

VME64x-CHIP of TCS-9U-card

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Version 0x1012

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1 Introduction

The VME64x Interface for Global Trigger boards is made for a slave module without interrupt capabilities. It works in systems with backplanes supplying VME64x standard as well as in systems with VME/VME64 backplanes. The Interface will contain a VME64x-chip, a VME-CHIP-TCS, transceivers for VME-data, logic for “live-insertion”, DTACK*- and BERR*-drivers and a special VME64x connector (P1/J1).

2 VME64x-chip

2.1 Versionshistory

- **V1012: based on V1012 VME64x-chip of PSB-board** (no BLT implemented, only F0 used). (HB120407) ~~NEW~~
- **V100F: based on V1010** of VME64x-chip of **PSB-9U_V2**. (HB270207)
- V100E: based on V100D, but changes in logic of TEST_OUT module made. (HB241006)
- V100D: based on V100C, but additional signal NIRQ1 implemented. (HB201006)
- V100C: fully synchronous design implemented.
DTACK_EXT and BERR_EXT from VME-CHIP-TCS are used as negative active signals now (because at power-up configuration of VME64X-CHIP is faster than configuration of VME-CHIP and therefore wrong DTACK and BERR signals are generated after configuration, which causes LEDs=“on” of CAEN-controller). INIT_DONE-feedback on pin 19 (S26 and pin 18 (S27) is implemented to have no wrong DTACK and BERR signals during init-phase after configuration-phase. Card-number is on S31-S28 (CARD_NR[3..0]) now.
AM=0x2F is combined with BASE_ADDR_CR_CSR to generate correct NVME_OE. Therefore geo_addr_v2_0 and vme_d16_v1_6 are used. (HB150506)
- V1002: no block-transfer via VME implemented, only F0 (single-transfer) – version ok. (HB, 180504)
- V1001: block-transfer via VME implemented (F1) – version ok. (HB, 270504)
- V1000: block-transfer via VME implemented (F1) – **version not ok**, during configuration of TCS- and TCSM-chip no DTACK generated, because of wrong (internal) addresses, error not verified yet!

2.2 Changes of signals ~~NEW~~

The following signals to VME-TCS-chip of the board have got a different meaning:

- ASCYC is S31 (which represents the CARD_NR3).
- ASSYNC is S30 (which represents the CARD_NR2).
- ASPULS is S29 (which represents the CARD_NR1).
- D08_E is S28 (which represents the CARD_NR0).

2.3 Hardware

The VME64x-chip is an Altera EP1K10QC208-3.

2.4 Firmware

```
serial-nr.:    TCS
chip_id:      0x00015n11      (n = CARD_NR [hex] jumpers S31-S28)
version:      0x00001012
```

2.5 References

See VME64-specification and VME64x-specification for definitions.

2.6 Features of the VME64x-chip (V1012) ~~NEW~~

- **User Configuration ROM** (USER_CR: address range 0x01003..0x01033, size is 13 bytes) for “**chip identifier**“ and “**version**“ of VME64x-chip (see 2.10.3) [0x01003-0x0101F] and for “**serial number**“ of board (see 2.10.3) [0x01023-0x01033].
- “**Card number**“ is part of “**chip identifier**“ and is fix soldered by jumpers on the lines S31-S28 (CARD_NR[3..0]).
- “**Serial number**“ is TCS.
- **Function 0 (F0) – D16** only, base-address at **A31-A25**, AM=**0x0D** and **0x09** (only **single** transfer).

2.7 Fixed test-outputs ~~NEW~~

TST_OUT_1: CLK_VME64X (40 MHz clock)

TST_OUT_2: DTACK_EXT (from VME-chip)

TST_OUT_3: BERR_EXT (from VME-chip)

TST_OUT_4: DTACK_CR_CSR (internal signal)

2.8 Programmable test-outputs ~~NEW~~

Not used in this version!!!

2.9 Address spaces overview

AM: 0x2F, access: **D08_O**

A23-A19: Geographic address (=VME slot number) or ‘11110’=amnesia address

A18-A00	=>	Register-name
mask: 0x000000FF		
0x00003 - 0x007FF	=>	512x8 bit Configuration ROM (read)
0x01003	=>	chip-id_3 (read)
0x01007	=>	chip-id_2 (read)
0x0100B	=>	chip-id_1 (read)
0x0100F	=>	chip-id_0 (read)
0x01013	=>	version_3 (read)
0x01017	=>	version_2 (read)
0x0101B	=>	version_1 (read)
0x0101F	=>	version_0 (read)
0x01023 - 0x0102B	=>	3 bytes Serial Number [TCS] (read)
0x03003 - 0x037FF	=>	CRAM 512x8 bit RAM (not used!!) (read/write)
0x05003 - 0x05007	=>	TEST_OUT-selection in USER_CSR (read/write)
[0x7FC03 - 0x7FFF7	=>	Command/Status registers (read/write)]
0x7FF63	=>	ADER-F0_3 register (read/write)
0x7FF67	=>	ADER-F0_2 register (read/write)
0x7FF6B	=>	ADER-F0_1 register (read/write)
0x7FF6F	=>	ADER-F0_0 register (read/write)
0x7FF73	=>	ADER-F1_3 register (read/write)
0x7FF77	=>	ADER-F1_2 register (read/write)
0x7FF7B	=>	ADER-F1_1 register (read/write)
0x7FF7F	=>	ADER-F1_0 register (read/write)
0x7FFF7	=>	Bit Clear Register [BCR] (read/write)
0x7FFFB	=>	Bit Set Register [BSR] (read/write)
0x7FFFF	=>	BAR - Geographic address (read)

2.10 Parts of the VME64x-chip

2.10.1 Defined Configuration ROM (CR)

The definition of the CR is made in the VME64x-specification (10.2.1 The defined CR area, page 39 and Table 10-12, page 53).

- Checksum (0x03): see VME64-specification (Table 2-32, page 55)
not calculated yet, to be done in cr.mif!!!
- Length of ROM (0x07..0x0F): see VME64-specification (Table 2-32, page 55)
not calculated yet, to be done in cr.mif!!!
- Configuration ROM data access width (0x13): see VME64-specification (Table 2-32, page 55)
0x81 => "Only use D08(O), every fourth byte"
- CSR data access width (0x17): see VME64-specification (Table 2-32, page 55)
0x81 => "Only use D08(O), every fourth byte"
- CR/CSR space specification ID (0x1B): see VME64x-specification (Rule 10.3, page 39)
0x02 => VME64x.
- Manufacturer's ID (0x27..0x2F): see VME64-specification (Table 2-32, page 56)
0x00.
- Board ID (0x33..0x3F): see VME64-specification (Table 2-32, page 56)
not fixed yet, has to be defined for all boards of the GT-system!!
- Revision ID (0x43..0x4F): see VME64-specification (Table 2-32, page 56)

not fixed yet, has to be defined for all boards of the GT-system!!

- Program ID (0x7F): see VME64-specification (Table 2-32, page 56)
0x01 => “No program, ID ROM only“.
- Offset to BEG_USER_CR (0x83..0x8B): see VME64x-specification (Table 10-12, page 53)
0x01003 => used for chip_id- and version-register.
- Offset to END_USER_CR (0x8F..0x97): see VME64x-specification (Table 10-12, page 53)
0x0101F => used for chip_id- and version-register.
- Offset to BEG_CRAM (0x9B..0xA3): see VME64x-specification (Table 10-12, page 53)
0x03003 => used for future applications.
- Offset to END_CRAM (0xA7..0xAF): see VME64x-specification (Table 10-12, page 53)
0x037FF => used for future applications.
- Offset to BEG_USER_CSR (0xB3..0xBB): see VME64x-specification (Table 10-12, page 53)
0x05003 => not used.
- Offset to END_USER_CSR (0xBF..0xC7): see VME64x-specification (Table 10-12, page 53)
0x0502F => not used.
- Offset to BEG_SN (0xCB..0xD3): see VME64x-specification (Table 10-12, page 53)
0x01023 => part of USER_CR, contains the “serial number“.
- Offset to END_SN (0xD7..0xDF): see VME64x-specification (Table 10-12, page 53)
0x0103F.
- Slave characteristics parameter (0xE3): see VME64x-specification (Table 10-1, page 40)
0x00.
- Master characteristics parameter (0xEB): see VME64x-specification (Table 10-2, page 40)
0x00.
- CRAM_ACCESS_WIDTH (0xFF): see VME64x-specification (Table 10-10, page 49)
0x81 => “Only use D08(O), every fourth byte“.
- Function 0 DAWPR (0x103..0x107): see VME64x-specification (Table 10-3, page 42)
0x83 => “Accepts D16 cycles only“.
- Function 0 AMCAP (0x123..0x13F): see VME64x-specification (Table 10-5, page 44)
0x0000 0000 0000 2200 => AM=0x0D and 0x09 “extended data access“ - single access.
- Function 0 ADEM (0x623..0x63F): see VME64x-specification (Table 10-4, page 43)
0xFE000000 => "mask bits 31-25=1".

2.10.2 Defined Control/Status Register (CSR)

The definition of the CSR is made in the VME64x-specification (10.2.2 The defined CSR area, page 45 and Table 10-13, page 55).

- **Base Address Register (BAR)** (0x7FFFF): see VME64x-specification (Table 10-13, page 55), set with geographical address or amnesia address.
- **Bit Set Register (BSR)** (0x7FFF7B): see VME64x-specification (Table 10-13, page 55), for setting see Table 10-6, page 45.
- **Bit Clear Register (BCR)** (0x7FFF77): see VME64x-specification (Table 10-13, page 55), for setting see Table 10-7, page 46.

BCR, BSR bits:

Bit 7: EN/DIS RESET_MODE

Bit 4: EN/DIS MODULE

Bit 3: EN/DIS BERR FLAG

- **Function 0 ADER** (0x7FF63..0x7FF6F): see VME64x-specification (Table 10-13, page 55), used for address relocation with Function 0 ADEM and Function 0 AMCAP (see Table 10-8, page 47).

2.10.3 Chip_ID and version ROM space

A user configuration ROM is implemented for the “chip_ID“ and “version” of the VME64x-chip of the board. It is located at the addresses 0x01003-0x0101F, size is 8 bytes, part of the USER_CR.

2.10.4 Serial Number ROM space

A user configuration ROM is implemented for the “serial number“ of the board. It is located at the addresses 0x01023-0x0103F, size is 8 bytes (PSB_V2nn), part of the USER_CR.

2.10.5 USER_CSR space

Not used in this version!!!

2.10.6 CRAM space

The configuration RAM (CRAM) is defined as a RAM for special purpose. The size is 512 bytes. The CRAM is located at addresses 0x03003..0x037FF.

The contents of the CRAM has to be defined!!!

3 Softwareguide for the VME64x Interface

3.1 Module enable

After power-up the module is disabled through the default value of the “ENABLE MODULE”-bit of the BitSet-register in the CommandStatusRegister (CSR) of VME64x.

To enable the module, one has to set bit 4 in the CSR, that means to write 0x10 to address 0x7FFFb with AM=0x2F.