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JTAG-Booster for

IBM PPC405xxx

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FS FORTH-SYSTEME GmbH
Postfach 1103, D-79200 Breisach, Germany

Release of Document: September 10, 2003
Author: Dieter Fögele
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Program Version: 4.xx

Table of Contents

1.   General

The programs JT405EP.EXE and JT405GPr.EXE use the JTAG port of the IBM PPC405xxx mircocontrollers in conjunction with the small JTAG-Booster:

- to program data into flash memory
- to verify and read the contents of a flash memory
- to make a memory dump
- to access an I²C Device
- to test CPU signals

All functions are done without any piece of software running in the target. No firmware or BIOS must be written. Bootstrap software may be downloaded to initially unprogrammed memories.

The JTAG-BOOSTER' s software is highly optimized to the JTAG chain of a specific target CPU. To give support for all processors of the IBM PPC405xxx family, there are two different programs on the distribution disk:

- JT405EP.EXE   : Tool for IBM PPC405EP

- JT405GPr.EXE   : Tool for IBM PPC405GPr

Please contact us, if you need support for other members of the IBM PPC405xxx family.

For latest documentation please refer to the file README.TXT on the distribution disk.

1.1.   Ordering Information

The following related products are available

- 9017   JTAG-Booster IBM PPC405xxx, 3.3V,
         PPC405EP and PPC405GPr
         DOS/Win9x/WinNT/Win2000/WinXP,
         delivered with adapter type 285

1.2.   System Requirements

To successfully run this tool the following requirements must be met:

- MSDOS, WIN3.x, WIN9x, WinNT, Win2000 or WindowsXP
  (WinNT/Win2000/WindowsXP is supported with an additional tool, see
  chapter 5 "Support for Windows NT, Windows 2000 and Windows XP")

- Intel 80386 or higher

- 205 kByte of free DOS memory

- Parallel Port

1.3.　Contents of Distribution Disk

- JT405EP.EXE   Tool for IBM PPC405EP
  JT405EP.OVL

- JT405EP.INI   Template configuration file for IBM PPC405EP. See
  chapter 1.9 "Initialization file JT405xxx.INI"

- JT405GPr.EXE   Tool for IBM PPC405GPr
  JT405GPr.OVL

- JT405GPr.INI   Template configuration file for IBM PPC405GPr. See
  chapter 1.9 "Initialization file JT405xxx.INI"

- WinNT.zip   Support for Windows NT, Windows 2000 and Windows
  XP. See chapter 5 "Support for Windows NT, Windows
  2000 and Windows XP"

- JTAG_V4xx_FLAS   List of all supported Flash devices
  HES.pdf

- README.txt   Release notes, new features, known problems

1.4. Connecting your PC to the target system

The JTAG-Booster can be plugged into standard parallel ports (LPT1-3) with a DB25-Connector.

LPT1-3
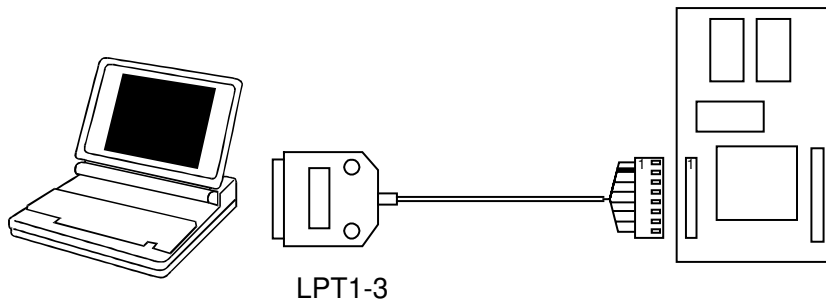
The target end of the cable has the following reference:

1	2*	3	4	5	6	7	8
TCK	GND	TMS	TRST#	NC	TDI	TDO	+3.3V

*PIN 2 can be detected by the thick cable.

To connect your design to the JTAG-BOOSTER you need a single row berg connector with a spacing of 2.54mm on your PCB. The names refer to the target: Pin 7 is the target's TDO pin and is connected to the JTAG-Booster's TDI pin.

The 3.3V version of the JTAG-Booster (FS part number 285) is delivered together with this package. Don't use the 5V version of the JTAG-Booster (FS part number 227) with a 3.3V target. **Don't apply 5V to the 3.3V version of the JTAG-Booster!**

Your target must be able to power the JTAG-Booster, it draws about 100mA.

Before you start the program, the JTAG-BOOSTER must be plugged to a parallel interface of your PC and to the 8 pin JTAG connector on the target.

The utility is started with the general command line format: JTAGxxx

JT405xxx /function [filename] [/option_1] ... [/option_n].

Note that the function must be the first argument followed (if needed) by the filename.

If you want to cancel execution of JT405xxx, press CTRL-Break-Key.

On any error the program aborts with an MSDOS error level of one.

1.5.   First Example with IBM PPC405EP

In the following simple example it is assumed that the JTAG-Booster is connected to LPT1 of your PC and target power is on.

Typing

JT405EP /P MYAPP.BIN

at the DOS prompt results in the following output:

JT405EP --- JTAG utility for IBM PPC405EP
Copyright © FS FORTH-SYSTEME GmbH, Breisach
Version 4.xx of mm/dd/yyyy

(1)	Configuration loaded from file JT405EP.INI
(2)	Target: Generic Target
(3)	Using LPT at I/O-address 0378h
(4)	JTAG Adapter detected

(5)   1 Device detected in JTAG chain
        Device 0: IDCODE=00267049 IBM PPC405EP, Revision 0

(6)	Sum of instruction register bits	: 7
(7)	CPU position	: 0
(8)	Instruction register offset	: 0
(9)	Length of boundary scan reg	: 300

Looking for a known flash device. Please wait..

(10)   STM 29W320B, 3,3V, Boot Block Bottom detected
(11)   Bus size is 16 Bit
(12)   Erasing Flash-EPROM Block #:0 1 2 3
        Programming File MYAPP.BIN
        65536 Bytes programmed successfully

Erase Time	:	0.8 sec
Programming Time	:	33.8 sec

(1)   The initialization file JT405EP.INI was found in the current directory.

(2)   The target identification line of the initialization file is printed here.

(3)   The resulting I/O-address of the parallel port is printed here. With WinNT/Win2000/WinXP you must specify the option /LPT2 to access to the standard address 378h.

(4)   A JTAG-Booster is found on the parallel port

(5)   The JTAG chain is analyzed. There may be several parts in the JTAG chain. The chain is analyzed and all parts except the IBM PPC405EP are switched to bypass mode.

(6)   The length of all instruction registers in the JTAG chain are added.

(7)   The position of the IBM PPC405EP in the JTAG chain is assumed to be zero, if not specified in the command line (see option /CPUPOS=).

(8)   The position of the JTAG instruction register of the IBM PPC405EP is assumed to be zero, if not specified in the command line (see option /IROFFS=).

(9)   The real length of the boundary scan register is displayed here and compared with the boundary scan register length of a IBM PPC405EP.

(10)   A Flash STM 29W320B selected with PER_CS0# was found.

(11)   The resulting data bus size is printed here.

(12)   In this example 4 blocks must be erased.

1.6.   First Example with IBM PPC405GPr

In the following simple example it is assumed that the JTAG-Booster is connected to LPT1 of your PC and target power is on.

Typing

        JT405GPr /P MYAPP.BIN

at the DOS prompt results in the following output:

```
        JT405GPr --- JTAG utility for IBM PPC405GPr
        Copyright © FS FORTH-SYSTEME GmbH, Breisach
        Version 4.xx of mm/dd/yyyy
```

(1)   Configuration loaded from file JT405GPr.INI
(2)   Target: Generic Target
(3)   Using LPT at I/O-address 0378h
(4)   JTAG Adapter detected

(5)   1 Device detected in JTAG chain
             Device 0: IDCODE=04088049 IBM PPC405GPr, Revision 0
(6)   Sum of instruction register bits   : 7
(7)   CPU position   : 0
(8)   Instruction register offset   : 0
(9)   Length of boundary scan reg   : 360

        Looking for a known flash device. Please wait..
(10)   STM 29W320B, 3.3V, Boot Block Bottom detected
(11)   Bus size is 16 Bit
(12)   Erasing Flash-EPROM Block #:0 1 2 3
        Programming File MYAPP.BIN
        65536 Bytes programmed successfully

        Erase Time   :   0.8 sec
        Programming Time   :   xx.0 sec

(1)   The initialization file JT405GPr.INI was found in the current directory.

(2)   The target identification line of the initialization file is printed here.

(3)   The resulting I/O-address of the parallel port is printed here.

(4)   A JTAG-Booster is found on the parallel port

(5)   The JTAG chain is analyzed. There may be several parts in the JTAG chain. The chain is analyzed and all parts except the IBM PPC405GPr are switched to bypass mode.

(6)   The length of all instruction registers in the JTAG chain are added.

(7)   The position of the IBM PPC405GPrin the JTAG chain is assumed to be zero, if not specified in the command line (see option /CPUPOS=).

(8)   The position of the JTAG instruction register of the IBM PPC405GPris assumed to be zero, if not specified in the command line (see option /IROFFS=).

(9)   The real length of the boundary scan register is displayed here and compared with the boundary scan register length of a IBM PPC405GPr.

(10)   A Flash STM 29W320B selected with EX_CS0# was found.

(11)   The resulting data bus size is printed here.

(12)   In this example four blocks must be erased.

1.7.   Trouble Shooting

Avoid long distances between your Host-PC and the target. If you are using standard parallel extension cable, the JTAG-BOOSTER may not work. Don't use Dongles between the parallel port and the JTAG-BOOSTER.

Switch off all special modes of your printer port (EPP, ECP, ...) in the BIOS setup. Only standard parallel port (SPP) mode is allowed.

If there are problems with autodetection of the flash devices use the /DEVICE= option. To speed up autodetection specify one of the options /8BIT /16BIT or /32BIT.

Don't use hardware protected flash memories.

The used chip selects must be defined as output and inactive in the initialization file (see chapter 1.9 "Initialization file JT405xxx.INI"). Also the address bits must be defined as output.

Use the option /NOWRSETUP to speed up flash programming.

1.8. Error Messages

- **80386 or greater required**
  The JTAG-BOOSTER does not work on a 8088/8086 or a 80286 platform.

- **Cable not connected or target power fail**
  The JTAG-Booster (or one of the simple Parallel Port JTAG adapters
  selected with the options /LATTICE /WIGGLER /PLS) wasn't found. Please
  check connection to parallel port and connection to target. Check target
  power. Check the command line options. Check your BIOS-Setup. If you are
  using this program with WinNT, Win2000 or WinXP you must specify /LPT2
  or /LPT-BASE=378 to get access to the standard printer port.

- **Can't open x:\yyy\zzz\JT405xxx.OVL**
  The overlay file JT405xxx.OVL must be in the same directory as
  JT405xxx.EXE.

- **Configuration file XYZ not found.**
  The file specified with the option /INI= wasn't found.

- **Device offset out of range**
  The value specified with the option /OFFSET= is greater than the size of
  the detected flash device.

- **Disk full**
  Writing a output file was aborted as a result of missing disk space.

- **Do not specify option /NOCS with any other chip select**
  There is a conflict in the command line.

- **Do not specify option /BYTE-MODE. *Flash device* does not have a byte
  mode pin.**
  The flash device specified with the option /DEVICE= does not support
  switching between 16 (or 32) bit mode and 8 bit mode. In practice it does not
  have a pin with the name BYTE#

- **Error creating file:**
  The output file could not be opened. Please check free disk space or write
  protection.

- **Error: *Pin-Name* is an output only pin**
  The specified pin cannot be sampled. Check the command line. Check the initialization file.

- **Error: *Pin-Name* is an input only pin**
  The specified pin cannot be activated. Check the command line. Check the initialization file.

- **Error: *Pin-Name* may not be read back**
  The specified pin can be switched to tristate, but cannot be read back. Check the command line.

- **illegal function:**
  The first parameter of the command line must be a valid function. See chapter 2 "JT405xxx Parameter Description" for a list of supported functions.

- **illegal number:**
  The specified number couldn't be interpret as a valid number. Check the relevant number base.

- **illegal option:**
  See chapter 2 "JT405xxx Parameter Description" for a list of supported options.

- **illegal Pin Type:**
  The name specified with the option /PIN= must be one of the list of chapter 1.9 "Initialization file JT405xxx.INI"

- **illegal Flash Type:**
  The name specified with the option /DEVICE= must be one of the list of chapter 1.10 "Supported flash devices".

- **Input file not found:**
  The specified file cannot be found

- **Input file is empty:**
  Files with zero length are not accepted

- **"   " is undefined**
  Please check the syntax in your configuration file. (See chapter 1.9 "Initialization file JT405xxx.INI").

- **LPTx not installed**
  The LPT port specified with /LPTx cannot be found. Please check the LPT port or specify a installed LPT port. Check your BIOS setup. If you are using this program with WinNT, Win2000 or WinXP you 1st must install the WinNT support package as described in chapter 5 "Support for Windows NT, Windows 2000 and Windows XP"

- **missing filename**
  Most functions need a filename as second parameter.

- **missing option /I2CCLK=**
  Some functions need the option /I2CCLK= to be defined.

- **missing option /I2CDAT=**
  Some functions need the option /I2CDAT= or the options /I2CDATO= and /I2CDATI= to be defined.

- **missing option /LENGTH=**
  Some functions need the option /LENGTH= to be defined.

- **missing option /PIN=**
  Some functions need the option /PIN= to be defined.

- **More than 9 devices in the JTAG chain or TDO pin stuck at low level**
  The JTAG chain is limited to 9 parts. Check target power. Check the target's TDO pin.

- **No devices found in JTAG chain or TDO pin stuck at high level**
  A stream of 32 high bits was detected on the pin TDO. TDO may stuck at high level. Check the connection to your target. Check the target power. Check the target's TDO pin.

- **Option /CPUPOS= out of range**
  The number specified with the option /CPUPOS= must be less or equal to the number of parts minus 1.

- **Option /IROFFS= out of range**
  Please specify a smaller value

- **Part at specified position is not a IBM PPC405xxx**
  The option /CPUPOS= points to a part not a IBM PPC405xxx

- **Pins specified with /I2CCLK= and /I2CDAT= must have different control cells**
  The pin specified with the option /I2CDAT= must be able to be switched to high impedance while the pin specified with option /I2CCLK= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Pins specified with /I2CCLK= and /I2CDATI= must have different control cells**
  The pin specified with the option /I2CDATI= must be able to be switched to high impedance while the pin specified with option /I2CCLK= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Pins specified with /I2CDATO= and /I2CDATI= must have different control cells**
  The pin specified with the option /I2CDATI= must be able to be switched to high impedance while the pin specified with option /I2CDATO= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Specify only one of these options:**
  Some options are exclusive (i.e. /8BIT and /16BIT). Don't mix them.

- **Sum of instruction register bits to low. Should be at least 7 bits for a IBM PPC405xxx**
  The sum of all instruction register bits in the JTAG chain does not fit to the IBM PPC405xxx. Check the target connection. Check the target CPU type. Check the settings for /IROFFS= and /CPUPOS= , if there are several parts in the JTAG chain.

- **Target no longer connected**
  There is a cyclic check of the JTAG chain. Check target power. Check target connection.

- **There are unknown parts in the JTAG chain. Please use the option /IROFFS= to specify the instr. reg. offset of the CPU.**
  If there are unknown parts in the JTAG chain, the program isn't able to determine the logical position of the CPU's instruction register.

- **There is no IBM PPC405xxx in the JTAG chain**
  No IBM PPC405xxx was found in the JTAG chain. Check the target power. Try with option /DRIVER=4 again.

- **Value of option /FILE-OFFSET out of range**
  The value of the option /FILE-OFFSET= points behind end of file.

- **wrong driver #**
  The value specified with the option /DRIVER= is out of range.

- **Wrong Flash Identifier (xxxx)**
  No valid identifier found. Check the specified chip select signal and the bus width. Try with the option /DEVICE= . Use the option /8BIT or /16BIT or /32BIT to specify the correct data bus size.

- **Wrong length of boundary scan register. Should be 300 for a IBM PPC405EP. (Should be 360 for a IBM PPC405GPr.)**
  The length of the boundary scan register of the selected part (if there are more than one in the chain) does not fit to the IBM PPC405xxx. Check the target connection. Check the target CPU type. Check the settings for /IROFFS= and /CPUPOS= , if there are several parts in the JTAG chain.

1.9.   Initialization file JT405xxx.INI

This file is used to define the default direction and level of all CPU signals. This file **must be carefully adapted** to your design with the IBM PPC405xxx. The Target-Entry is used to identify your design which is displayed with most commands.

When the program JT405xxx.EXE is started it scans the current directory for an existing initialization file named JT405xxx.INI. If no entry is found the default values are used. You may also specify the initialization file with the option /INI= .
If the specified file isn't found, the program aborts with an error message.

The CPU pins can also be used with the functions /BLINK (chapter 2.9), /PIN? (chapter 2.10) and /SAMPLE (chapter 2.11) to test the signals on your design.

The sample file below represents the values which are used for default initialization when no initialization file could be found in the current directory and no initialization file is specified with the option /INI=.

Changes to the structure of the file could result in errors. Remarks can be added by using //.

Sample File JT405EP.INI:

// Description file for IBM PPC405EP
Target: Generic Target, 2003/08/26
// Adapt this file carefully to your design!!
// All chip select signals are set to output and inactive.
// All signals should be defined. Undefined signals are set to their defaults.
// Pin names are defined in upper case.
// Low active signals are signed with a trailing #.

// Group 25:   All pins in this group must be set to the same direction
//   These pins are bidirectional
//   During flash programming these pins are switched between
//   input/inactive and output/active.
//   For Flash programming and other memory accesses
//   these pins should be set to Input
PER_DATA0   Inp   //
PER_DATA1   Inp   //
PER_DATA2   Inp   //
PER_DATA3   Inp   //
PER_DATA4   Inp   //
PER_DATA5   Inp   //
PER_DATA6   Inp   //
PER_DATA7   Inp   //

// Group 43:   All pins in this group must be set to the same direction
//   These pins are bidirectional
//   During flash programming these pins are switched between
//   input/inactive and output/active.
//   For Flash programming and other memory accesses
//   these pins should be set to Input
PER_DATA8   Inp   //
PER_DATA9   Inp   //
PER_DATA10   Inp   //
PER_DATA11   Inp   //
PER_DATA12   Inp   //
PER_DATA13   Inp   //
PER_DATA14   Inp   //
PER_DATA15   Inp   //

```
// The following pins are output only pins.
// Setting to input (tristate) one of these pins results in an error.
// These are used for Flash programming
PER_ADDR6       Out,Lo //
PER_ADDR7       Out,Lo //
PER_ADDR8       Out,Lo //
PER_ADDR9       Out,Lo //
PER_ADDR10      Out,Lo //
PER_ADDR11      Out,Lo //
PER_ADDR12      Out,Lo //
PER_ADDR13      Out,Lo //
PER_ADDR14      Out,Lo //
PER_ADDR15      Out,Lo //
PER_ADDR16      Out,Lo //
PER_ADDR17      Out,Lo //
PER_ADDR18      Out,Lo //
PER_ADDR19      Out,Lo //
PER_ADDR20      Out,Lo //
PER_ADDR21      Out,Lo //
PER_ADDR22      Out,Lo //
PER_ADDR23      Out,Lo //
PER_ADDR24      Out,Lo //
PER_ADDR25      Out,Lo //
PER_ADDR26      Out,Lo //
PER_ADDR27      Out,Lo //
PER_ADDR28      Out,Lo //
PER_ADDR29      Out,Lo //
PER_ADDR30      Out,Lo //
PER_ADDR31      Out,Lo //

// Group 264:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA0       Inp    //
MEM_DATA1       Inp    //
MEM_DATA2       Inp    //
MEM_DATA3       Inp    //
MEM_DATA4       Inp    //
MEM_DATA5       Inp    //
MEM_DATA6       Inp    //
MEM_DATA7       Inp    //
```

```
// Group 278:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA8      Inp     //
MEM_DATA9      Inp     //
MEM_DATA10     Inp     //
MEM_DATA11     Inp     //
MEM_DATA12     Inp     //
MEM_DATA12     Inp     //
MEM_DATA14     Inp     //
MEM_DATA15     Inp     //

// Group 290:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA16     Inp     //
MEM_DATA17     Inp     //
MEM_DATA18     Inp     //
MEM_DATA19     Inp     //
MEM_DATA20     Inp     //
MEM_DATA21     Inp     //
MEM_DATA22     Inp     //
MEM_DATA23     Inp     //

// Group 7:    All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA24     Inp     //
MEM_DATA25     Inp     //
MEM_DATA26     Inp     //
MEM_DATA27     Inp     //
MEM_DATA28     Inp     //
MEM_DATA29     Inp     //
MEM_DATA30     Inp     //
MEM_DATA31     Inp     //

// Group 229:  All pins in this group must be set to the same direction
//             These pins are bidirectional
UART0_TX       Inp     //
UART0_RTS#     Inp     //
SYS_ERR        Inp     //
```

```
// Group 125:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD0          Inp      //
PCI_AD1          Inp      //
PCI_AD2          Inp      //
PCI_AD3          Inp      //

// Group 132:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD4          Inp      //
PCI_AD5          Inp      //
PCI_AD6          Inp      //
PCI_AD7          Inp      //

// Group 137:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD8          Inp      //
PCI_AD9          Inp      //
PCI_AD10         Inp      //
PCI_AD11         Inp      //

// Group 142:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD12         Inp      //
PCI_AD13         Inp      //
PCI_AD14         Inp      //
PCI_AD15         Inp      //

// Group 173:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD16         Inp      //
PCI_AD17         Inp      //
PCI_AD18         Inp      //
PCI_AD19         Inp      //

// Group 179:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD20         Inp      //
PCI_AD21         Inp      //
PCI_AD22         Inp      //
PCI_AD23         Inp      //
```

```
// Group 184: All pins in this group must be set to the same direction
//            These pins are bidirectional
PCI_AD24        Inp     //
PCI_AD25        Inp     //
PCI_AD26        Inp     //
PCI_AD27        Inp     //

// Group 190: All pins in this group must be set to the same direction
//            These pins are bidirectional
PCI_AD28        Inp     //
PCI_AD29        Inp     //
PCI_AD30        Inp     //
PCI_AD31        Inp     //

// Group 130: All pins in this group must be set to the same direction
//            These pins are bidirectional
PCI_C/BE0#      Inp     //
PCI_C/BE1#      Inp     //
PCI_C/BE2#      Inp     //
PCI_C/BE3#      Inp     //

// Group 163: All pins in this group must be set to the same direction
//            These pins are bidirectional
PCI_TRDY#       Inp     //
PCI_STOP#       Inp     //
PCI_DEVSEL#     Inp     //

// The following pins are complete bidirectional pins.
// The direction of each pin can be set independent of the other pins.
// Each pin can be used as an input.
// For Flash programming
PER_ADDR3       Out,Lo // GPIO14
PER_ADDR4       Out,Lo // GPIO15
PER_ADDR5       Out,Lo // GPIO16

// Group 152: All pins in this group must be set to the same direction
//            These pins are tristateable, but can not be read back
PCI_GNT0#       Out,Lo // REQ#
PCI_GNT1#       Out,Lo //
PCI_GNT2#       Out,Lo //
```

```
// The following pins are complete bidirectional pins.
// The direction of each pin can be set independent of the other pins.
// Each pin can be used as an input.
IIC_SDA          Inp      //
IIC_SCL          Inp      //
UART0_DCD#       Inp      // GPIO24
UART0_DSR#       Inp      // GPIO25
UART0_RI#        Inp      // GPIO26
UART0_DTR#       Inp      // GPIO27
UART1_RX         Inp      // GPIO28
UART1_TX         Inp      // GPIO29
PER_CS1#         Out,Lo // GPIO10
PER_CS2#         Out,Lo // GPIO11
PER_CS3#         Out,Lo // GPIO12
PER_CS4#         Out,Lo // GPIO13
PER_BLAST#       Inp      // GPIO0
PCI_INT#         Inp      // PER_WE#
PCI_FRAME#       Inp      //
PCI_IRDY#        Inp      //
PCI_TRDY#        Inp      //
PCI_SERR#        Inp      //
PCI_PERR#        Inp      //
PCI_PARITY       Inp      //
IRQ6             Inp      // GPIO23
IRQ5             Inp      // GPIO22
IRQ4             Inp      // GPIO21
IRQ3             Inp      // GPIO20
IRQ2             Inp      // GPIO19
IRQ1             Inp      // GPIO18
IRQ0             Inp      // GPIO17
GPIO9            Inp      // TRC_CLK
GPIO8            Inp      // TS6
GPIO7            Inp      // TS5
GPIO6            Inp      // TS4
GPIO5            Inp      // TS3
GPIO4            Inp      // TS2O
GPIO3            Inp      // TS1O
GPIO2            Inp      // TS2E
GPIO1            Inp      // TS1E
REJECT_PKT1      Inp      // GPIO31
REJECT_PKT0      Inp      // GPIO30
SYS_RESET#       Inp      //
EMC0_MDIO        Inp      //
```