

## RENESAS RTE0T00020KCE00000R

# RENESAS E2 Emulator RTE0T00020KCE00000R User Manual

Model: RTE0T00020KCE00000R

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## 1. INTRODUCTION

The RENESAS E2 Emulator (Model RTE0T00020KCE00000R) is a professional-grade in-circuit debugging and programming tool designed for the development of embedded systems utilizing Renesas RH850, RL78, and RX series microcontrollers. This device facilitates real-time code analysis, system optimization, and efficient firmware updates directly within the target system. It integrates seamlessly with Renesas development environments to streamline the embedded software development process.

## 2. SAFETY INFORMATION

Please read and understand all safety instructions before operating the E2 Emulator. Failure to follow these instructions may result in injury, damage to the product, or damage to connected devices.

- **Power Supply:** Use only the specified power supply for the emulator and target system.
- **Environment:** Operate the device in a dry, stable environment, away from extreme temperatures, humidity, and direct sunlight.
- **Handling:** Handle the emulator with care. Avoid dropping or subjecting it to strong impacts.
- **Connections:** Ensure all connections are secure and correctly oriented before applying power. Disconnect power before making or breaking connections.
- **Static Electricity:** Take precautions against electrostatic discharge (ESD) when handling the emulator and target boards.
- **Modifications:** Do not attempt to modify or disassemble the emulator. Refer all servicing to qualified personnel.

## 3. PACKAGE CONTENTS

Verify that all items listed below are present in your package:

- RENESAS E2 Emulator (RTE0T00020KCE00000R)
- USB Cable (for PC connection)
- Connection Cable (for target board connection)
- Software Development Tool (on media or available for download)
- Quick Start Guide (or similar documentation)



Image 1: RENESAS E2 Emulator and typical accessories. The image displays the compact E2 Emulator unit, a USB cable for connecting to a host PC, and a ribbon cable for connecting to the target microcontroller board.

## 4. SETUP

Follow these steps to set up your E2 Emulator for use:

1. **Install Software:** Install the necessary Renesas Integrated Development Environment (IDE) and E2 Emulator drivers on your personal computer. Refer to the software documentation for specific installation instructions.
2. **Connect to PC:** Connect the E2 Emulator to your personal computer using the provided USB cable. The PC should recognize the device and install any remaining drivers automatically.
3. **Connect to Target Board:** Connect the E2 Emulator to your target microcontroller board using the appropriate connection cable. Ensure the orientation is correct and the connection is secure. Refer to your target board's documentation for the correct debug header pinout.
4. **Power On Target:** Apply power to your target microcontroller board. The E2 Emulator typically draws power from the USB connection, but the target board requires its own power supply.
5. **Verify Connection:** Launch your Renesas IDE (e.g.,  $\epsilon^2$  studio) and configure the debugger settings

to detect and connect to the E2 Emulator and your target microcontroller.

## 5. OPERATING INSTRUCTIONS

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The E2 Emulator supports various operations for developing and testing embedded applications.

### 5.1. Debugging Microcontrollers

To debug your application code:

- **Load Program:** In your IDE, load the compiled program (e.g., .elf file) onto the target microcontroller via the E2 Emulator.
- **Set Breakpoints:** Place breakpoints in your source code where you want execution to pause.
- **Start Debugging:** Initiate the debugging session from the IDE. The program will execute on the target until a breakpoint is hit.
- **Step Through Code:** Use the IDE's debugging controls (step over, step into, step out) to navigate through your code line by line.
- **Monitor Variables:** Observe the values of variables, registers, and memory contents in real-time.
- **Real-time Analysis:** Utilize advanced debugging features for performance analysis and event tracing, if supported by your IDE and microcontroller.

### 5.2. Programming Microcontrollers

To program or re-program your microcontroller:

- **Prepare Firmware:** Ensure you have the final firmware image (e.g., .hex, .mot, .srec file) ready for programming.
- **Select Device:** In your IDE or dedicated programming tool, select the correct target microcontroller device.
- **Configure Programmer:** Configure the E2 Emulator as the programming tool.
- **Erase/Program:** Use the programming interface to erase the existing flash memory and then program the new firmware image onto the microcontroller.
- **Verify:** After programming, perform a verification step to ensure the firmware was written correctly.

### 5.3. Supported Microcontroller Families

The E2 Emulator is compatible with the following Renesas microcontroller families:

- RH850 Series
- RL78 Series
- RX Series

For specific device support within these families, refer to the latest documentation provided by Renesas for the E2 Emulator and your chosen IDE.

## 6. MAINTENANCE

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Proper maintenance ensures the longevity and reliable operation of your E2 Emulator.

- **Cleaning:** Use a soft, dry cloth to clean the exterior of the emulator. Do not use liquid cleaners or solvents.
- **Storage:** Store the emulator in a clean, dry, and dust-free environment when not in use.

- **Cable Care:** Avoid bending or crimping the USB and connection cables excessively. Inspect cables regularly for damage.
- **Software Updates:** Regularly check for and install the latest firmware and software updates for the E2 Emulator and your IDE from the official Renesas website.

## 7. TROUBLESHOOTING

If you encounter issues with your E2 Emulator, try the following troubleshooting steps:

Problem	Possible Cause / Solution
Emulator not detected by PC	<ul style="list-style-type: none"> <li>◦ Ensure USB cable is securely connected to both the emulator and PC.</li> <li>◦ Try a different USB port or cable.</li> <li>◦ Verify that E2 Emulator drivers are correctly installed.</li> <li>◦ Restart your PC.</li> </ul>
Cannot connect to target microcontroller	<ul style="list-style-type: none"> <li>◦ Check the connection cable between the emulator and target board for correct orientation and secure fit.</li> <li>◦ Ensure the target board is powered on.</li> <li>◦ Verify the target microcontroller is supported by the E2 Emulator and your IDE version.</li> <li>◦ Check target board's debug interface settings (e.g., clock speed, reset configuration).</li> <li>◦ Ensure the correct device is selected in your IDE's debugger settings.</li> </ul>
Programming fails or is unstable	<ul style="list-style-type: none"> <li>◦ Confirm the target microcontroller's power supply is stable.</li> <li>◦ Reduce the programming speed in the IDE settings.</li> <li>◦ Ensure the firmware image is valid and compatible with the target device.</li> <li>◦ Check for any external interference or noise on the debug lines.</li> </ul>

If the problem persists, consult the detailed documentation provided by Renesas or contact Renesas technical support.

## 8. SPECIFICATIONS

Key technical specifications for the RENESAS E2 Emulator (RTE0T00020KCE00000R):

Feature	Detail
Brand	RENESAS
Model Name	E2 Emulator
Model Number	RTE0T00020KCE00000R
Connectivity Technology	USB
Compatible Devices	Personal Computer, Renesas Microcontrollers (RH850, RL78, RX series)

Feature	Detail
Operating System	Embedded (for the emulator itself)
Built-In Media	Software Development Tool
Item Dimensions (L x W x H)	6"L x 3"W x 1"H
Total USB Ports	1
RAM Memory Installed Size	1 MB
Memory Storage Capacity	1 Bytes (likely refers to internal storage for basic operation, not user data)
RAM Memory Technology	DDR3
Processor Brand	Renesas
Processor Count	1

## 9. WARRANTY AND SUPPORT

**Warranty:** The manufacturer's warranty description states "No". Please refer to your point of purchase or Renesas' official website for any applicable regional or reseller-specific warranty information.

**Technical Support:** For technical assistance, documentation, software downloads, and further information regarding the E2 Emulator, please visit the official RENESAS website or contact their authorized support channels.