

## T-EMU: GRLIB GPTIMER Device Model Manual



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## Record of Changes

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# 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 behaviour 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	
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.