



## AC FUNCTION MODULE DATA GUIDE

### DESCRIPTION

The AC Function Module plugs directly into a 110VAC wall receptacle and is capable of switching devices at loads up to 1,800 watts (15 amps) or 1HP at 120VAC. Devices connect via a standard NEMA 5-15 North American power plug. Labeling can be modified to meet specific customer requirements. The antenna rotates to a variety of positions to allow for maximum range when plugged into a power strip or floor outlet. The unit is pre-approved as a Class B device to allow immediate integration and sale in most OEM products.

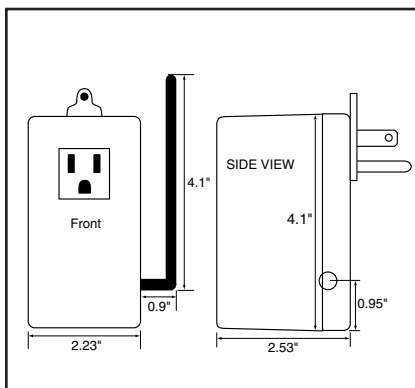


Figure 1: Package Dimensions

### FEATURES

- FCC pre-tested
- 8 unique addresses
- Standard NEMA 5-15 power plug
- Switch 1,800 watts at 15 amps
- Easily customized cosmetically for OEM applications.



### OEM Configurations

With a one-time NRE and minimum order, Linx can configure the keypad and label areas to meet your specific requirements. Contact Linx for details.

### APPLICATIONS INCLUDE

- General Remote Control
- Process Control
- Lighting Control
- Home / Industrial Automation
- Wire Elimination

### ORDERING INFORMATION

PART #	DESCRIPTION
FCTN-WALL-315	AC Function Module - 315MHz
FCTN-WALL-418	AC Function Module - 418MHz
FCTN-WALL-433	AC Function Module - 433MHz

## ELECTRICAL SPECIFICATIONS

Parameter	Designation	Min.	Typical	Max.	Units	Notes
<b>POWER SUPPLY</b>						
Operating Voltage	V <sub>CC</sub>	–	110	–	VAC	–
Supply Current	I <sub>CC</sub>	–	15.0	–	A	–
Output Power		–	–	1,800	W	–
<b>RECEIVER SECTION</b>						
Receive Frequency Range:	F <sub>C</sub>					
FCTN-WALL-315	–	–	315	–	MHz	–
FCTN-WALL-418	–	–	418	–	MHz	–
FCTN-WALL-433	–	–	433.92	–	MHz	–
Center Frequency Accuracy	–	-75	–	+75	kHz	–
Receiver Sensitivity	–	-92	-95	-100	dBm	–
Noise Bandwidth	N <sub>3dB</sub>	–	280	–	kHz	1
<b>ENVIRONMENTAL</b>						
Operating Temperature Range	–	-30	–	+70	°C	1
Storage Temperature Range	–	-45	–	+85	°C	1

Table 1: FCTN-WALL-\*\*\* Specifications

### Notes

1. Characterized, but not tested.

## AC FUNCTION MODULE FEATURES

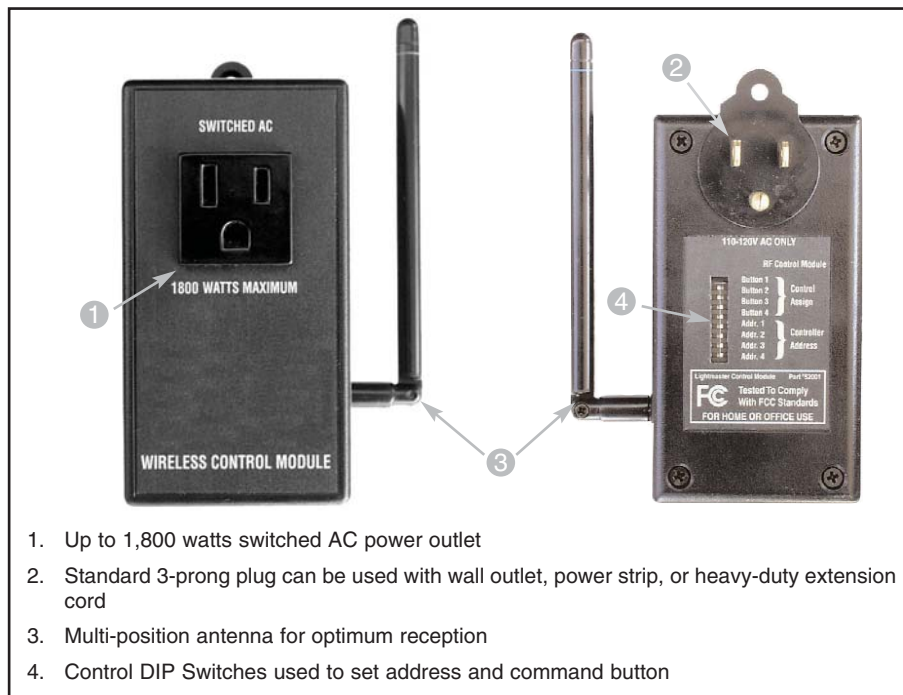


Figure 2: AC Function Module Features

## THEORY OF OPERATION

The FCTN-WALL-\*\*\* module combines the popular Linx KH Series receiver with a switching relay. When transmitted data is received, the data is presented to the decoder. The decoder detects the logic states of the DIP switch address lines, and if these match the address settings of the encoder, the decoder's outputs are set to replicate the state of the encoder's data lines. In the AC Function Module, the data lines are also compared to the DIP switch for the control setting. The setting of the four control dip switches determines from which transmitter buttons or transmitter data lines commands will be accepted. The relationship is shown in the adjacent chart. This means that if the DIP switch labeled Button 1 is turned on, then when Data line D6 on the decoder goes high, the AC Function Module will activate and apply power to the output. When line D7 goes high, the module will turn off. As long as the other button switches are turned off, the module will ignore all of the other data lines. If multiple DIP switches are turned on, then the module will be controlled by multiple buttons or data lines. For example, if switches 1 and 2 are on, then lines D6 and D4 will activate the module and lines D7 and D5 will deactivate it.

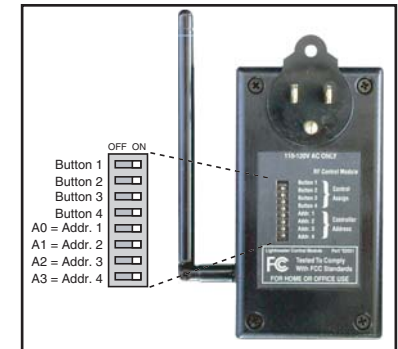


Figure 3: Module DIP Switches

DIP Switch	Data Lines	
	Button Off	On
1	D7	D6
2	D5	D4
3	D3	D2
4	D1	D0

## SETTING MODULE ADDRESS

The AC Function Module provides a total of sixteen unique address settings. Address selection is made via the bottom four DIP switches on the module. In order for the encoded commands sent by the transmitter to be recognized, the address settings of the transmitter and receiver must match precisely.

## CREATING UNIQUE GROUPS

The four control DIP switches can be used to create distinct groups of AC Function Modules that can all be operated by a single command unit. For example, any number of AC Function Modules can be set to a single address and be controlled by one of the button pairs (ON / OFF) on a command unit. You can also set up different banks using up to sixteen AC Function Modules, each set to a different address. Please read the Contention Considerations section when using multiple transmitters in close proximity.

## EQUIPMENT CONNECTION

Each AC Function Module is designed to switch AC loads of up to 1,800 watts. Plug the AC Function Module unit into a 110V outlet, then plug the equipment to be switched into the receptacle on the face of the unit. More than one device can be connected with the addition of a power strip; however, the total draw of all connected equipment must never exceed the unit's 1,800W rating.

## FUSE REPLACEMENT

An internal fuse protects the AC Function Module if the output is shorted or an excessive load is attached. Following such an event, the fuse can be replaced by unplugging the unit, removing the 4 rear screws, folding the cover over (DO NOT UNPLUG THE WIRES GOING TO THE COVER RECEPTACLE), and unclipping the fuse. The location of the fuse is shown in Figure 4. Replace only with a 25A, 125V, 3AB ceramic fast-blow fuse. Never use a different value or attempt to bypass the fuse, as extensive damage to the module, equipment, or property may result. If the fuse blows immediately after replacement, service may be required.

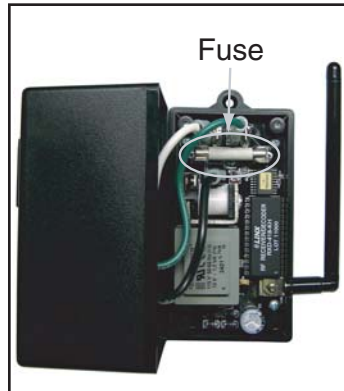


Figure 4: FCTN-WALL-\*\*\* Fuse

## ANTENNA ORIENTATION

It is always important to remember that the control signals for the AC Function Module are sent through the air. For this reason, the physical orientation of the transmitter and receiver plays an important role in determining the overall range. The antenna may be swiveled to adjust for maximum range in your environment. In most cases, orienting the antennas in a vertical position will result in optimum performance.

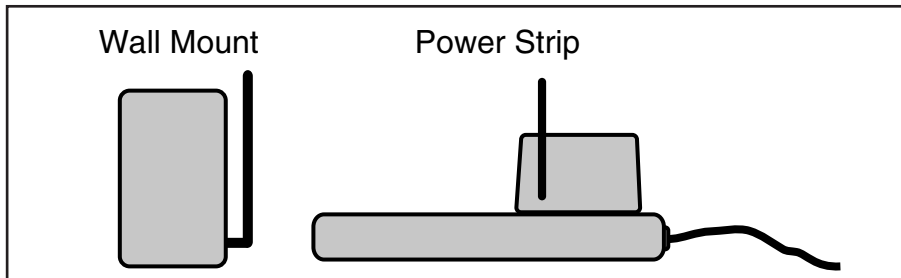


Figure 5: FCTN-WALL-\*\*\* Antenna Orientation

## CONTENTION CONSIDERATIONS

An unlimited number of AC Function Modules may be operated in proximity without interference. It is important to understand that only one transmitter at a time can be activated within a reception area. While the transmitted signal consists of encoded digital data, only one carrier of any frequency can occupy airspace without contention at any given time. If two or more transmitters are activated at the same time, the AC Function Module will receive a corrupted signal and take no action.

## INTERFERENCE CONSIDERATIONS

The range performance of the modules is heavily dependent on the environment in which they are operated. The effects of interference, multipath, and physical attenuation will vary significantly from location to location.

The AC Function Module is based on the Linx KH Series RF receiver. This is a simple, low-cost device intended for short-range transmissions. It utilizes OOK AM-based modulation. AM devices can be affected by external noise, such as that from motors or other sources of broadband RF emissions. Interference can also come from sources such as paging towers or amateur radio activity. The designer should carefully test the AC Function Module in the environment in which it will be used to ensure that its performance is appropriate for the chosen application.

## TRANSMITTER CONSIDERATIONS

The AC Function Module incorporates a Linx KH Series receiver, which is a Linx LC Series receiver paired with a Holtek decoder IC. This means that there are several options available for controlling the module.

The first option is to use one of the pre-certified OEM transmitters offered by Linx. These transmitters come in several packages and can be customized to bear the logo or other artwork required by the customer. The only setup required by the customer is to set the address of the transmitter and the AC Function Module.



Figure 6: Pre-Certified Transmitters

There are four OEM transmitters that can be used with the AC Function Module: the Full-Size Handheld, the Compact Handheld, the Long-Range Handheld, and the Keyfob. The Full-Size Handheld uses eight address lines while the AC Function Module uses four. This means that the last four address lines (A4 through A7) on the Full-Size Handheld should be turned off.

The other three transmitters use all ten address lines offered by the Holtek ICs, while the AC Function Module uses four. This means that the last six address lines (A4 through A9) on the transmitters must be left floating (turn off the DIP switches on the handhelds, cut traces 4 through 9 on the Keyfob). The other address lines can be set to whatever the user desires, as long as the transmitter and the AC Function Module match.

A custom transmitter can also be created with a KH Series transmitter or an LC or LR Series transmitter paired with a Holtek encoder or microprocessor. Because these devices offer all ten address lines used by the Holtek ICs, the last six lines (A4 through A9) must be left open. The Holtek address lines are tri-state, meaning that they have three valid input conditions: high, low, or floating. The AC Function Module uses only the low and floating states, so the custom transmitter can only use these states as well. The lines that are floating should be left open and have no electrical connection.

## LABELING REQUIREMENTS

In cases where the FCTN-WALL-\*\*\* module is incorporated inside a product and its standard labeling is not visible, the end product must be labeled as shown below.

- The following label shall be affixed in a conspicuous location to any device previously self-certified under the FCC's Declaration of Conformity process, when the product is authorized based on assembly using separately authorized components and the resulting product does not require additional testing:



- When the device is constructed in two or more sections connected by wires and marketed together, the label is required to be affixed only to the main control unit.
- When the device is so small, or for such use that it is not practical to place the statement on the unit itself, the information shown on the label shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the unique FCC logo, device trade name, and model number must be present on the device.
- The label shall not be a stick-on paper label. The label shall be “permanently affixed” to the device (meaning the label is etched, engraved, stamped, silk-screened, indelibly printed on a permanently attached part of the device, or on a nameplate fastened to the equipment by welding, riveting, or a permanent adhesive). The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and may not be readily detachable.

## COMPLIANCE REQUIREMENTS

The FCTN-WALL-\*\*\* has been tested by an FCC-approved facility and been found to comply with all applicable FCC requirements as of the date of this document. A Declaration of Conformity (DoC) is on file. It is the user's responsibility to consult the FCC or other testing body to determine if any additional testing may be required on the user's completed product. In products where no additional testing is required, further labeling of the unit is not needed unless the module will be placed inside another housing. It is, however, necessary to include the following statement in the end product's instruction manual or insert card.

### INSTRUCTION TO THE USER

This device complies with Part 15 of the FCC Rules.

Operation of this device 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.

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

*Place the above statement in the instruction manual or insert card.*

## TRANSMITTER ADDRESS SETTINGS

The AC Function Module and the corresponding transmitter must have the same address setting in order to function together. The following figures show how to set the address on the Linx transmitters described in the previous section. Application Note AN-00300 describes setting the addresses on the OEM products in detail. This note can be downloaded from the Linx website, [www.linxtechnologies.com](http://www.linxtechnologies.com).

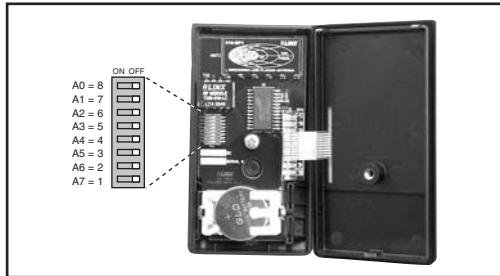


Figure 7: Full-Size Handheld Transmitter

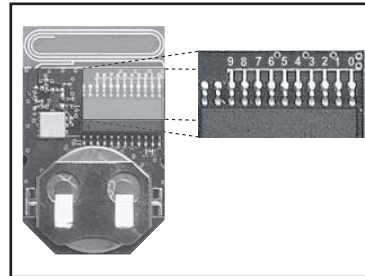


Figure 8: Keyfob Transmitter

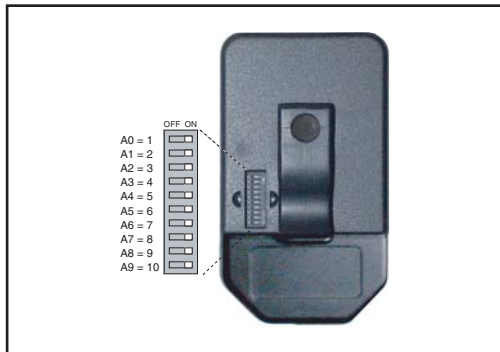


Figure 9: Compact Handheld Transmitter



Figure 10: Long Range Handheld Transmitter

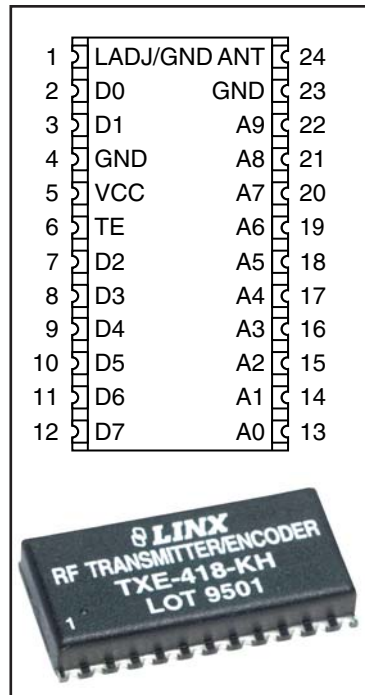


Figure 11: KH Series Transmitter

## ONLINE RESOURCES



[www.linxtechnologies.com](http://www.linxtechnologies.com)

- Latest News
- Data Guides
- Application Notes
- Knowledgebase
- Software Updates



If you have questions regarding any Linx product and have Internet access, make [www.linxtechnologies.com](http://www.linxtechnologies.com) your first stop. Our website is organized in an intuitive format to immediately give you the answers you need. Day or night, the Linx website gives you instant access to the latest information regarding the products and services of Linx. It's all here: manual and software updates, application notes, a comprehensive knowledgebase, FCC information, and much more. Be sure to visit often!



[www.antennafactor.com](http://www.antennafactor.com)

The Antenna Factor division of Linx offers a diverse array of antenna styles, many of which are optimized for use with our RF modules. From innovative embeddable antennas to low-cost whips, domes to Yagis, and even GPS, Antenna Factor likely has an antenna for you, or can design one to meet your requirements.



[www.connectorcity.com](http://www.connectorcity.com)

Through its Connector City division, Linx offers a wide selection of high-quality RF connectors, including FCC-compliant types such as RP-SMAs that are an ideal match for our modules and antennas. Connector City focuses on high-volume OEM requirements, which allows standard and custom RF connectors to be offered at a remarkably low cost.



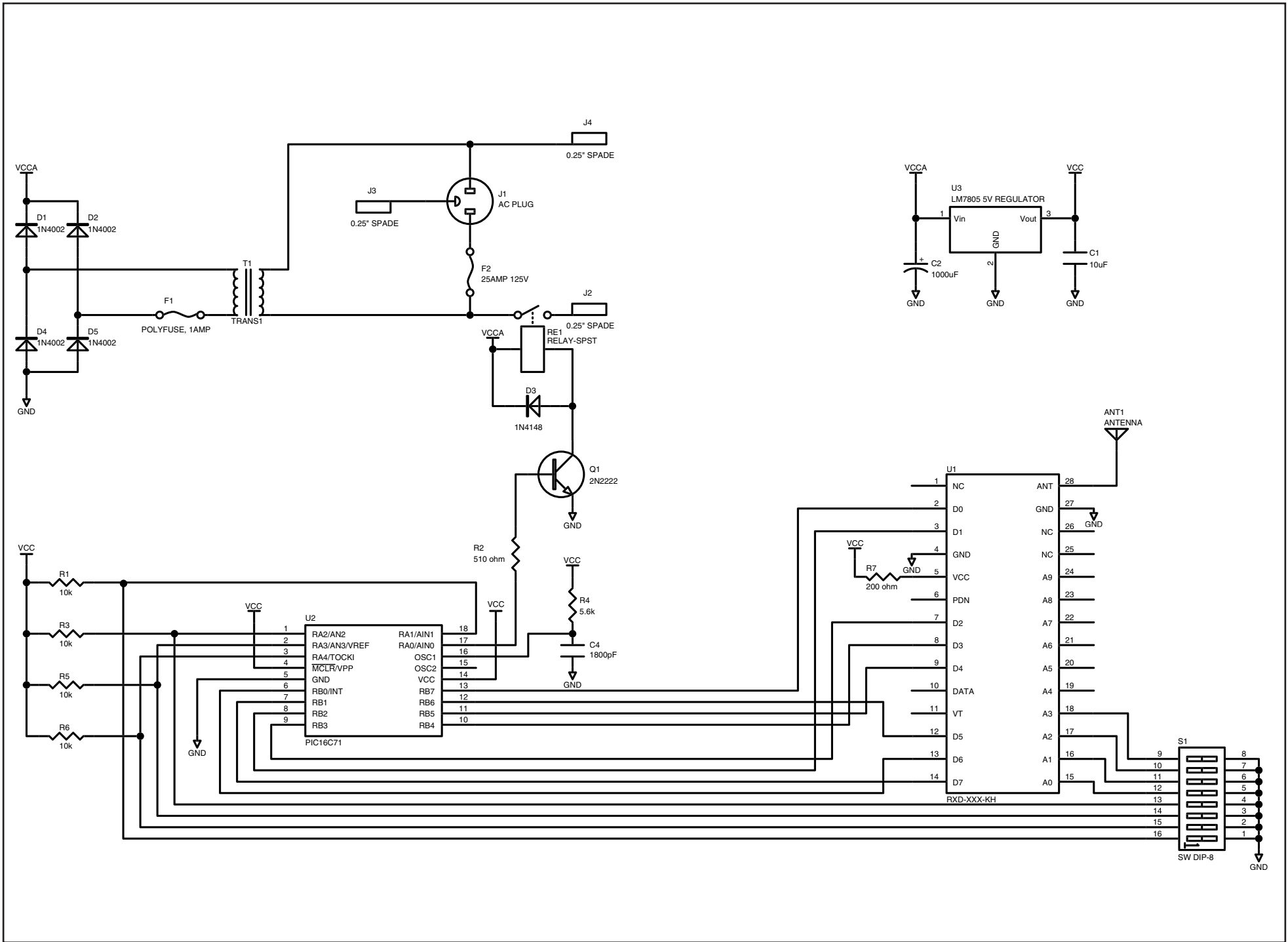


Figure 12: FCTN-WALL-\*\*\* Schematic Diagram



## U.S. CORPORATE HEADQUARTERS

### **LINX TECHNOLOGIES, INC.**

**159 ORT LANE  
MERLIN, OR 97532**

**PHONE: (541) 471-6256**

**FAX: (541) 471-6251**

**[www.linxtechnologies.com](http://www.linxtechnologies.com)**

### **Disclaimer**

Linx Technologies is continually striving to improve the quality and function of its products. For this reason, we reserve the right to make changes to our products without notice. The information contained in this Overview Guide is believed to be accurate as of the time of publication. Specifications are based on representative lot samples. Values may vary from lot-to-lot and are not guaranteed. "Typical" parameters can and do vary over lots and application. Linx Technologies makes no guarantee, warranty, or representation regarding the suitability of any product for use in any specific application. It is the customer's responsibility to verify the suitability of the part for the intended application. NO LINX PRODUCT IS INTENDED FOR USE IN ANY APPLICATION WHERE THE SAFETY OF LIFE OR PROPERTY IS AT RISK.

Linx Technologies DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL LINX TECHNOLOGIES BE LIABLE FOR ANY OF CUSTOMER'S INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING IN ANY WAY FROM ANY DEFECTIVE OR NON-CONFORMING PRODUCTS OR FOR ANY OTHER BREACH OF CONTRACT BY LINX TECHNOLOGIES. The limitations on Linx Technologies' liability are applicable to any and all claims or theories of recovery asserted by Customer, including, without limitation, breach of contract, breach of warranty, strict liability, or negligence. Customer assumes all liability (including, without limitation, liability for injury to person or property, economic loss, or business interruption) for all claims, including claims from third parties, arising from the use of the Products. The Customer will indemnify, defend, protect, and hold harmless Linx Technologies and its officers, employees, subsidiaries, affiliates, distributors, and representatives from and against all claims, damages, actions, suits, proceedings, demands, assessments, adjustments, costs, and expenses incurred by Linx Technologies as a result of or arising from any Products sold by Linx Technologies to Customer. Under no conditions will Linx Technologies be responsible for losses arising from the use or failure of the device in any application, other than the repair, replacement, or refund limited to the original product purchase price. Devices described in this publication may contain proprietary, patented, or copyrighted techniques, components, or materials. Under no circumstances shall any user be conveyed any license or right to the use or ownership of such items.