

Wireless RF Long Range Transmitter Receiver

Model: FBX-ALBATROSS-04DDIO

Technical Product Specification Document



FORBIX SEMICON®
ALBATROSS-04DDIO Long Range RF
Transmitter-Receiver

Transmitter: 4 input digital input.

Receiver: 4 potential free contact relay output

Signal Range: 2-3Kms in (open Line of Sight)

Operating voltage: 12VDC (adapters along with the device), customized designs for 5VDC USB input voltage

Customized design possible for 8 channel digital input and 8 channel output (8-DDIO)

About the device

FORBIX SEMICON® Long Range RF Transmitter-Receiver system delivers secure, interference-resistant wireless control over extreme distances. Both transmitter and receiver are designed for wall or pole mounting with no metallic or electronic interference nearby to ensure optimal performance.

Applications:

Defence – Remote activation of perimeter warning systems or concealed barriers

Factories – Emergency stop triggers or machine start/stop across large production floors

Warehouses – Control of overhead doors, conveyor belts, or forklift warning beacons

Airports – Distant control of runway warning lights or baggage handling indicators

Security – Silent panic alarms or gate opening from guard posts up to 3 km away

Logistics – Trigger loading bay hooters or dock lock systems from inbound vehicle position

Technical Data

Index (Table of Contents)

Long Range RF Transmitter.....	Page 3
Long Range RF Receiver.....	Page 4
Wiring Diagram.....	Page 5
Mounting Details.....	Page 6
Regulated AC Power Supply Adapter.....	Page 7
Timing Diagram and Details from the Designer's Diary.	Page 8
Revision History.....	Page 10
Company.....	Page 13

Wireless Long Range Transmitter Receiver, FBX-ALBATROSS-04TR Technical Product Document

Product designed and manufactured by **FORBIX SEMICON®**

Long Range RF Transmitter

Model: FBX-ALBATROSS-04T



Features:

4 Digital Inputs (with loopback).
Signals from + points to b

Technical details:

Transmitter PA +30dbm
Operating frequency: 315 – 480 MHz
System operates works on signal hop mechanism. Signal transmission happens at more than 12-15 predefined frequencies
Modulation type: GFSK
Radio IC: CC1100 (Chipcon/TI) sub-GHz frequency
Data packet error correction mechanism: FEC

Operating voltage:

12 Volt (220AC/12VDC adapter power supply)
Customized designs with 5VDC USB input
Users can also plug to any 12V external battery. Active working hours depends on the battery power

RF antenna:

Wire coil antenna / metal antenna / rubber duck / spiral with 30cm-100cm 50 ohms wire (depends on environment necessity)

Applications:

Defence – Remote activation of perimeter warning systems or concealed barriers
Factories – Emergency stop triggers or machine start/stop across large production floors
Warehouses – Control of overhead doors, conveyor belts, or forklift warning beacons
Airports – Distant control of runway warning lights or baggage handling indicators
Security – Silent panic alarms or gate opening from guard posts up to 3 km away
Logistics – Trigger loading bay hooters or dock lock systems from inbound vehicle position

Precautions and mounting locations:

Device can be mounted on wall / pole etc.
Outdoor installations keep away from direct sunlight / rain.
Keep away from metallic enclosures

Range of communication:

2-3Kms outdoors in open Line of Sight [LoS]
Signal range can vary from 500m to 8Kms (depending on environmental conditions)

Mechanical:

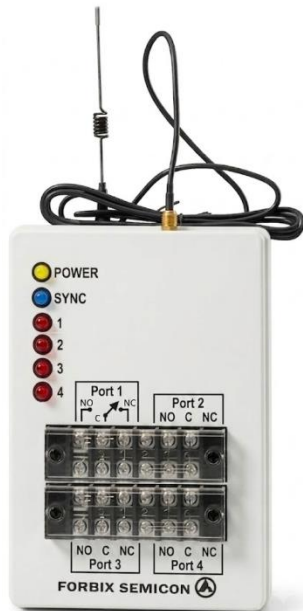
Enclosure type: ABS plastic (color white)
Receiver unit size: 200 x 150 x 70 mm
Receiver unit weight: 220 gms

Environmental Requirement:

Operating Temperature: 0°C to 40°C
Storage Temperature: 5°C to 25°C
Relative Humidity: 5% (0°C) ~ 95% (40°C) RH

Long Range RF Receiver

Model: FBX-ALBATROSS-04R



Precautions and mounting locations:

Device can be mounted on wall / pole etc.
Outdoor installations keep away from direct sunlight / rain.
Keep away from metallic enclosures

Range of communication:

2-3Kms outdoors in open Line of Sight [LoS]
Signal range can vary from 500m to 8Kms (depending on environmental conditions)

Mechanical:

Enclosure type: ABS plastic (color white)
Receiver unit size: 200 x 150 x 70 mm
Receiver unit weight: 220 gms

Environmental Requirement:

Operating Temperature: 0°C to 40°C
Storage Temperature: 5°C to 25°C
Relative Humidity: 5% (0°C) ~ 95% (40°C) RH

Features:

Long range receiver with 4 relays & LED indicators
Each relay turns ON and the corresponding LED glows on signal from the transmitter unit. Customized connections to external electrical control devices is possible with respective driver integration to Sirens / Relay / Hooter / Display etc.

Technical details:

Receiver sensitivity: – 112 dbm
Operating frequency: 315 – 480 MHz
System operates works on signal hop mechanism. Signal transmission happens at more than 12-15 predefined frequencies
Modulation type: GFSK
Radio IC: CC1100 (Chipcon/TI) sub-GHz frequency
Data packet error correction mechanism: FEC

Operating voltage:

12 Volt (220AC/12VDC adapter power supply)
Users can also plug to any 12V external battery. Active working hours depends on the battery power

Customized designs with 5VDC USB input (only for LED indication and buzzer)

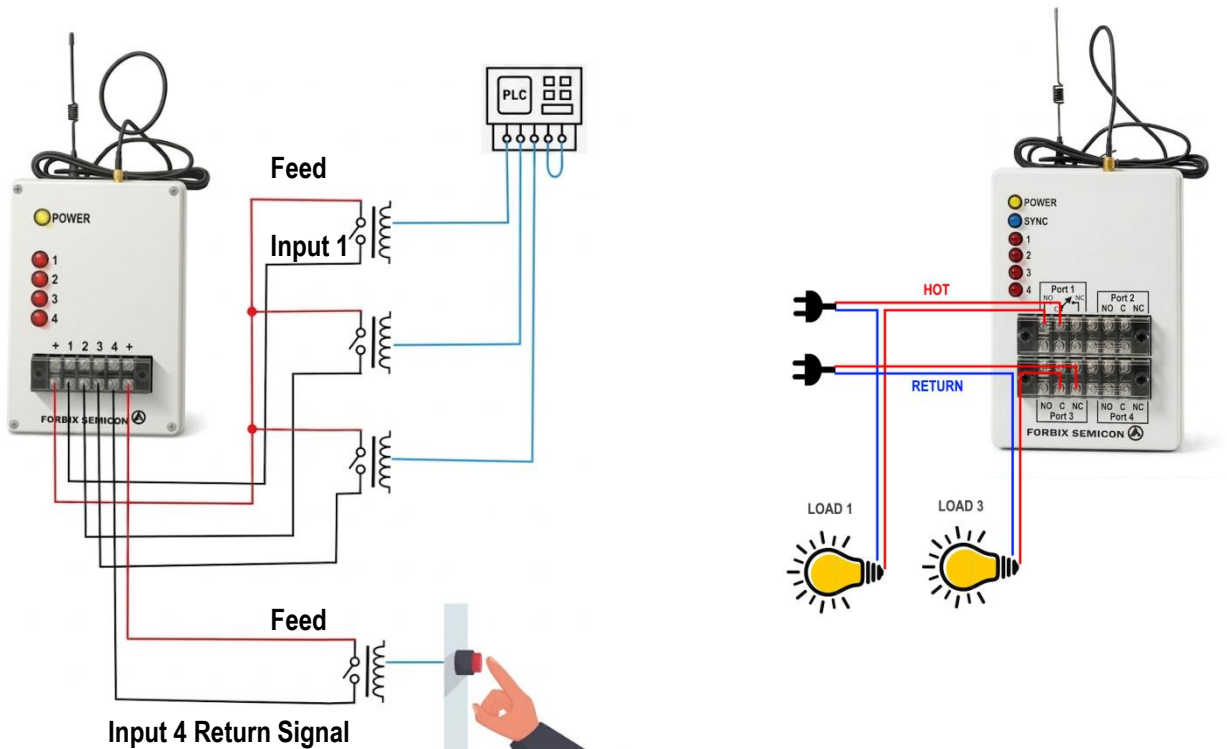
RF antenna:

Wire coil antenna / metal antenna / rubber duck / spiral with 30cm-100cm 50 ohms wire (depends on environment necessity)

Relay Specifications

Switching Capacity: Maximum 5A at 250V AC or 30V
Internal DC Coil Voltage: 5V
Contact Configuration: SPST (Single Pole Single Throw - 4 pin)
Contact Material: Silver alloy (e.g., AgNi or AgSnO₂) for durability
Dielectric Strength: Usually rated for 1,500V to 4,000V AC isolation between coil and contacts to protect the low-voltage control side

Wiring Diagram Long Range Transmitter and Receiver



Loop-Based Channel Detection

The transmitter detects a digital input on channels 1 through 4 by sensing a closed-loop circuit. A known pulsed signal is continuously transmitted from the common (+) terminal; when this signal is looped back to a specific channel input (pin 1–4), the transmitter registers that channel as active.

Potential-Free Relay Interface

External PLCs or electrical devices interface with the transmitter using potential-free relay contacts. By closing the relay, the external device completes the loop between the common (+) terminal and the desired channel pin, enabling the transmitter to detect the digital input without being affected by the external system's voltage levels.

Wire Length

The wires can extent: 10-20meters
(5V PWM signal running voltage on the wires)

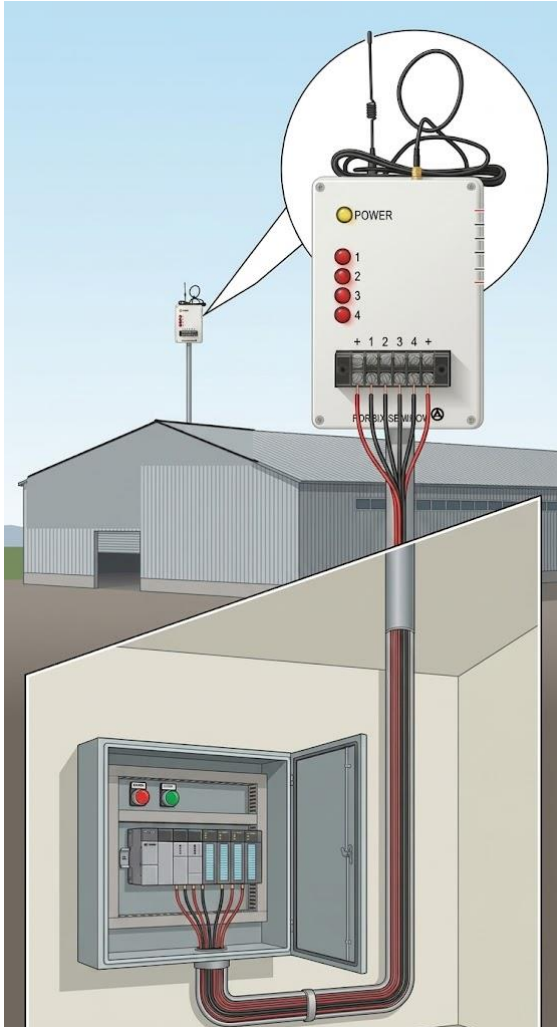
Relay Connection Diagram

The hot wire pass through the potential free relay ports to the load.

Wire Length

Depends on the running voltage and current through the load 220VAC/110VAC, 5ADC-7ADC potential free relay capacity

Mounting Long Range Transmitter



Mounting the transmitter on the top of an industrial / warehouse building (on a pole)

Best Place – On a Roof Pole

For the best wireless range, mount the transmitter box on the top of a building, industrial shed, or warehouse, on a pole. This gives it a clear, open view for sending signals.

Range – Up to 3 to 4 Kilometers

When mounted in an open area with a clear line of sight, the transmitter can send signals reliably over distances of 3 to 4 kilometers.

Don't Keep It Indoors

Placing the transmitter inside a room or building will weaken the RF signals. This greatly reduces the communication range and makes the system less reliable.

Run Wires from the Control Room

The transmitter can be mounted on the roof, while the wires from the PLC, switch or control panel inside the shop floor are extended up to the transmitter. This way, the electronics stay safe indoors, but the antenna and the transmitting unit is placed at the best possible height for long-range communication.

Regulated AC Power Supply Adapter

Model: FBXADP12V2A



Important Note:

This product (Model: FBXADP12V2A 12V 2A Power Supply Adapter) is sourced from a qualified vendor. FORBIX SEMICON® performs quality verification at the batch level to ensure baseline specifications are met prior to distribution. However, as a non-manufactured part, this adapter is expressly excluded from the standard FORBIX SEMICON® product warranty.

Environmental Requirement:

Operating Temperature: 0°C to 40°C

Storage Temperature: 5°C to 25°C

Relative Humidity: 5% (0°C) ~ 95% (40°C) RH

Mechanical:

Enclosure: 80mm (L) × 50mm (W) × 30mm (H) Input

Connector : 2 Pin Input plug

Out Cord: UL1185 18AWG VW-1 80° 300V, FT1 Line with word on the cord Length: 0.6m - 1.2m

DC Plug : 5.5mm × 2.1mm × 12mm

Input Characteristics:

Rated Voltage: 100 – 240V AC Variation

Range: 90 – 264V AC

Rated Frequency: 50/60Hz

Variation Frequency: 47 – 63Hz

Input Current: 0.6A Max. @ Any input AC voltage & output full load

Inrush Current: 35A Max. Cold start @ 240V AC input, rated output load & 25°C ambient

AC Leakage Current: 0.25mA Max. @ 240V AC input

Output Characteristics:

Voltage: 12V

Min. Load: 0.01A

Rated Load: 2A

Output Power: 24W

Combined Load / Line Regulation:

Voltage: 12V

Min. Load: 0.01A

Rated Load: 2A

Line Regulation: $\pm 1\%$

Load Regulation: $\pm 3\%$

Ripple and Noise :

Under normal voltage & nominal load, the ripple & noise are as follows when measure with Max. Bandwidth of 20MHz & parallel 10 μ F electrolysis capacitor & 0.1 μ F ceramic capacitor crossed connect at testing point.

Ripple & Noise (Max.): 120mVp-p

Turn on Delay Time: 2S Max. @ 115V AC input and output Max. Load

Rise Time: 40ms Max. @ 115V AC input and output Max. Load

Hold Up Time: 5msec Min. @ 115V AC input and output Max.

Load Efficiency: Average efficiency 87.4% minimum @ 25%, 50%, 75% & 100% of full-loading and 230V AC input (After warm up 30 minutes).

Timing Diagram and details from the designer's diary

This section describes a typical deployed link: one **FBX722 transmitter** unit with four digital inputs and one **FBX722 receiver** unit with four relay outputs. Each relay is driven from a dedicated output driver on the receiver MCU. Wording is for system integrators; internal firmware identifiers are omitted.

Item	Specification
Digital inputs	Input 1 ... Input 4 (active-high or active-low per wiring)
Relay outputs	Port 1 ... Port 4 (one relay per port)
Radio link	FBX722 mesh module on each unit (same RF channel and air rate on all modules)
Control logic	MCU on transmitter reads inputs; MCU on receiver drives ports from received status
Data carried	4-bit port image (which inputs are ON) inside a short secure mesh frame

Sequence — one input (direct path)

Example: **Input 3** goes ON; **Port 3** relay energizes at the receiver.

```
sequenceDiagram
    participant IN as Input 3
    participant TX as FBX722 transmitter (MCU)
    participant RF as FBX722 RF link
    participant RX as FBX722 receiver (MCU)
    participant OUT as Port 3 relay

    IN->>TX: Digital ON
    TX->>RF: Frame 1 (port status)
    RF->>RX: ~50-150 ms
    RX->>OUT: Port 3 ON
    loop Frames 2-10 (100 ms apart)
        TX->>RF: Repeat frame
        RF->>RX: Duplicate suppressed
    end
```

Sequence — with repeater

```
sequenceDiagram
    participant TX as FBX722 transmitter
    participant RF as FBX722 RF
    participant RPT as FBX722 repeater
    participant RX as FBX722 receiver
    participant OUT as Port 1-4 relays

    TX->>RF: Frame from Input change
    RF->>RPT: First hop ~50-120 ms
    Note over RPT: Short hold-off (~150 ms)
    RPT->>RF: Re-transmit
    RF->>RX: Second hop ~50-120 ms
    RX->>OUT: Update ports 1-4 per received status
```

Propagation delay (typical)

End-to-end time from an input edge at the **FBX722 transmitter** to the matching relay at the **FBX722 receiver**:

Path	Typical delay to first port change
Direct (transmitter and receiver in radio range)	50-150 ms
Via one in-range FBX722 repeater	250-400 ms

Actual delay depends on RF range, module air rate, and installation. The receiver updates the relay as soon as the first valid frame in a burst is accepted.

Input toggle rate (4-channel transmitter)

Default transmitter behaviour: **10 radio frames per input event**, spaced **100 ms** apart (~900 ms total burst per edge).

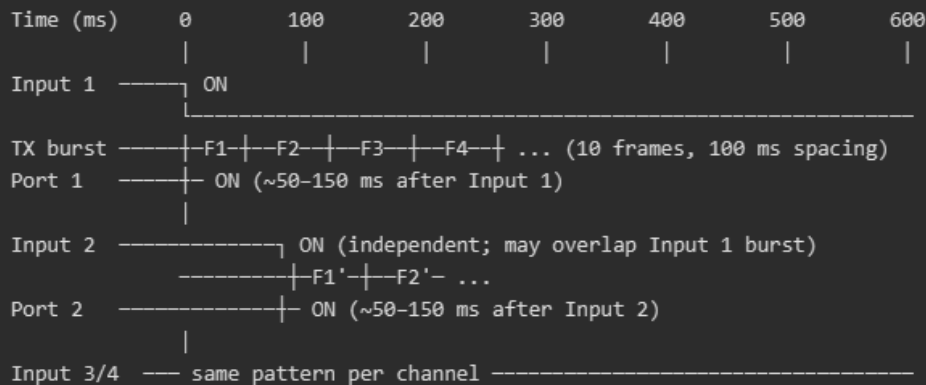
Requirement	Direct link (typical)
First response after input ON or OFF	50-150 ms
Reliable full ON→OFF→ON on the same input	allow ~1 s between opposite edges (~1 Hz)
Independent inputs (e.g. Input 2 toggles while Input 1 is ON)	supported; each edge starts its own burst
All four inputs toggling in turn	~1 Hz per input sustained with default burst; faster if burst length is reduced at factory configuration

Shorter bursts (e.g. 3 frames at 100 ms) raise sustainable toggle rate to roughly **3 Hz** per input on a direct link, at the cost of less over-the-air redundancy.

Timing Diagram and details from the designer's diary

Timing diagram — fast signalling on four inputs (direct link)

Four-channel transmitter: each input edge triggers its own burst. Relays respond on **first good frame**; later frames in the burst are redundancy only.



Fastest practical use (default burst, direct link):

- **Different inputs:** each can be operated at about **1 Hz** (one full ON or OFF edge per second per input).
- **Same input:** wait **~1 s** between opposite edges for reliable ON/OFF/ON cycling.
- **First action after a press:** relay responds in **~50-150 ms** (direct path).

For applications needing faster repetition on one input (e.g. **2-3 Hz**), the transmission burst length can be reduced in factory configuration while keeping the same four-input / four-relay hardware.

Port status at receiver

The receiver holds the last valid status for each port. Multiple transmitters in a larger network can be merged so Port *n* reflects the combined command image from all trusted transmitters: a four-input / four-relay pair uses a single transmitter image for Ports 1-4.

Revision History

Version	Changes	Time	Verified	Approved
v1.0	Initial Release Copy	Apr'2026	Yes	-

Company

Regd. Office:

FORBIX SEMICON® Technologies Private Limited

Plot No. 77, JBR Tech Park, 6th Road,
Whitefield, Bangalore
India, Pin – 560066

Legal details:

CIN:U31909KA2021PTC156093

PAN:AAECF8700F

HSN:8542 9000

GSTIN:29AAECF8700F1ZO

Trade Mark No.:4216274, Class 9

Subsidiary Division:

FORBIX OÜ

Harju maakond, Tallinn,
Kesklinna linnaosa,
Sakala tn 7-2, 10141
Estonia

Legal details:

Registry Code: 14366377

VAT No: EE102037683

Website: <https://www.forbixindia.com>

Email: sales@forbixindia.com