	Description
Useful life of a device	43800 hours (5 years at 24 hrs/day, 7 days/week, 356 days/year)
Number of units	10 PCS
Run time	720 hours
Number of failures	1 PCS
MTBF	$(10 \times 720) / 1 = 7200$ hours

## 9. Connector Specification

### 9.1 MOTION SENSOR CONNECTOR(MALE)





9.2 MOTION SENSOR CONNECTOR(FEMALE)

# 2.00mm (0.079") PITCH CONNECTOR

Wire-to-Board Housing

SMH200

TERMINAL ASSEMBLY DRAWING

AWG : #22 ~ #28

Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	HOUSING	SMH200	PA66, UL 94V Grade

Available Pin

PARTS NO.	A	B	C
SMH200-02P	5.8	4.8	2.0
SMH200-03P	7.8	6.8	4.0
SMH200-04P	9.8	8.8	6.0
SMH200-05P	11.8	10.8	8.0
SMH200-06P	13.8	12.8	10.0
SMH200-07P	15.8	14.8	12.0
SMH200-08P	17.8	16.8	14.0
SMH200-09P	19.8	18.8	16.0
SMH200-10P	21.8	20.8	18.0
SMH200-11P	23.8	22.8	20.0
SMH200-12P	25.8	24.8	22.0
SMH200-13P	27.8	26.8	24.0
SMH200-14P	29.8	28.8	26.0
SMH200-15P	31.8	30.8	28.0

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	AWG #22~#28
Applicable P.C.B	-
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

Application Terminal : YST200 (83 page)

# Ambient Light Sensor

## 1. Environmental requirements

Parameter	Min	Typ.	Max	Unit
Operation temperature	-20		70	℃
Storage temperature	-30		85	℃
Operation Humidity	0		85	%
Storage Humidity	0		95	%

## 2. Power requirements

Parameter	Min	Typ.	Max	Unit
Supply Voltage		7	10	V
<b>Current consumption</b>				
Normal Condition (Condition: at 25℃, V_IN=7V)		12		mA

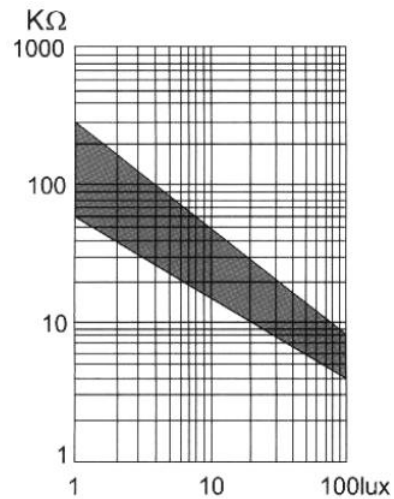
## 3. Electrical Specification

(Condition: at 25℃, V\_IN=7V)

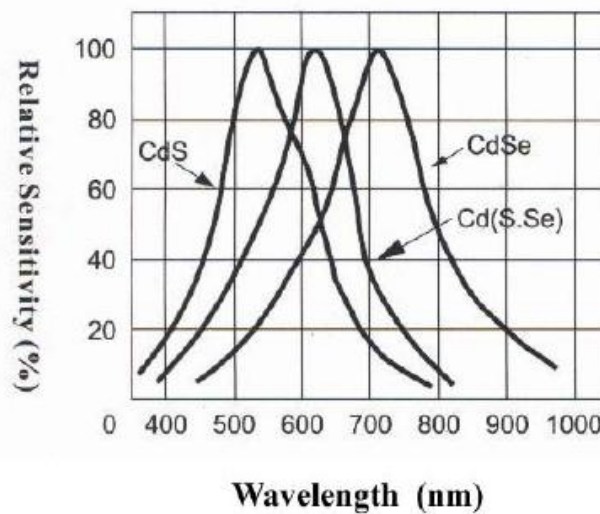
Parameter	Min	Typ.	Max	Unit
<b>Sensor Specification</b>				
Light Resistance at 10Lux (at 25℃)	18		50	KΩ
Dark Resistance at 0Lux	2.0			MΩ
Gamma value at 100-10Lux		0.7		
Power Dissipation (at 25℃)		100		mW
Max Voltage (at 25℃)			150	V

Spectral Response peak (at 25°C)		540		nm
----------------------------------	--	-----	--	----

### Illuminance Vs. Photo Resistance



### Spectral Response



## 4. Serial Communications

Communications standard : RS232

Parameter	Min	Typ.	Max	Unit
Baud Rate		9600		bps
Data Bits		8		bits

## 5.1 Dimension & Pin Description



## 5.2 Measurements

Dimensions	US measurements	Metric Measurements
Weight (oz/g)	1.6400	46.54
Length (in/mm)	3.2283	82.00
Width (in/mm)	3.2283	82.00

## 5.3 Pin Assignments

Pin Name	Description
GND	System Ground
Vout	Output DC Voltage (+7V)
RS232_Tx	RS232 transmit Data port
RS232_Rx	RS232 receive Data port

## 6. Standard certifications

### 6.1 FCC INFORMATION

This device complies with part 15 of the FCC Rules.

## 7. Warranties

This device is warranted to the original purchaser for a period of five years from the date of original purchase against all defects in materials and workmanship. This limited warranty is void if the unit is abused, modified, installed improperly, or if the housing and/or serial numbers have been removed. There are no express warranties covering this product other than those set forth in this warranty. All express or implied warranties for this product are limited to the above time. We are not liable for damages arising from the use, misuse, or operation of this product.

## 8. MTBF

Parameter	Description
Useful life of a device	43800 hours (5 years at 24 hrs/day, 7 days/week, 356 days/year)
Number of units	10 PCS
Run time	720 hours
Number of failures	1 PCS
MTBF	$(10 \times 720) / 1 = 7200$ hours



9. Connector Specification

9.1 ILLUMINATION SENSOR CONNECTOR(MALE)

# 2.00mm (0.079") PITCH CONNECTOR

DIP type

Wire-to-Board  
Wafer

SMW200 Series

DIP

Straight

Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	WAFER	SMW200	PA66, UL 94V Grade
2	PIN		Brass & Tin Plated

Available Pin

PARTS NO.	A	B	C
SMW200-02P	5.98	4.75	2.0
SMW200-03P	7.98	6.75	4.0
SMW200-04P	9.98	8.75	6.0
SMW200-05P	11.98	10.75	8.0
SMW200-06P	13.98	12.75	10.0
SMW200-07P	15.98	14.75	12.0
SMW200-08P	17.98	16.75	14.0
SMW200-09P	19.98	18.75	16.0
SMW200-10P	21.98	20.75	18.0
SMW200-11P	23.98	22.75	20.0
SMW200-12P	25.98	24.75	22.0
SMW200-13P	27.98	26.75	24.0
SMW200-14P	29.98	28.75	26.0
SMW200-15P	31.98	30.75	28.0

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	-
Applicable P.C.B	1.2~1.6mm
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

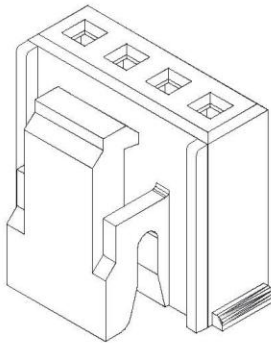


9.2 ILLUMINATION SENSOR CONNECTOR(FEMALE)

2.00mm (0.079") PITCH CONNECTOR

Wire-to-Board  
Housing

SMH200

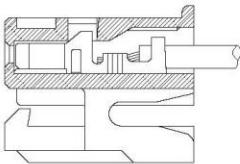
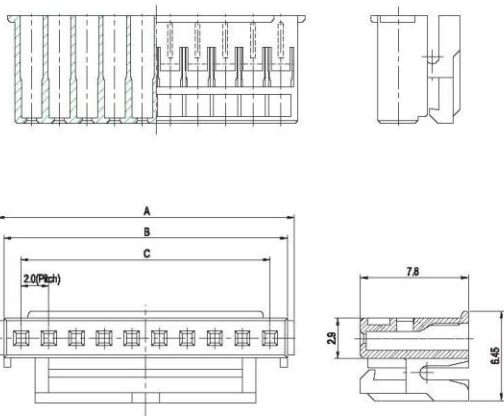


Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	HOUSING	SMH200	PA66, UL 94V Grade

Available Pin

PARTS NO.	A	B	C
SMH200-02P	5.8	4.8	2.0
SMH200-03P	7.6	6.6	4.0
SMH200-04P	9.6	8.6	6.0
SMH200-05P	11.6	10.6	8.0
SMH200-06P	13.6	12.6	10.0
SMH200-07P	15.6	14.6	12.0
SMH200-08P	17.6	16.6	14.0
SMH200-09P	19.6	18.6	16.0
SMH200-10P	21.6	20.6	18.0
SMH200-11P	23.6	22.6	20.0
SMH200-12P	25.6	24.6	22.0
SMH200-13P	27.6	26.6	24.0
SMH200-14P	29.6	28.6	26.0
SMH200-15P	31.6	30.6	28.0



TERMINAL ASSEMBLY DRAWING



AWG : #22 ~ #28

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	AWG #22~#28
Applicable P.C.B	-
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

Application Terminal : YST200 (83 page)

# Zigbee Dimmer

## 1. Environmental requirements

Parameter	Min	Typ.	Max	Unit
Operation temperature	-20		70	°C
Storage temperature	-30		85	°C
Operation Humidity	0		85	%
Storage Humidity	0		95	%

## 2. Power requirements

Parameter	Min	Typ.	Max	Unit
Supply Voltage	24	48	50	V
<b>Current consumption</b>				
Active MCU with TX Mode (AES, Peripheral, SADC Disabled) @+8dBm output power (Condition: at 25°C, V_IN=48V)		25		mA
Active MCU with RX Mode (AES, Peripheral, SADC Disabled) (Condition: at 25°C, V_IN=48V)		22		mA

## 3. Electrical Specification

(Condition: at 25°C, V\_IN=48V)

Parameter	Min	Typ.	Max	Unit
<b>RF Characteristics</b>				

RF Frequency Range	2.4		2.4835	GHz
Transmit data rate(normal mode)		250		kbps
Transmit data rate(turbo mode)		500		kbps
Transmit data rate(premium mode)		1000		kbps
Transmit chip rate		2000		kbps
Maximum output power			8	dBm
Programmable output power range		30		dB
Receiver sensitivity				
Normal mode		-98		
Turbo mode		-95		
Premium mode		-91		
Adjacent Channel Rejection				
+5MHz		56.1		
-5MHz		56.8		
Blocking/Desensitization				
+/- 5 MHz		-45		
+/- 10 MHz		-42		
+/- 15 MHz		-48		
+/- 20 MHz		-40		
+/- 30 MHz		-43		
+/- 50 MHz		-46		
Co-Channel Rejection		-10.7		
Spurious Emission(30Hz~1GHz)		-60		
Spurious Emission(1GHz~2.5GHz)		-40		
Spurious Emission(2.5GHz~12.7GHz)		-50		
2nd Harmonics		-50		
3rd Harmonics		-70		
Frequency Error Tolerance			±200	KHz
Error Vector Magnitude(EVM)		9.8		%

Saturation(Maximum Input Level)		5		dBm
RSSI Dynamic Range		90		dB
RSSI Accuracy		±1.2	+6/-3	dB
RSSI Linearity		±0.2	±6	dB
RSSI Average Time		128		usec
<b>Frequency Synthesizer</b>				
Phase Noise @±100KHz offset @±1MHz offset @±2MHz offset @±3MHz offset @±5MHz offset		-80.3 -108.8 -113.3 -120.2 -124.2		dBc/Hz
PLL Lock Time		100		usec
PLL Jitter		16		psec
Crystal Frequency Accuracy Requirement	-30		+30	ppm
<b>On-chip RC Regulator</b>				
Frequency		32.78		KHz
<b>Sensor ADC</b>				
Number of Bits		8		bits
Conversion Time		256		usec
Differential Nonlinearity(DNL)		±1.7		LSB
Integral Nonlinearity(INL)		±2.4		LSB
SINAD(Sine Input)		51.0		dB
<b>On-Chip Voltage Regulator</b>				
Supply range for Regulator	1.9	3.0	3.6	V
Regulated Output		1.5		V

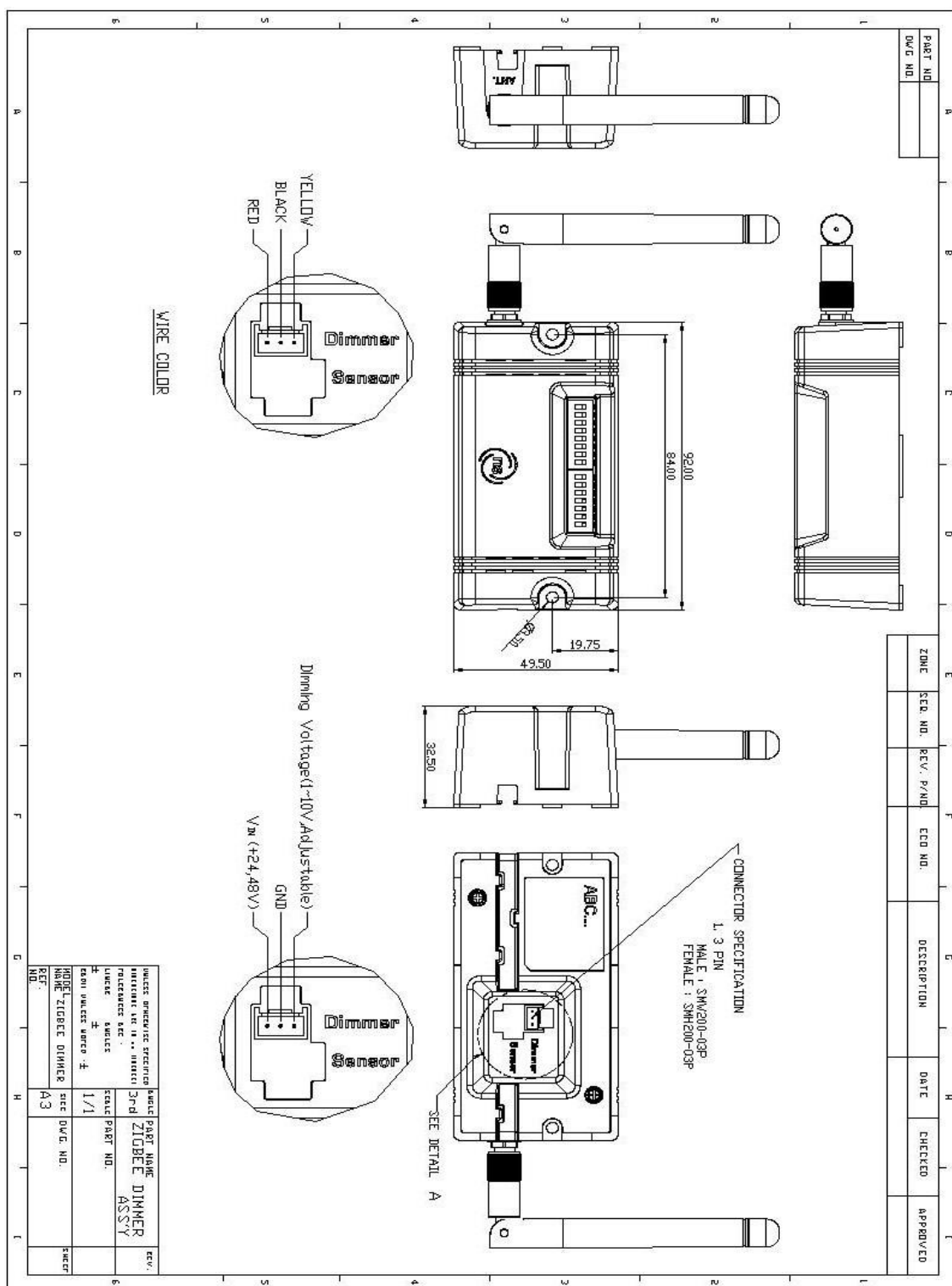
Maximum Current			140	mA
No Load Current		15		uA
Start-up Time		260		usec

## 4. Specification of Antenna

Parameter	Min	Typ.	Max	Unit
Frequency	2400		2500	MHz
V.S.W.R			2.5	
Gain		2		dBi
Maximum input power			50	W
Impedence		50		$\Omega$
Connector Type	SMA			
Polarization	Linear, Vertical			
Radiated Pattern	Omni-directional			
Size	108mm (H) * 10 mm (Dia)			

## 5. Physical characteristics

### 5.1 Dimension & Pin Description



## 5.2 Measurements

Dimensions	US measurements	Metric Measurements
Weight (oz/g)	2.7300	77.30
Length (in/mm)	3.62200	92.00
Width (in/mm)	1.9488	49.50

## 5.3 Pin Assignments

Pin Name	Description
Vin	Input DC Voltage (+24,48V)
GND	System Ground
Diming Voltage	1~10 V, Adjustable

## 6. Standard certifications

### 6.1 Technical Standard IEEE802.15.4

### 6.2 FCC INFORMATION

This device complies with part 15 of the FCC Rules.

## 7. Warranties

This device is warranted to the original purchaser for a period of five years from the date of original purchase against all defects in materials and workmanship. This limited warranty is void if the unit is abused, modified, installed improperly, or if the housing and/or serial numbers have been removed. There are no express warranties covering this product other than those set forth in this warranty. All express or implied warranties for this product are limited to the above time. We are not liable for damages arising from the use, misuse, or operation of this product.

## 8. MTBF

Parameter	Description
Useful life of a device	43800 hours (5 years at 24 hrs/day, 7 days/week, 356 days/year)
Number of units	100 PCS
Run time	720 hours
Number of failures	1 PCS
MTBF	$(100 \times 720) / 1 = 72000$ hours



9. Connector Specification

9.1 ZIGBEE DIMMER CONNECTOR(MALE)

2.00mm (0.079") PITCH CONNECTOR

DIP type

Wire-to-Board Wafer

SMW200 Series

DIP

Straight

Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	WAFER	SMW200	PA66, UL 94V Grade
2	PIN		Brass & Tin Plated

Available Pin

PARTS NO.	A	B	C
SMW200-02P	5.98	4.75	2.0
SMW200-03P	7.98	6.75	4.0
SMW200-04P	9.98	8.75	6.0
SMW200-05P	11.98	10.75	8.0
SMW200-06P	13.98	12.75	10.0
SMW200-07P	15.98	14.75	12.0
SMW200-08P	17.98	16.75	14.0
SMW200-09P	19.98	18.75	16.0
SMW200-10P	21.98	20.75	18.0
SMW200-11P	23.98	22.75	20.0
SMW200-12P	25.98	24.75	22.0
SMW200-13P	27.98	26.75	24.0
SMW200-14P	29.98	28.75	26.0
SMW200-15P	31.98	30.75	28.0

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	-
Applicable P.C.B	1.2~1.8mm
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

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9.2 ZIGBEE DIMMER CONNECTOR(FEMALE)

# 2.00mm (0.079") PITCH CONNECTOR

Wire-to-Board Housing

SMH200

TERMINAL ASSEMBLY DRAWING

AWG : #22 ~ #28

## Material

V/NO	DESCRIPTION	TITLE	MATERIAL
1	HOUSING	SMH200	PA66, UL 94V Grade

## Available Pin

PARTS NO.	A	B	C
SMH200-02P	5.6	4.6	2.0
SMH200-03P	7.6	6.6	4.0
SMH200-04P	9.6	8.6	6.0
SMH200-05P	11.6	10.6	8.0
SMH200-06P	13.6	12.6	10.0
SMH200-07P	15.6	14.6	12.0
SMH200-08P	17.6	16.6	14.0
SMH200-09P	19.6	18.6	16.0
SMH200-10P	21.6	20.6	18.0
SMH200-11P	23.6	22.6	20.0
SMH200-12P	25.6	24.6	22.0
SMH200-13P	27.6	26.6	24.0
SMH200-14P	29.6	28.6	26.0
SMH200-15P	31.6	30.6	28.0

## Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	AWG #22~#28
Applicable P.C.B	-
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

Application Terminal : YST200 (83 page)

# Zigbee Dimmer / Sensor

## 1. Environmental requirements

Parameter	Min	Typ.	Max	Unit
Operation temperature	-20		70	°C
Storage temperature	-30		85	°C
Operation Humidity	0		85	%
Storage Humidity	0		95	%

## 2. Power requirements

Parameter	Min	Typ.	Max	Unit
Supply Voltage	24	48	50	V
<b>Current consumption</b>				
Active MCU with TX Mode (AES, Peripheral, SADC Disabled) @+8dBm output power (Condition: at 25°C, V_IN=48V)		30		mA
Active MCU with RX Mode (AES, Peripheral, SADC Disabled) (Condition: at 25°C, V_IN=48V)		27		mA

## 3. Electrical Specification

(Condition: at 25°C, V\_IN=48V)

Parameter	Min	Typ.	Max	Unit
-----------	-----	------	-----	------

RF Characteristics				
RF Frequency Range	2.4		2.4835	GHz
Transmit data rate(normal mode)		250		kbps
Transmit data rate(turbo mode)		500		kbps
Transmit data rate(premium mode)		1000		kbps
Transmit chip rate		2000		kbps
Maximum output power			8	dBm
Programmable output power range		30		dB
Receiver sensitivity				
Normal mode		-98		dBm
Turbo mode		-95		
Premium mode		-91		
Adjacent Channel Rejection				
+5MHz		56.1		dBc
-5MHz		56.8		
Blocking/Desensitization				
+/- 5 MHz		-45		dBm
+/- 10 MHz		-42		
+/- 15 MHz		-48		
+/- 20 MHz		-40		
+/- 30 MHz		-43		
+/- 50 MHz		-46		
Co-Channel Rejection		-10.7		dBc
Spurious Emission(30Hz~1GHz)		-60		dBm
Spurious Emission(1GHz~2.5GHz)		-40		dBm
Spurious Emission(2.5GHz~12.7GHz)		-50		dBm
2nd Harmonics		-50		dBm
3rd Harmonics		-70		dBm
Frequency Error Tolerance			±200	KHz

Error Vector Magnitude(EVM)		9.8		%
Saturation(Maximum Input Level)		5		dBm
RSSI Dynamic Range		90		dB
RSSI Accuracy		±1.2	+6/-3	dB
RSSI Linearity		±0.2	±6	dB
RSSI Average Time		128		usec
<b>Frequency Synthesizer</b>				
Phase Noise				
@±100KHz offset		-80.3		
@±1MHz offset		-108.8		
@±2MHz offset		-113.3		
@±3MHz offset		-120.2		
@±5MHz offset		-124.2		
PLL Lock Time		100		usec
PLL Jitter		16		psec
Crystal Frequency Accuracy Requirement	-30		+30	ppm
<b>On-chip RC Regulator</b>				
Frequency		32.78		KHz
<b>Sensor ADC</b>				
Number of Bits		8		bits
Conversion Time		256		usec
Differential Nonlinearity(DNL)		±1.7		LSB
Integral Nonlinearity(INL)		±2.4		LSB
SINAD(Sine Input)		51.0		dB
<b>On-Chip Voltage Regulator</b>				
Supply range for Regulator	1.9	3.0	3.6	V

Regulated Output		1.5		V
Maximum Current			140	mA
No Load Current		15		uA
Start-up Time		260		usec

## 4. Serial Communications

Communications standard : RS232

Parameter	Min	Typ.	Max	Unit
Baud Rate		9600		bps
Data Bits		8		bits

## 5. Specification of Antenna

Parameter	Min	Typ.	Max	Unit
Frequency	2400		2500	MHz
V.S.W.R			2.5	
Gain		2		dBi
Maximum input power			50	W
Impedence		50		$\Omega$
Connector Type	SMA			
Polarization	Linear, Vertical			
Radiated Pattern	Omni-directional			
Size	108mm (H) * 10 mm (Dia)			

## 6.1 Dimension & Pin Description



## 6.2 Measurements

Dimensions	US measurements	Metric Measurements
Weight (oz/g)	2.8000	79.47
Length (in/mm)	3.6220	92.00
Width (in/mm)	1.9488	49.50

## 6.3 Pin Assignments

Pin Name	Description
Vin	Input DC Voltage (+24,48V)
GND	System Ground
Diming Voltage	1~10 V, Adjustable
Vout	Output DC Voltage (+7V)
RS232_Tx	RS232 transmit Data port
RS232_Rx	RS232 receive Data port

## 7. Standard certifications

### 7.1 Technical Standard IEEE802.15.4

### 7.2 FCC INFORMATION

This device complies with part 15 of the FCC Rules.

## 8. Warranties

This device is warranted to the original purchaser for a period of five years from the date of original purchase against all defects in materials and workmanship. This limited warranty is void if the unit is abused, modified, installed improperly, or if the housing and/or serial numbers have been removed. There are no express warranties covering this product other than those set forth in this warranty. All express or implied warranties for this product are limited to the above time. We are not liable for damages arising from the use, misuse, or operation of this product.

## 9. MTBF

Parameter	Description
Useful life of a device	43800 hours (5 years at 24 hrs/day, 7 days/week, 356 days/year)
Number of units	100 PCS
Run time	720 hours
Number of failures	1 PCS
MTBF	$(100 \times 720) / 1 = 72000$ hours



10. Connector Specification

10.1 ZIGBEE SENSOR CONNECTOR(MALE)

2.00mm (0.079") PITCH CONNECTOR

DIP type

Wire-to-Board Wafer

SMW200 Series

DIP

Straight

Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	WAFER	SMW200	PA66, UL 94V Grade
2	PIN		Brass & Tin Plated

Available Pin

PARTS NO.	A	B	C
SMW200-02P	5.98	4.75	2.0
SMW200-03P	7.98	6.75	4.0
SMW200-04P	9.98	8.75	6.0
SMW200-05P	11.98	10.75	8.0
SMW200-06P	13.98	12.75	10.0
SMW200-07P	15.98	14.75	12.0
SMW200-08P	17.98	16.75	14.0
SMW200-09P	19.98	18.75	16.0
SMW200-10P	21.98	20.75	18.0
SMW200-11P	23.98	22.75	20.0
SMW200-12P	25.98	24.75	22.0
SMW200-13P	27.98	26.75	24.0
SMW200-14P	29.98	28.75	26.0
SMW200-15P	31.98	30.75	28.0

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃→+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	-
Applicable P.C.B	1.2~1.6mm
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706



10.2 ZIGBEE SENSOR CONNECTOR(FEMALE)

2.00mm (0.079") PITCH CONNECTOR

Wire-to-Board Housing

SMH200

TERMINAL ASSEMBLY DRAWING

AWG : #22 - #28

Material

I/NO	DESCRIPTION	TITLE	MATERIAL
1	HOUSING	SMH200	PA66, UL 94V Grade

Available Pin

PARTS NO.	A	B	C
SMH200-02P	5.6	4.6	2.0
SMH200-03P	7.6	6.6	4.0
SMH200-04P	9.6	8.6	6.0
SMH200-05P	11.6	10.6	8.0
SMH200-06P	13.6	12.6	10.0
SMH200-07P	15.6	14.6	12.0
SMH200-08P	17.6	16.6	14.0
SMH200-09P	19.6	18.6	16.0
SMH200-10P	21.6	20.6	18.0
SMH200-11P	23.6	22.6	20.0
SMH200-12P	25.6	24.6	22.0
SMH200-13P	27.6	26.6	24.0
SMH200-14P	29.6	28.6	26.0
SMH200-15P	31.6	30.6	28.0

Specification

ITEM	SPEC
Voltage Rating	AC/DC 250V
Current Rating	AC/DC 3A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC1000V/1min
Insulation Resistance	1000MΩ MIN
Applicable Wire	AWG #22-#28
Applicable P.C.B	-
Applicable FPC/FFC	-
Solder Height	-
Crimp Tensile Strength	-
UL FILE NO	E108706

Application Terminal : YST200 (83 page)

# Zigbee Coordinator

## 1. Environmental requirements

Parameter	Min	Typ.	Max	Unit
Operation temperature	-20		70	℃
Storage temperature	-30		85	℃
Operation Humidity	0		85	%
Storage Humidity	0		95	%

## 2. Power requirements

### 2.1 RF (Condition: at 25℃, V\_IN=12V)

Parameter	Min	Typ.	Max	Unit
Supply Voltage	3.1	3.3	3.4	V
<b>Current consumption</b>				
Active MCU with TX Mode (AES, Peripheral, SADC Disabled) @+8dBm output power (Condition: at 25℃, V_IN=12V)		25		mA
Active MCU with RX Mode (AES, Peripheral, SADC Disabled) (Condition: at 25℃, V_IN=12V)		22		mA

### 2.1 Ethernet (Condition: at 25℃, V\_IN=12V)

Parameter	Min	Typ.	Max	Unit
Supply Voltage	9	12	20	V
Active MCU with TX Mode	180	200	230	mA
Active MCU with RX Mode	180	200	230	mA

### 3. Electrical Specification

#### 3.1 RF (Condition: at 25°C, V<sub>IN</sub>=12V)

Parameter	Min	Typ.	Max	Unit
<b>RF Characteristics</b>				
RF Frequency Range	2.4		2.4835	GHz
Transmit data rate(normal mode)		250		kbps
Transmit data rate(turbo mode)		500		kbps
Transmit data rate(premium mode)		1000		kbps
Transmit chip rate		2000		kbps
Maximum output power			8	dBm
Programmable output power range		30		dB
Receiver sensitivity				
Normal mode		-98		dBm
Turbo mode		-95		
Premium mode		-91		
Adjacent Channel Rejection				
+5MHz		56.1		dBc
-5MHz		56.8		
Blocking/Desensitization				
+/- 5 MHz		-45		dBm
+/- 10 MHz		-42		
+/- 15 MHz		-48		
+/- 20 MHz		-40		
+/- 30 MHz		-43		
+/- 50 MHz		-46		
Co-Channel Rejection		-10.7		dBc
Spurious Emission(30Hz~1GHz)		-60		dBm
Spurious Emission(1GHz~2.5GHz)		-40		dBm
Spurious Emission(2.5GHz~12.7GHz)		-50		dBm

2nd Harmonics		-50		dBm
3rd Harmonics		-70		dBm
Frequency Error Tolerance			±200	KHz
Error Vector Magnitude(EVM)		9.8		%
Saturation(Maximum Input Level)		5		dBm
RSSI Dynamic Range		90		dB
RSSI Accuracy		±1.2	+6/-3	dB
RSSI Linearity		±0.2	±6	dB
RSSI Average Time		128		usec
<b>Frequency Synthesizer</b>				
Phase Noise				
@±100KHz offset		-80.3		
@±1MHz offset		-108.8		
@±2MHz offset		-113.3		
@±3MHz offset		-120.2		
@±5MHz offset		-124.2		
PLL Lock Time		100		usec
PLL Jitter		16		psec
Crystal Frequency Accuracy Requirement	-30		+30	ppm
<b>On-chip RC Regulator</b>				
Frequency		32.78		KHz
<b>Sensor ADC</b>				
Number of Bits		8		bits
Conversion Time		256		usec
Differential Nonlinearity(DNL)		±1.7		LSB
Integral Nonlinearity(INL)		±2.4		LSB

SINAD(Sine Input)		51.0		dB
<b>On-Chip Voltage Regulator</b>				
Supply range for Regulator	1.9	3.0	3.6	V
Regulated Output		1.5		V
Maximum Current			140	mA
No Load Current		15		uA
Start-up Time		260		usec

### 3.2 Ethernet (Condition: at 25°C, V\_IN=12V)

Parameter	Description
Number of Ports	1 Port
Speed	10/100 Mbps, Auto MDI/MDIX
Connector	RJ-45

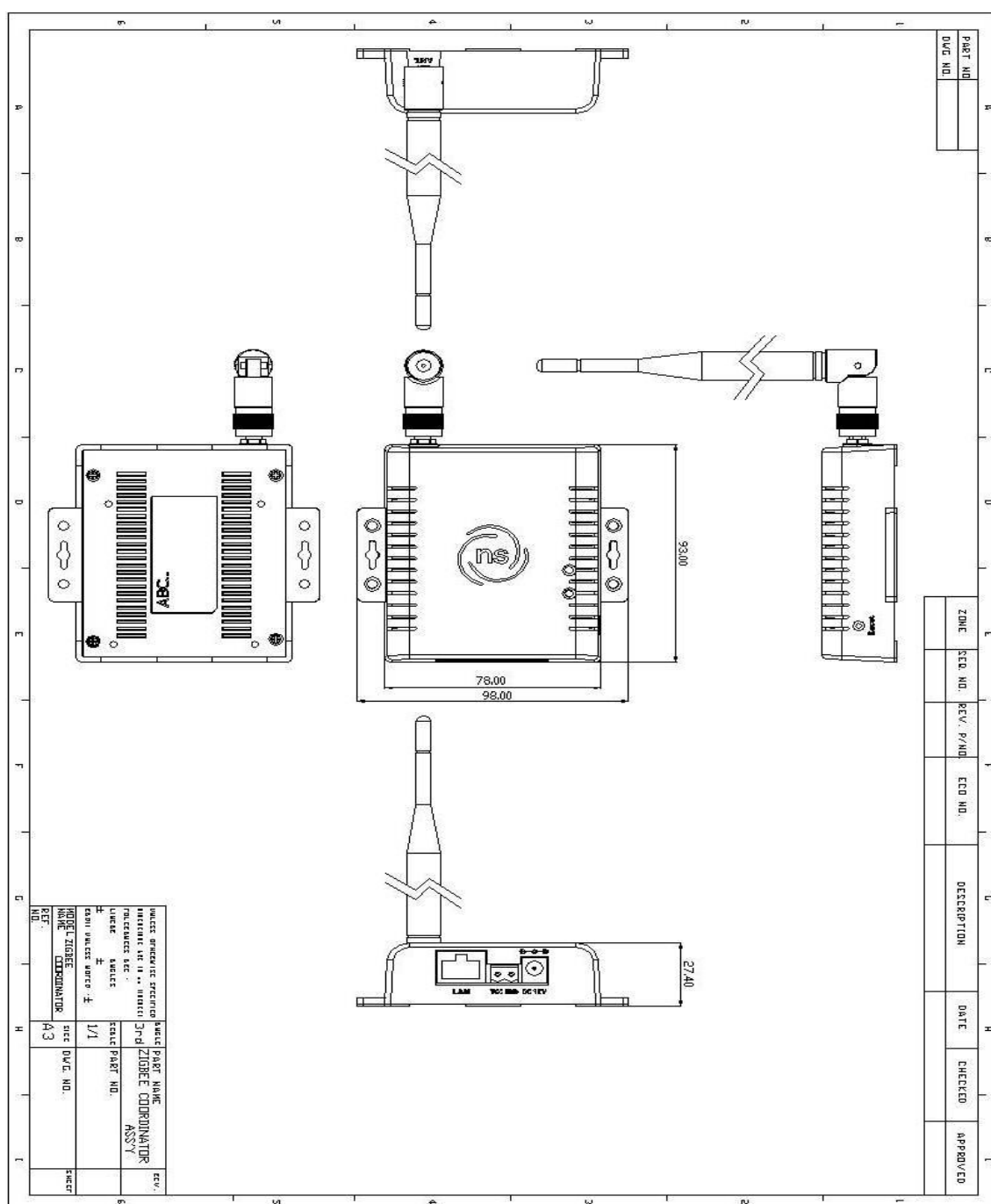
## 4. Specification of Antenna

Parameter	Min	Typ.	Max	Unit
Frequency	2400		22483	MHz
V.S.W.R			1.5	
Gain		5		dBi
Maximum input power			50	W
Impedence		50		Ω
Connector Type	SMA			
Polarization	Linear, Vertical			
Radiated Pattern	Omni-directional			
Size	210mm (H) * 12 mm (Dia)			

## 5. Physical characteristics

### 5.1 Dimension & Pin Description

- . 93.00mm X 78.00mm (only Main Body)
- . 93.00mm X 98.00mm (with Mounting Wings)



## 5.2 Measurements

Dimensions	US measurements	Metric Measurements
Weight (oz/g)	46.1700	130.90
Length (in/mm)	3.6614	93.00
Width (in/mm) (Only Main Body)	3.0709	78.00

## 5.3 Pin Assignments

Connector Name	Description
DC 12V	DC-Jack Power Input, DC Adapter, DC12V
VCC GND	Terminal Block Power Input, DC12V
LAN	Ethernet Cable, Direct Cable

## 6. Standard certifications

### 6.1 Technical Standard IEEE802.15.4

### 6.2 FCC INFORMATION

This device complies with part 15 of the FCC Rules.

## 7. Warranties

This device is warranted to the original purchaser for a period of five years from the date of original purchase against all defects in materials and workmanship. This limited warranty is void if the unit is abused, modified, installed improperly, or if the housing and/or serial numbers have been removed. There are no express warranties covering this product other than those set forth in this warranty. All express or implied warranties for this product are limited to the above time. We are not liable for damages arising from the use, misuse, or operation of this product.

## 8. MTBF

Parameter	Description
Useful life of a device	
Number of units	
Run time	
Number of failures	
MTBF	

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.

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.