HITACHI MICROCOMPUTER TECHNICAL UPDATE

DATE	8 August 2001	No.	TN-SH7-346A/E
THEME	Limitation on Using Address Space Identifier in Single Virtual Memory Mode (1)		
CLASSIFICATION	☐ Spec change ■ Limitation on Use ☐ Supplement of Documents		
PRODUCTNAME	SH7751		Lot ALL
REFERENCE DOCUMENTS	SH7751 Series Hardware Manual (1st Edition) SH-4 Programming Manual (- 5th Edition)	Rev.	Effective Date
			Eternity

SH7751 has a limitation on hardware ITLB miss handling when Address Space Identifier (ASID) is used in single virtual memory mode.

1. Background

In single virtual memory mode, ASID is used to provide memory protection for processes running simultaneously while using the virtual memory space on an exclusive basis (See Section 3.3.6-3.3.7 in Hardware Manual).

2. Contents

When the following three conditions are satisfied, SH7751 may not execute hardware ITLB miss handling procedure (See Section 3.3.6-3.3.7 in Hardware Manual) correctly.

- Single virtual memory mode is specified
- ITLB miss occurs in user mode
- The address translation information exists in UTLB as non-sharable (SH=0), with different ASID, and with the same address missed in ITLB access.

The conceivable malfunction is:

- Hang-up
- UTLB multiple hit exception occurs (and branches to the reset handling routine).

3. Workaround

Any of the following workarounds can be applied in the case above:

- Workaround 1

  Purge the contents of UTLB when changing ASID value of the current process (PTEH.ASID).

- Workaround 2

  Watch an instruction fetch address in user mode (SR.MD=0) and guarantee that the instruction execution should not occur to the area where such address translation information exists in UTLB as non-sharable and with different ASID. Here, instruction execution includes the overrun pre-fetch accesses.

When Workaround 2 is applied, the original function of single virtual memory mode that generates exceptions for the accesses of different ASID can only be effective for data accesses.