KIT-V850E/GP1-NBD

USER'S MANUAL (REV. 1.00)

Midas lab.

¨ **Upgrading version of software**

- The newest version of RTE for Win32 (Rte4win32) can be downloaded from the following site:

  http://www.midas.co.jp/products/download/program/rte4win_32.htm

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REVISION HISTORY

Date of application	Revision	Chapter	Description
July 21, 2002	1.00		Official first edition

CONTENTS

1. OVERVIEW

KIT-V850E/GP1-NBD is a kit packaging software that controls the NBD functions of the V850E/GP1, and a dedicated cable. To use this kit, the RTE-NBD2 optionally available is necessary.

This document explains the functions and handling of the RTE-NBD2 when the RTE-NBD2 is connected to the V850E/GP1.

2. MAIN FEATURES

RAM monitoring

Data from multiple built-in RAM areas can be recorded without halting the execution of a running program.

Data tuning for flash ROM

Tuning RAM replaces the data area of the flash ROM, thus allowing data tuning without rewriting the flash ROM.

Event detection

An event detection function that allows the user to freely use the trigger of RAM monitor is provided.

3. UNPACKING AND CHECKING THE CONTENTS

Unpack the delivered packages and make sure that none of the following components are missing. If any of the components is missing or damaged, contact the retailer from whom you purchased the product.

- 40-pin-16-pin flat cable
- 10-pin-10-pin flat cable
- RTE for WIN32 Setup Disk (CD-ROM)
- NBD Manager Setup Disk
- User's Manuals (one set for each)
- License setting sheet

The following are general-purpose products that are required to use the KIT-V850E/GP1-NBD, although they are not supplied with the product.

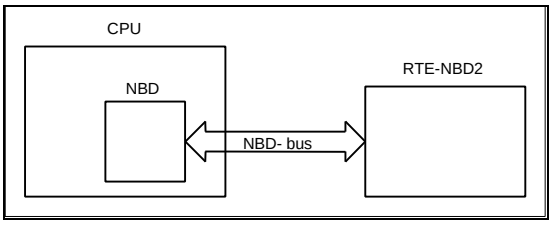
- RTE-NBD2 set
- Interface kit (interface card and cable)
  One of the following interface kits is needed:
  - PC Card interface kit
  - PC98 Series Host Card (C bus) interface kit
  - PC/AT compatible Host Card (ISA bus) interface kit
  - PC/AT compatible Host Card (PCI bus) interface kit

4. ABOUT THE NBD

4.1. OUTLINE

NBD stands for "Non-Break Debug" and supplies a function to access the internal resources of the CPU while the CPU is under execution. The NBD is connected to an external CPU with 10 or so signal lines.

The following figure illustrates how the NBD is used.



4.2. NBD FUNCTIONS

The V850E/GP1 provides the following NBD functions.

* RAM monitoring
* Flash ROM reading (evaluation chip only)
* Event detection (disabled when ICE is connected)
* Tuning RAM (evaluation chip only)
* Peripheral I/O register reading (disabled when ICE is connected)

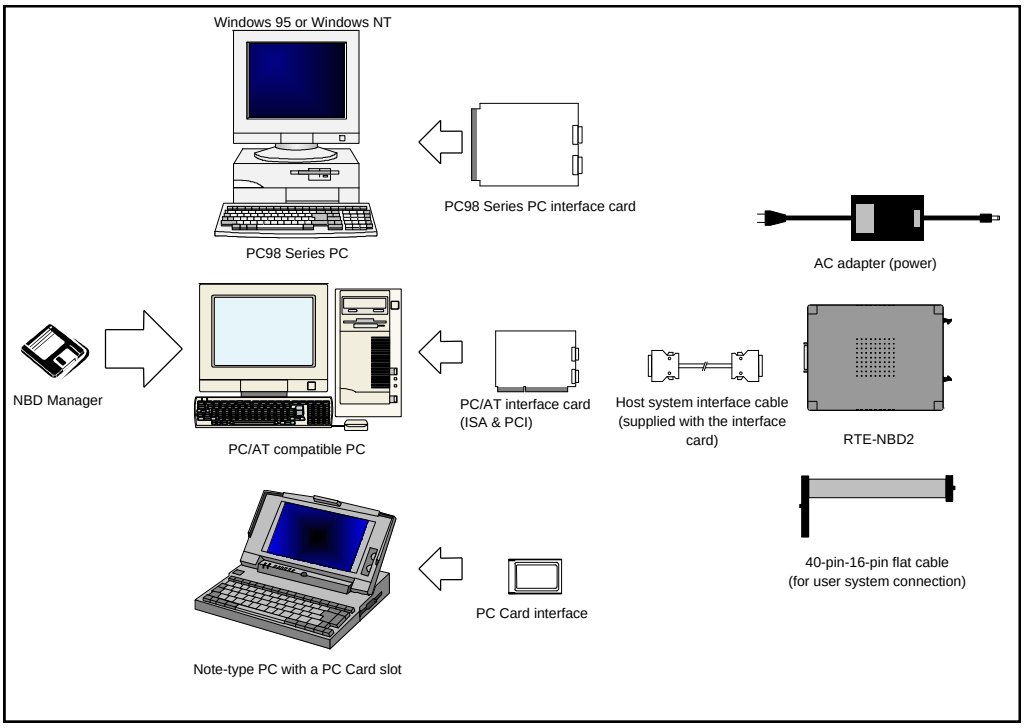
5. HARDWARE SPECIFICATIONS

The following table gives the specifications of the RTE-NBD2 when it is connected to the V850E/GP1.

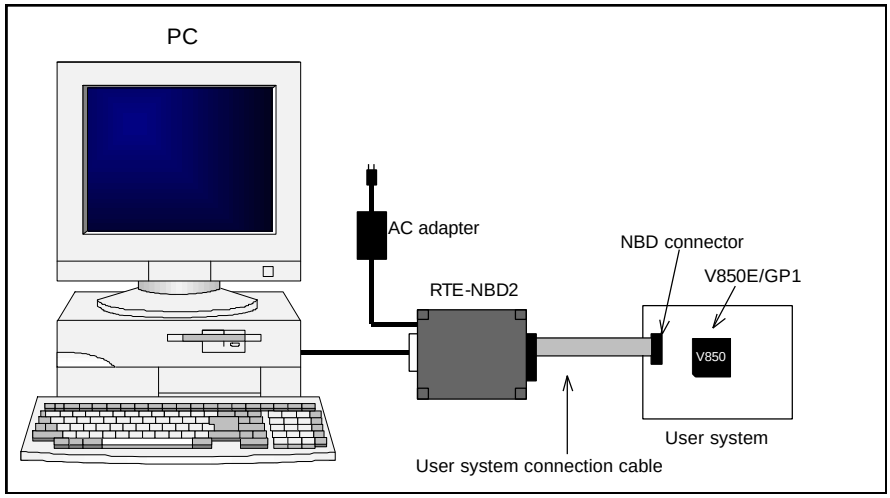
CPU to be debugged		V850E/GP1
RAM monitoring functions		
	Memory area that can be monitored	RAM area built in the CPU
	Number of channels	64 channels
	Memory monitoring unit	Byte, half-word, or word
	Maximum number of channels that can be recorded	16 K channels
	Specifiable triggers	Interval time, event, and external signal
	Other	Real-time data output
Tuning RAM functions		
	Replaceable memory area	ROM area built into the CPU
	RAM size	4 KB * 8 areas
Event functions		
	Number of events	1
	Status	Write, execute
	Address conditions	26 bits
	External output	Supported
Operating voltage		+3 to +5 V

6. SYSTEM CONFIGURATION

The following figure shows the system configuration in which the RTE-NBD2 is used.

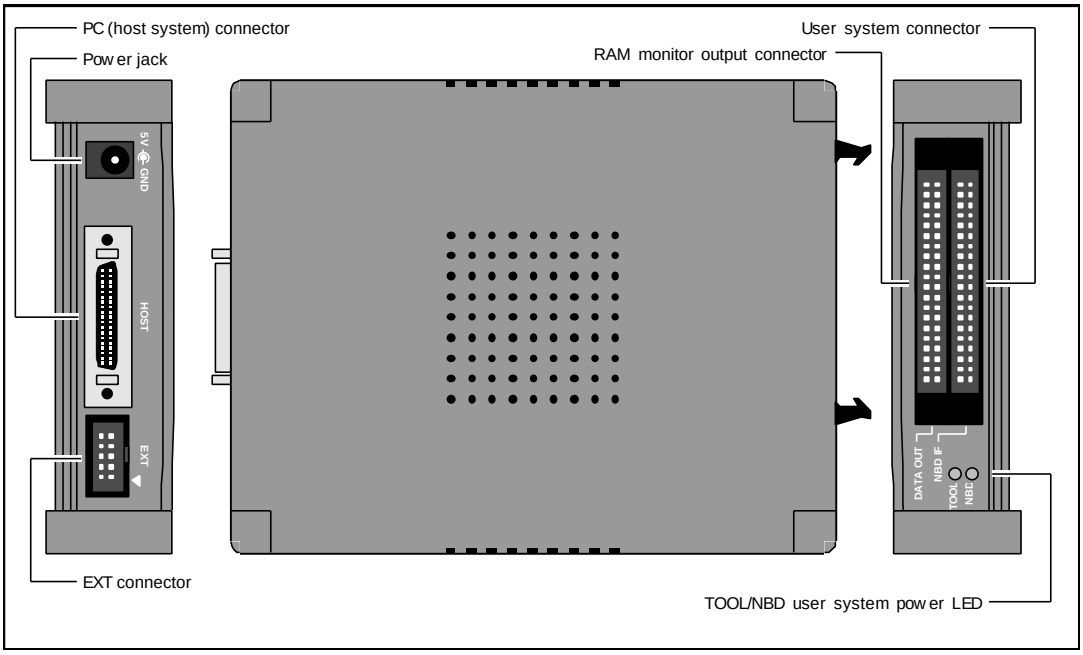


The following figure shows how the devices are connected.



7. COMPONENT NAMES AND FUNCTIONS

This chapter shows the appearance of the RTE-NBD2, as well as the names and functions of its components.



Power jack

This is a connector for power supply. For the power specifications, see **Section 12.1**.

Do not connect any device other than the supplied AC adapter (RTE-PS03) to the power jack.

PC (host system) connector (HOST)

This connector is used for connecting the RTE-NBD2 to the PC (host system). The host system interface cable is connected to this connector.

EXT connector (EXT)

This connector is used for external signal input and internal signal output. For details, see **Section 12.2**.

User system connector (NBD IF)

This connector is used for connecting the RTE-NBD2 to the user system. The RTE-NBD2 connector is a 40-pin connector that used only 16 pins. For details, see **Section 12.3**.

RAM monitor output connector (DATA OUT)

This connector provides a real-time output for the RAM monitor data. It is used for storing the data in an external device. For details, see **Chapter 13**.

Power LED (POWER)

This LED lights steadily while the power to the RTE-NBD2 is on.

NBD user system power LED (NBD)

This LED lights steadily while the NBD is connected to the user system and the power to the user system is on.

8. INSTALLATION PROCEDURE

This chapter describes the procedure for installing the RTE-NBD2.

1. **Mount the interface card.**

   → Refer to the manual provided with the interface card.

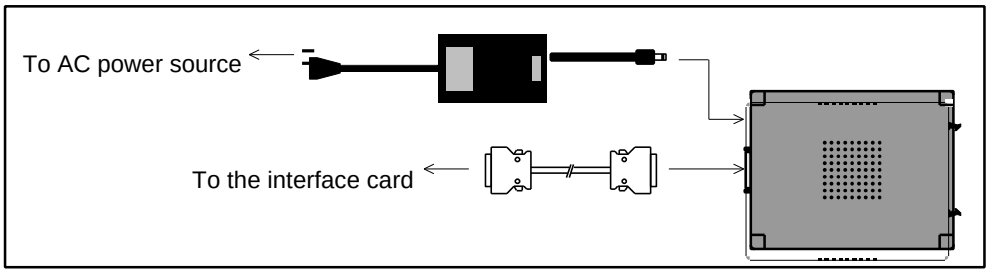
2. **Install RTE for WIN32.**

   → Refer to the manual provided with RTE for WIN32.

> **Unlike ICEs, the RTE-NBD2 does not operate until it is connected to the user system. Therefore, do not start ChkRTE2.exe immediately after completing the installation of RTE for WIN32.**

3. **Connect the RTE-NBD2.**

   Connect the RTE-NBD2 to the interface card using the host system interface cable. Also, connect the AD adapter to the RTE-NBD2 when it is supplied with power.



4. **Connect the RTE-NBD2 to the user system.**

   → See **Chapter 9**.

5. **Set RTE for WIN32.**

   Start ChkRTE2.exe and set the necessary parameters. For details, refer to the manual provided with RTE for WIN32 or see **Chapter 10** of this manual.

9. CONNECTION TO THE USER SYSTEM

Use the 40-pin-16-pin cable supplied as an accessory to connect the RTE-NBD2 to the user system.

The user system must have a connector that connects the RTE-NBD. See **Section 12.3** and prepare a connector that can be connected to the 16-pin connector of the user system connection cable supplied as an accessory.

When connecting the RTE-NBD2 to the user system to which an ICE is connected, a 10-pin-10-pin cable is necessary in addition to the above cable. Connect the EXT connector of the ICE to the EXT connector of the RTE-NBD2. Check if 7 of the switch of the ICE is OFF; if it is ON, set it to OFF. This arbitrates NBD access by the ICE and NBD access by the RTE-NBD2, so that both the accesses can be used.

9.1. POWERING ON AND OFF

The procedures for powering the system on and off are described below.

Powering on

1. Turn on the power to the host system.
2. Turn on the power to the RTE-NBD2. (Connect the AC adapter dedicated to the RTE to the power jack of the RTE-NBD2.)
3. Turn on the power to the user system.
4. Start NBD Manager.

Powering off

1. Quit NBD Manager.
2. Turn off the power to the user system.
3. Turn off the power to the RTE-NBD2. (Disconnect the AC adapter from the RTE-NBD2.)
4. Turn off the power to the host system.

Do not turn on the power to the user system before powering on the RTE-NBD2. Doing so may cause a malfunction.

10. RTE for WIN32

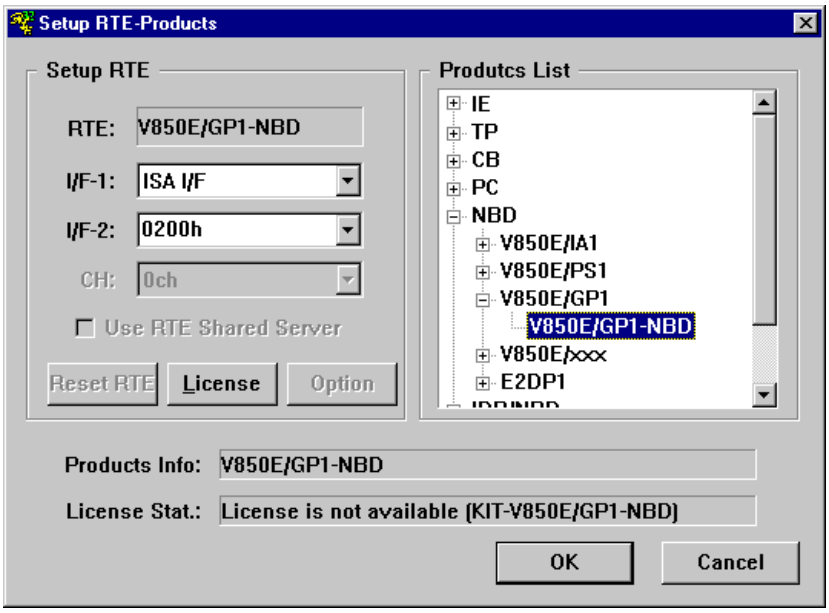
This chapter describes the setting and operation of RTE for WIN32, with the focus on the aspects specific to the RTE-NBD2. ChkRTE2.exe is used to check the RTE for WIN32 setting and the RTE-NBD2 connection.

The function test of ChkRTE2.exe cannot be used unless the RTE-NBD2 and the user system are properly connected and the power to the user system is on.

10.1. SELECTING RTE

After completing connection with the user system and turning on power to all the units, start ChkRTE2.exe and perform environment setting of "RTE for WIN32". Be sure to perform environment setting of "RTE for WIN32" at least once when new hardware has been installed.

<Setting RTE>



<Selecting RTE>

Select V850E/GP1-NBD at the lower layer of NBD, from the product list.

<Selecting I/F-1 or I/F-2>

Select an interface suitable to the host interface to be used, from the pull-down menu (the above screen shows, as an example, that ISA I/F card is specified).

<License>

Click this button, see the license setting sheet supplied with the kit, and perform license setting. For details, refer to the manual of RTE for WIN32.

<Function test>

The function test cannot be done unless the connection with the user system is correct and debugging is enabled. When the function test is performed in accordance with the instructions on the screen after setting of RTE was made, the following dialog box is displayed upon normal completion. In this status, the RTE-NBD2 can be controlled by NBD Manager.

If an error occurs during testing, the user system may have a fault or the NBD cable may not be correctly connected. Check these.

Execute the function test of ChkRTE2.exe while the RTE-NBD2 and user system are connected, and power is supplied to both.

11. PRECAUTIONS

This chapter provides precautionary information about the use of the RTE-NBD2.

11.1. PRECAUTIONS RELATED TO OPERATION

1) Do not turn on the power to the user system when the power to the RTE-NBD2 is off. Doing so may cause a malfunction.
2) Do not allow conductive material to fall through the vents of the RTE-NBD2 cabinet. Doing so may cause a malfunction.

11.2. PRECAUTIONS RELATING TO THE USE OF THE NBD

1) When the CPU of the user system is connected to the ICE, functions other than the one to access the internal RAM cannot be used.
2) If reset or power failure is effected from the user system, all the contents, including the setting of events and tuning RAM, will be lost and must be set again.

12. CONNECTOR SPECIFICATIONS

This chapter describes the specifications of the connectors for RTE-NBD2 connection.

12.1. POWER JACK

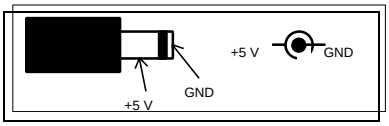
The specifications of the power jack are given below.

Operating voltage: 5 V

Operating current: Max. 2 A

Applicable connector: Type A (Φ 5.5)

Polarity: Center ground



Applicable power supply device: RTE-PS03

Do not connect any power supply device other than the supplied AC adapter (RTE-PS03) to the power jack.

12.2. EXT CONNECTOR

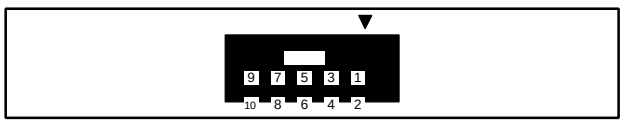
The specifications of the EXT connector are given below.

Pin number	Signal name	Input/ output	Description
1	Reserved	--	Leave this pin unconnected
2	SCAN_END	Output	Signal that goes high at the end of each RAM monitor scan Note 2
3	Reserved	--	Leave this pin unconnected
4	NBD_TRG-	Output	Low pulse signal output in response to an NBD event
5	Reserved	--	Leave this pin unconnected
6	no use		Leave this pin unconnected
7	no use		Leave this pin unconnected
8	no use		Leave this pin unconnected
9	GND	--	Ground signal
10	RAMMON_EXT	Input	External input signal for RAM monitor

Notes

1. The input circuit of these signals is of a 5 V-TTL level element and the output circuit is of OC. + 1-kΩ pull-up resistor.
2. SCAN_END is a low-level signal that is output during the RAM monitor scanning. The output of this signal indicates the end of one cycle of the RAM monitor scan process.

Pin arrangement:



JEXT pin arrangement

Applicable connector:

XG4M-1031 manufactured by Omron Corporation, or equivalent

12.3. NBD CONNECTOR

The specifications of the NBD connector are given below.

Pin number (RTE-NBD2)	Pin number (User system)	Signal name	Input/output	Description
1	1	NBD_TRG-	Input	Connected to the TRIG_DBG terminal of the CPU.
2	2	NBD_VCC	Input	Connected to the power (3.3 V) of the user system. Note 3
3	3	NBD_OUT-	Output	Usually not used. Note 1
4	4	GND	--	Connected to the ground of the user system.
5	5	NBD_CLK	Output	Connected to the CLK_DBG terminal of the CPU.
6	6	GND	--	Connected to the ground of the user system.
7	7	NBD_SYNC-	Output	Connected to the SYNC terminal of the CPU.
8	8	GND	--	Connected to the ground of the user system.
9	9	NBD_DATA0	Input/output	Connected to the AD0_DBG terminal of the CPU.
10	10	GND	--	Connected to the ground of the user system.
11	11	NBD_DATA1	Input/output	Connected to the AD1_DBG terminal of the CPU.
12	12	GND	--	Connected to the ground of the user system.
13	13	NBD_DATA2	Input/output	Connected to the AD2_DBG terminal of the CPU.
14	14	NBD_DATA3	Input/output	Connected to the AD3_DBG terminal of the CPU.
15	15	MODE_DBG	Output	Connected to the MODE_NBD terminal of the CPU.
16	16	NBD_RESETO-	Input	Connected to the RESETO_DBG terminal of the CPU. Note 4
17 to 40		Reserved		Not used

Notes

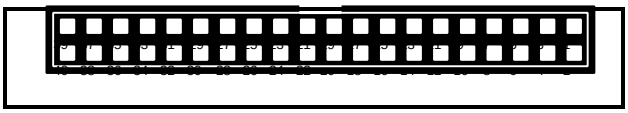
1. NBD_OUT- is used when the user system stores input and output signals in a buffer. When the signal is low, the signal flow of the bidirectional signal bus is from the RTE-NBD2 to the CPU.

2. The NBD connector is a 40-pin connector that used only 16 pins.

3. The high level of the output signal is a CMOS-level signal that is automatically limited to the level of NBD_VCC. +3 to +5 V can be connected to NBD_VCC.

4. While the NBD_RESETO- signal is active (low level), monitor scanning and start condition sampling are not performed. If this signal is asserted during scanning, the scanning is aborted. It is started again as soon as the start condition is satisfied after the signal was cleared.

Pin arrangement (RTE-NBD2 side):



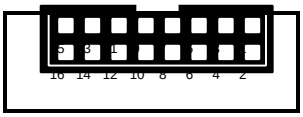
NBD connector pin arrangement (RTE-NBD2 side)

Applicable connector:

For 40-pin cable: XG4M-4030-T manufactured by Omron Corporation, or equivalent

For 40-pin board: XG4C-4031/4034 manufactured by Omron Corporation, or equivalent

Pin arrangement (user system side):



NBD connector pin arrangement (user system side)

Applicable connector:

For 16-pin cable: XG4M-1630-T manufactured by Omron Corporation, or equivalent

For 16-pin board: XG4C-1631/1634 manufactured by Omron Corporation, or equivalent

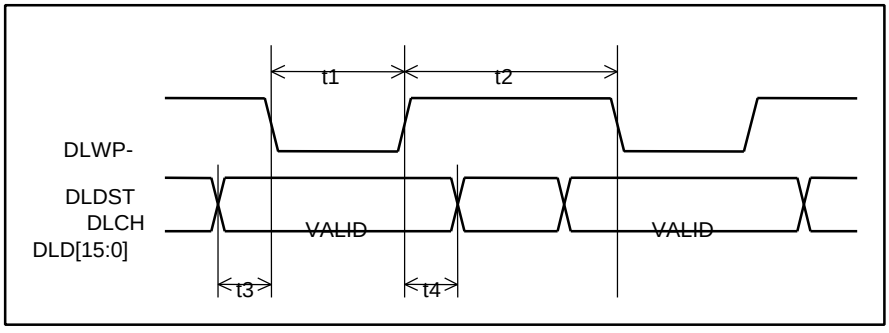
13. DATA OUT CONNECTOR

The DATA OUT connector outputs the results of the RAM monitor scan in real time. The output level of this signal is 5 V TTL. The specifications of the DATA OUT connector are given below.

Pin number	Signal name	Input/ output
1	GND	--
2	DLWP-	Output
3	GND	--
4	DLDSTS	Output
5	GND	--
6	DLCH0	Output
7	DLCH1	Output
8	DLCH2	Output
9	DLCH3	Output
10	DLCH4	Output
11	DLCH5	Output
12	GND	--
13	DLD0	Output
14	DLD1	Output
15	DLD2	Output
16	DLD3	Output
17	DLD4	Output
18	DLD5	Output
19	DLD6	Output
20	DLD7	Output

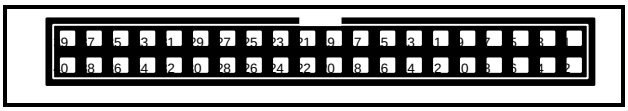
Pin number	Signal name	Input/ output
21	GND	--
22	DLD8	Output
23	DLD9	Output
24	DLD10	Output
25	DLD11	Output
26	DLD12	Output
27	DLD13	Output
28	DLD14	Output
29	DLD15	Output
30	GND	--
31	NC	--
32	NC	--
33	NC	--
34	NC	--
35	NC	--
36	NC	--
37	NC	--
38	NC	--
39	NC	--
40	NC	--

Signal name	Function
DLWP-	This signal is for data latch timing. When the channel size is set to Byte (8 bits) or Half-word (16 bits), one DLWP- signal is output per channel. When the channel size is set to Word (32 bits), two DLWP- signals are output per channel.
DLDSTS	This signal goes low when the output data of the DLD[15:0] signal is the low-order 16 bits. It goes high when the output data of the DLD[15:0] signal is the high-order 16 bits.
DLCH[5:0]	This signal indicates the channel number that is output to the DLD[15:0] signal.
DLD[15:0]	This signal contains the data that is read and output as a result of the scan. When the channel size is set to Byte (8 bits), "0" is output to this signal. When the channel size is set to Word (32 bits), two signals are output, one containing the low-order 16 bits and the other containing the high-order 16 bits.



Symbol	Content	Interval
t1	Low pulse width of the DLWP- signal	Min. 30 ns
t2	High pulse width of the DLWP- signal	Min. 110 ns
t3	Setup time of the DLWP- signal	Min. 20 ns
t4	Hold time of the DLWP- signal	Min. 20 ns

Pin arrangement:



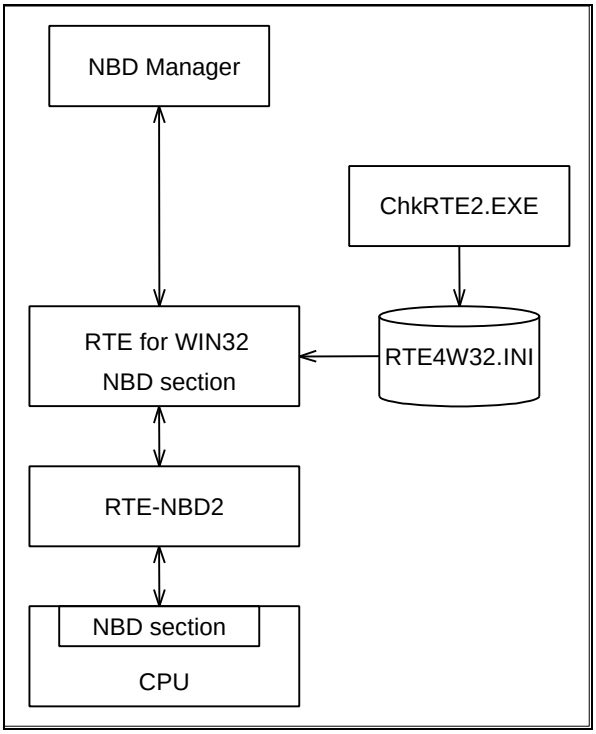
DATA OUT connector pin arrangement

Applicable connector:

XG4M-4030-T manufactured by Omron Corporation, or equivalent

14. SOFTWARE CONFIGURATION

The overall configuration of the software of this tool is as shown below.



- RTE for WIN32 identifies the types of the connected hardware and I/O addresses from the RTE4W32.INI file, which is created in the Windows directory.
- RTE4W32.INI is set by ChkRTE2.exe.

15. LINE COMMAND

15.1. AVAILABLE COMMANDS

The line command is used on the command window of NBD Manager. The commands available in the command window are listed below. All the commands are processed fly-by (non-break) vis-à-vis the CPU.

Command name	Description
<	Executes a batch file.
HELP ?	Displays a list of commands.
VER	Displays the version.
NBDENV	Sets the environment (sets the cycle of NBD_CLK)
ACC	Allows the user to specify the access size.
SYMFILE	Reads a symbol file.
SYM	Displays symbol information.
ntp	Sets the trigger point
FREAD	Fly-by read
FWRITE	Fly-by write
FDASM	Disassembles the memory contents by means of fly-by read.
FFILL	Fills up the memory space by means of fly-by write.
FSAVE	Reads the memory contents by means of fly-by read and writes them into a file.
FLOAD	Reads the contents of a file and writes them into the memory space by means of fly-by write.
TREAD	Tuning RAM read
TWRITE	Tuning RAM write
TDASM	Disassembles the memory contents by means of tuning RAM read.
TSAVE	Reads the memory contents by means of tuning RAM read and writes them into a file.
TLOAD	Reads the contents of a file and writes them into the memory space by means of tuning RAM write.
TMAP	Specifies the tuning RAM allocation.
TCOPY	Copies the contents of flash-ROM to the tuning RAM.

15.2. DESCRIPTION OF COMMANDS

15.2.1. Numeric Representation

Unless otherwise specified, all numeric values of parameters of commands are handled as hexadecimal numbers.

15.2.2. HELP (?)

<Format> HELP

HELP displays a list of the commands. You may view this list by entering "?" instead of "HELP".

<Example> HELP

Displays a list of commands.

15.2.3. VER

<Format> VER

VER displays the version of the RTE-NBD2 environment.

15.2.4. NBDENV

<Format> NBDENV [x1|x2|..x16]

NBDENV specifies the period of NBD_CLK.

On starting, a period in which CPU-ID can be correctly read is automatically set, with 80 ns (12.5 MHz) as the maximum frequency. x1..x16 specify a value of an integer multiple of period 40 ns.

<Example> x1 = 40 ns (25 MHz), x2 = 80 ns (12.5 MHz), x3 = 120 ns (8.333 MHz)…x16 = 640 ns (1.5625 MHz)

15.2.5. ACC

<Format> ACC [BYTE | HWORD | WORD]

ACC allows the user to specify the data size for access to memory. The FWRITE, TWRITE, and FFILL commands observe the data size specified by the ACC command. If you omit the parameter setting, the current setting is displayed.

<Example> ACC WORD

The memory access size is set to WORD (32 bits).

15.2.6. SYMFILE

<Format> SYMFILE file_name

SYMFILE reads symbol information from a file that must be assigned for file_name. The file format shall be ELF format in which GHS tool output is made. Symbols to be read shall be limited to **global symbols**.

<Example> SYMFILE C:\TEST\TEST_PRO.ELF

15.2.7. SYM

<Format> SYM string

SYM displays a symbol that corresponds to a character string that must be assigned for string.

<Example> SYM main

15.2.8. ntp

<Format> NTP [address] [exec|write]

NTP sets a trigger points. exec specifies an executable address, and write specifies a write cycle of a specified address.

<Example> NTP 3ff4000 write

15.2.9. FREAD/TREAD

<Format> FREAD [address [length]]
TREAD [address [length]]

FREAD/TREAD reads and displays the contents in a region whose range must be specified by length, starting at an address that must be assigned for address. The maximum value to be assigned to length is 100 (0x100). By pressing Return in response to the prompt, however, the display of the memory contents can be continued. If you omit the parameter setting, the most recently set parameters are applied.

FREAD is a command that is used to access a space that can be viewed from the CPU. Only the space permitted by the specifications of the CPU can be accessed.

TREAD is a command that is used to access only the tuning RAM. The tuning RAM in the area allocated by TMAP as tram or hidden can be accessed.

<Example> FREAD 0 100

15.2.10. FWRITE/TWRITE

<Format> FWRITE address data0[data1[data2[data3...]]]
TWRITE address data0[data1[data2[data3...]]]

FWRITE/TWRITE writes data0, data1, data2 ... begins at an address that must be assigned for address. The data size for write shall be as set by the ACC command. Therefore, if the ACC command setting is "WORD", an input of "FWRITE FF8000 1", for example, is evaluated with "1" being "0x00000001".

FWRITE is a command that is used to access a space that can be viewed from the CPU. Only the space permitted by the specifications of the CPU can be accessed.

TWRITE is a command that is used to access only the tuning RAM. The tuning RAM in the area allocated by TMAP as tram or hidden can be accessed.

<Example> FWRITE ff8000 11 22 33 44

15.2.11. FDASM/TDASM

<Format> FDASM [address [length]]
TDASM [address [length]]

FDASM/TDASM displays the contents in a region whose range must be specified by length, starting at an address that must be assigned for address. Regardless of the value assigned for length, the display is terminated once twenty lines have been displayed. By pressing Return in response to the prompt, however, display can be continued. If you omit the parameter setting, the most recently set parameters are applied.

FDASM is a command that is used to access a space that can be viewed from the CPU. Only the space permitted by the specifications of the CPU can be accessed.

TDASM is a command that is used to access only the tuning RAM. The tuning RAM in the area allocated by TMAP as tram or hidden can be accessed.

<Example> FDASM 0 10

15.2.12. FFILL

<Format> FFILL address length data

FFILL writes data into a whole region whose range must be specified by length, starting at an address that must be assigned for address. The data size for write shall be as set by the ACC command. Therefore, if the ACC command setting is "WORD", an input of "FFILL FF8000 10 1", for example, is evaluated with "1" being "0x00000001".

FFILL is a command that is used to access a space that can be viewed from the CPU. Only the space permitted by the specifications of the CPU can be accessed.

<Example> FFILL ff8000 10 55aa

15.2.13. FSAVE/TSAVE

<Format> FSAVE address length file_name
TSAVE address length file_name

FSAVE/TSAVE reads a region whose range must be specified by length, starting at an address that must be assigned for address, and writes the contents into a file that must be specified for file_name.

FSAVE is a command that is used to access a space that can be viewed from the CPU. Only the space permitted by the specifications of the CPU can be accessed.

TSAVE is a command that is used to access only the tuning RAM. The tuning RAM in the area allocated by TMAP as tram or hidden can be accessed.

<Example> FSAVE ff8000 1000 c:\data1.bin

15.2.14. FLOAD/TLOAD

<Format> FLOAD address file_name
TLOAD address file_name

FLOAD/TLOAD downloads the contents of a file that must be specified for file_name to an address that must be assigned for address.

FLOAD is a command that is used to access a space that can be viewed from the CPU. The space permitted by the specifications of the CPU can be accessed.

TLOAD is a command that is used to access only the tuning RAM. The tuning RAM in the area allocated by TMAP as tram or hidden can be accessed.

<Example> FLOAD ff8000 c:\data1.bin

15.2.15. TMAP

<Format> TMAP [address length {flash|tram|hidden}]

TMAP allows the user to specify the tuning RAM allocation. The user may specify an address length to which the tuning RAM is allocated. Up to eight blocks can be allocated as the tuning RAM in 4-KB units.

An area of the tuning RAM allocated as tram can be accessed by fly-by access commands such as FREAD and FWRITE, as well as by the CPU.

An area of the tuning RAM allocated as hidden can be accessed only by a command to the tuning RAM (TREAD, TWRITE, …) while the executing CPU can view flash.

flash clears allocation of the tuning RAM and allocates flash ROM. This area of the tuning RAM cannot be accessed by neither the CPU nor tool.

<Example> tmap 0 8000 tram

15.2.16. TCOPY

<Format> TCOPY [address length|/all]

TCOPY copies the contents of the flash ROM within the address range in which the tuning RAM is allocated and in the range specified by address length, to the tuning RAM. If /all is specified in the place of address length, all the blocks allocated as tram and hidden are transferred.

<Example> tcopy 0 100

15.3. BATCH FILE

The use of "**<filename**" format commands in a batch file is supported. Because a batch file is a text format file, describe one command on one line.

A batch file is useful when commands are used repeatedly or when a series of commands shall be executed, for instance, for initialization.

<Example> < RAMCHECK1.BAT

15.4. NOTES

- Entry shall be made from the prompt line, regardless of the cursor position.
- When the command window becomes active, the contents of the clipboard are cleared.
- Copy and paste are the only edit functions.

Memo