



eHouse CAN, eHouse RF

Apartment & Building Automation

Catalog

Automation for:

- | | | |
|-----------------------------------|----------------|--------------------|
| ✓ home | ✓ building | ✓ flat |
| ✓ apartments | ✓ school | ✓ sport facilities |
| ✓ swimming pools | ✓ green houses | ✓ special objects |
| ✓ any other building and premises | | |



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<http://www.isys.pl/download/ehouse-can-rf-catalog-en.pdf>



Smart Home, Building Automation



eHouse Home Automation, Building Management System - Table of Contents

1.Introduction.....	3
1.1.eHouse CAN / RF system applications.....	4
1.2.Main features of eHouse CAN/RF system.....	5
2. eHouse CAN / RF and accessories.....	6
2.1.Intelligent eHouse CAN Controller (EC).....	8
2.1.1 Main functions of intelligent eHouse CAN (EC) controller	9
2.2.Relays and Dimmers module (REL4DIM4).....	11
2.3.RF Module for eHouse RF.....	12
3.eHouse RF wireless radio network (MESH PRO).....	13
3.1.eHouse RF (MESH PRO) Server {S} / gateway – CANRFGW.....	13
3.2.Coordinators - {C}.....	14
3.3.End Devices {E}.....	14
4."eHouse CAN", „eHouse RF” Software Package.....	16
4.1.Linux binary software package: eHouse4cServer, eHouse.PRO.....	16
4.2.eHouse4Apache Module.....	17
4.2.1 Android (Java) - Control Panel Software since 4.0.0 (eHouse4Android).....	18
4.3.Java - PC Control Panel Software (eHouse4Java).....	19
4.4.Windows Mobile 6.x+ .Net, .Net Compact Framework - Control Panel for devices (Mature).....	20
FOR DEVELOPERS ONLY UNDER eHouse Alliance licence.....	20
4.5.JavaScript script - for Web browser client side support.....	21
4.6.CorelDraw VBA script - for creating visualizations for all control panels.....	22
4.7.Programming libraries and code sources for development.....	23
4.8.Screenshots.....	24
5.Documentation / Do It Yourself – English Version.....	25
6.Contact and Cooperation.....	27
7.Notes:.....	28



1.Introduction.

eHouse is complex solution of home automation from **iSys – Intelligent Systems**, developed since 2000.

Currently eHouse exists in 5 versions (LAN, RS-485, PRO, RF, CAN):

- ✓ **eHouse LAN, RS-485** based on RoomManagers for complete room control installed in mini/midi switch-board (differs with communication interfaces)
- ✓ **eHouse CAN** (wired) , **eHouse RF** (radio wireless) miniature (all in one) controllers for installation in electric sockets (cans)
- ✓ **eHouse PRO** Centralized version of eHouse system for main switch-board installation.
- ✓ **eHouse Hybrid** is based on **eHouse.PRO** server and integrate all above versions of eHouse systems depending of installation preference:
 - wireless/wired
 - for mini/midi/central switch-board
 - for electric cans / sockets
 - for cost optimization

This catalog covers only **eHouse CAN**, **eHouse RF** versions, other version are explained in separate catalogs.

Both **eHouse CAN** and **eHouse RF** are based on the same eHouse CAN controller. Controllers are miniature and designed for electric cans (sockets) installation and both have the same firmware algorithms and eHouse functionality. Working in **eHouse RF** wireless network requires plugging in additional RF module for desired frequency band 863, 902, 915 MHz (Sub-GHz), with much smaller band utilization than 2.4GHz network (used for WiFi, BlueTooth etc.). **eHouse CAN** controllers working on **Controller Area Network** serial bus, up to 100m length and up to 128 controllers (it is designed for smaller installations: flats, apartments, small houses up to 200m²). Controllers are connected serially and managed by main host (Linux microcomputer with eHouse.PRO, eHouse4cServer server software). eHouse CAN network is connected to RS-232 port via **eHouse CAN/RF gateway**. **CAN/RF** architecture is suitable for spread installation with small or medium count of controlled devices.



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eHouse RF works in MESH PRO wireless radio network under **eHouse CAN/RF gateway** supervision which works as Wireless Network Server for whole RF network installation (**PAN Coordinator**). Maximal range of RF signal is about 300m for “Peer-to-Peer” installation.

Some of devices “**Coordinators**” (up to 64) can route data from other devices in case of no direct range to PAN Coordinator, which widely increase total range of RF wireless network.

Other devices without RF routing functionality are “**End Devices**”.

eHouse RF Network can contain up to RF 128 devices supported by eHouse.PRO, eHouse4cServer (theoretical count is 8000 of all RF Devices in MESH PRO topology).

eHouse CAN/RF controllers are integrated each other by eHouse.PRO, eHouse4cServer software and control protocols for sending events, controllers statuses, etc.

For installation in new building we suggest using wired eHouse installations as a base: (LAN, PRO, RS-485, CAN) and only for extreme cases use eHouse RF version

1.1. eHouse CAN / RF system applications

eHouse system was designed for interfacing software applications and all sort of electric and electronic devices. Main application of eHouse are:

- ✓ Home, Flat, Apartment Automation
- ✓ Smart Home
- ✓ Building / Facility Management
- ✓ Office Automation
- ✓ Access Control & Limitation
- ✓ Security Systems
- ✓ Safety Systems
- ✓ Measurement systems
- ✓ Electronic Houses
- ✓ Low voltage house installations
- ✓ Control systems
- ✓ Visualization and graphical control
- ✓ Systems integration

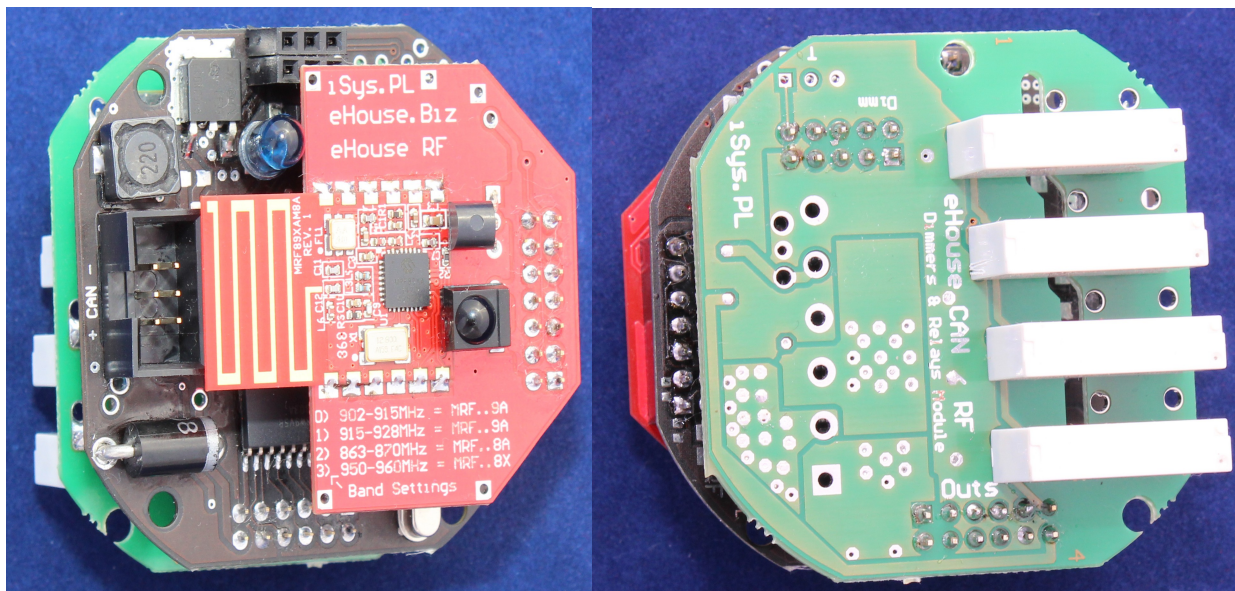
1.2. Main features of eHouse CAN/RF system

- ✓ eHouse CAN/RF is the cheapest home automation system considering costs of electronics and installation, thanks to multi-functional micro-controllers installed in electric cans (sockets), for wired (CAN) or wireless (RF) operation
- ✓ Small devastation of home for eHouse CAN and no devastation in case of eHouse RF system installation in old buildings
- ✓ eHouse CAN controllers are not sensitive for elements aging
- ✓ eHouse CAN controllers are not sensitive for external interference, disruption, noise, sabotage, malfunction comparing to wireless systems
- ✓ Low voltage eHouse CAN controllers with individually programmed and configured functionality contain:
 - 4 intelligent digital outputs
 - 4 PWM/DC LED dimmers outputs,
 - 4 intelligent digital inputs,
 - 4 intelligent measurement inputs (ADC),
 - Infrared transmitter and receiver
- ✓ Easy Installation in electric cans (sockets) up to 100m of serial cable.
- ✓ eHouse CAN/RF controller has optional (plugged in) Relays (230V/5A) / LED Dimmers (12V/3A) module for connecting executive devices and LED lights.
- ✓ External Relay module increase distance between electronics and mains voltage (230V) for safety and security.
- ✓ Multi Platform software for integration, configuration, visualization, programming libraries
- ✓ Possibility of self development, programming integration with attached programming libraries, templates, open source code
- ✓ Segments are totally separated for eHouse RF wireless controllers
- ✓ Very cheap solution of usage eHouse RF system for long distance wireless installation for plots, outside the building, warehouses, greenhouses.

2. eHouse CAN / RF and accessories

eHouse CAN intelligent controllers work directly on wired Controller Area Network serial bus of UTP-8 or AWT-6..8 (flat cable) put during montage. Controllers works under supervising host: Linux PC, microcomputer board with eHouse CAN/RF gateway connected and eHouse4cServer or eHouse.PRO software.

In order to obtain eHouse RF wireless installation controllers require to plug in RF module for desired radio frequency band (863, 902/915MHz)



eHouse CAN/RF system contains:

- ✓ Intelligent eHouse CAN micro-controller for wired network operation
- ✓ RF module for one of available frequency band for operation in **eHouse RF** wireless network (MESH PRO) for plugging into eHouse CAN controller
- ✓ Relays (4*230V/5A) + LED Dimmers (4*12V/3A) module for plugging in into eHouse CAN controller

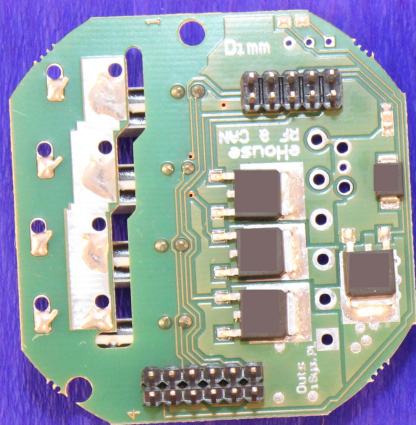
eHouse CAN/RF architecture is optimized for small and medium (wired) and (any for wireless) decentralized installation in case of wide spread control points of installation without division to rooms. In small systems cost of installation is much lower then in case of system based on Mini/Midi/Central Switch-boards or



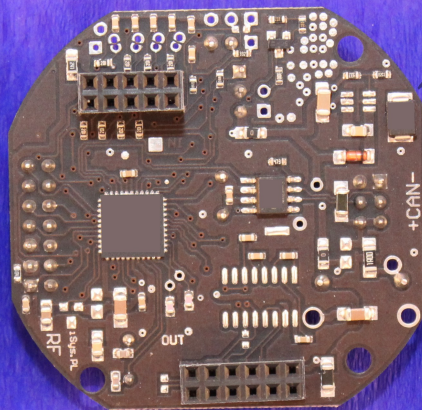
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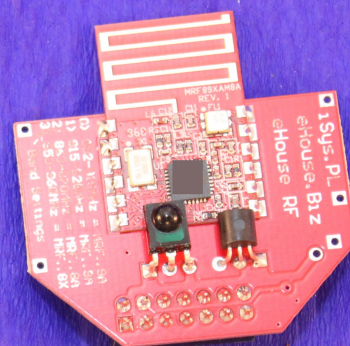
systems based on single blocks of inputs, outputs.



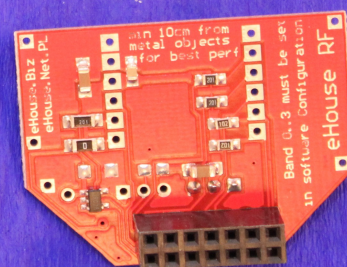
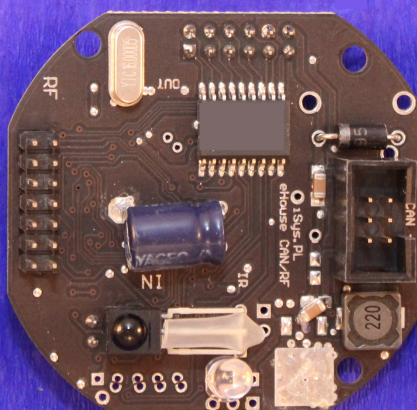
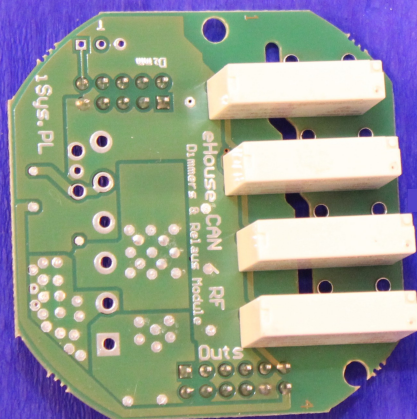
4*Relays 230V/5A +
4 LED Dimmers 12V/3A



eHouse CAN/RF
controller



RF Module
863, 902/915MHz



2.1. Intelligent eHouse CAN Controller (EC)

Intelligent eHouse CAN controller is decentralized small range, low voltage smart home controller (separated from Mains for safety and DIY solutions). ECs are dedicated for control and management of wide spread multi-point control of devices:

- ✓ home, apartment, flat automation
- ✓ smart home
- ✓ intelligent building integration

EC is much smaller than other eHouse system controllers, however it implements more advanced algorithms and functions due to integration of different algorithms from many types of eHouse controllers (CommManager, RoomManager, eHouse PRO):

- ✓ drive / rollers / gateway control (pairs of outputs +/-/stop)
- ✓ electrical devices on/off
- ✓ measurement and regulation of physical values like temperature, light level etc.
- ✓ IR control : transmission (external A/V systems management) reception (for management eHouse CAN / RF system and eHouse Hybrid via Infrared)
- ✓ LED Light Dimming/Regulation

eHouse CAN controllers works on serial interface, UTP-8 or AWT-8 flat cable up to 100m of length much shorter than eHouse RS-485.

eHouse CAN can be used for much smaller installations (flats, apartments and building lower than 200m²) with optimized cable placement.

eHouse CAN/RF controllers should be installed in electric cans (sockets) on various height depending on needs for connection:

- switch, sensor, security sensor (digital input on/off)
- turn on/off electrical device (digital output on/off with relay)
- measure some physical values with external sensors eg. Temperature, humidity, etc
- dimming LED lights (single dimmer/component RGBW)
- control eHouse CAN/RF, Hybrid system via IR remote controller
- control external Audio-Video systems via infrared (sending learned codes of

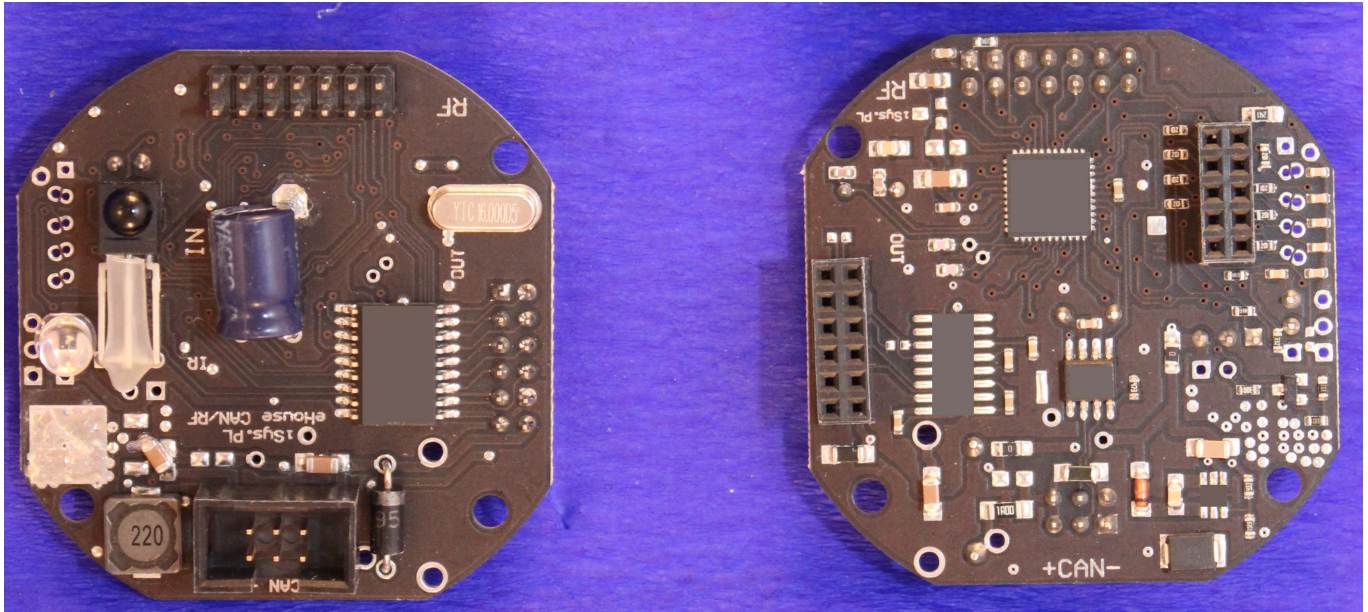


original remote controllers)

2.1.1 Main functions of intelligent eHouse CAN (EC) controller

- ✓ 7..25VDC input power supply
- ✓ 4 intelligent / programmable digital outputs (on/off) with relays drivers, (can work as pairs for drives, gateway, cutoff control +/-/stop) – Relays are on “RELAY DIMMER MODULE”
- ✓ 4 intelligent / programmable digital inputs (on/off) for connecting sensors, switches, etc.
- ✓ 4 intelligent / programmable ADC inputs with individually programmed levels (min,max)
- ✓ 4 LED PWM 12VDC/3A Dimmers - Drivers are on “RELAY DIMMER MODULE”
- ✓ IR receiver compatible with Sony (SIRC) system for direct control of EC by remote controllers (optional)
- ✓ IR transmitter for remote control of external Audio, Video, HiFi equipment (optional)
- ✓ RS232-TTL interface for installation extension modules to the controllers (optional)
- ✓ up to 128 ECs can be installed in eHouse CAN System without bus expansions (theoretically ~65000)
- ✓ socket for plug-in RF module for **eHouse RF** wireless radio operation
- ✓ watchdog timer, communication test, hang up protection and restart

eHouse CAN controller without expansions modules (relays+dimmers, RF) are wired and have only input functions (4 inputs on/off, 4 measurement inputs, IR Transmitter and Receiver)



Picture for information only Not for reference may be changed during production and development.

Pictures are not in 1:1 scale.

Dimensions: fi 55mm*15mm and may be changed during production and development

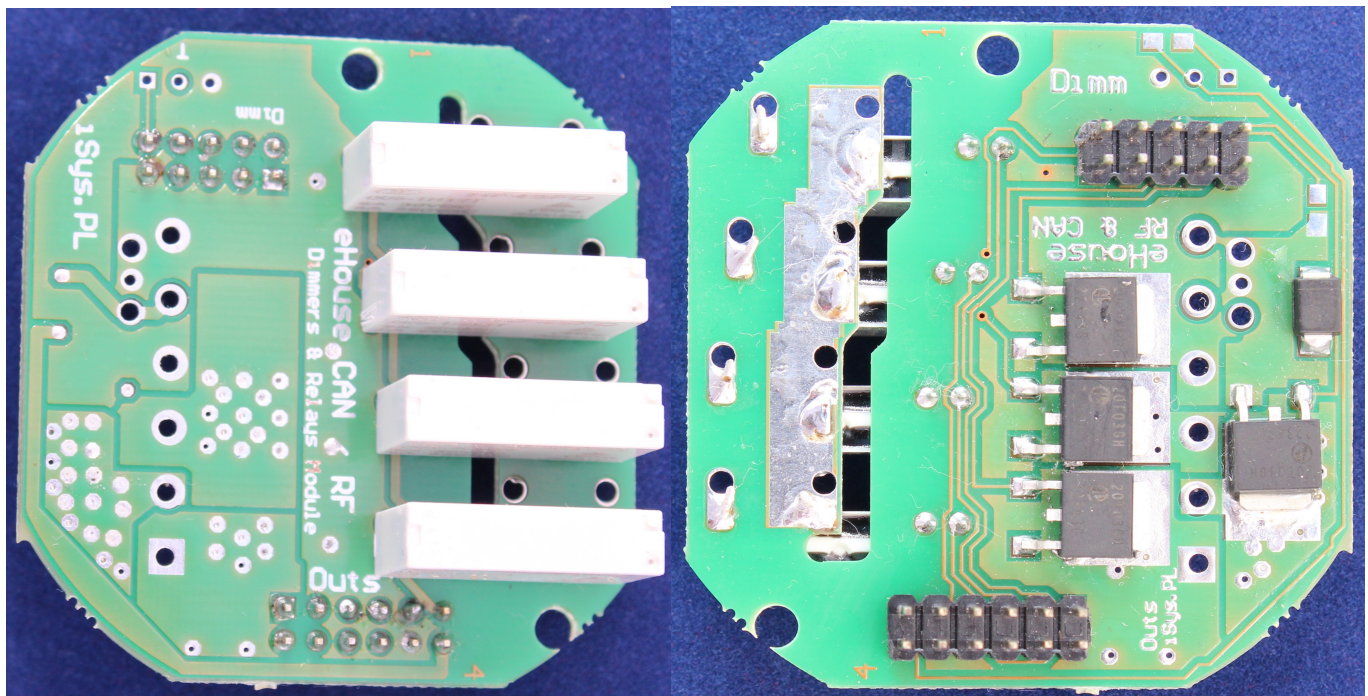
- ✓ Modules can be painted with insulation materials on demand
- ✓ Modules may be RoHS or not on demand
- ✓ Product for Installation RoHS not required for CE
- ✓ Complying with CE norms for (EMI)

2.2. Relays and Dimmers module (REL4DIM4)

Module is expansion board of intelligent eHouse CAN/RF controller for connection executive devices (relays for turning on/off electrical devices and dimmer drivers for LED lights)

Main features of Relay/Dimmer module:

- ✓ 4 relays 230V/5A
- ✓ 4 LED dimmers drivers 12V/3A
- ✓ sockets for direct plug into eHouse CAN/RF controller
- ✓ socket for connecting LED Light (optional)
- ✓ Mounted 230V cables (optional)

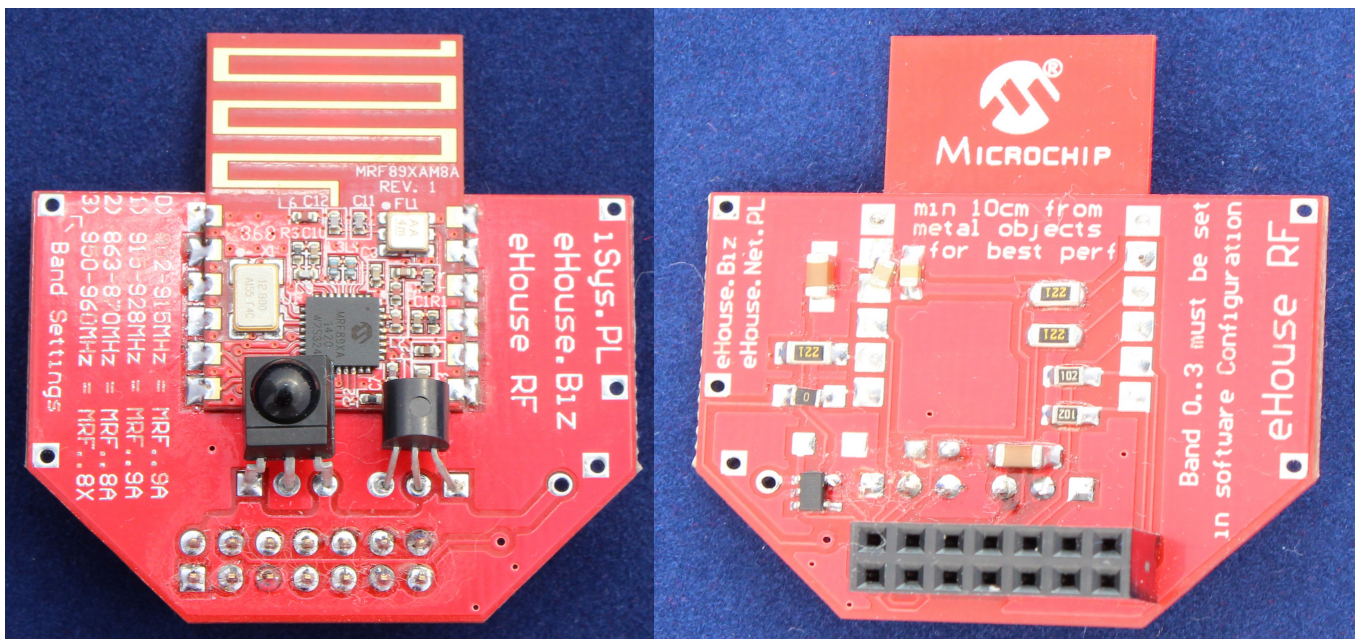


2.3. RF Module for eHouse RF

Insertable RF module for **eHouse RF** operation of eHouse CAN controller.

Main features of RF module:

- ✓ 2 hardware versions available for different frequency band (863, 902/915 MHz). Selection between 902 and 915 MHz is set by configuration on the same Hardware RF module.
- ✓ 32 channels of operation in case of occupations by other systems in RF range
- ✓ maximal range 300m with build in mini-antenna
- ✓ Size: 45mm*45mm*15mm
- ✓ Temperature sensor (optional)
- ✓ IR receiver (optional)
- ✓ socket for plug into intelligent eHouse CAN controller



3.eHouse RF wireless radio network (MESH PRO)

eHouse RF smart house use RF transceivers modules for chosen frequency band 863, 902, 915 MHz – Sub-GHz (low utilized frequency bands comparing to 2.4GHz used by WiFi, BlueTooth and other wireless systems).

eHouse RF works in MESH PRO wireless network up to 128 wireless devices in single installation (limited by eHouse.PRO, eHouse4cServer applications). Theoretical number of devices is 8000 in single RF wireless network.

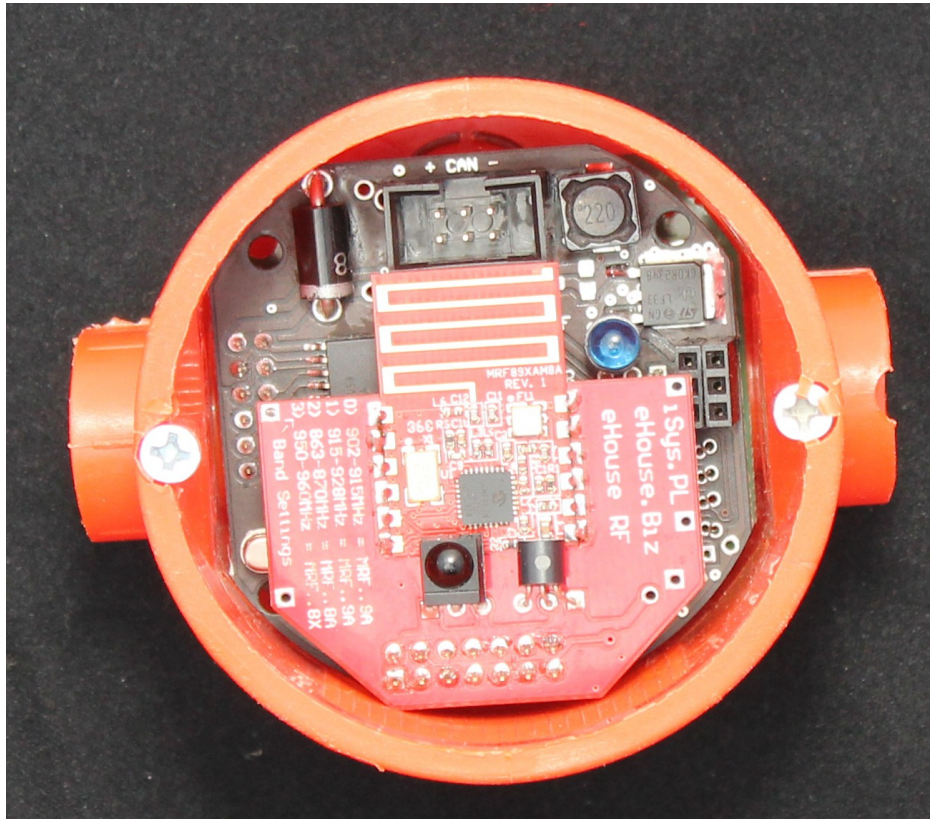
3.1. eHouse RF (MESH PRO) Server {S} / gateway – CANRFGW

eHouse RF network works under **eHouse CAN/RF gateway** supervision which operates as RF wireless network server. CANRFGW is connected to Linux based microcomputer via RS-232TTL port, with eHouse.PRO, eHouse4cServer software.

eHouse CAN/RF gateway enables integration both **eHouse CAN** and **eHouse RF** versions with eHouse.PRO, eHouse4cServer.

Main features of eHouse CAN/RF Gateway:

- ✓ RS-232TTL serial port for direct connection to eHouse.PRO server (LINUX microcomputer board)
- ✓ RS-232C driver for standard PC connection (optional)
- ✓ CAN interface compatible with eHouse CAN controllers
- ✓ RF module for selectable frequency band 863, 902/915 MHz for communication and supervising eHouse RF intelligent controllers
- ✓ eHouse RF (MESH PRO) server of whole wireless network



3.2. Coordinators - {C}

In case of no direct range between MESH PRO Server and other RF controllers (peer-to-peer), MESH PRO protocol assures routing information via other RF devices, through nearer devices, with additional RF network functions known as Coordinators {C}. eHouse RF wireless network support up to 64 coordinators for whole MESH PRO network.

In case of small installation below 65 RF modules all controllers can be Coordinators for easiest installation and maintenance.

For larger installation all coordinators must assure full and powerful coverage of whole controlled area with eHouse RF network considering possible future development of installation.

3.3. End Devices {E}

In case of larger installations than 64 modules, End Devices {E} (without RF communication routing functionality) must be used for further expansion of eHouse RF network. **End Devices** have the same eHouse algorithms as **Coordinators**, however less utilization of processor



Smart Home, Building Automation



because smaller utilization of RF network and data processing during communication. **End Devices** hardware is the same as **Coordinator**, however has other firmware installed in the controller for operation.

4. "eHouse CAN", „eHouse RF” Software Package

eHouse CAN/RF system is also equipped in auxiliary software for Linux systems and Web Browser support including: configuration, management, control, visualization, graphical control, web browser support, integration to other systems interfaces

4.1. Linux binary software package: eHouse4cServer, eHouse.PRO

eHouse4cServer, eHouse.PRO assures supervision and integration of all versions of eHouse system.

Currently supported Linux versions:

- ✓ RaspberryPi or other based on the same ARM processor
- ✓ Banana PRO / PI or other based on the same ARM processor
- ✓ x64
- ✓ x86
- ✓ Other Linux boxes may be developed depending on availability on the market

Main Functions

- ✓ Web Browser integration
- ✓ Apache Web Server integration (TCP Server)
- ✓ TCP Servers for panels connection
- ✓ eHouse1 support for integration
- ✓ eHouse.PRO support for integration, configuration
- ✓ eHouse CAN support for integration, configuration
- ✓ eHouse RF support for integration, configuration
- ✓ Implements SMS hardware gateway support for SMS reception and transmission
- ✓ HTML requests support to control other systems, applications, programs
- ✓ Update configuration of eHouse CAN/RF controllers
- ✓ Generate automatic visualization of each eHouse controller
- ✓ TCP server for integration to other systems



- ✓ Supports Onkyo Audio-Video systems via Ethernet
- ✓ Supports Denon, Marantz Audio-Video systems via Ethernet
- ✓ Process IR control signals received from any controllers

eHouse4cServer, eHouse.PRO are under constant development and functionality may change without notice

4.2. eHouse4Apache Module

- ✓ Enables integration eHouse4cServer, eHouse.PRO with Apache WWW server
- ✓ transfer data between web browser and eHouse4cServer, eHouse.PRO
- ✓ transmit events, commands, configuration
- ✓ send statuses to web browser



4.2.1 Android (Java) - Control Panel Software since 4.0.0 (eHouse4Android)

eHouse4Android application is supported by various hardware devices eg.

- ✓ Pods
- ✓ Pads
- ✓ SmartPhones
- ✓ SmartTV

Main functions:

- ✓ Text control
- ✓ Voice control (Speech recognition)
- ✓ graphical control
- ✓ Online status via TCP, UDP (Local Network)
- ✓ Graphical visualization individually designed
- ✓ Graphical visualization automatic for each eHouse Controller
- ✓ Control via WiFi, Ethernet, LAN, Internet, SMS, eMail
- ✓ Online status via WiFi, Ethernet, LAN, Internet
- ✓ Supports eHouse 1, eHouse LAN, eHouse.PRO versions

4.3. Java - PC Control Panel Software (eHouse4Java)

- ✓ Linux
- ✓ Windows
- ✓ other Java enabled system

Main functions:

- ✓ Text control
- ✓ Graphical control
- ✓ Online status TCP, UDP (Local Network)
- ✓ Graphical visualization individually designed
- ✓ Automatic graphical visualization for each eHouse Controller
- ✓ Control via WiFi, Ethernet, LAN, Internet, eMail
- ✓ Online status via WiFi, Ethernet, LAN, Internet
- ✓ TCP server for connecting external panels
- ✓ TCP server for OpenRemote support
- ✓ Supports eHouse 1, eHouse LAN, eHouse.PRO versions



4.4. Windows Mobile 6.x+ .Net, .Net Compact Framework - Control Panel for devices (Mature)

- ✓ Pods
- ✓ Pads
- ✓ SmartPhones

Main functions:

- ✓ Text control
- ✓ Graphical control
- ✓ Online status TCP, UDP (Local Network)
- ✓ Graphical visualization individually designed
- ✓ Automatic graphical visualization for each eHouse Controller
- ✓ Control eHouse system via WiFi, Ethernet, LAN, Internet, SMS, eMail
- ✓ Online status via WiFi, Ethernet, LAN, Internet
- ✓ Supports eHouse 1, eHouse LAN versions

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4.5. JavaScript script - for Web browser client side support

- ✓ online status reception via JSON, data update
- ✓ online text control
- ✓ online graphical control
- ✓ online graphical visualization
- ✓ sending control commands (events) to eHouse system
- ✓ supports eHouse 1, eHouse LAN, eHouse.PRO versions
- ✓ supports SVG (Scalable Vector Graphics), XML

4.6. CorelDraw VBA script - for creating visualizations for all control panels

- ✓ WebBrowser: HTML, SVG, XML
- ✓ Custom programmed formats (text)
- ✓ Windows XP, Vista, 7, 8 - PC, Pods, Pads
- ✓ Windows Mobile .Net, .Net Compact Framework - Pods, Pads, Smartphones
- ✓ Java - visualization and graphical control for PCs Java enabled platforms
- ✓ Android - visualization and graphical control for SmartPhones, Pods, Pads, SmartTV
- ✓ supports eHouse 1, eHouse LAN, eHouse.PRO versions
- ✓ supports templates

4.7. Programming libraries and code sources for development

For eHouse system developers and members of eHouse Alliance we offer programming libraries and scripts for most of operating systems:

- ✓ Windows XP, Vista, 7, 8, .Net
- ✓ Windows Mobile 6.x,7,8 .Net Compact Framework
- ✓ Linux x86, x64, ARM, RaspberryPi
- ✓ Java enabled platforms and operating systems
- ✓ Java Mobile for PDAs, Palmtops, Smartphones
- ✓ Web Server (Apache) modules
- ✓ Web Browser Integration scripts
- ✓ OpenRemote.Org integration
- ✓ Android

Libraries and scripts are in most important programming languages:

- ✓ Delphi, Pascal
- ✓ C,C++
- ✓ C#, .Net, .Net Compact Framework
- ✓ Java, Java Mobile (MIDP)
- ✓ Android (Java)
- ✓ VBA – Visual Basic
- ✓ PHP
- ✓ SVG, XML
- ✓ HTML
- ✓ JavaScript

Libraries are individually distributed base on license agreement and fees.



4.8. Screenshots

http://home-automation.isys.pl/all,eHouse_smart_home_visualization_galery.htm

http://www.isys.pl/all,inteligenty_dom_budynnek_galeria_software.htm

5. Documentation / Do It Yourself – English Version

Most current documentation in English are located at producer home page:

http://home-automation.isys.pl/ehouse_doc.intelligent_house_building_doc.htm

Source code examples, templates, libraries: <http://isys.pl/download/>

Do It Yourself information: <http://smart.ehouse.pro/> - eHouse Blog

Details DIY, Programming, Designing, Instalation, Configuration, Articles, tips & tricks:

<http://smart.ehouse.pro/category/applications/> - eHouse applications

<http://smart.ehouse.pro/category/boilerroom/> - Boiler Room & Central Heating

<http://smart.ehouse.pro/category/building-management/> - Building Management General Info

<http://smart.ehouse.pro/category/design/> - eHouse Design, solutions, demos

<http://smart.ehouse.pro/category/ehouse4can/> - eHouse CAN – Installation, Configuration

<http://smart.ehouse.pro/category/ehouse-lan/> - eHouse Ethernet – Installation, Configuration

<http://smart.ehouse.pro/category/ehouse-rs-485/> eHouse 1 – Installation, Configuration

<http://smart.ehouse.pro/category/ehouse-pro/> - eHouse.PRO – Installation, Configuration

<http://smart.ehouse.pro/category/renewableenergy/> - free and renewable energy usage

<http://smart.ehouse.pro/category/general/> - eHouse general info

<http://smart.ehouse.pro/category/integrationcontrol/> - Integration to other systems, devices, A/V

<http://smart.ehouse.pro/category/openremote/> - Integration with OpenRemote.ORG

<http://smart.ehouse.pro/category/os/linux/> - Linux programming for eHouse - „C”

<http://smart.ehouse.pro/category/os/windows/> - Windows programming

<http://smart.ehouse.pro/category/programming/android/> - Mobile Devices PADs, SmartPhone, SmartTV, Android programming, screenshots for eHouse

<http://smart.ehouse.pro/category/programming/apache/> - Apache integration to eHouse.PRO server

<http://smart.ehouse.pro/category/programming/csharp/> - C#, .Net, .Net CF programming

<http://smart.ehouse.pro/category/programming/c/> - C programming for Linux

<http://smart.ehouse.pro/category/programming/delphi/> - Delphi, Pascal programming for Windows



Smart Home, Building Automation



<http://smart.ehouse.pro/category/programming/java/> - Multiplatform Java programming, screenshots

<http://smart.ehouse.pro/category/programming/windows-phone/> - Windows Mobile, Phone programming

<http://smart.ehouse.pro/category/programming/www/> - Web browser support for eHouse

<http://smart.ehouse.pro/category/visualization/> - Creating individual visualization and graphical control views



6. Contact and Cooperation

iSys – Intelligent Systems

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Poland

tel: +48504057165

email: is@isys.pl

GPS: (N:52 st 2min 44.3s; E:21st 15min 49.19s)

[Map](#)

Producer, manufacturer, developer home page in English:

<http://home-automation.isys.pl/> - Producer homepage

<http://smart.ehouse.pro/> - Do It Yourself, designing, development, examples, applications

<http://eHouse.Biz/> - eHouse smart home producer online shop

http://www.isys.pl/?home_automation - Other Languages (for information only not for reference)

Serwisy eHouse w języku polskim:

<http://inteligentny-dom.ehouse.pro/> Zrób to sam, programowanie, przykłady, projektowanie, zastosowania

<http://www.isys.pl/> - strona WWW producenta

<http://www.ehouse.pro/> - Automatyka domu, budynku, hoteli, pensionatów



7. Notes: