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EBYTE E49-400M20S4

EBYTE CMT2300A Wireless Module E49-400M20S4 User Manual

Model: E49-400M20S4

1. Introduction

The EBYTE E49-400M20S4 is a cost-effective wireless data transmission module based on the CMT2300A chip. Designed for reliable radio frequency communication, this module operates in the global license-free ISM 433MHz and 470MHz bands. It offers a maximum transmission power of 100mW (20dBm) and supports various modulation methods, making it suitable for a wide range of applications requiring low power consumption and compact size.

This manual provides essential information for the proper setup, operation, and maintenance of your E49-400M20S4 module.

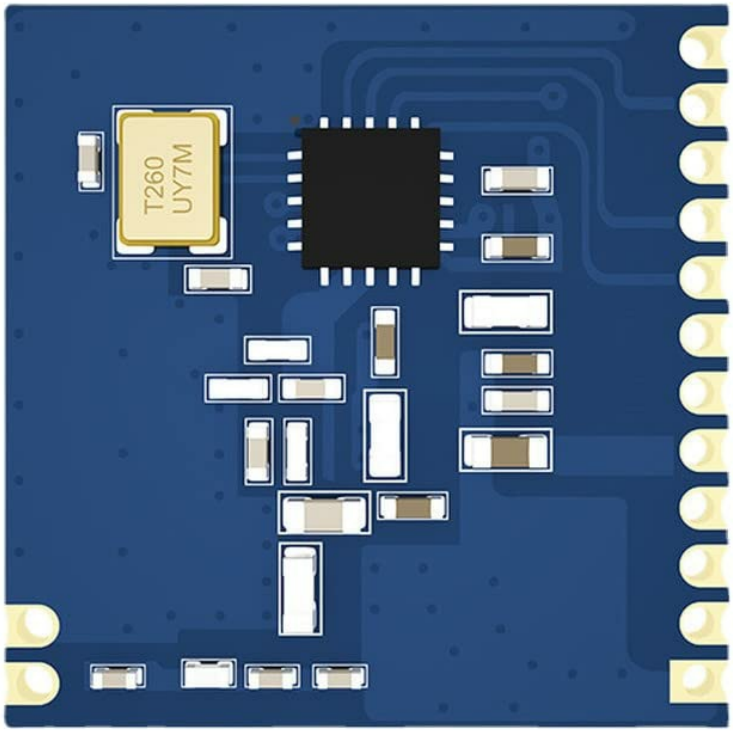

Figure 1: EBYTE CMT2300A Wireless Module E49-400M20S4. This image shows the compact design of the wireless module.

2. Key Features

- **Communication Distance:** Measured communication distance can reach up to 2.5km.
- **Transmission Power:** Maximum transmission power of 100mW (20dBm), with software multi-level adjustable settings.
- **Frequency Band:** Supports global license-free ISM 433MHz and 470MHz bands.
- **Data Rate:** Supports data transmission rates from 0.5Kbps to 300Kbps.
- **Low Power Consumption:** Features a low power consumption mode, ideal for battery-powered applications.
- **Modulation Methods:** Supports GFSK, OOK, and (G)MSK modulation methods.
- **Power Supply:** Operates with a 1.8V to 3.6V power supply.
- **Industrial Grade Design:** Standard industrial grade design, supporting operation from -40°C to 85°C for extended periods.
- **Interface:** Features a stamp interface, facilitating secondary development and integration.

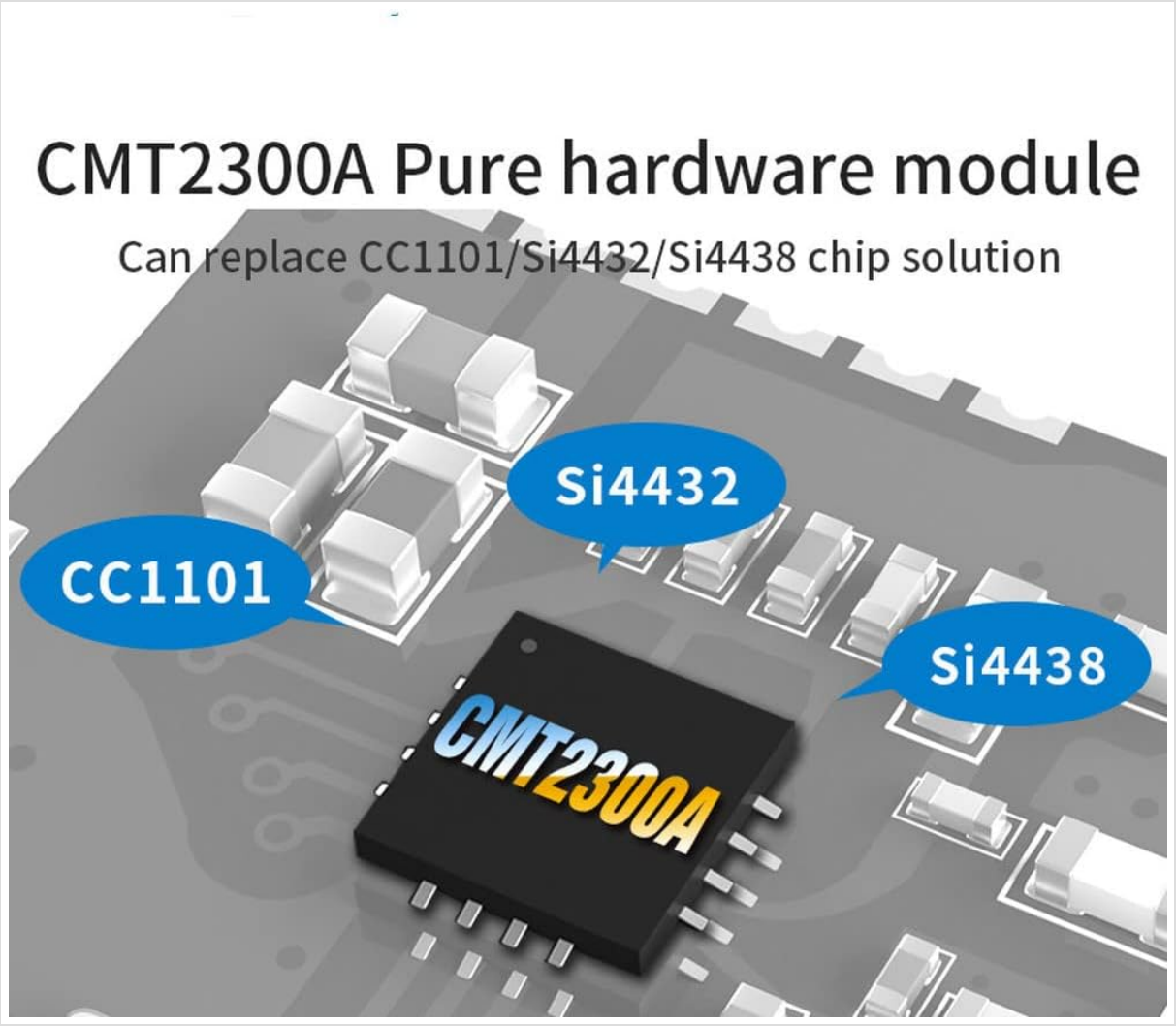

Figure 2: CMT2300A Module Compatibility. The CMT2300A is a pure hardware module designed to replace solutions using CC1101, Si4432, or Si4438 chips.

3. Setup and Integration

The E49-400M20S4 is a pure RF transceiver module, meaning it requires an external microcontroller (MCU) or a dedicated SPI debugging tool for operation and configuration. It does not operate as a standalone device.

3.1 Power Supply Connection

Connect the module to a stable power supply within the specified range of 1.8V to 3.6V. Ensure proper polarity to prevent damage to the module.

3.2 Antenna Connection

The module is equipped with a stamp hole for antenna integration. A suitable 433MHz or 470MHz antenna must be connected to this interface for optimal performance. The stamp hole design allows for easy integration into custom PCB designs.

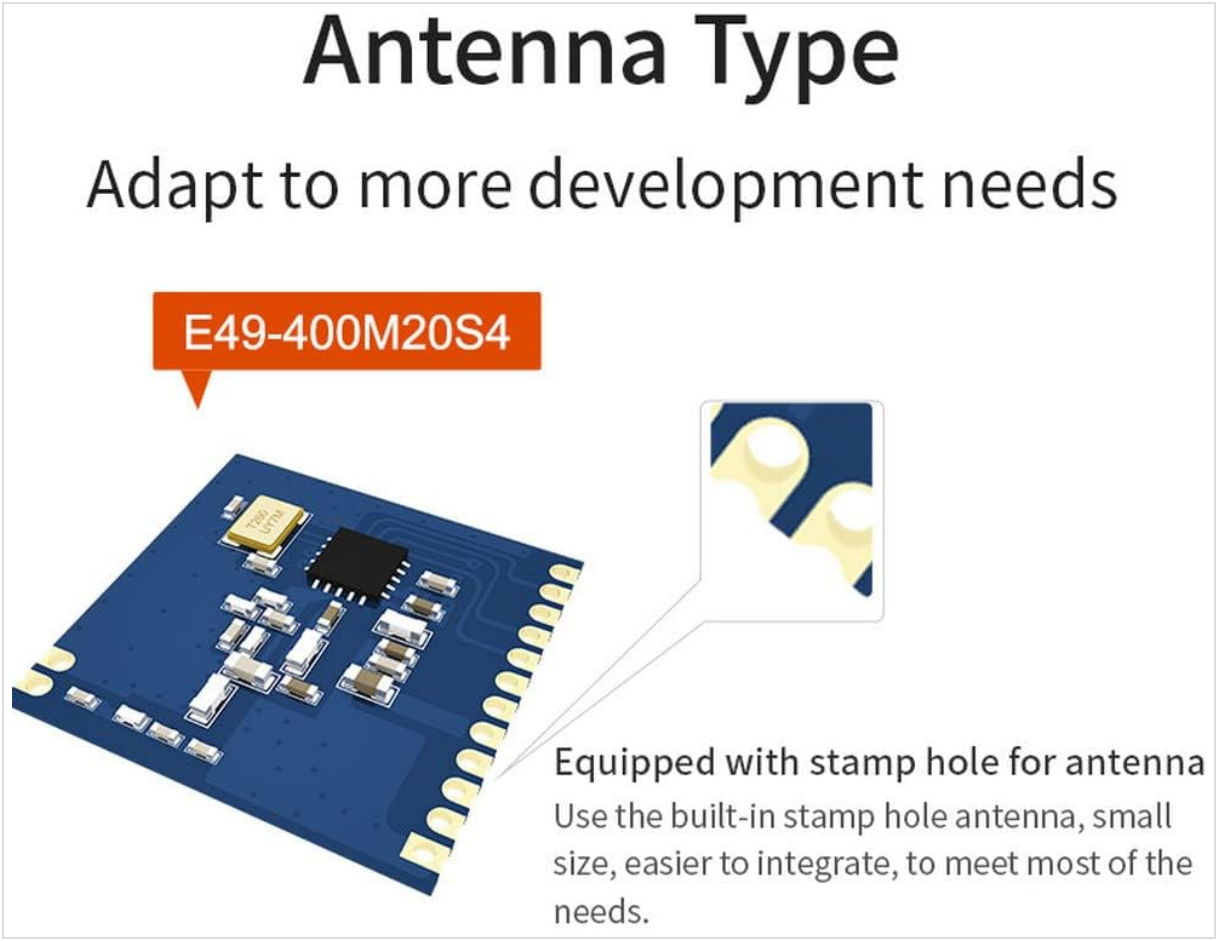

Figure 3: E49-400M20S4 Antenna Type. The module features a stamp hole for integrating an external antenna, adapting to various development needs.

3.3 MCU Interface

Interface the module with your chosen MCU via the SPI bus. Refer to the CMT2300A datasheet for detailed pinout and SPI communication protocols. Proper initialization and configuration of the CMT2300A registers are crucial for module functionality.

4. Operating Principles

The E49-400M20S4 module operates as a half-duplex transceiver, capable of both transmitting and receiving data. Its operation is controlled by an external MCU through the SPI interface.

4.1 Modulation Methods

The module supports multiple modulation schemes to accommodate different application requirements:

- **GFSK (Gaussian Frequency Shift Keying):** A common modulation for robust data transmission.
- **OOK (On-Off Keying):** Simple modulation, often used for low-cost, low-data-rate applications.
- **(G)MSK (Gaussian Minimum Shift Keying):** Offers good spectral efficiency.

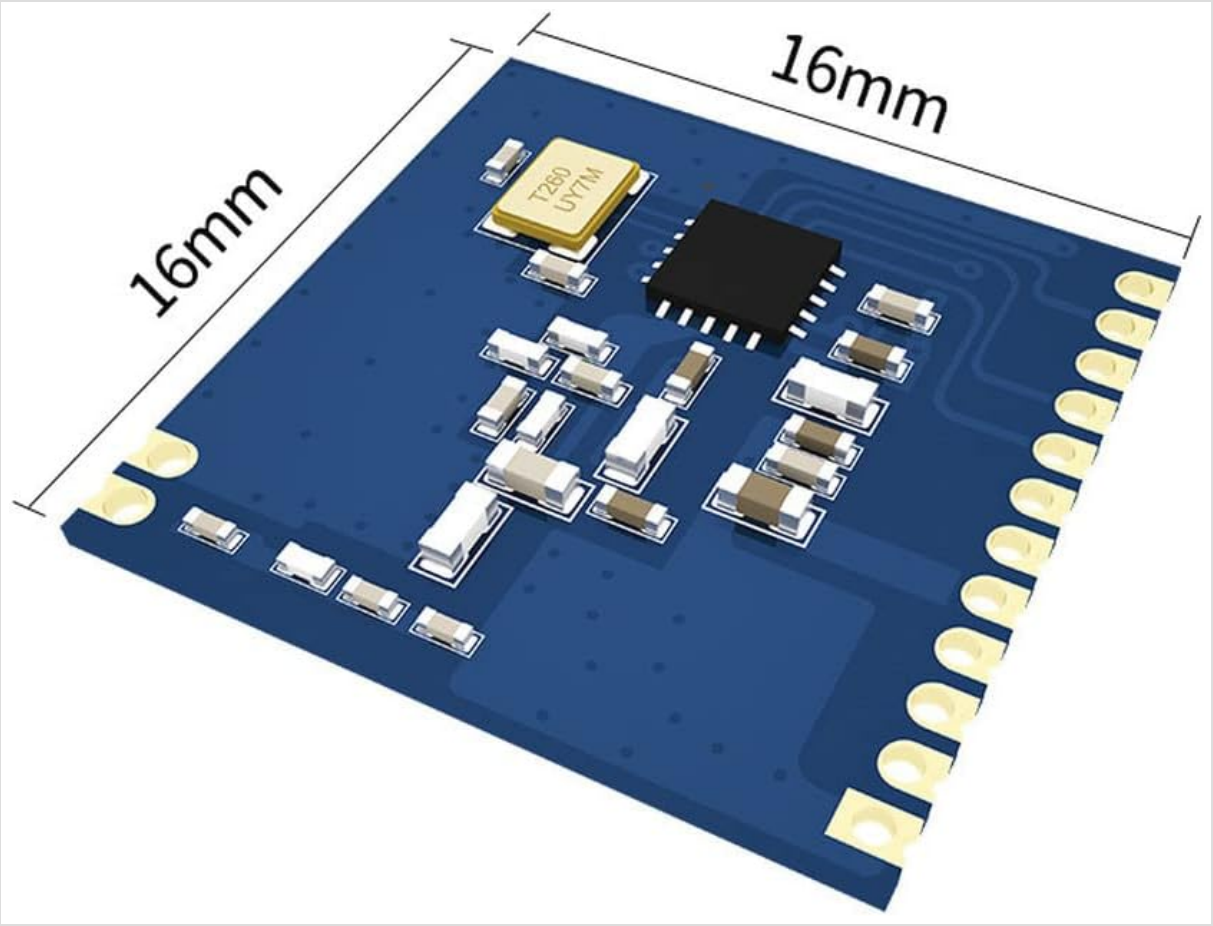

Figure 4: Multiple Modulation Methods. The module supports OOK, (G)FSK, and (G)MSK for flexible communication.

4.2 Frequency Bands and Channels

The module operates in the 433MHz and 470MHz ISM bands. Specific channels within these bands can be configured via the MCU to avoid interference and optimize communication.

4.3 Data Transmission and Reception

Data packets are sent and received through the configured RF link. The MCU is responsible for preparing data for transmission, initiating the transmit sequence, and processing received data. Error correction and packet handling should be implemented in the MCU firmware.

5. Maintenance

The E49-400M20S4 module is designed for robust industrial use and generally requires minimal maintenance. However, adhering to the following guidelines can prolong its lifespan and ensure reliable operation:

- **Environmental Conditions:** Operate the module within its specified temperature range (-40°C to 85°C) and avoid excessive humidity or exposure to corrosive substances.
- **Physical Inspection:** Periodically inspect the module for any signs of physical damage, loose connections, or corrosion.
- **Cleaning:** If necessary, gently clean the module with a dry, soft brush or compressed air to remove dust. Avoid using liquids or solvents.
- **Firmware Updates:** Keep the MCU firmware that controls the module updated to the latest version provided by EBYTE or your solution developer to benefit from performance improvements and bug fixes.

6. Troubleshooting

If you encounter issues with the E49-400M20S4 module, consider the following troubleshooting steps:

- **No Communication:**
  - Verify power supply voltage is within 1.8V-3.6V and correctly connected.
  - Check SPI connections between the MCU and the module for continuity and correct pin assignment.
  - Ensure the MCU firmware correctly initializes and configures the CMT2300A registers.
  - Confirm the antenna is properly connected and suitable for the operating frequency.
- **Poor Range/Signal Quality:**
  - Ensure the antenna is correctly matched and positioned for optimal signal propagation.
  - Check for environmental interference from other RF devices.
  - Verify that the transmit power is set to an appropriate level (up to 20dBm).
  - Confirm that both transmitting and receiving modules are configured to the same frequency and modulation settings.
- **Module Overheating:**
  - Ensure the module is operating within its specified temperature range.
  - Verify that the power supply voltage is not exceeding 3.6V.
  - Reduce the transmit power if high power is not strictly necessary for the application.

7. Technical Specifications

Specification	Value
Model Name	E49-400M20S4
ASIN	B09NKMWPQY
Brand	EBYTE
Manufacturer	EBYTE
Frequency Bands	433MHz, 470MHz (ISM)
Max Transmission Power	20dBm (100mW)
Communication Distance	Up to 2.5km (measured)
Data Rate	0.5Kbps - 300Kbps
Modulation Methods	GFSK, OOK, (G)MSK
Power Supply Voltage	1.8V - 3.6V
Operating Temperature	-40°C to 85°C
Interface	SPI, Stamp Hole
Connectivity Technology	Wireless

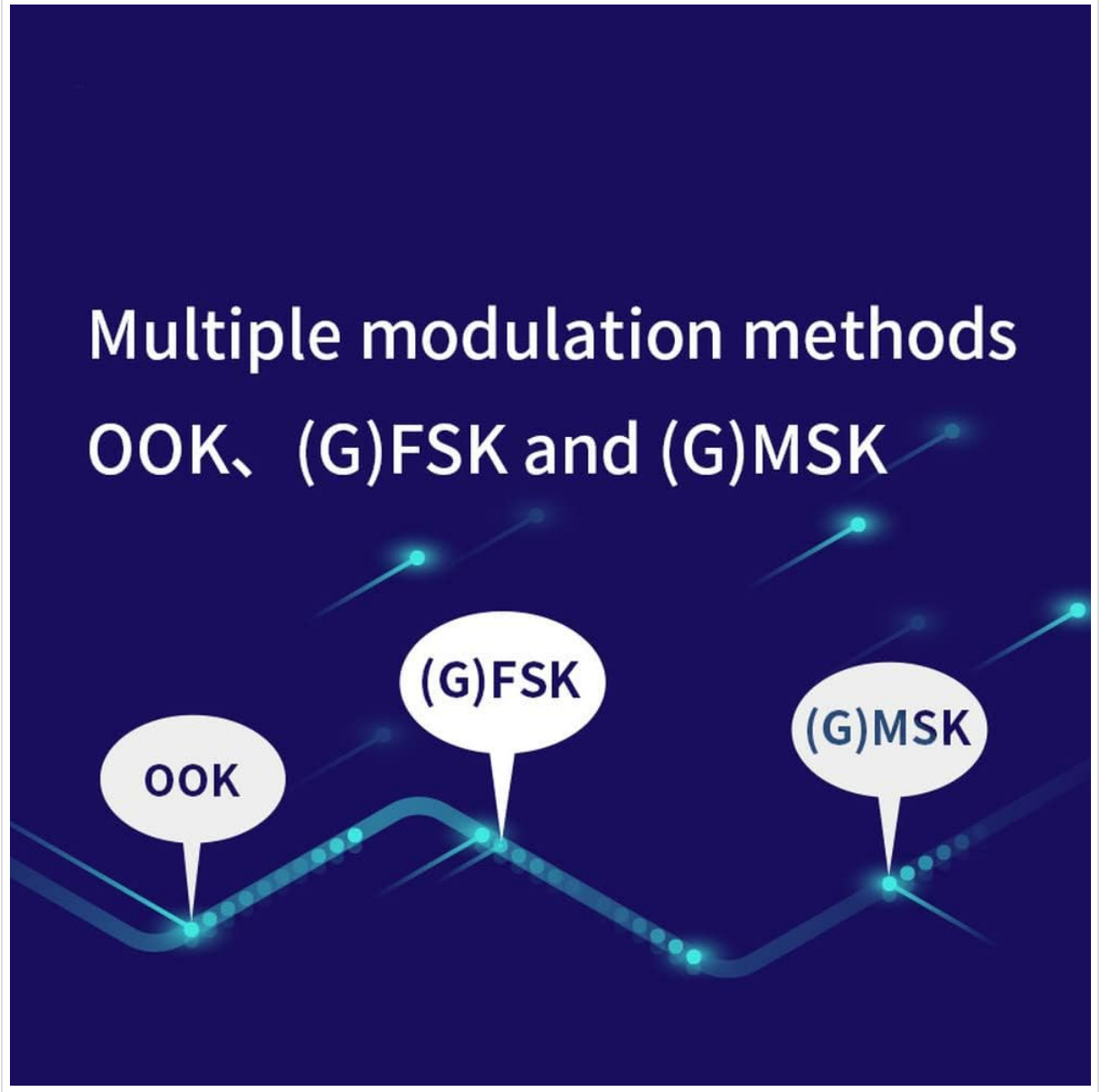

Figure 5: E49-400M20S4 Module Dimensions. This image illustrates the compact size of the module, measuring 16mm by 16mm.

8. Application Scenarios

The E49-400M20S4 module's features make it suitable for a variety of wireless communication applications:

- Smart home and industrial sensors
- Security systems and positioning systems
- Wireless remote control devices, including UAVs
- Wireless game remote controls
- Healthcare products requiring wireless data transmission
- Wireless voice and wireless headsets
- Automotive industry applications

Figure 6: E49-400M20S4 Application Scenarios. This image displays various potential uses for the wireless module, including smart home, security, UAVs, remote control, medical, and automotive industries.

9. Warranty and Support

9.1 Warranty Information

This EBYTE E49-400M20S4 module comes with a**1-year warranty** from the date of purchase. The warranty covers defects in materials and workmanship under normal use. It does not cover damage caused by misuse, accident, unauthorized modification, or improper installation.

9.2 Technical Support

For technical assistance, user manuals, or any issues not covered in this document, please contact EBYTE customer support. When contacting support, please provide your module model number (E49-400M20S4) and a detailed description of the problem.