

# SmartDV™

Proven and Trusted Smart Design and Verification Solutions™

## VERIFICATION

Industry's Most  
Comprehensive Portfolio

Full Design Cycle Support:  
Verification IP, Formal,  
Emulation, Post-Silicon

New! RISC-V CPU Verification  
Platform

## SUPPORT

Rapid, On-Demand Creation  
and Customization of  
Design IP and Verification IP

Verification and Design  
Services

## DESIGN

All Protocols Supported

Rapid, On-Demand  
Customization

# The World's Largest Portfolio ...

## Verification IP

Protocol	Verification IP SimXL *	Assertion IP	Post-Silicon VIP	Protocol	Verification IP SimXL *	Assertion IP	Post-Silicon VIP	Protocol	Verification IP SimXL *	Assertion IP	Post-Silicon VIP	Protocol	Verification IP SimXL *	Assertion IP	Post-Silicon VIP
AMBA 3 AHB	✓	✓	✓	* CAN XL	✓			Ethernet 10G	✓	✓		FPMRAM	✓		
AMBA 3 AHB Bus	✓	✓	✓	CCIX 1.0	✓			Ethernet 10G 64b/66b WIS	✓	✓		FRAM	✓		
AMBA 3 AHB-Lite	✓	✓	✓	CJTAG (IEEE 1149.7)	✓			Ethernet 10G TBI (PCS)	✓	✓		G.999.1	✓		
AMBA 3 AHB-Lite Bus	✓	✓	✓	CoaXPress (CXP)	✓			Ethernet 10G	✓	✓		GCI	✓	✓	
AMBA 3 APB	✓	✓	✓	Compact Flash	✓			XAU/10GBase-KX4	✓	✓		GDDR2	✓	✓	
AMBA 4 APB	✓	✓	✓	CPRI	✓	✓		Ethernet 10GBase-KR	✓	✓		GDDR2 DFI	✓		
AMBA 5 AHB	✓	✓	✓	CRAM	✓			Ethernet 1G	✓	✓		GDDR3	✓	✓	
AMBA 5 AHB Bus	✓	✓	✓	CXL	✓			Ethernet 2.5GBase-KX/5GBase-KR/2.5GBase-T/5GBase-T	✓	✓		GDDR3 DFI	✓		
AMBA 5 CHI	✓	✓	✓	DALI	✓	✓		Ethernet 200G, 400G	✓	✓		GDDR3L	✓	✓	
AMBA ACE4	✓	✓	✓	DDR	✓	✓	✓	Ethernet 200GBase-KR8/KR4/KR2	✓	✓		GDDR3L DFI	✓		
AMBA ACE4-Lite	✓	✓	✓	DDR DFI	✓	✓	✓	Ethernet 25G, 50G	✓	✓		GDDR4	✓	✓	
AMBA ACE5	✓	✓	✓	DDR2	✓	✓	✓	Ethernet 25GBase-R/KR	✓	✓		GDDR4 DFI	✓		
AMBA ACE5-Lite	✓	✓	✓	DDR2 DFI	✓	✓	✓	Ethernet 400GBase-KR4/KR8/KR16	✓	✓		GDDR5	✓	✓	✓
AMBA ATB	✓	✓	✓	DDR2 Monitor	✓			Ethernet 40G, 100G	✓	✓		GDDR5 DFI	✓		
AMBA AXI3	✓	✓	✓	DDR3	✓	✓	✓	Ethernet 40GBase-KR4/CR4/SR4/LR4/KR2	✓	✓		GDDR5X	✓	✓	✓
AMBA AXI3 Interconnect	✓	✓	✓	DDR3 3DS	✓	✓		Ethernet 50GBase-KR/KR2	✓	✓		GDDR5X DFI	✓		
AMBA AXI4	✓	✓	✓	DDR3 DFI	✓	✓	✓	Ethernet 800G	✓	✓		GDDR6	✓	✓	✓
AMBA AXI4 Interconnect	✓	✓	✓	DDR3 DIMM	✓			Ethernet AVB	✓	✓		GDDR6 DFI	✓	✓	✓
AMBA AXI4-Lite	✓	✓	✓	DDR3 Monitor	✓			Ethernet CGMII 100G	✓	✓		* GDDR6X	✓		
AMBA AXI4-Lite Interconnect	✓	✓	✓	DDR3L	✓	✓		Ethernet GMII TBI (8b/10b)	✓	✓		* GDDR7	✓	✓	✓
AMBA AXI4-Stream	✓	✓	✓	DDR4	✓	✓	✓	Ethernet MII/SMII/RMII/GMII/RGMII	✓	✓		GDDR7 DFI	✓		
AMBA AXI4-Stream Interconnect	✓	✓	✓	DDR4 3DS	✓	✓		Ethernet SGMII/1000Base-KX	✓	✓		GENZ	✓		
AMBA AXI5	✓	✓	✓	DDR4 3DS DIMM	✓			Ethernet TSN	✓	✓		GHBM	✓	✓	✓
AMBA AXI5 Interconnect	✓	✓	✓	DDR4 DB	✓			Ethernet XGMII	✓	✓		HBM	✓	✓	✓
AMBA AXI5-Lite	✓	✓	✓	DDR4 DFI	✓	✓	✓	Ethernet XLGMII 40G	✓	✓		HBM DFI	✓	✓	✓
AMBA AXI5-Lite Interconnect	✓	✓	✓	DDR4 DIMM	✓			eUSB	✓			HBM2E	✓	✓	✓
AMBA CXS	✓	✓	✓	DDR4 RCD	✓			Excelon FRAM	✓			HBM2E DFI	✓	✓	✓
AMBA LPI	✓	✓	✓	DDR5	✓	✓	✓	External Memory Interface (EMIF)	✓			HBM3	✓	✓	✓
ARINC 419	✓	✓		DDR5 DFI	✓	✓	✓	FCoE	✓			* HBM3 DFI	✓		
ARINC 429	✓	✓		DDR5 DIMM	✓			FCRAM	✓	✓		HDMI 1.4/2.0/2.1	✓	✓	
ARINC 818	✓			DDR5 NVRAM	✓			Fibre Channel	✓	✓		HMC	✓	✓	
ARINC 825	✓	✓	✓	Display Port	✓	✓		FlexRay	✓	✓		HyperBus	✓	✓	
Avalon	✓			Display Port 2.0	✓	✓		* FPD-Link (Flat Panel Display Link)	✓			HyperFlash	✓		
AVCI (Advanced VCI)	✓			DMX	✓	✓						HyperRAM	✓		
AVSBus	✓	✓		eCPRI	✓	✓						I2C	✓	✓	✓
BISS	✓			EDORAM	✓							I2S	✓	✓	
BVCI (Basic VCI)	✓			Embedded Display Port (eDP)	✓							IEC61162	✓		
Camera Link HS	✓			eMMC	✓	✓						Interlaken	✓	✓	
Camera Parallel Interface (CPI)	✓	✓		eSPI (Enhanced Serial Peripheral Interface)	✓	✓	✓					IPMB	✓		
CAN	✓	✓		EtherCAT	✓	✓						JESD204	✓	✓	
				Ethernet - up to 800G	✓	✓						JESD207	✓	✓	
				Ethernet 100BASE-T1	✓	✓						* JESD403 (Sideband Bus)	✓		
				Ethernet 100GBase-KR10/CR10/SR10/LR4	✓	✓						JTAG (IEEE 1149.1/1149.6)	✓	✓	✓

\* SimXL (Synthesizable Transactors)

**\*NEW**

# ... of Design IP and Verification IP

## Verification IP

Protocol	Verification IP	SimXL*	Assertion IP	Post-Silicon VIP	Protocol	Verification IP	SimXL*	Assertion IP	Post-Silicon VIP	Protocol	Verification IP	SimXL*	Assertion IP	Post-Silicon VIP	Protocol	Verification IP	SimXL*	Assertion IP	Post-Silicon VIP
Low Latency DRAM	✓	✓			MIPI STP	✓	✓			Safe-By-Wire Plus	✓				SRIOV	✓			
LPC	✓	✓	✓		MIPI UniPro	✓	✓			SafeSPI	✓				SSI (Synchronous Serial Interface)	✓			
LPDDR	✓	✓	✓		MIPI VGI	✓				SAS	✓	✓			SSRAM	✓			
LPDDR DFI	✓	✓	✓		MPCIE	✓				SATA	✓	✓			SVID	✓			
LPDDR2	✓	✓	✓		MPEG2TS	✓				SD Express	✓				SWD (Serial Wire Debug)	✓			
LPDDR2 DFI	✓	✓	✓		MRAM	✓	✓			SDI	✓				* SWP (Single Wire Protocol)	✓			
LPDDR3	✓	✓	✓		NAND Flash	✓	✓			SDIO 8.0	✓				TCAM	✓	✓		
LPDDR3 DFI	✓	✓	✓		NFC	✓	✓			SDIO UHS II	✓				TDM	✓	✓		
LPDDR4	✓	✓	✓		NVDIMM-P	✓	✓			SDRAM	✓	✓	✓		TileLink	✓	✓	✓	
LPDDR4 DFI	✓	✓	✓		NVMe	✓				SENT (SAE J2716)	✓	✓	✓		Toggle Flash	✓			
LPDDR5	✓	✓	✓		nvSRAM	✓				Serial Flash	✓	✓			Trusted Platform Module (TPM)	✓			
LPDDR5 DFI	✓	✓	✓		OBSAI	✓	✓			Serial Front Panel Data Port (SFPDP)	✓				TS5	✓			
LPDDR5X	✓	✓	✓		OCP	✓	✓	✓		Serial NOR Flash	✓	✓			Twin Quad NOR Flash	✓			
LPSDR	✓	✓			Octal SPI (Serial Peripheral Interface)	✓				Serial PCM	✓				UART	✓	✓	✓	
LVDS	✓	✓			OCTARAM	✓				Serial PCRAM	✓				* UAS	✓			
MDRAM	✓				Open LVDS Display Interface (OpenLDI)	✓				SGRAM	✓				UFS	✓	✓		
MHL	✓				Open Nand Flash Interface (ONFI)	✓	✓			SIMCARD	✓				USB 1.0/1.1/2.0	✓			
Microsecond Channel (MSC)	✓				Open CAPI	✓	✓			SLC NAND	✓	✓			USB 3.0/3.1/3.2/SSIC	✓			
Microwire	✓	✓			OpenCores Wishbone B3	✓	✓			SLVS-EC	✓				USB 4.0	✓			
MIL STD 1553	✓	✓			ORAN	✓				SmartCard (IEC7816)	✓	✓			USB PD	✓	✓		
MIL STD 1773	✓	✓			Parallel NOR Flash	✓	✓			SMBus	✓	✓	✓		USB TYPE-C	✓			
MIPI APHY	✓				Parallel PCM	✓				SMPTe Serial Data Interface (SDI)	✓	✓			* USIM	✓			
MIPI BIF	✓				Parallel PCRAM	✓				SpaceFibre	✓				V-By-One	✓	✓		
MIPI CPHY	✓				PCI	✓	✓			SpaceWire	✓	✓			VRAM	✓			
MIPI CSI-2	✓	✓			PCI Express	✓	✓			SPDIF (IEC60958)	✓	✓			WIDE IO	✓	✓		
MIPI CSI-3	✓	✓			PDM	✓	✓			SPI (Serial Peripheral Interface)	✓	✓	✓		WIDE IO2	✓	✓		
MIPI DBI	✓				PMBus	✓	✓	✓		SPI (Serial Peripheral Interface) Flash	✓				Wide Range VCC Flash	✓			
MIPI DigRF	✓				PSRAM	✓				SPI NAND Flash	✓				Xccela Flash	✓			
MIPI DPHY	✓				PVCI (Peripheral VCI)	✓	✓			SPI/BOSCH	✓				Xccela PSRAM	✓			
MIPI DPI	✓				QDR2	✓	✓			SPI/EEPROM	✓				XMBus	✓			
MIPI DSI	✓	✓			QDR4	✓	✓			SPI/FRAM	✓				xSPI (Expanded Serial Peripheral Interface)	✓	✓		
MIPI DSI-2	✓	✓			QI	✓				SPI/MACRONIX	✓								
MIPI GbD USB	✓				QSPI (Quad Serial Peripheral Interface)	✓				RapidIO	✓	✓							
MIPI HSI	✓				RDRAM	✓				RDRAM	✓								
MIPI HTI	✓	✓			RERAM	✓				RLDRAM	✓	✓							
MIPI I3C	✓	✓	✓		RLDRAM	✓	✓			RLDRAM2	✓	✓							
MIPI LLI	✓				RLDRAM2	✓	✓			RLDRAM3	✓	✓							
MIPI MPHY	✓	✓			RoCE	✓				RoE	✓								
MIPI RFFE	✓	✓	✓		SAE J1850	✓													
MIPI SLIMbus	✓	✓																	
MIPI SoundWire	✓	✓	✓																
MIPI SoundWire I3S	✓																		
MIPI SPMI	✓	✓	✓																
MIPI SPP	✓																		

\* SimXL (Synthesizable Transactors)

**\*NEW**

## Design IP

AC97 Controller	Ethernet 10G MAC	HDCP 2.x Receiver	MIPI DSI-2 Transmitter	SMPTE SDI Receiver
AFDX 1G MAC	Ethernet 10G TSN MAC	HDCP 2.x Transmitter	MIPI I3C Master	SMPTE SDI Transmitter
AHB Arbiter	Ethernet 10G XAUI PCS	HDMI CEC	MIPI I3C Slave	* SPDIF
AHB Decoder	Ethernet 1G MAC	HDMI eARC Receiver	MIPI I3C Slave To AHB Bridge	SPI Master
AHB Multilayer Interconnect	Ethernet 1G PCS	HDMI eARC Transmitter	MIPI I3C Slave To AXI Bridge	SPI Slave
AHB To APB Bridge	Ethernet 1G TSN MAC	HDMI Sink	MIPI RFFE Master	SPI Slave To AHB Bridge
AVB MAC	Ethernet 200/400G TSN MAC	HDMI Source	MIPI RFFE Slave	SPI Slave To AXI Bridge
AVSBUS Master	Ethernet 200G MAC	I2C Master	MIPI RFFE SPI I2C Slave	* SPI Slave To SOC Bridge
AVSBUS Slave	Ethernet 25G MAC	I2C Slave	MIPI RFFE SPI Slave	TileLink To AHB Bridge
CAN Controller	Ethernet 25G PCS	I2C Slave To AHB Bridge	* MIPI SoundWire Master	TileLink To APB Bridge
CPRI Controller	Ethernet 25G TSN MAC	I2C Slave To AXI Bridge	* MIPI SoundWire Slave	Timer
CXL Controller	Ethernet 40/100G TSN MAC	I2S Controller	MIPI SPMI Master	TSS Master
CXP Device	Ethernet 400G MAC	IEC7816 Slave	* MIPI SPMI Slave AHB Bridge	TSS Slave
CXP Host	Ethernet 40G MAC	IEEE 1149.7 Compact TAP	* MIPI SPMI Slave AXI Bridge	UART Controller
DDR Controller	* Ethernet 40G PCS	IEEE 1149.7 DTS Adapter	* MIPI SPMI Slave DMA	* UFS Device
DDR2 Controller	Ethernet 50G MAC	IEEE 1588	MIPI SPMI Slave	* UFS Host
DDR3 Controller	* Ethernet 50G PCS	INTC	MIPI STP Master	* USB 1.x Device
DDR3L Controller	Ethernet Switch	Interlaken	MIPI UniPro	* USB 2.x Device
DDR4 Controller	* FEC RS (198,194) Decoder	JESD204B Receiver	* MPEG2 Decoder	* USB 2.x Host
DDR5 Controller	* FEC RS (198,194) Encoder	JESD204B Transmitter	* MPEG2 Encoder	* USB 2.x Hub
DFI LPDDR5 PHY	* FEC RS (254,250) Decoder	JESD204C Receiver	* MPEG4 Decoder	* USB 2.x OTG
Display Port Receiver	* FEC RS (254,250) Encoder	JESD204C Transmitter	* MPEG4 Encoder	* USB 3.x Device
Display Port Transmitter	FlexRay Controller	JESD207 BBIC	OCTAL SPI Master	* USB3.x Host
DMA Controller with AHB	GDDR2 Controller	JESD207 RFIC	PCI Master/Slave	* USB 3.x Hub
DMA Controller with AXI	GDDR3 Controller	LIN Controller	PCIE Controller	* USB 3.x OTG
DMA Controller with OCP	GDDR3L Controller	LPC Device	PMBUS Master	* USB PD
DMA Controller with TileLink	GDDR4 Controller	LPC Host	PMBUS Slave	* USB Type-C
eCPRI Controller	GDDR5 Controller	LPDDR Controller	Quad SPI Master	V-By-One Receiver
eDP Receiver	GDDR5X Controller	LPDDR2 Controller	RapidIO EndPoint Controller	V-By-One Transmitter
eDP Transmitter	GDDR6 Controller	LPDDR3 Controller	RTC	* VC1 Decoder
eMMC Device	* GDDR6X Controller	LPDDR4 Controller	SAE J1850	* VC1 Encoder
eMMC Host	GPIO	LPDDR5 Controller	SAE J2716 Controller	VDC-M Decoder
eSPI Controller	* H264 Decoder	LPDDR5X Controller	* SAS Initiator	VDC-M Encoder
eSPI LPC Bridge	* H264 Encoder	MIL STD 1553 Controller	* SATA Host Controller	VESA DSC Decoder
eSPI Master	* H265 Decoder	MIPI ASPMI Slave	SDIO Device	VESA DSC Encoder
eSPI Slave	* H265 Encoder	MIPI BIF Master	SDIO Host	Virtual GPIO
eSPI Slave SOC	HBM2 Controller	MIPI BIF Slave	Serial Flash Controller	* VP8 Decoder
* EtherCAT Slave	HBM2E Controller	MIPI CSI-2 Receiver	SLVS-EC Receiver	* VP8 Encoder
Ethernet 100G MAC	HBM3 Controller	MIPI CSI-2 Transmitter	SLVS-EC Transmitter	Watchdog Timer
* Ethernet 100G PCS	HDCP 1.x Receiver	* MIPI Debug Target	SMBUS Master	XSPI Controller
Ethernet 10G KR PCS	HDCP 1.x Transmitter	MIPI DSI-2 Receiver	SMBUS Slave	

**\*NEW**

For a specific requirement not found in this directory,  
please send email to [info@smart-dv.com](mailto:info@smart-dv.com).

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# SmartDV™

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Design and Verification Solutions™

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