TMS320DM357 DMSoC
Pulse-Width Modulator (PWM)

User's Guide
# Preface

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## 1 Introduction

1.1 Purpose of the Peripheral ................................................................. 8
1.2 Features ......................................................................................... 8
1.3 Industry Standard(s) Compliance Statement ...................................... 8

## 2 Peripheral Architecture

2.1 Clock Control ................................................................................. 9
2.2 Signal Descriptions ......................................................................... 9
2.3 Functional Operation ....................................................................... 10
2.4 Reset Considerations ..................................................................... 13
2.5 Initialization .................................................................................. 13
2.6 Interrupt Support .......................................................................... 13
2.7 EDMA Event Support ..................................................................... 13
2.8 Power Management ....................................................................... 14
2.9 Emulation Considerations .............................................................. 14

## 3 Registers

3.1 Pulse Width Modulator (PWM) Peripheral Identification Register (PID) .................................................. 15
3.2 Pulse Width Modulator (PWM) Peripheral Control Register (PCR) ......................................................... 15
3.3 Pulse Width Modulator (PWM) Configuration Register (CFG) ................................................................. 16
3.4 Pulse Width Modulator (PWM) Start Register (START) ........................................................................... 17
3.5 Pulse Width Modulator (PWM) Repeat Count Register (RPT) ................................................................. 17
3.6 Pulse Width Modulator (PWM) Period Register (PER) ........................................................................... 18
3.7 Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D) .................................................... 18

## Appendix A Revision History

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Table of Contents

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List of Figures

1. PWM Waveform Polarity Control (PWM_RPT = 2, for 3 periods) .................................................. 9
2. PWM One-Shot Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 0, PWM_RPT = 2) .......... 10
3. PWM Event-Triggered One-Shot Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 1, 
   PWM_RPT = 1) ............................................................................................................ 11
4. PWM Continuous Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 1, PWM_RPT = 0) ....... 12
5. Pulse Width Modulator (PWM) Peripheral Identification Register (PID) ........................................ 15
6. Pulse Width Modulator (PWM) Peripheral Control Register (PCR) ................................................ 15
7. Pulse Width Modulator (PWM) Configuration Register (CFG) .................................................... 16
8. Pulse Width Modulator (PWM) Start Register (START) ............................................................ 17
9. Pulse Width Modulator (PWM) Repeat Count Register (RPT) .................................................... 17
10. Pulse Width Modulator (PWM) Period Register (PER) .............................................................. 18
11. Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D) ...................................... 18

List of Tables

1. Pulse Width Modulator (PWM) Registers .................................................................................... 14
2. Pulse Width Modulator (PWM) Peripheral Identification Register (PID) Field Descriptions .......... 15
3. Pulse Width Modulator (PWM) Peripheral Control Register (PCR) Field Descriptions .............. 15
4. Pulse Width Modulator (PWM) Configuration Register (CFG) Field Descriptions ................. 16
5. Pulse Width Modulator (PWM) Start Register (START) Field Descriptions ............................ 17
6. Pulse Width Modulator (PWM) Repeat Count Register (RPT) Field Descriptions .................... 17
7. Pulse Width Modulator (PWM) Period Register (PER) Field Descriptions ............................... 18
8. Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D) Field Descriptions .......... 18
9. Document Revision History ....................................................................................................... 19
About This Manual

This document describes the pulse-width modulator (PWM) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC).

Notational Conventions

This document uses the following conventions.

• Hexadecimal numbers are shown with the suffix h. For example, the following number is 40 hexadecimal (decimal 64): 40h.

• Registers in this document are shown in figures and described in tables.
  – Each register figure shows a rectangle divided into fields that represent the fields of the register. Each field is labeled with its bit name, its beginning and ending bit numbers above, and its read/write properties below. A legend explains the notation used for the properties.
  – Reserved bits in a register figure designate a bit that is used for future device expansion.

Related Documentation From Texas Instruments

The following documents describe the TMS320DM357 Digital Media System-on-Chip (DMSoC). Copies of these documents are available on the Internet at www.ti.com. Tip: Enter the literature number in the search box provided at www.ti.com.

SPRUG06 — TMS320DM357 DMSoC Video Processing Back End (VPBE) User’s Guide. Describes the video processing back end (VPBE) in the TMS320DM357 Digital Media System-on-Chip (DMSoC) video processing subsystem. Included in the VPBE is the video encoder, on-screen display, and digital LCD controller.

SPRUG25 — TMS320DM357 DMSoC ARM Subsystem Reference Guide. Describes the ARM subsystem in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The ARM subsystem is designed to give the ARM926EJ-S (ARM9) master control of the device. In general, the ARM is responsible for configuration and control of the device; including the video processing subsystem, and a majority of the peripherals and external memories.

SPRUG26 — TMS320DM357 DMSoC Universal Asynchronous Receiver/Transmitter (UART) User’s Guide. This document describes the universal asynchronous receiver/transmitter (UART) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The UART peripheral performs serial-to-parallel conversion on data received from a peripheral device, and parallel-to-serial conversion on data received from the CPU.

SPRUG27 — TMS320DM357 DMSoC Inter-Integrated Circuit (I2C) Peripheral User’s Guide. Describes the inter-integrated circuit (I2C) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The I2C peripheral provides an interface between the DMSoC and other devices compliant with the I2C-bus specification and connected by way of an I2C-bus. External components attached to this 2-wire serial bus can transmit and receive up to 8-bit wide data to and from the DMSoC through the I2C peripheral. This document assumes the reader is familiar with the I2C-bus specification.
Notational Conventions

SPRUG28 — TMS320DM357 DMSoC 64-Bit Timer User’s Guide. Describes the operation of the software-programmable 64-bit timer in the TMS320DM357 Digital Media System-on-Chip (DMSoC). Timer 0 and Timer 1 are used as general-purpose (GP) timers and can be programmed in 64-bit mode, dual 32-bit unchained mode, or dual 32-bit chained mode; Timer 2 is used only as a watchdog timer. The GP timer modes can be used to generate periodic interrupts or enhanced direct memory access (EDMA) synchronization events. The watchdog timer mode is used to provide a recovery mechanism for the device in the event of a fault condition, such as a non-exiting code loop.

SPRUG29 — TMS320DM357 DMSoC Serial Peripheral Interface (SPI) User’s Guide. Describes the serial peripheral interface (SPI) in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The SPI is a high-speed synchronous serial input/output port that allows a serial bit stream of programmed length (1 to 16 bits) to be shifted into and out of the device at a programmed bit-transfer rate. The SPI is normally used for communication between the DMSoC and external peripherals. Typical applications include an interface to external I/O or peripheral expansion via devices such as shift registers, display drivers, SPI EPROMs and analog-to-digital converters.

SPRUG30 — TMS320DM357 DMSoC Host Port Interface (HPI) Reference Guide. This document describes the host port interface in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The HPI provides a parallel port interface through which an external host processor can directly access the TMS320DM357 DMSoC processor's resources (configuration and program/data memories).

SPRUG31 — TMS320DM357 DMSoC General-Purpose Input/Output (GPIO) User’s Guide. Describes the general-purpose input/output (GPIO) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The GPIO peripheral provides dedicated general-purpose pins that can be configured as either inputs or outputs. When configured as an input, you can detect the state of the input by reading the state of an internal register. When configured as an output, you can write to an internal register to control the state driven on the output pin.

SPRUG32 — TMS320DM357 DMSoC Multimedia Card (MMC)/Secure Digital (SD) Card Controller User’s Guide. Describes the multimedia card (MMC)/secure digital (SD) card controller in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The MMC/SD card is used in a number of applications to provide removable data storage. The MMC/SD controller provides an interface to external MMC and SD cards. The communication between the MMC/SD controller and MMC/SD card(s) is performed by the MMC/SD protocol.

SPRUG33 — TMS320DM357 DMSoC Asynchronous External Memory Interface (EMIF) User’s Guide. Describes the asynchronous external memory interface (EMIF) in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The EMIF supports a glueless interface to a variety of external devices.

SPRUG34 — TMS320DM357 DMSoC Enhanced Direct Memory Access (EDMA) Controller User’s Guide. Describes the operation of the enhanced direct memory access (EDMA3) controller in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The EDMA3 controller’s primary purpose is to service user-programmed data transfers between two memory-mapped slave endpoints on the DMSoC.

SPRUG35 — TMS320DM357 DMSoC Audio Serial Port (ASP) User’s Guide. Describes the operation of the audio serial port (ASP) audio interface in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The primary audio modes that are supported by the ASP are the AC97 and IIS modes. In addition to the primary audio modes, the ASP supports general serial port receive and transmit operation, but is not intended to be used as a high-speed interface.

SPRUG36 — TMS320DM357 DMSoC Ethernet Media Access Controller (EMAC)/Management Data Input/Output (MDIO) Module User’s Guide. Discusses the ethernet media access controller (EMAC) and physical layer (PHY) device management data input/output (MDIO) module in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The EMAC controls the flow of packet data from the DMSoC to the PHY. The MDIO module controls PHY configuration and status monitoring.
**SPRUG37** — *TMS320DM357 DMSoC Pulse-Width Modulator (PWM) Peripheral User’s Guide.* Describes the pulse-width modulator (PWM) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC).

**SPRUG38** — *TMS320DM357 DMSoC DDR2 Memory Controller User’s Guide.* Describes the DDR2 memory controller in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The DDR2 memory controller is used to interface with JESD79D-2A standard compliant DDR2 SDRAM devices.

**SPRUG39** — *TMS320DM357 DMSoC Video Processing Front End (VPFE) User’s Guide.* Describes the video processing front end (VPFE) in the TMS320DM357 Digital Media System-on-Chip (DMSoC) video processing subsystem. Included in the VPFE is the preview engine, CCD controller, resizer, histogram, and hardware 3A (H3A) statistic generator.

**SPRUGH2** — *TMS320DM357 DMSoC Peripherals Overview Reference Guide.* This document provides an overview of the peripherals in the TMS320DM357 Digital Media System-on-Chip (DMSoC).

**SPRUGH3** — *TMS320DM357 DMSoC Universal Serial Bus Controller User’s Guide.* This document describes the universal serial bus (USB) controller in the TMS320DM357 Digital Media System-on-Chip (DMSoC). The USB controller supports data throughput rates up to 480 Mbps. It provides a mechanism for data transfer between USB devices and also supports host negotiation.
1 Introduction

This document describes the pulse-width modulator (PWM) peripheral in the TMS320DM357 Digital Media System-on-Chip (DMSoC).

1.1 Purpose of the Peripheral

The pulse width modulator (PWM) feature is very common in embedded systems. It provides a way to generate a pulse periodic waveform for motor control or can act as a digital-to-analog converter with some external components. This PWM peripheral is basically a timer with a period counter and a first-phase duration comparator, where bit width of the period and first-phase duration are both programmable.

1.2 Features

The PWM has the following features:

- 32-bit period counter
- 32-bit first-phase duration counter
- 8-bit repeat counter for one-shot operation. One-shot operation will produce N + 1 periods of the waveform, where N is the repeat counter value.
- Configurable to operate in either one-shot or continuous mode.
- One-shot operation can be triggered by the CCD VSYNC output of the video processing subsystem to allow any of the PWM instantiations to be used as a CCD timer.
- Configurable PWM output pin inactive state.
- Interrupt and EDMA synchronization events.
- Emulation support for stop or free-run operation.

1.3 Industry Standard(s) Compliance Statement

The PWM does not conform to any recognized industry standards.
2 Peripheral Architecture

2.1 Clock Control

The PWM peripheral is driven by the equivalent of the DM357 input clock. This clock is normally 27 MHz and is not affected by the configuration of the PLLs. The PWM timer counts are referenced to this clock.

2.2 Signal Descriptions

Each instance of the PWM peripheral has a single output signal, PWM\textsubscript{n}. The output signal is driven based on the state of the PWM as described below:

- **Inactive state**: When the PWM is idle, the output pin is driven to its inactive output level. This inactive logic state is determined by configuring the INACTOUT bit in the PWM configuration register (CFG).

- **First-phase active state**: During the first phase of an active PWM period, the output signal is driven to the state defined in the P1OUT bit in the PWM configuration register (CFG). The duration of the first phase is controlled by the PWM first-phase duration register (PH1D). The duration of the entire period is controlled by the PWM period register (PER).

- **Second-phase active state**: After the first phase of the period is complete, the output signal is driven to the opposite state of the first phase for the remainder of the period (the second phase).

Figure 1 shows the behavior of PWM\textsubscript{n} with different combination of active and inactive polarities.

![Figure 1. PWM Waveform Polarity Control (PWM_RPT = 2, for 3 periods)](image)

If PH1D value is 0, the first phase has zero time and the opposite of the first-phase output value is driven on PWM\textsubscript{n} for the entire period. If PH1D is greater than or equal to (PER + 1), the first phase is 100\% of the period and the P1OUT output level is sent for the duration of the period.
2.3 **Functional Operation**

The PWM module can operate in either one-shot or continuous mode. In both modes, the PWM peripheral has a first-phase duration register (PH1D) and a period register (PER) to specify, respectively, the first-phase duration and period of the waveform. The first-phase output level can be configured to be either high or low in the P1OUT bit of the PWM configuration register (CFG) and the second phase output is automatically the opposite polarity of the first-phase level. The inactive state before and after the PWM operation can also be configured to be either a 0 or a 1 in the INACTOUT bit of CFG. For one-shot mode operation, see [Section 2.3.1](#); for continuous mode operation, see [Section 2.3.2](#).

### 2.3.1 One-Shot Mode Operation

In one-shot mode operation, the PWM produces a series of periods but does not run continuously. The number of periods in the series is controlled by the repeat count contained in the PWM repeat count register (RPT). To select one-shot mode, configure the MODE bit in the PWM configuration register (CFG) to 1h.

For one-shot mode operation, the PWM should first be configured for mode, period, and first-phase duration, along with other configuration options. The PWM uses the last programmed set of parameters once it is started by writing a 1 to the START bit in the PWM start register (START).

Once started, the PWM asserts/deasserts the output as configured, driving to the first-phase output level during the first phase and the opposite level during the second phase. When the prescribed number of RPT + 1 periods of pulses expire, the peripheral sends an interrupt to the system (if the interrupt is enabled in CFG). The PWM then becomes inactive until the START bit is written a 1 again.

The PWM is stopped during one-shot mode operation by changing the MODE bit to 0 (disable). When the PWM is disabled, the output is immediately driven to the configured inactive state.

**Figure 2** shows the one-shot mode operation. The waveform generation is started by writing to the START bit (assuming event triggering is disabled). After RPT + 1 number of periods, the waveform stops and an interrupt is generated. The polarity is configured as inactive low, first phase high-then-low.

---

**Figure 2. PWM One-Shot Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 0, PWM_RPT = 2)**

```
<table>
<thead>
<tr>
<th>Write PWM START</th>
<th>Write PWM START</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1D</td>
<td>PER+1</td>
</tr>
<tr>
<td>PWM output</td>
<td>Interrupt</td>
</tr>
</tbody>
</table>
```
2.3.1.1 Event-Triggered One-Shot Mode Operation

In one-shot mode, the PWM senses a rising or falling transition on an event-trigger input signal to start the operation. This event trigger input is synchronized to the PWM clock inside the module and is driven by the video processing subsystem CCDC_VD output signal. This capability is provided to allow the PWM to be used as a CCD timer.

The trigger event can be detected on the rising edge or the falling edge of CCDC_VD. After event triggering is enabled as part of the configuration process, a write to the PWM START register (START) starts the sensing circuitry in the PWM and after the first event, the PWM starts the period counting.

Figure 3 shows the event-triggered one-shot mode operation. Note that each subsequent event does not restart period counting. It takes another write to the START bit to sense the event signal again. Also note, that events received within the PWM period are ignored as well.

The PWM is stopped from the event-triggered one-shot mode operation by changing the MODE bit to 0 (disable). When the PWM is disabled, the output is immediately driven to the configured inactive state.

Figure 3. PWM Event-Triggered One-Shot Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 1, PWM_RPT = 1)
2.3.2 Continuous Operation

In continuous mode operation, the PWM produces the repeating output waveforms continuously without stopping. For continuous mode operation, the PWM should first be configured for mode, period, and first-phase duration, along with other configuration options. The PWM uses the last programmed set of parameters once it is started by writing a 1 to the START bit in the PWM start register (START). Unlike the one-shot mode, the repeat count does not affect the continuous operation. To select continuous mode, configure the MODE bit in the PWM configuration register (CFG) to 2h.

Once started, the PWM asserts/deasserts the output as configured, driving to first-phase output level during the first phase and the opposite level during the second phase. Once a period expires, the next period starts. When a period starts, the PWM copies the period and first-phase duration registers into a set of internal shadow registers and maintains the counts there. An interrupt is also generated (if enabled) after the registers are copied. This buffering scheme and interrupt timing allows the CPU or EDMA to program the durations for the next period while the current period is running.

The PWM is stopped during the continuous mode operation by either disabling it or by reconfiguring it to one-shot mode using the MODE bit. Whenever the PWM is disabled, the output is immediately driven to the configured inactive state. To allow the PWM to stop gracefully from continuous operation, upon an interrupt, configure the PWM to one-shot mode operation. The PWM then operates for RPT + 1 periods and stops by itself (sending an interrupt, if enabled). Note that unlike normal one-shot mode operation, another write to the START bit is not required for the one-shot mode operation to start.

While operating in continuous mode, the minimum period for the PWM is 8 cycles.

Figure 4 shows programming of period/first-phase-duration, and the resulting output waveform, and interrupt signal for continuous operation.

**Figure 4. PWM Continuous Mode Operation (P1OUT = 1, INACTOUT = 0, EVTRIG = 1, PWM_RPT = 0)**
2.4 Reset Considerations

2.4.1 Software Reset Considerations
A software reset (such as a reset generated by the emulator) causes the PWM peripheral registers to return to their default state after reset.

2.4.2 Hardware Reset Considerations
A hardware reset of the processor causes the PWM peripheral registers to return to their default values after reset.

2.5 Initialization
To initialize and start the PWM:
1. Write the desired period duration to the PWM period register (PER)
2. Write the desired first-phase duration to the PWM first-phase duration register (PH1D)
3. If one-shot mode will be used, write the desired repeat value to the PWM repeat count register (RPT).
4. Configure the operating mode, inactive output level, first-phase output level, and event trigger behavior in the CFG register.
5. If interrupts will be used, enable interrupts in the PWM configuration register (CFG).
6. Configure how the PWM responds to emulation suspend events in the PWM peripheral control register (PCR). See Section 2.9 for more information.
7. Start the PWM by writing a 1 to the START bit in the PWM start register (START).

2.6 Interrupt Support
There is a single interrupt from the CPU interrupt controller for each PWM instance.

When the PWM is configured in one-shot mode and the interrupt bit (INTEN) in the PWM CFG register is enabled, the peripheral generates an interrupt when RPT+1 number of periods have been completed.

When the PWM is configured in continuous mode and the interrupt bit (INTEN) in the PWM configuration register (CFG) is enabled, the PWM peripheral generates an interrupt every period after the first-phase duration register and period register values have been copied to the associated shadow registers. This event indicates it is safe to program the duration values for the next period.

2.6.1 Interrupt Multiplexing
The interrupts from the PWM peripheral instances are not multiplexed with any other interrupt sources on the DMSoC.

2.7 EDMA Event Support
The PWM provides EDMA synchronization events to allow the EDMA to update the values for the first-phase duration and period registers. The EDMA events occur at the same times as the interrupts previously described. For detailed information on EDMA synchronization events, see the device-specific data manual.
2.8 Power Management

The PWM peripheral can be placed in reduced-power modes to conserve power during periods of low activity. The power management of the PWM peripheral is controlled by the processor Power and Sleep Controller (PSC). The PSC acts as a master controller for power management for all of the peripherals on the device. For detailed information on power management procedures using the PSC, see the TMS320DM357 DMSoC ARM Subsystem Reference Guide (SPRUG25).

When the PWM peripheral exits the power-down state, it will resume normal function (no register values are altered), but a write to the START bit is required to restart operation. If the PWM was configured to be event-triggered before power-down, a trigger event will also be required to restart the PWM after it exits the power-down state.

2.9 Emulation Considerations

The PWM implements a FREE bit in the PWM peripheral control register (PCR) to determine operation during an emulation stop. If FREE is set to 1, the PWM continues to run during an emulation stop; if FREE is cleared to 0 (default), then the following occurs:

- Suspend operation immediately.
- Freeze PWM output at its current state.
- Suspend internal counters.
- Suspend interrupt generation.
- Keep the event capture circuitry functional. If the PWM is configured for event-triggered operation and is waiting for an event, an event coming in during suspend is registered and the PWM period starts as soon as the emulation suspend is deasserted.

3 Registers

Table 1 lists the memory-mapped registers for the pulse-width modulator (PWM) controller. See the device-specific data manual for the memory addresses of these registers.

<table>
<thead>
<tr>
<th>Offset</th>
<th>Acronym</th>
<th>Register Description</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>PID</td>
<td>PWM Peripheral Identification Register</td>
<td>Section 3.1</td>
</tr>
<tr>
<td>04h</td>
<td>PCR</td>
<td>PWM Peripheral Control Register</td>
<td>Section 3.2</td>
</tr>
<tr>
<td>08h</td>
<td>CFG</td>
<td>PWM Configuration Register</td>
<td>Section 3.3</td>
</tr>
<tr>
<td>0Ch</td>
<td>START</td>
<td>PWM Start Register</td>
<td>Section 3.4</td>
</tr>
<tr>
<td>10h</td>
<td>RPT</td>
<td>PWM Repeat Count Register</td>
<td>Section 3.5</td>
</tr>
<tr>
<td>14h</td>
<td>PER</td>
<td>PWM Period Register</td>
<td>Section 3.6</td>
</tr>
<tr>
<td>18h</td>
<td>PH1D</td>
<td>PWM First-Phase Duration Register</td>
<td>Section 3.7</td>
</tr>
</tbody>
</table>
3.1 Pulse Width Modulator (PWM) Peripheral Identification Register (PID)

The pulse-width modulator (PWM) peripheral identification register (PID) contains identification data (type, class, and revision) for the peripheral. PID is shown in Figure 5 and described in Table 2.

**Figure 5. Pulse Width Modulator (PWM) Peripheral Identification Register (PID)**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-24</td>
<td>Reserved</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>23-16</td>
<td>TID</td>
<td>0-FFh</td>
<td>Identifies type of peripheral.</td>
</tr>
<tr>
<td>15-8</td>
<td>CID</td>
<td>0-FFh</td>
<td>Identifies class of peripheral.</td>
</tr>
<tr>
<td>7-0</td>
<td>REV</td>
<td>0-FFh</td>
<td>Identifies revision of peripheral.</td>
</tr>
</tbody>
</table>

**LEGEND: R = Read only; -n = value after reset**

**Table 2. Pulse Width Modulator (PWM) Peripheral Identification Register (PID) Field Descriptions**

3.2 Pulse Width Modulator (PWM) Peripheral Control Register (PCR)

The pulse-width modulator (PWM) peripheral control register (PCR) is shown in Figure 6 and described in Table 3.

**Figure 6. Pulse Width Modulator (PWM) Peripheral Control Register (PCR)**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>FREE</td>
<td>0</td>
<td>Free-running enable mode bit. This bit determines the behavior of the PWM when an emulation suspend event occurs (halt or breakpoint). The PWM stops immediately. Free-running mode is enabled; the PWM continues to run free.</td>
</tr>
</tbody>
</table>

**Table 3. Pulse Width Modulator (PWM) Peripheral Control Register (PCR) Field Descriptions**

LEGEND: R/W = Read/Write; R = Read only; -n = value after reset
### 3.3 Pulse Width Modulator (PWM) Configuration Register (CFG)

The pulse-width modulator (PWM) configuration register (CFG) is shown in Figure 7 and described in Table 4.

#### Figure 7. Pulse Width Modulator (PWM) Configuration Register (CFG)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-18</td>
<td>Reserved</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>17</td>
<td>OPST</td>
<td>0</td>
<td>Idle mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Running mode</td>
</tr>
<tr>
<td>16</td>
<td>CURLEV</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>High</td>
</tr>
<tr>
<td>15-7</td>
<td>Reserved</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>6</td>
<td>INTEN</td>
<td>0</td>
<td>Disable interrupt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Enable interrupt</td>
</tr>
<tr>
<td>5</td>
<td>INACTOUT</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>P1OUT</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>High</td>
</tr>
<tr>
<td>3-2</td>
<td>EVTRIG</td>
<td>0-3h</td>
<td>Event trigger.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1h</td>
<td>Positive edge triggered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2h</td>
<td>Negative edge triggered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3h</td>
<td>Reserved</td>
</tr>
<tr>
<td>1-0</td>
<td>MODE</td>
<td>0-3h</td>
<td>Operating mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1h</td>
<td>One shot mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2h</td>
<td>Continuous mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3h</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Legend: R/W = Read/Write; R = Read; -n = value at reset

#### Table 4. Pulse Width Modulator (PWM) Configuration Register (CFG) Field Descriptions
3.4  *Pulse Width Modulator (PWM) Start Register (START)*

The pulse-width modulator (PWM) start register (START) is shown in Figure 8 and described in Table 5.

![Figure 8. Pulse Width Modulator (PWM) Start Register (START)](image)

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-1</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>0</td>
<td>START</td>
<td>PWM start bit. Writing a 1 to this bit starts the PWM.</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>No effect</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Start PWM.</td>
</tr>
</tbody>
</table>

LEGEND: R/W = Read/Write; W= Write only; -n = value after reset

![Table 5. Pulse Width Modulator (PWM) Start Register (START) Field Descriptions](image)

3.5  *Pulse Width Modulator (PWM) Repeat Count Register (RPT)*

The pulse-width modulator (PWM) repeat count register (RPT) is shown in Figure 9 and described in Table 6.

![Figure 9. Pulse Width Modulator (PWM) Repeat Count Register (RPT)](image)

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-8</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>7-0</td>
<td>RPT</td>
<td>One-shot mode repeat count is RPT + 1.</td>
</tr>
</tbody>
</table>

LEGEND: R/W = Read/Write; R = Read only; -n = value after reset

![Table 6. Pulse Width Modulator (PWM) Repeat Count Register (RPT) Field Descriptions](image)
3.6 Pulse Width Modulator (PWM) Period Register (PER)

The pulse-width modulator (PWM) period register (PER) is shown in Figure 10 and described in Table 7.

**Figure 10. Pulse Width Modulator (PWM) Period Register (PER)**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-0</td>
<td>PER</td>
<td>0-FFFF FFFFh</td>
<td>Output period is PER + 1 clock cycles.</td>
</tr>
</tbody>
</table>

**Table 7. Pulse Width Modulator (PWM) Period Register (PER) Field Descriptions**

3.7 Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D)

The pulse-width modulator (PWM) first-phase duration register (PH1D) is shown in Figure 11 and described in Table 8.

**Figure 11. Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D)**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-0</td>
<td>PH1D</td>
<td>0-FFFF FFFFh</td>
<td>First-phase duration is PH1D clock cycles.</td>
</tr>
</tbody>
</table>

**Table 8. Pulse Width Modulator (PWM) First-Phase Duration Register (PH1D) Field Descriptions**
Appendix A  Revision History

Table 9 lists the changes made since the previous version of this document.

Table 9. Document Revision History

<table>
<thead>
<tr>
<th>Reference</th>
<th>Additions/Modifications/Deletions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 5</td>
<td>Changed reset value for all bits.</td>
</tr>
<tr>
<td>Table 2</td>
<td>Changed table.</td>
</tr>
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</table>
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