EBYTE E31-230T33D

EBYTE E31-230T33D 230MHz 2W RF Module Instruction Manual

Model: E31-230T33D

1. Introduction

The EBYTE E31-230T33D is a 2W wireless transceiver module designed for reliable long-range data transmission. It operates in the 225-237.6MHz frequency band (default 230MHz) and features a UART interface for communication. This module incorporates the AXSEM AX5243 RF chip, offering half-duplex transparent transmission mode and TTL level output. Key features include Forward Error Correction (FEC) for enhanced data reliability, data encryption and compression, and support for a wide operating voltage range (3.3V to 5.2V).
This manual provides essential information for the proper setup, operation, and maintenance of your E31-230T33D module.

Figure 1: EBYTE E31-230T33D RF Module. This image shows the top view of the module, highlighting the heatsink, SMA antenna connector, and pin headers for M0, M1, RXD, TXD, AUX, VCC, and GND connections.

2. Features

- **RF Chip:** AXSEM AX5243
- **Frequency:** 225~237.6MHz (default 230MHz)
- **Output Power:** 24~33dBm (up to 2W), software adjustable
- **Transmission Distance:** Up to 8.0 km (actual testing)
- **Interface:** UART (TTL level)
- **Data Rate:** 1.2kbps to 70kbps
- **Modulation:** Advanced ultra-narrow band GFSK
- **Operating Voltage:** 3.3V~5.2V (3.3V+ recommended for optimal performance)
- **Operating Temperature:** -40 to 85 °C (Industrial grade)

- **Special Functions:** Forward Error Correction (FEC), Data Encryption, Data Compression, Air Wake-up (ultra-low power consumption)
- **Compliance:** FCC, CE, CCC compliant design

3. Setup

3.1 Pin Definitions

The E31-230T33D module features several pins for power, data, and control. Refer to the pinout diagram for proper connection.

Figure 2: Pinout of the E31-230T33D module. This diagram illustrates the pin assignments for M0, M1, RXD, TXD, AUX, VCC, and GND, crucial for connecting the module to a host system.

Table 1: Pin Description

Pin	Name	Description

Pin	Name	Description
1	M0	Mode selection pin 0
2	M1	Mode selection pin 1
3	RXD	UART data receive (input to module)
4	TXD	UART data transmit (output from module)
5	AUX	Auxiliary pin (e.g., wireless wake-up indication)
6	VCC	Power supply (3.3V-5.2V)
7	GND	Ground

3.2 Power Supply

Connect the VCC pin to a stable power supply within the range of 3.3V to 5.2V. For optimal performance, especially when transmitting at higher power, a supply voltage greater than 3.3V is recommended. Ensure the power supply can provide sufficient current for the module's operation, particularly during transmission peaks.

3.3 Antenna Connection

The module features an SMA interface for antenna connection. Connect a suitable 230MHz antenna to this port. Ensure the antenna is securely attached and correctly matched for the operating frequency to achieve maximum transmission range and efficiency.

3.4 UART Interface

Connect the RXD and TXD pins to the corresponding TX and RX pins of your host microcontroller or device. The module operates with TTL level UART signals. Ensure proper voltage level shifting if your host device uses different logic levels.

4. Operating Modes

The E31-230T33D module supports various operating modes controlled by the M0 and M1 pins. These pins determine the module's behavior, such as transmission power, data rate, and sleep modes.

Table 2: Operating Mode Selection

M1	M0	Mode	Description
LOW	LOW	Normal Mode	Transparent transmission mode, module is always awake.
LOW	HIGH	Wake-up Mode	Module can be woken up by air data, suitable for low-power applications.
HIGH	LOW	Power-saving Mode	Module enters low power consumption state, suitable for battery-powered devices.
HIGH	HIGH	Configuration Mode	Used to configure module parameters via UART commands.

Refer to the official EBYTE documentation for detailed commands and parameter settings in Configuration Mode. A relevant link for further information is available at www.cdebyte.com.

5. Operating Instructions

5.1 Data Transmission

In Normal Mode (M1=LOW, M0=LOW), the module operates as a transparent serial port. Any data sent to the module's

RXD pin will be transmitted wirelessly, and any data received wirelessly will be output through the TXD pin. Ensure both transmitting and receiving modules are configured with compatible parameters (frequency, data rate, etc.).

5.2 Parameter Configuration

To change module parameters such as frequency, air data rate, UART baud rate, and transmission power, set the module to Configuration Mode (M1=HIGH, M0=HIGH). Use a serial port assistant or custom software to send specific configuration commands via the UART interface. After configuration, return the module to Normal or Wake-up Mode for operation.

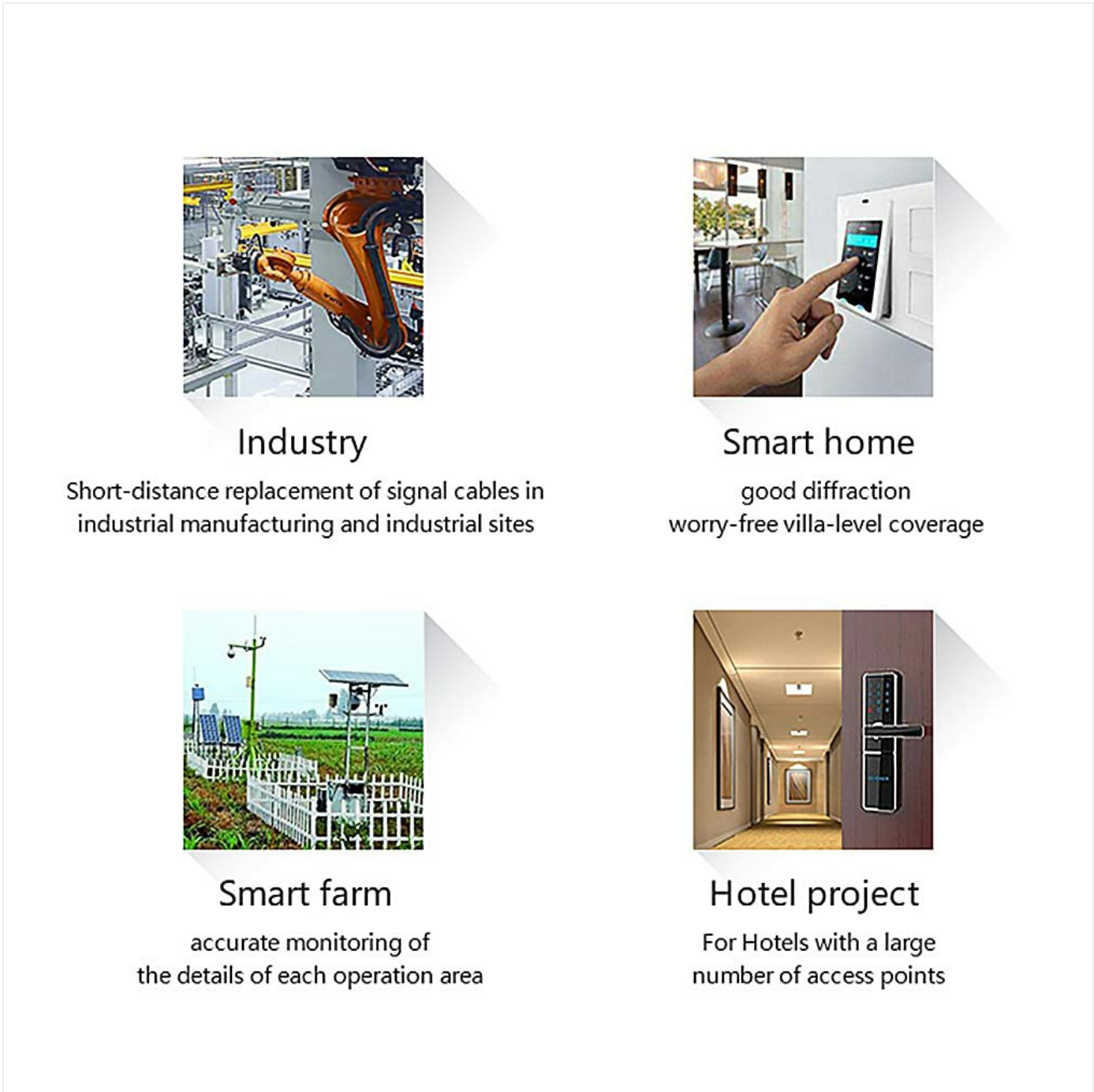

Figure 3: Example application scenarios for the E31-230T33D module. This image illustrates potential uses in industrial automation, smart homes, smart farming, and hotel projects, demonstrating the module's versatility.

6. Maintenance

The E31-230T33D module is designed for industrial-grade reliability and requires minimal maintenance. However, adhering to the following guidelines can ensure long-term stable operation:

- **Environmental Conditions:** Operate the module within the specified temperature range of -40°C to 85°C. Avoid exposure to extreme humidity, corrosive gases, or strong electromagnetic interference.
- **Power Supply Stability:** Ensure a stable and clean power supply. Fluctuations or noise in the power supply can affect module performance and longevity.
- **Antenna Integrity:** Periodically check the antenna connection for tightness and ensure the antenna itself is not damaged. A damaged or improperly connected antenna can significantly reduce transmission range and efficiency.
- **ESD Protection:** The module is an ESD sensitive device. Always handle it with appropriate electrostatic discharge precautions to prevent damage.

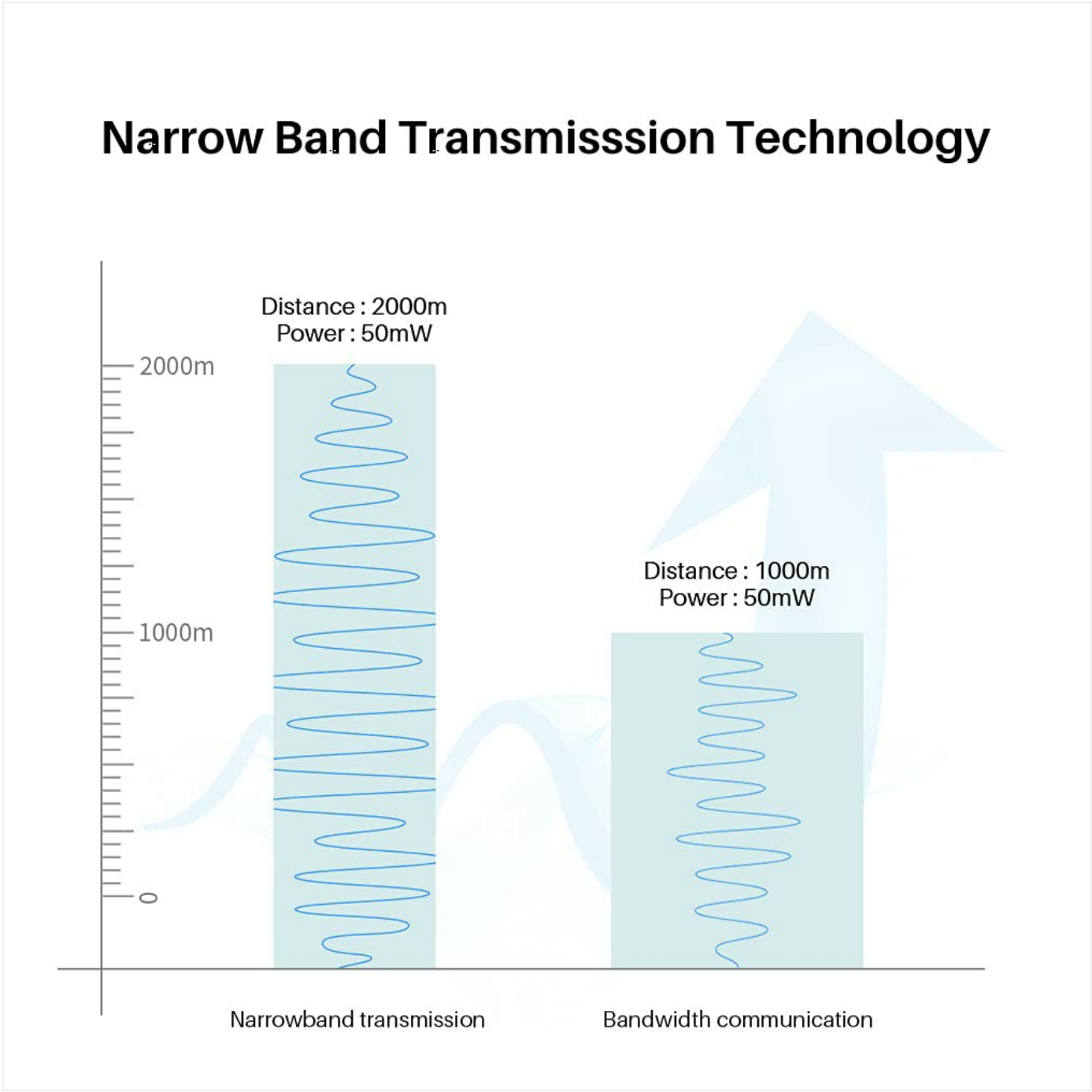

Figure 4: Environmental testing of the E31-230T33D module. This image shows the module being tested in a high and low temperature chamber, demonstrating its robustness for operation in extreme cold and hot environments (-40°C to +85°C).

7. Troubleshooting

If you encounter issues with your E31-230T33D module, consider the following troubleshooting steps:

- **No Communication:**
  - Verify power supply voltage and connections (VCC, GND).
  - Check UART connections (RXD, TXD) and ensure correct baud rate settings on both the module and host device.
  - Confirm the module is in the correct operating mode (e.g., Normal Mode for transparent transmission).
- **Poor Range/Unreliable Transmission:**
  - Ensure the antenna is securely connected and suitable for 230MHz.
  - Check for obstructions or sources of interference between the transmitting and receiving modules.
  - Verify that both modules are configured to the same frequency and air data rate.
  - Increase transmission power if possible (via Configuration Mode).
  - Ensure the power supply can deliver sufficient current, especially during transmission.
- **Module Not Responding to Configuration Commands:**
  - Ensure the M0 and M1 pins are set to Configuration Mode (HIGH, HIGH).
  - Verify UART connections and baud rate.
  - Check the format of the configuration commands against the official documentation.

8. Specifications

Table 3: Technical Specifications

Parameter	Value
Model	E31-230T33D
RF Chip	AXSEM AX5243
Frequency Range	225~237.6MHz (default 230MHz)
Transmit Power	24~33dBm (2W max)
Communication Distance	Up to 8 km (line of sight)
Interface	UART (TTL)
Data Rate	1.2kbps to 70kbps
Operating Voltage	3.3V~5.2V
Operating Temperature	-40°C to +85°C
Dimensions	60mm x 37mm (approx.)
Weight	23.6 ± 0.1g

Figure 5: Dimensions of the E31-230T33D module. This image shows the module with its approximate length of 60mm and width of 37mm, providing physical specifications for integration.

9. Warranty and Support

For warranty information, technical support, and further documentation, please visit the official EBYTE website or contact their customer service. The manufacturer's website is www.cdebyte.com.

EBYTE products are designed and manufactured to high standards. In case of any issues, please refer to the troubleshooting section first. If the problem persists, contact EBYTE support with your product model and a detailed description of the issue.