



Imperas Peripheral Model Guide

Model Specific Information for xilinx.ovpworld.org / zynq_7000-can

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Model Release Status

This model is released as part of OVP releases and is included in OVPworld packages. Please visit OVPworld.org.

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1.0 Model Specific Information

This document provides usage information for an Imperas OVP peripheral behavioral model.

The document is split into sections providing specific information for this peripheral, including any ports for connecting into a platform, registers, other component parts, and configuration options and general information for peripheral modeling with Imperas OVP.

1.1 Description

Zynq 7000 CAN Registers

1.2 Licensing

Open Source Apache 2.0

1.3 Limitations

This model implements the full set of registers but no behavior.

1.4 Reference

Zynq-7000 TRM

(https://www.xilinx.com/support/documentation/user_guides/ug585-Zynq-7000-TRM.pdf)

1.5 Location

The zynq_7000-can peripheral model is located in an Imperas/OVP installation at the VLNV: [xilinx.ovpworld.org / peripheral / zynq_7000-can / 1.0](https://xilinx.ovpworld.org/peripheral/zynq_7000-can/1.0).

2.0 Net Ports

This model has the following net ports:

Table 1. Net Ports

Name	Type	Must Be Connected	Description
intOut	output	F (False)	

3.0 Bus Slave Ports

This model has the following bus slave ports:

3.1 Bus Slave Port: bport1

Table 2. Bus Slave Port: bport1

Name	Size (bytes)	Must Be Connected	Description
bport1	0x1000	T (True)	

Table 3. Bus Slave Port: bport1 Registers:

Name	Offset	Width (bits)	Description	R/W	is Volatile

ab_SRR	0x0	32	Software Reset Register		
ab_MSR	0x4	32	Mode Select Register		
ab_BRPR	0x8	32	Baud Rate Prescaler Register		
ab_BTR	0xc	32	Bit Timing Register		
ab_ECR	0x10	32	Error Counter Register		
ab_ESR	0x14	32	Error Status Register		
ab_SR	0x18	32	Status Register		
ab_ISR	0x1c	32	Interrupt Status Register		
ab_IER	0x20	32	Interrupt Enable Register		
ab_ICR	0x24	32	Interrupt Clear Register		
ab_TCR	0x28	32	Timestamp Control Register		
ab_WIR	0x2c	32	Watermark Interrupt Register		
ab_TXFIFO_ID	0x30	32	transmit message fifo message identifier		
ab_TXFIFO_DLC	0x34	32	transmit message fifo data length code		
ab_TXFIFO_DATA1	0x38	32	transmit message fifo data word 1		
ab_TXFIFO_DATA2	0x3c	32	transmit message fifo data word 2		
ab_TXHPB_ID	0x40	32	transmit high priority buffer message identifier		
ab_TXHPB_DLC	0x44	32	transmit high priority buffer data length code		
ab_TXHPB_DATA1	0x48	32	transmit high priority buffer data word 1		
ab_TXHPB_DATA2	0x4c	32	transmit high priority buffer data word 2		
ab_RXFIFO_ID	0x50	32	receive message fifo message identifier		
ab_RXFIFO_DLC	0x54	32	receive message fifo data length code		
ab_RXFIFO_DATA1	0x58	32	receive message fifo data word 1		
ab_RXFIFO_DATA2	0x5c	32	receive message fifo data word 2		
ab_AFR	0x60	32	Acceptance Filter Register		
ab_AFMR1	0x64	32	Acceptance Filter Mask Register 1		
ab_AFIR1	0x68	32	Acceptance Filter ID Register 1		
ab_AFMR2	0x6c	32	Acceptance Filter Mask Register 2		
ab_AFIR2	0x70	32	Acceptance Filter ID Register 2		
ab_AFMR3	0x74	32	Acceptance Filter Mask Register 3		
ab_AFIR3	0x78	32	Acceptance Filter ID Register 3		
ab_AFMR4	0x7c	32	Acceptance Filter Mask		

			Register 4		
ab_AFIR4	0x80	32	Acceptance Filter ID Register 4		

4.0 Platforms that use this peripheral component

Peripheral components can be used in many different platforms, including those developed by Imperas or by other users of OVP. You can use this peripheral in your own platforms.

Table 4. Publicly available platforms using peripheral 'zynq_7000-can'

Platform Name	Vendor
Zynq_PS	xilinx.ovpworld.org

5.0 Peripheral components in the library

Table 5. Publicly available Imperas/OVP peripheral models (224 models)

Peripheral	Peripheral	Peripheral
xilinx.ovpworld.org/zynq_7000-ddrc	xilinx.ovpworld.org/zynq_7000-devcfg	xilinx.ovpworld.org/zynq_7000-dmac
xilinx.ovpworld.org/zynq_7000-gpio	xilinx.ovpworld.org/zynq_7000-iic	xilinx.ovpworld.org/zynq_7000-ocm
xilinx.ovpworld.org/zynq_7000-qos301	xilinx.ovpworld.org/zynq_7000-qspi	xilinx.ovpworld.org/zynq_7000-sdio
xilinx.ovpworld.org/zynq_7000-slcr	xilinx.ovpworld.org/zynq_7000-spi	xilinx.ovpworld.org/zynq_7000-swdt
xilinx.ovpworld.org/zynq_7000-ttc	xilinx.ovpworld.org/zynq_7000-tz_GPVsecurity	xilinx.ovpworld.org/zynq_7000-tz_security
xilinx.ovpworld.org/zynq_7000-usb	altera.ovpworld.org/dw-apb-timer	altera.ovpworld.org/dw-apb-uart
altera.ovpworld.org/IntervalTimer32Core	altera.ovpworld.org/IntervalTimer64Core	altera.ovpworld.org/JtagUart
altera.ovpworld.org/PerformanceCounterCore	altera.ovpworld.org/RSTMGR	altera.ovpworld.org/SystemIDCore
altera.ovpworld.org/Uart	amd.ovpworld.org/79C970	andes.ovpworld.org/ATCUART100
andes.ovpworld.org/NCEPLIC100	andes.ovpworld.org/NCEPLMT100	arm.ovpworld.org/AaciPL041
arm.ovpworld.org/CompactFlashRegs	arm.ovpworld.org/CoreModule9x6	arm.ovpworld.org/DebugLedAndDipSwitch
arm.ovpworld.org/DMemCtrlPL341	arm.ovpworld.org/IcpControl	arm.ovpworld.org/IcpCounterTimer
arm.ovpworld.org/IntICP	arm.ovpworld.org/IntICP	arm.ovpworld.org/KbPL050
arm.ovpworld.org/L2CachePL310	arm.ovpworld.org/LcdPL110	arm.ovpworld.org/MmciPL181
arm.ovpworld.org/RtcPL031	arm.ovpworld.org/SerBusDviRegs	arm.ovpworld.org/SmartLoaderArm64Linux
arm.ovpworld.org/SmartLoaderArmLinux	arm.ovpworld.org/SMemCtrlPL354	arm.ovpworld.org/SysCtrlSP810
arm.ovpworld.org/TimerSP804	arm.ovpworld.org/TzpcBP147	arm.ovpworld.org/UartPL011
arm.ovpworld.org/VexpressSysRegs	arm.ovpworld.org/WdtSP805	atmel.ovpworld.org/AdvancedInterruptController
atmel.ovpworld.org/ParallelIIOController	atmel.ovpworld.org/PowerSaving	atmel.ovpworld.org/SpecialFunction
atmel.ovpworld.org/TimerCounter	atmel.ovpworld.org/UsartInterface	atmel.ovpworld.org/WatchdogTimer
cadence.ovpworld.org/gem	cadence.ovpworld.org/uart	cirrus.ovpworld.org/GD5446
freescale.ovpworld.org/KinetisADC	freescale.ovpworld.org/KinetisAIPS	freescale.ovpworld.org/KinetisAXBS
freescale.ovpworld.org/KinetisCAN	freescale.ovpworld.org/KinetisCMP	freescale.ovpworld.org/KinetisCMT
freescale.ovpworld.org/KinetisCRC	freescale.ovpworld.org/KinetisDAC	freescale.ovpworld.org/KinetisDDR
freescale.ovpworld.org/KinetisDMA	freescale.ovpworld.org/KinetisDMAC	freescale.ovpworld.org/KinetisDMAMUX
freescale.ovpworld.org/KinetisENET	freescale.ovpworld.org/KinetisEWM	freescale.ovpworld.org/KinetisFB
freescale.ovpworld.org/KinetisFMC	freescale.ovpworld.org/KinetisFTFE	freescale.ovpworld.org/KinetisFTM
freescale.ovpworld.org/KinetisGPIO	freescale.ovpworld.org/KinetisI2C	freescale.ovpworld.org/KinetisI2S
freescale.ovpworld.org/KinetisLLWU	freescale.ovpworld.org/KinetisLPTMR	freescale.ovpworld.org/KinetisMCG
freescale.ovpworld.org/KinetisMPU	freescale.ovpworld.org/KinetisNFC	freescale.ovpworld.org/KinetisOSC
freescale.ovpworld.org/KinetisPDB	freescale.ovpworld.org/KinetisPIT	freescale.ovpworld.org/KinetisPMC
freescale.ovpworld.org/KinetisPORT	freescale.ovpworld.org/KinetisRCM	freescale.ovpworld.org/KinetisRFSYS
freescale.ovpworld.org/KinetisRFVBAT	freescale.ovpworld.org/KinetisRNG	freescale.ovpworld.org/KinetisRTC
freescale.ovpworld.org/KinetisSDHC	freescale.ovpworld.org/KinetisSIM	freescale.ovpworld.org/KinetisSMC
freescale.ovpworld.org/KinetisSPI	freescale.ovpworld.org/KinetisTSI	freescale.ovpworld.org/KinetisUART
freescale.ovpworld.org/KinetisUSB	freescale.ovpworld.org/KinetisUSBDCD	freescale.ovpworld.org/KinetisUSBHS
freescale.ovpworld.org/KinetisVREF	freescale.ovpworld.org/KinetisWDOG	freescale.ovpworld.org/Uart
freescale.ovpworld.org/VybridADC	freescale.ovpworld.org/VybridANADIG	freescale.ovpworld.org/VybridCCM
freescale.ovpworld.org/VybridDMA	freescale.ovpworld.org/VybridGPIO	freescale.ovpworld.org/VybridI2C
freescale.ovpworld.org/VybridLCD	freescale.ovpworld.org/VybridQUADSPI	freescale.ovpworld.org/VybridSDHC
freescale.ovpworld.org/VybridSPI	freescale.ovpworld.org/VybridUART	freescale.ovpworld.org/VybridUSB
imperas.ovpworld.org/frameBuffer	imperas.ovpworld.org/uart	imperas.ovpworld.org/usecCounter
intel.ovpworld.org/82077AA	intel.ovpworld.org/82371EB	intel.ovpworld.org/8253

intel.ovpworld.org/8259A	intel.ovpworld.org/NorFlash48F4400	intel.ovpworld.org/PciIDE
intel.ovpworld.org/PciPM	intel.ovpworld.org/PciUSB	intel.ovpworld.org/Ps2Control
marvell.ovpworld.org/GT6412x	maxim.ovpworld.org/max673x	microsemi.ovpworld.org/CoreUARTapb
mips.ovpworld.org/16450C	mips.ovpworld.org/MaltaFPGA	mips.ovpworld.org/SmartLoaderLinux
motorola.ovpworld.org/MC146818	national.ovpworld.org/16450	national.ovpworld.org/16550
national.ovpworld.org/16550_4bytes	nxp.ovpworld.org/iMX6_Analog	nxp.ovpworld.org/iMX6_CCM
nxp.ovpworld.org/iMX6_GPC	nxp.ovpworld.org/iMX6_GPIO	nxp.ovpworld.org/iMX6_GPT
nxp.ovpworld.org/iMX6_MMDC	nxp.ovpworld.org/iMX6_SDHC	nxp.ovpworld.org/iMX6_SRC
nxp.ovpworld.org/iMX6_UART	nxp.ovpworld.org/iMX6_WDOG	ovpworld.org/Alpha2x16Display
ovpworld.org/DynamicBridge	ovpworld.org/FlashDevice	ovpworld.org/ledRegister
ovpworld.org/SerInt	ovpworld.org/SimpleDma	ovpworld.org/switchRegister
ovpworld.org/temperatureSensor	ovpworld.org/trap	ovpworld.org/trap4K
ovpworld.org/vEthernet_Bridge	ovpworld.org/VirtioBlkMMIO	ovpworld.org/VirtioNetMMIO
philips.ovpworld.org/ISP1761	renesas.ovpworld.org/adc	renesas.ovpworld.org/bcu
renesas.ovpworld.org/brg	renesas.ovpworld.org/can	renesas.ovpworld.org/can
renesas.ovpworld.org/clkgen	renesas.ovpworld.org/crc	renesas.ovpworld.org/csib
renesas.ovpworld.org/csie	renesas.ovpworld.org/dma	renesas.ovpworld.org/intc
renesas.ovpworld.org/memc	renesas.ovpworld.org/rng	renesas.ovpworld.org/taa
renesas.ovpworld.org/tms	renesas.ovpworld.org/tmt	renesas.ovpworld.org/uartc
renesas.ovpworld.org/UPD70F3441Logic	riscv.ovpworld.org/CLINT	riscv.ovpworld.org/PLIC
riscv.ovpworld.org/SmartLoaderRV64Linux	safepower.ovpworld.org/node	safepower.ovpworld.org/NostrumNode
safepower.ovpworld.org/ring_oscillator	safepower.ovpworld.org/TTElNode	sifive.ovpworld.org/gpio
sifive.ovpworld.org/MSEL	sifive.ovpworld.org/PRCI	sifive.ovpworld.org/pwm
sifive.ovpworld.org/spi	sifive.ovpworld.org/teststatus	sifive.ovpworld.org/UART
smc.ovpworld.org/LAN9118	smc.ovpworld.org/LAN91C111	ti.ovpworld.org/tca6416a
ti.ovpworld.org/UartInterface	ti.ovpworld.org/ucd9012a	ti.ovpworld.org/ucd9248
vendor.com/fifo	xilinx.ovpworld.org/axi-gpio	xilinx.ovpworld.org/axi-intc
xilinx.ovpworld.org/axi-pcie	xilinx.ovpworld.org/axi-timer	xilinx.ovpworld.org/logicore-fit
xilinx.ovpworld.org/mdm	xilinx.ovpworld.org/mpmc	xilinx.ovpworld.org/xps-gpio
xilinx.ovpworld.org/xps-iic	xilinx.ovpworld.org/xps-intc	xilinx.ovpworld.org/xps-ll-temac
xilinx.ovpworld.org/xps-mch-emc	xilinx.ovpworld.org/xps-sysace	xilinx.ovpworld.org/xps-timer
xilinx.ovpworld.org/xps-uartlite	xilinx.ovpworld.org/zynq_7000-can	

6.0 General Information on Peripheral Models

This document provides usage information for an Imperas OVP peripheral behavioral model.

The document is split into sections providing specific information for this peripheral, including any ports for connecting into a platform, registers etc. and configuration options and general information for peripheral modeling with Imperas OVP.

6.1 Background

Imperas OVP simulation technology enables very high performance simulation, debug and analysis of platforms containing multiple processors and peripheral models. The technology is designed to be extensible: you can create new models of processors, peripherals and other platform components using interfaces and libraries defined by OVP.

The peripheral models created using the OVP APIs run on the Peripheral Simulation Engine (PSE).

The model is typically written in C and compiled into an executable for the PSE processor architecture. The model is compiled for speed of execution and to protect IP. It is dynamically loaded by the simulator at run time.

7.0 Building peripherals easily with Imperas iGen

To aid with model creation, Imperas products include iGen, a model generation tool. iGen takes the laborious and error-prone task of constructing the various hardware model and software element files required for a typical model, and automates this process. iGen creates the needed C files. iGen also creates the C++ SystemC TLM2 interface files needed to run peripheral models in SystemC simulations.

iGen takes as input a simple script specification that includes device internals such as registers and memories, port information, component descriptors, and other elements. iGen then builds the C code model files and user editable templates. These include model frameworks with registers, function calls, memory map, and other items. It ensures that all component parts of the model are well-structured using best practices, and are consistent throughout the files, thus eliminating a common source of errors.

More information on iGen can be found: imperas.com/products.

8.0 Peripheral model internals

Each instance of a peripheral model runs on its own virtual machine with an address space large enough for the model. This processor (the PSE) and its memory are separate from any processors, memories and buses in the platform being simulated; they exist only to execute the code of the peripheral model.

Interception of functions defined in the peripheral model allows the use of features of the host system in the

implementation of the behavior of a peripheral. As an example, a real platform might contain a video display device. When simulating this system, it is generally more convenient not to simulate the complete video display device but to use a video package available on the host machine, such as SDL, and to use this to render to the host display. Also models of uarts, ethernet devices and USB components can make use of the host PC resources during simulation, to allow, for example, a simulation to browse the real internet, or the simulation to connect to a real USB device.

9.0 Parts of peripheral models

9.1 *Configuring the Peripheral Instance with Parameters*

A peripheral can include the behaviour of several configurations. These are controlled when the peripheral is instanced in the platform by setting parameters defined on the peripheral.

9.2 *Net Ports*

Peripherals may be connected to other peripherals or processors with signal wires (nets). These can be used to act as interrupt signals or used to control behavior between peripherals.

The wires are created in the platform as nets and this net is connected into the peripheral using a net port.

9.3 *Bus master ports*

A bus master port initiates (and controls the address of) a bus cycle. Bus cycles are generated by behavioral code within the peripheral model.

9.4 *Bus slave ports*

A peripheral can be defined as having several bus slave ports. The bus slave ports can be split into several address blocks. Each address block be either local memory or memory mapped registers. Both of these can have associated callback functions. A memory mapped register can also be defined as specific read/write access, whether it is volatile, and also whether it is associated with a reset pin and mask. A memory mapped register can also have specific bit fields defined.

9.5 *Packetnets*

A peripheral can be defined as being connected to packetnet ports. A packetnet is used to model packet based communication such as Ethernet, CAN bus or GSM. A packetnet is created in a platform, then connected to packetnet ports on model instances. A packetnet can have many connections, each able to send or receive packets. A packetnet is used as an efficient method of communication within OVP models.

For more information on modeling with packetnets, please see the peripheral modeling documentation: [OVP_Peripheral_Modeling_Guide.pdf](#), [OVPSim_and_CpuManager_User_Guide.pdf](#) and the example: [\\$IMPERAS_HOME/Examples/Models/Peripherals/packetnet](#).

10.0 More information (documentation) on peripheral models and modeling

More information on modeling and APIs can be found at: OVPworld.org/technology_apis.

Specifics on modeling peripherals can be found: [OVP Peripheral Modeling Guide.pdf](#).

A full list of the currently available OVP documentation is available: [OVPworld.org/documentation](#).

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