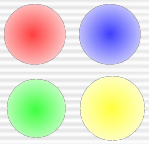
NEC

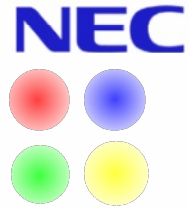
MINICUBE2

Development Tool Group
Multipurpose Microcontroller Systems Division
4th Systems Operations Unit
NEC Electronics Corporation
March 10, 2006

Caution The information in this document is subject to change without notice.
Make sure that the document is the latest version.



CONTENTS



NEC

MINICUBE2

Overview

What Is MINICUBE2?

A development tool to be marketed soon that enables further reduction of investment for development and mass production environments

Features

On-chip debugging and flash programming
- Covers from debugging to mass production

Low price (about 1/3 price of MINICUBE®)
- Reduction of initial development costs

Support from 8-bit to 32-bit MCUs (78K0S, 78K0, 78K0R, V850)
- Hardware tools can be shared
- Reduction of migration development costs

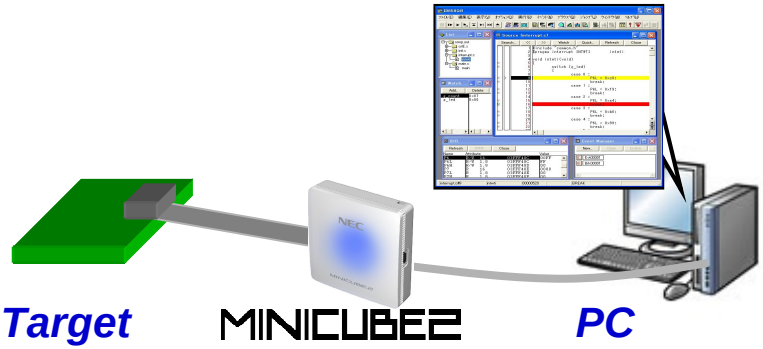
Support of single-power flash memory versions to be released in the future
- Reliability for the future

Compact, light-weight, carrying strap may be attached
- Easy to carry
- Free from space constraints

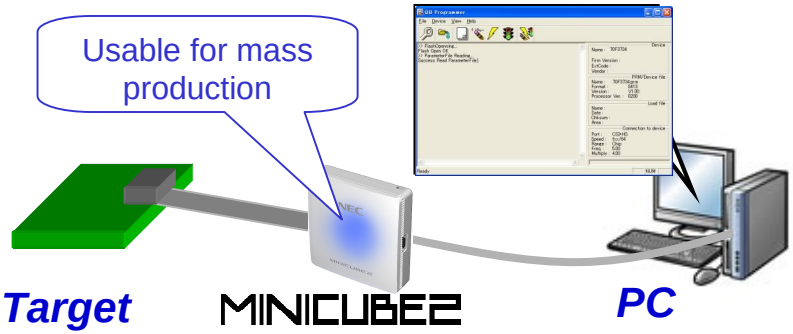
Smallest class in the market and reasonable price

What Does MINICUBE2 Make Possible?

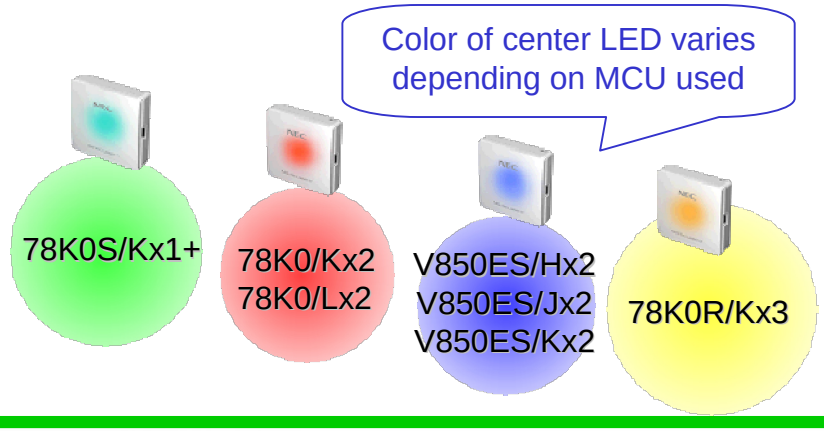
1 *Just start debugger to perform on-chip debugging*



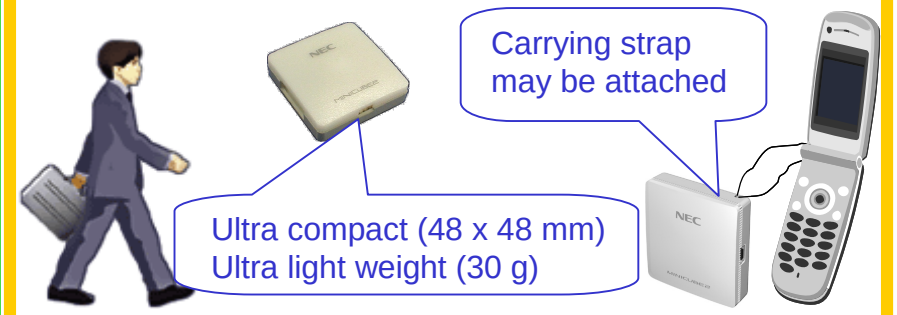
2 *Just start programmer GUI to perform flash programming*



3 *Can be used with All Flash MCUs*



4 *Easy to carry for business trips*



Differences from MINICUBE

Differences from MINICUBE

On-chip debugging and flash programming
- MINICUBE only supports on-chip debugging

Low price
- About 1/3 of MINICUBE for 78K0
- About 1/5 of MINICUBE for V850

Support of 8-bit to 32-bit MCUs
- MINICUBE is dedicated to 78K0 and V850 MCUs

Compact, light-weight, can be strapped
- About 1/4 by volume, about 1/3 by weight compared with MINICUBE

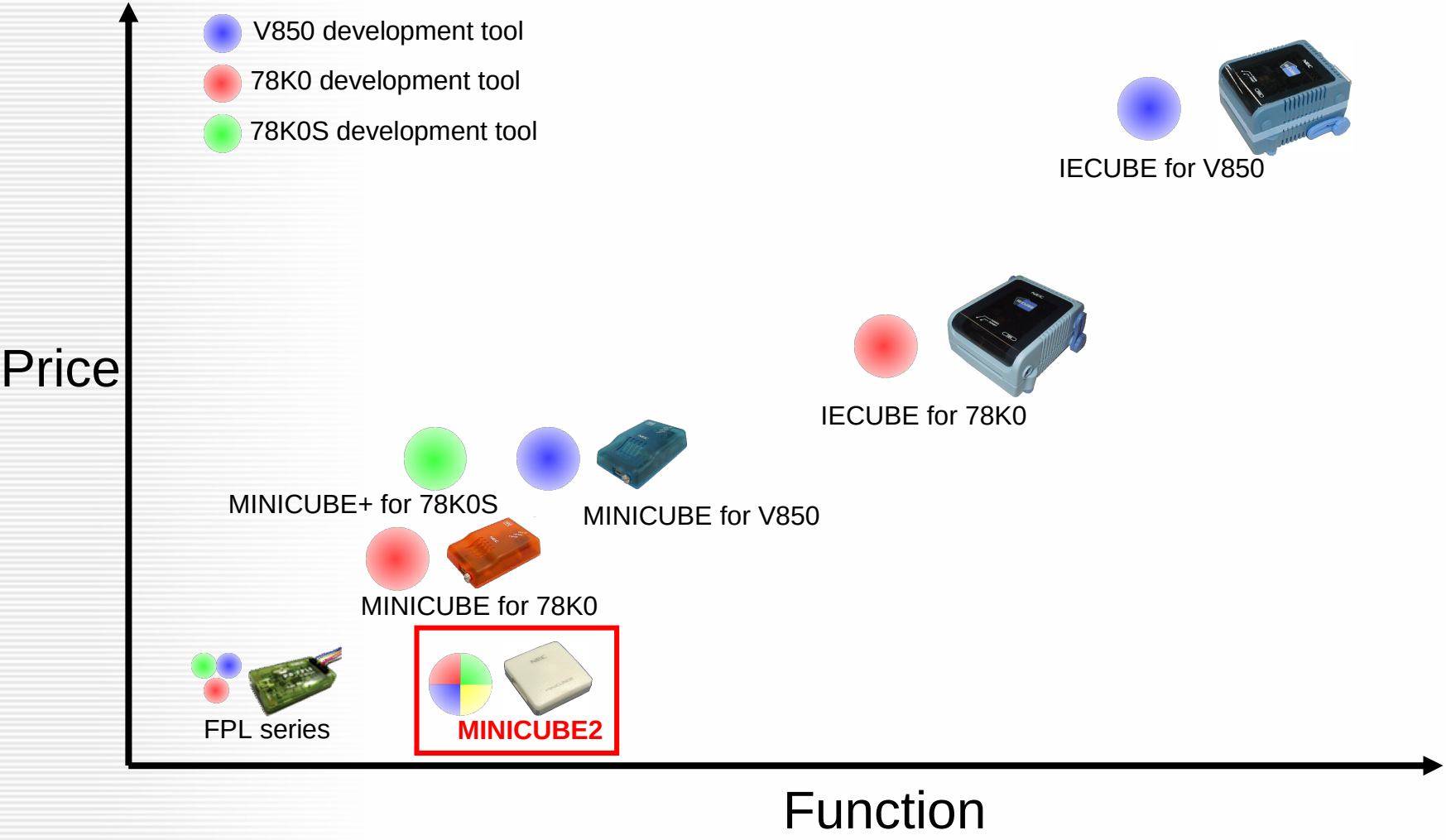
MINICUBE for V850 | MINICUBE for 78K0

What's different?

MINICUBE2

Different debug method for V850 (see the next page for detailed specifications)
- MINICUBE uses 5 pins, but MINICUBE2 uses 2 to 4 pins and a part of user resources
- MINICUBE2 can share I/F for debugging and programming

Positioning of MINICUBE2



MINICUBE2 Price/Schedule

Order name	QB-MINI2

Price	About 10,000 yen

Schedule

March 2006: MINICUBE2 shipments start
Devices supported:
V850ES/Hx2, V850ES/IE2, V850ES/Jx2,
V850ES/Kx2, 78K0/Kx2, 78K0/Lx2

April 2006: Support of 78K0S/Kx1+ (low pin count series)

June 2006: Support of 78K0R/Kx3

More devices will be supported in the future.

NEC

MINICUBE2

Details

For the usage of MINICUBE2 and target system design,
refer to the MINICUBE2 user's manual.
The user's manual is available on the MINICUBE2 information site.

URL http://www.necel.com/micro/english/product/sc/allflash/minicube2.html

Package Details

All required hardware units are packaged.
Software and documents can be downloaded from the website.

Package details

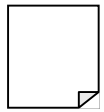

MINICUBE2


USB cable


78K0-OCD board
20 MHz clock mounted


16-pin target cable


10-pin target cable


- Setup manual, etc.

Website

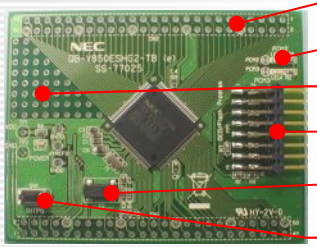
- Debugger
- Programming GUI
- Utility software
- Device file
- Parameter file
- Firmware
- User's manual, etc.

Optional Products

MINICUBE2

★ For those who want to run the MCU just after purchase

■ Target board for trial use



- DIP conversion
- 2 LEDs
- Simple universal area
- MINICUBE2 connector
- On-board clock
- 1 switch

You can immediately start the trial development of MCUs by using the Quick Start Guide posted on the website.

The following products are available:

- 78K0S/KB1+
- 78K0/KF2, 78K0/LG2
- V850ES/HG2, 850ES/IE2,V850ES/JG2, V850ES/KG2

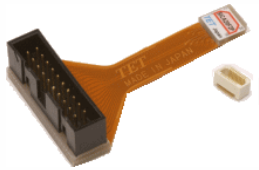
★ For those who want to use an FPL interface

■ 5-pin loose-wire cable

Remark Product of Naito Densei Machida Mfg. Co., Ltd.

★ For those who want to use a small connector

■ SICA (10-pin, 16-pin)



Remark Product of Tokyo Eletech Corp.

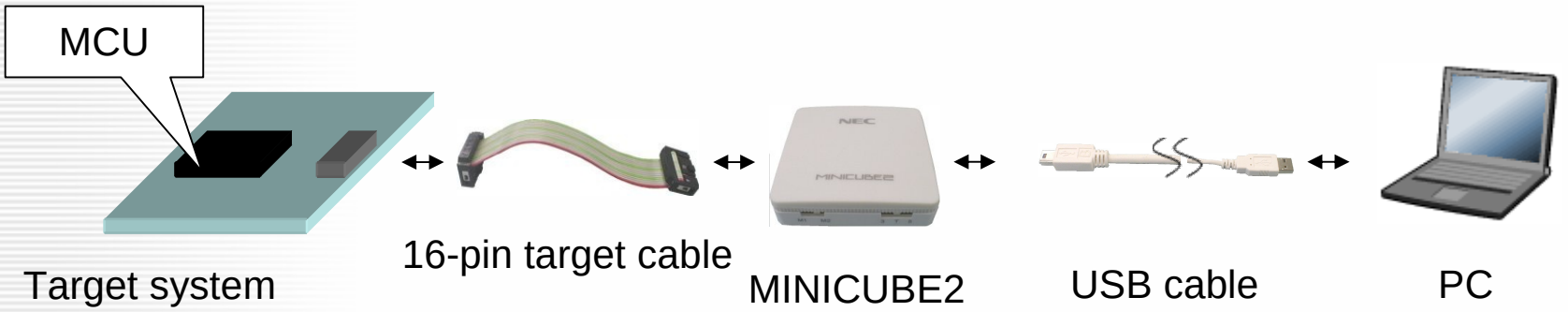
When Using MINICUBE2 with V850

1. System Configuration
2. Debug Method
3. Debug Function List
4. Area Reserved for Debugging
5. Flash Programming Function List

When using MINICUBE2 with V850

System Configuration

★ System configuration for debugging



★ System configuration for flash programming

Same as that for debugging

Features

- MINICUBE2 can share interface for debugging and programming
- Employs a conventional programming interface (compatible with UART or CSI H/S of PG-FP4)
- Conventional N-Wire interface cannot be used

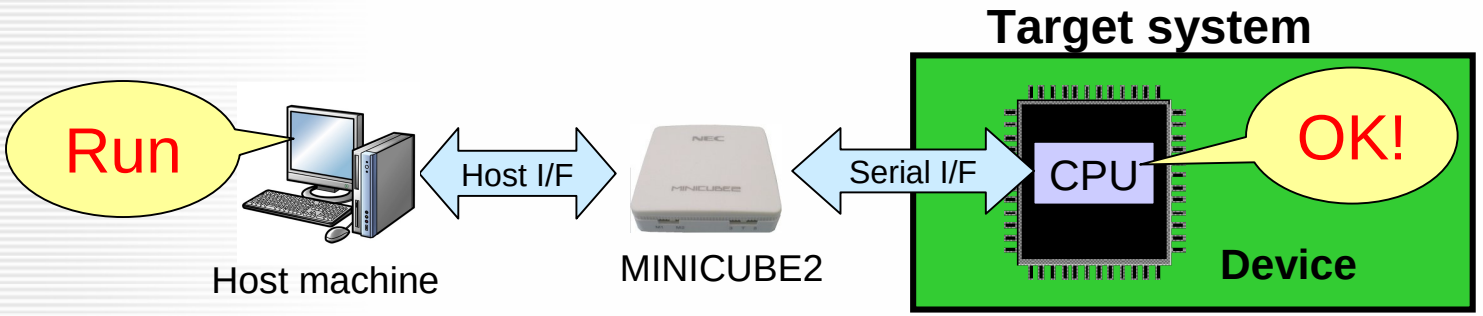
When using MINICUBE2 with V850

Debug Method

See the next page for actual functional differences.

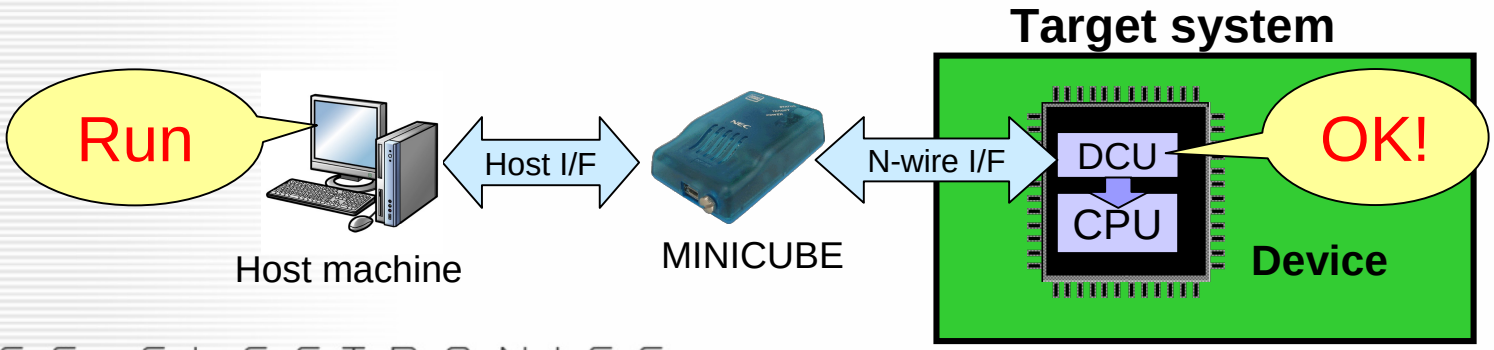
★ Debug method of MINICUBE2

Employs a foreground monitoring method that uses user memory spaces.
Debugging through one serial function channel (with 3 or 4 pins) with user memory space



★ Debug method of MINICUBE for V850

Employs a background monitoring method, that does not use user memory spaces.
Debugging through J-TAG-compliant N-Wire communication (via 5 pins) with debug control unit (DCU)



When using MINICUBE2 with V850

Debug Function List

★ Debug function list table (V850)

Differences from MINICUBE

Function Items	MINICUBE (V850)	MINICUBE2 Device Type A ***1**	MINICUBE2 Device Type B ***1**
Host I/F	USB1.1/2.0		
Target I/F	N-Wire I/F compliant with J-TAG specifications	CSI-H/S UART	
Operating frequency	Equivalent to the target device operating frequency		
Security function	10byte ID code authentication		
Download	Supported		
Execution	Go, Start From Here, Come Here, Restart, step execution		
Hardware break	2 points (commonly used by execution and access)		Not supported
Software break (ROM)	4 points (V850ES/Hx2, V850ES/Jx2, V850ES/Kx2, V850ES/IE2)		
Software break (RAM)	2000 points		
Forced break	Supported	Supported (with restrictions) ***2**	
Pseudo-RRM, DMM *3	Supported	Supported	
Masking of pins	Supported	Reset pin only	
Time measurement (execution to break)	Measurement resolution: 100 nsec Max. measurement time: 210 sec	Measurement resolution: 100 μsec Max. measurement time: Approx. 100 hours	
User spaces that can be used for debugging	Not available	Internal ROM: 2 KB Internal RAM: 16 bytes Max.	

***1** Type A: Device with hardware break function,
Type B: Device without hardware break function (e.g., V850ES/KE2, V850ES/KF2, V850ES/KG2, V850ES/IE2)

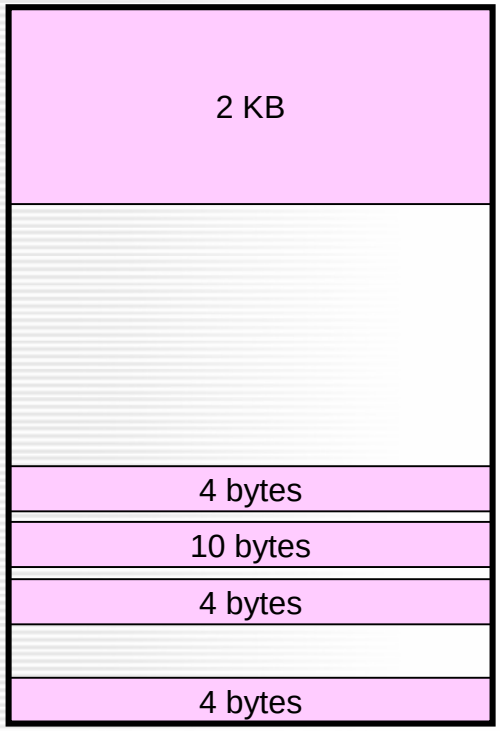
***2** Forced breaks cannot be used while interrupts are disabled (DI) or during standby.

***3** RRM: Realtime RAM Monitor, DMM: Dynamic Memory Modification

When using MINICUBE2 with V850

User Spaces Used for Debugging

Internal ROM space



Internal ROM end address

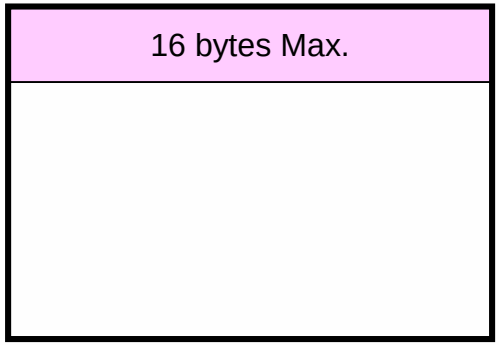
Interrupt vector for CSI or UART reception

0x70 (Security ID setting area)

0x60 (interrupt vector for debugging)

0x0 (reset vector)

Internal RAM space



Internal RAM end address

When using MINICUBE2 with V850

Flash Programming Function List

★ Flash programming function list table (V850)

Function Items	Specifications
Host interface	USB 2.0 (compatible with 1.1)
Target interface	UART or CSI-H/S
Target system voltage	2.7 V to 5.5 V (depends on target device)
Clock supply	16, 8, or 4 MHz (Clock mounted on the target system can be used)
Power supply	3.0 or 5.0 V (maximum current rating: 100 mA)
Device-specific information	PG-FP4-dedicated parameter file
Security flag setting	Available
Programmer standalone programming	Unavailable (must be connected to host machine)

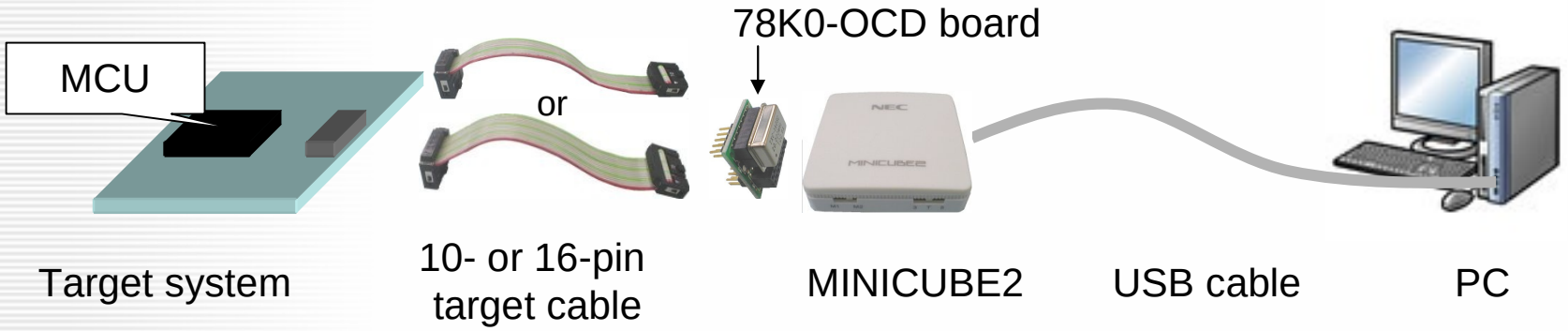
When Using MINICUBE2 with 78K0

1. System Configuration
2. Debug Function List
3. Area Reserved for Debugging
4. Flash Programming Function List

When using MINICUBE2 with 78K0

System Configuration

★ System configuration for debugging



★ System configuration for self-programming

Features

- The 78K0-OCD board must be connected for debugging
- MINICUBE2 can share I/F for debugging and programming (with 16-pin cable)
- Connection with MINICUBE (QB-78K0MINI) I/F enabled (with 10-pin cable)

When using MINICUBE2 with 78K0

Debug Function List (78K0)

★ Debug function list table (78K0) * Equivalent to MINICUBE

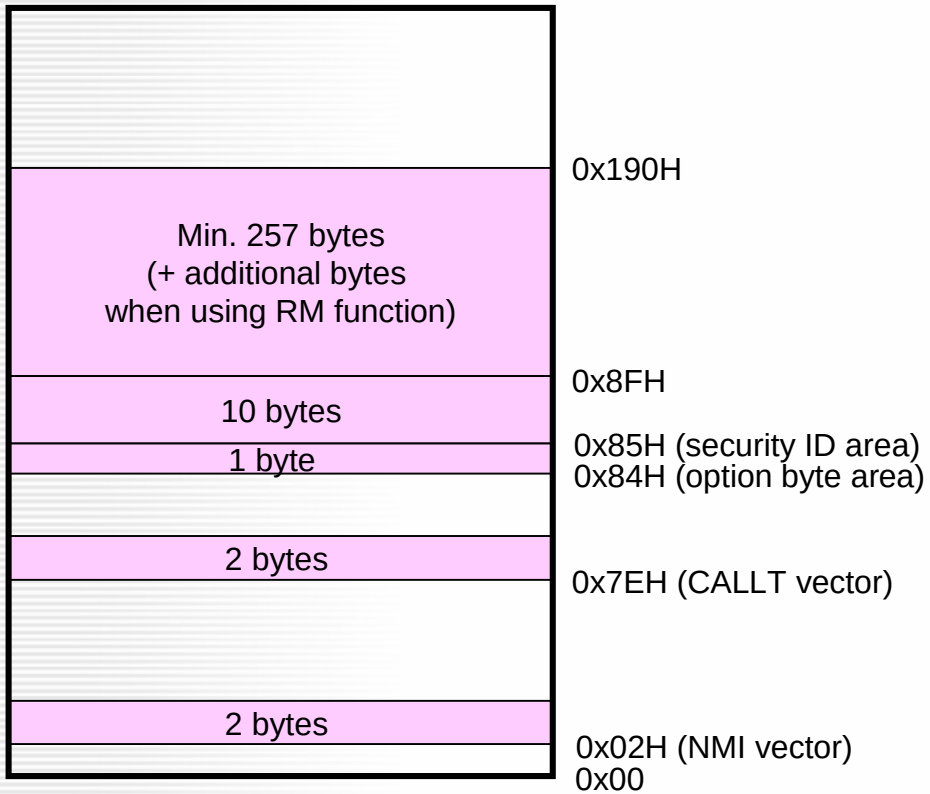
Function Items	Specifications
Host interface	USB 1.1/2.0
Target interface	X1/X2 or OCD1A/OCD1B
Operating frequency	Equivalent to target device (16/8/4 MHz clock or clock mounted on 78K0-OCD board can be supplied)
Security function	10-byte ID code authentication
Download	Available
Hardware break	Break before execution: 1 point (unavailable when using software break) Access break: 1 point
Execution	Go, Start From Here, Come Here, Restart, step execution
Software break	2,000 points
Forced break	Available
Masking of pins	Reset pin only
Pseudo RRM, DMM*1	Available
Time measurement (RUN to break)	Resolution: 100 μs, Max. measurement time: Approx. 100 hours
User Spaces Used for Debugging	Internal ROM: Min. 257 bytes (+ additional bytes when using pseudo RRM function) Internal RAM: Min. 7 bytes

***1** RRM: Realtime RAM Monitor, DMM: Dynamic Memory Modification

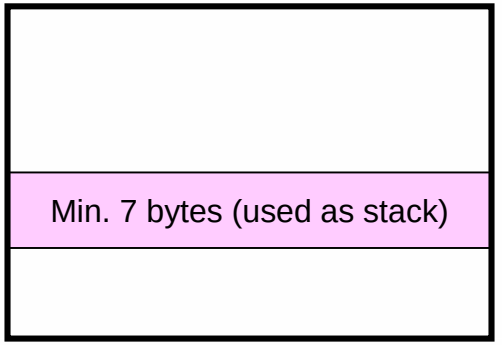
When using MINICUBE2 with 78K0

User Spaces Used for Debugging

Internal ROM space



Internal RAM space



When using MINICUBE2 with 78K0

Flash Programming Function List

★ Flash programming function list table (78K0)

Function Items	Specifications
Host interface	USB 2.0 (compatible with 1.1)
Target interface	UART
Target system voltage	2.7 V to 5.5 V (depends on target device)
Clock supply	16, 8, or 4 MHz (Clock mounted on the target system can be used)
Power supply	3.0 or 5.0 V (maximum current rating: 100 mA)
Device-specific information	PG-FP4-dedicated parameter file
Security flag setting	Available
Programmer standalone programming	Unavailable (must be connected to host machine)

When Using MINICUBE2 with 78K0S

Under Development

1. System Configuration
2. Debug Function List
3. Area Reserved for Debugging
4. Flash Programming Function List

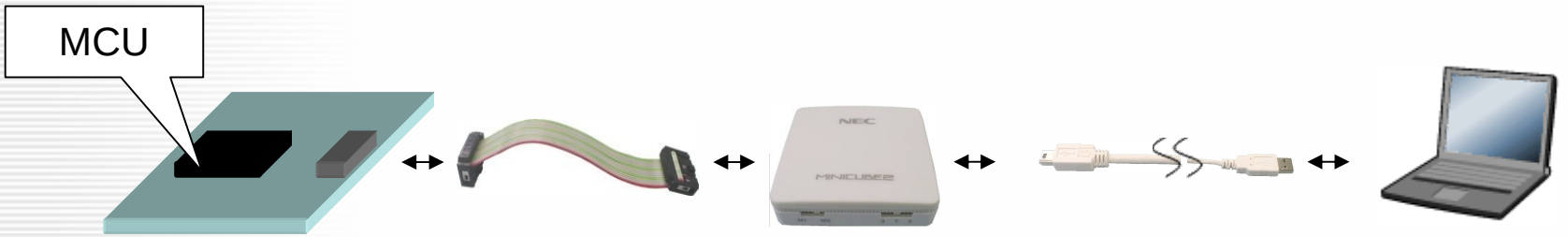
Debugging and programming for 78K0S is under development as of March, 2006. The information in this document is subject to change without notice.

When using MINICUBE2 with 78K0S

System Configuration

Under Development

★ System configuration for debugging



Target system　16-pin target cable　MINICUBE2　USB cable　PC

★ System configuration for self-programming

Same as that for debugging

Features

- Same connection signals are used for debugging and programming
- Employs a conventional programming interface and interrupt pins (Compatible with UART of PG-FP4 for programming)

When using MINICUBE2 with 78K0S

Debug Function List

★ Debug function list table (78K0S)

Under Development

Function Items	Specifications
Host interface	USB 1.1/2.0
Target interface	INTP3 or INTP1 (used for debug communication) X1, X2 (used for downloading program for debugging)
Operating frequency	Equivalent to target device
Security function	Unavailable
Download	Available
Hardware break	Unavailable
Execution	Go, Start From Here, Come Here, Restart, step execution
Software break	2000 points
Forced break	Available (with restrictions)
Masking of pins	Reset pin only
Pseudo RRM, DMM	Unavailable
Time measurement	Measurement resolution: 100 μs Max. measurement time: Approx. 100 hours
User Spaces Used for Debugging	Internal ROM: Approx. 300 bytes Internal RAM: 5 bytes (used as stack)

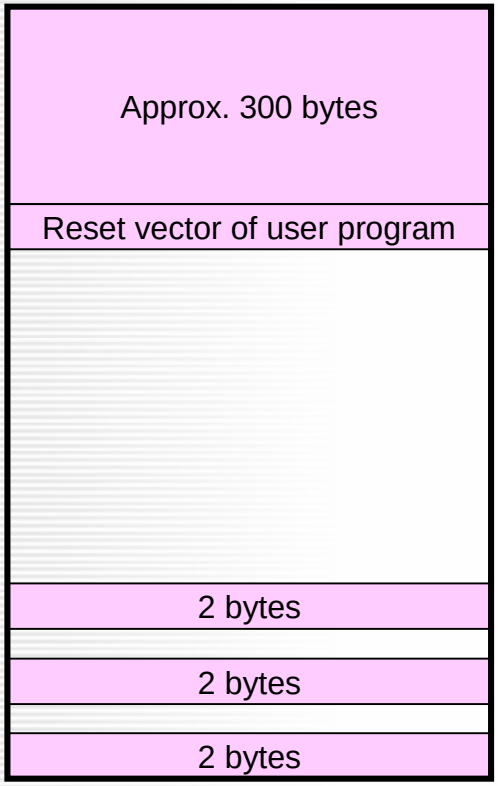
*1 RRM : Realtime RAM Monitor, DMM : Dynamic Memory Modification
*2 Forced breaks cannot be used while interrupts are disabled (DI).

When using MINICUBE2 with 78K0S

User Spaces Used for Debugging

Under Development

Internal ROM space



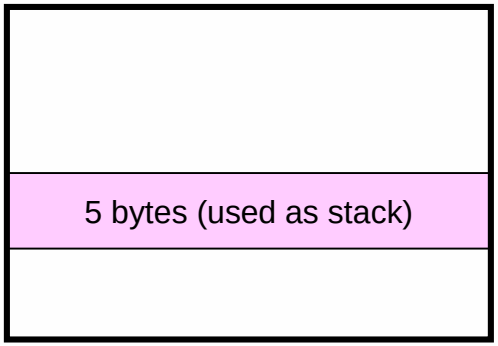
Internal ROM end address

CALLT 7E vector

INTP3 (KA1+, KB1+) or INTP1(KY1+) vector

0x0 (reset vector)

Internal RAM space



When using MINICUBE2 with 78K0S

Flash Programming Function List

Under Development

★ Flash programming function list table (78K0S)

Function Items	Specifications
Host interface	USB 1.1/2.0
Target interface	Single-wire UART
CLK supply from programmer	16, 8, or 4 MHz (Clock mounted on the target system cannot be used)
Power supply from programmer	3.0 or 5.0 V (Max. 100 mA)
Device-specific information	PG-FP4-dedicated parameter file
Security setting	Available
Programmer standalone writing	Unavailable (must be connected to host machine)

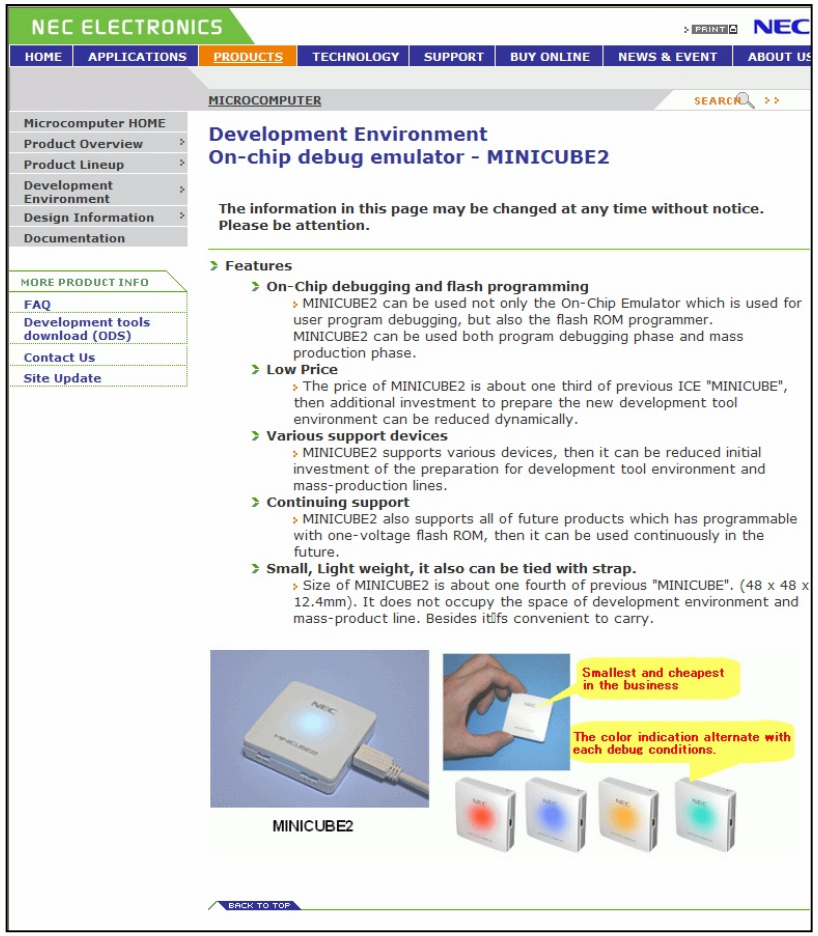
NEC

MINICUBE2

Others

MINICUBE2 Information Site

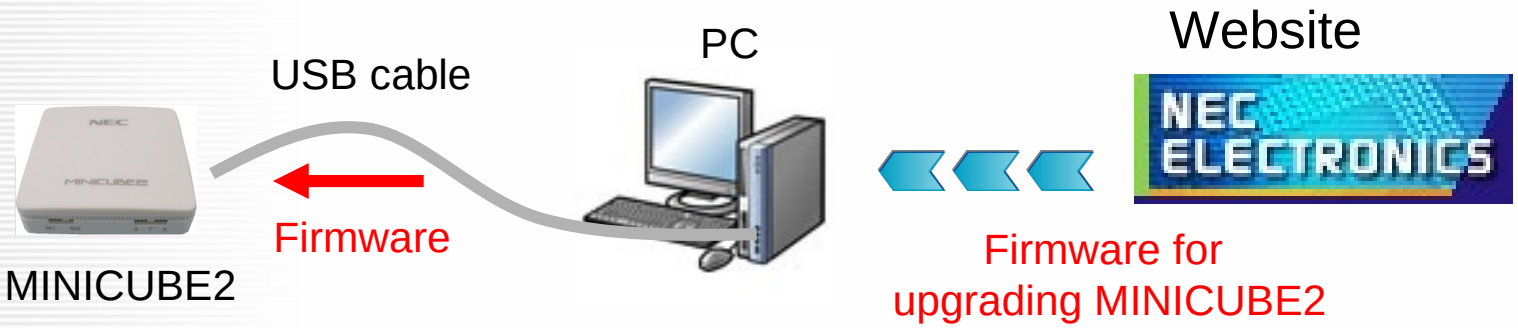
Refer to this site for product information and user's manual of MINICUBE2.



http://www.necel.com/micro/english/product/sc/allflash/minicube2.html

Addition of Supported Devices

MINICUBE2 may need to be upgraded when support for other devices is added.
Firmware can be downloaded from the website (ODS).

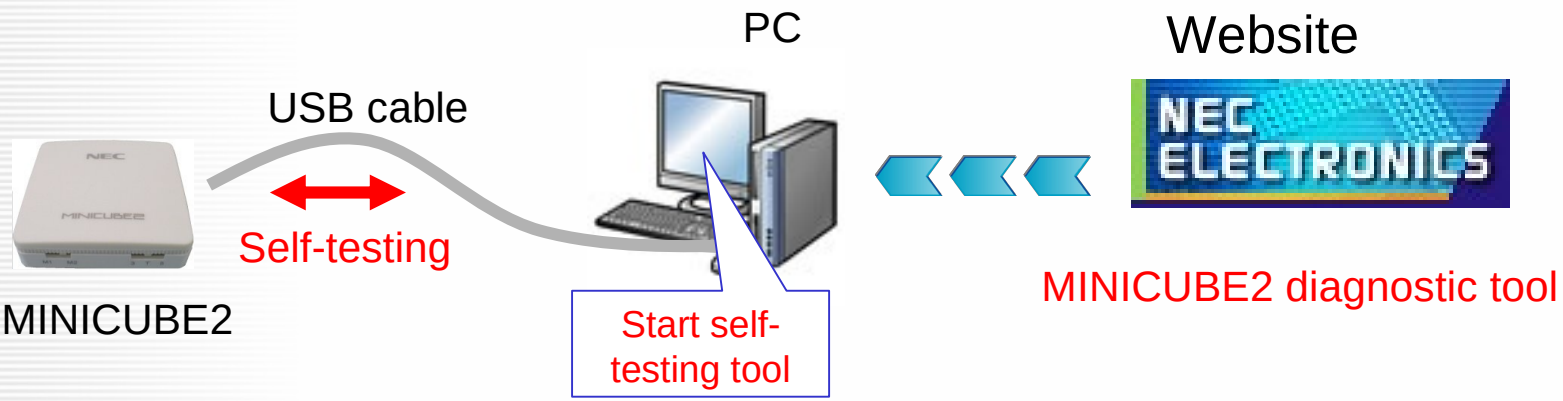


MINICUBE2 Repairs

Initial failure or failures covered by guarantee: Exchange with new product
Failures not covered by guarantee: New purchase

Remark The details of guarantee will be described in the warranty card supplied with the product.

The self-testing function can be used to check failures.



NEC Electronics

Revision History

Document Name	Document Number	Issued on	Remarks
MINICUBE2	ZUD-CD-05-0157	November 24, 2005	Newly created
	ZUD-CD-05-0157-1	March 10, 2006	2nd edition