

# TEMU

## ***GRLIB GPTIMER Device Model Manual***

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*Table 1. Record of Changes*

| Rev | Date       | Author | Note             |
|-----|------------|--------|------------------|
| 1.1 | 2016-05-12 | MH     | Auto gen tables. |
| 1.0 | 2015-03-01 | MH     | Initial version. |

# 1. Introduction

The GPTIMER is part of the GRLIB device library from Gaisler. The timer runs using synchronised events in order to ensure that would a timer tick be broadcasted by the interrupt controller, then the IRQ should be taken at roughly the same time.

## 2. Configuration

### 2.1. Separate Interrupts

Set the "config.separateInterrupts" property to non-zero.

### 2.2. Interrupt Index

The interrupt number can be set by configuring the "pnp.config" property. The lower 5 bits of the property is used for this.

### 2.3. Number of Timers

Set the "config.numTimers" property. By default this value is 4 to be compatible with the UT699.

### 2.4. Clear IRQ on Set

Set the "config.clearIrqOnSet" property changes the behaviour of bit 4 in the timer control registers. ClearOnSet can be non-zero (the default), in that case writing a 1 to the bit will clear bit 4 (i.e. it will read out as 0), if clearOnSet is zero, the bit is cleared if bit 4 is 0 in the written word.

The reason for this are ambiguities in the LEON3 and UT699 manuals.

## 3. Attributes

### 3.1. Properties

| Name                      | Type             | Description  |
|---------------------------|------------------|--|
| config.clearIrqOnSet      | uint8_t          | Use behaviour in GRIP manual. Set to zero for beahviour as documented in (UT699 manual from 2012 (p77)). |
| config.clockDivider       | uint32_t         | Clock divider for scaling event posting  |
| config.irqNumber          | uint8_t          | Set interrupt number for first interrupt   |
| config.numTimers          | uint8_t          |  |
| config.separateInterrupts | uint8_t          | Enable separate interrupts   |
| config.traceReads         | uint8_t          |  |
| config.traceWrites        | uint8_t          |  |
| configReg                 | uint32_t         |  |
| control                   | [7 x uint32_t]   |  |
| counters                  | [7 x uint32_t]   |  |
| irqCtrl                   | iref / <unknown> |  |
| object.timeSource         | object           | Time source object (a cpu or machine object)   |
| pnp.bar                   | uint32_t         |  |
| pnp.config                | uint32_t         |  |
| reload                    | [7 x uint32_t]   |  |
| scaler                    | uint32_t         |  |
| scalerReload              | uint32_t         |  |

## 3.2. Interfaces

| Name           | Type           | Description |
|----------------|----------------|-------------|
| ApbIface       | ApbIface       |             |
| DeviceIface    | DeviceIface    |             |
| MemAccessIface | MemAccessIface |             |
| ObjectIface    | ObjectIface    |             |
| ResetIface     | ResetIface     |             |

## 3.3. Ports

| Prop | Iface | Description |
|------|-------|-------------|
| -    | -     | -           |

## 4. Limitations

The following deviations from real hardware are known to exist with this model:

- The Disable Timer Freeze bit is always 1 and cannot be configured.
- The Debug Halt bit for each timer is always 0 and cannot be altered.
- Chained timers are not supported at the moment.
- The last timer does not work as a watchdog.
- As the timer utilise synchronised events, the minimum time for a timer expiration on a multi-core CPU would be equal to the time-quanta that the machine has been configured with.