

RISC-V Cores, SoC platforms and SoCs <https://riscv.org/risc-v-cores/>

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 **mgielda** Merge pull request #31 from xfguo/patch-1 ...

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Merge pull request #31 from xfguo/patch-1

last month

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RISC-V Cores and SoC Overview

This document captures the status of various cores and SoCs that endeavor to implement the RISC-V specification. Note that none of these cores/SoCs have passed the in-development RISC-V compliance suite.

Please add to the list and fix inaccuracies - see our [CONTRIBUTING file](#) for details.

Cores

Name	Supplier	Links	Priv. spec	User spec	Primary Language	License
RV32EC_P2	IQonIC Works	Website	1.11	RV32E[M]C/RV32I[M]C	SystemVerilog	IQonIC Works Commercial License
RV32IC_P5	IQonIC Works	Website	1.11	RV32I[M][N][A]C	SystemVerilog	IQonIC Works Commercial License
RV32EC_FMP5	IQonIC Works	Website	Custom	RV32EC	SystemVerilog	IQonIC Works Commercial License
rocket	SiFive, UCB Bar	GitHub	1.11-draft	2.3-draft	Chisel	BSD
freedom	SiFive	GitHub	1.11-draft	2.3-draft	Chisel	BSD
Berkeley Out-of-Order Machine (BOOM)	UCB BAR	Website , GitHub	1.11-draft	2.3-draft	Chisel	BSD

Name	Supplier	Links	Priv. spec	User spec	Primary Language	License
ORCA	VectorBlox	GitHub		RV32IM	VHDL	BSD
RISCY	ETH Zurich, Università di Bologna	GitHub		RV32IMC	SystemVerilog	Solderpad Hardware License v 0.51
Ibex (formerly Zero-riscy)	lowRISC	GitHub	1.11	RV32I[M]C/RV32E[M]C	SystemVerilog	Apache 2
Ariane	ETH Zurich, Università di Bologna	Website , GitHub	1.11-draft	RV64GC	SystemVerilog	Solderpad Hardware License v 0.51
Riscy Processors	MIT CSAIL CSG	Website , GitHub			Bluespec	MIT
RiscyOO	MIT CSAIL CSG	GitHub	1.10	RV64IMAFD	Bluespec	MIT
Lizard	Cornell CSL BRG	GitHub		RV64IM	PyMTL	BSD
Minerva	LambdaConcept	GitHub	1.10	RV32I	nMigen	BSD
OPenV/mriscv	OnChipUIS	GitHub		RV32I(?)	Verilog	MIT
VexRiscv	SpinalHDL	GitHub		RV32I[M][C]	SpinalHDL	MIT
Roa Logic RV12	Roa Logic	GitHub	1.9.1	2.1	SystemVerilog	Non-Commercial License
SCR1	Syntacore	GitHub	1.10	2.2, RV32I/E[MC]	SystemVerilog	SHL v. 2.0
SCR3	Syntacore	Website	1.10	RV[32/64]IMC[A], 2.2, multicore	SystemVerilog	commercial
SCR4	Syntacore	Website	1.10	RV[32/64]IMCF[DA], 2.2, multicore	SystemVerilog	commercial
SCR5	Syntacore	Website	1.10	RV[32/64]IMC[FDA], 2.2, multicore	SystemVerilog	commercial
SCR7	Syntacore	Website	1.10	RV64GC, 2.2, multicore	SystemVerilog	commercial
Hummingbird E200	Bob Hu	GitHub	1.10	2.2, RV32IMAC	Verilog	Apache 2
Shakti	IIT Madras	Website , GitLab	1.11	2.2, RV64IMAFDC	Bluespec	BSD
ReonV	Lucas Castro	GitHub			VHDL	GPL v3
PicoRV32	Clifford Wolf	GitHub		RV32I/E[MC]	Verilog	ISC
MR1	Tom Verbeure	GitHub		RV32I	SpinalHDL	Unlicense
SERV	Olof Kindgren	GitHub		RV32I	Verilog	ISC
SweRV EH1	Western Digital Corporation	GitHub		RV32IMC	SystemVerilog	Apache 2
Reve-R	Gavin Stark	GitHub	1.10	RV32IMAC	CDL	Apache 2

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Bk3	Codasip	Website	1.10	RV32EMC / RV32IM[F]C	Verilog	Codasip EULA
Bk5	Codasip	Website	1.10	RV32IM[F]C / RV64IM[F]C	Verilog	Codasip EULA
Bk7	Codasip	Website	1.10	RV64IMA[F][D][C]	Verilog	Codasip EULA
DarkRISCV	Darklife	GitHub		most of RV32I	Verilog	BSD
RPU	Domipheus Labs	GitHub		RV32I	VHDL	Apache 2
RV01	Stefano Tonello	OpenCores	1.7	2.1, RV32IM	VHDL	LPGL
N22	Andes	Website	1.11	RV32IMAC/EMAC + Andes V5/V5e ext.	Verilog	Andes FreeStart IPEA
N25F	Andes	Website	1.11	RV32GC + Andes V5 ext.	Verilog	Andes Commercial License
D25F	Andes	Website	1.11	RV32GCP + Andes V5 ext.	Verilog	Andes Commercial License
A25	Andes	Website	1.11	RV32GCP + SV32 + Andes V5 ext.	Verilog	Andes Commercial License
A25MP	Andes	Website	1.11	RV32GCP + SV32 + Andes V5 ext. + Multi-core	Verilog	Andes Commercial License
NX25F	Andes	Website	1.11	RV64GC + Andes V5 ext.	Verilog	Andes Commercial License
AX25	Andes	Website	1.11	RV64GCP + SV39/48 + Andes V5 ext.	Verilog	Andes Commercial License
AX25MP	Andes	Website	1.11	RV64GCP + SV39/48 + Andes V5 ext. + Multi-core	Verilog	Andes Commercial License
Instant SoC	FPGA Cores	Website		RV32IM	VHDL	Free Non Commercial
Taiga	Reconfigurable Computing Lab, Simon Fraser University	GitLab		RV32IMA	SystemVerilog	Apache 2
Maestro	João Chrisóstomo	GitHub		RV32I	VHDL	MIT

Name	Supplier	Links	Priv. spec	User spec	Primary Language	License
XuanTie C910	T-Head (Alibaba group)	Website	1.10	RV64GCV + SV39 + ISA Extension + Memory model Extension + multi-core & multi-cluster(16 cores maximum)	Verilog	Alibaba commercial license
XuanTie E902	T-Head (Alibaba group)	Website	1.10	RV32EMC/IMC/EC	Verilog	Alibaba commercial license
BM-310	CloudBEAR	Website	1.10	RV32IMC	SystemVerilog	CloudBEAR Commercial License
BI-350	CloudBEAR	Website	1.10	RV32IMAFC + multi-core	SystemVerilog	CloudBEAR Commercial License
BI-651	CloudBEAR	Website	1.10	RV64GC + multi-core	SystemVerilog	CloudBEAR Commercial License
BI-671	CloudBEAR	Website	1.10	RV64GC + multi-core	SystemVerilog	CloudBEAR Commercial License
SSRV	risclite	Website , GitHub	1.10	RV32IMC	Verilog	Apache 2
RSD	rsd-devel	GitHub		RV32IM	SystemVerilog	Apache 2
Pluto	PQShield	Website	1.11	RV32I[M][C] / RV32E[M][C] + Crypto Functions	Verilog	PQShield Commercial License

SoC platforms

Name	Supplier	Links	Core	License
Rocket Chip	SiFive, UCB BAR	GitHub , Simulator	Rocket	BSD
LowRISC	lowRISC	GitHub	RV32IM	BSD
PULPino	ETH Zurich, Università di Bologna	Website , GitHub	RISCY, Zero-riscy	Solderpad Hardware License v. 0.51
PULPissimo	ETH Zurich, Università di Bologna	Website , GitHub	RISCY, Zero-riscy	Solderpad Hardware License v. 0.51
Ariane SoC	ETH Zurich, Università di Bologna	Website , GitHub	Ariane	Solderpad Hardware License v. 0.51

Name	Supplier	Links	Core	License
OPENPULP	ETH Zurich, Università di Bologna	Website , GitHub	RI5CY, Zero-riscy	Solderpad Hardware License v. 0.51
HERO	ETH Zurich, Università di Bologna	Website , GitHub	RI5CY, Zero-riscy	Solderpad Hardware License v. 0.51
OpenPiton + Ariane	Princeton Parallel Group, ETH Zurich, Università di Bologna	Website , GitHub	Ariane	Solderpad Hardware License v. 0.51, BSD
Briey	SpinalHDL	GitHub	VexRiscv	MIT
Riscy	AleksandarKostovic	GitHub	RV64I	MIT
Raven	RTimothyEdwards, mkkassem (efabless.com)	GitHub	PicoRV32	ISC
PicoSoC	Clifford Wolf	GitHub	PicoRV32	ISC
Icicle	Graham Edgecombe	GitHub	RV32I	ISC
MIV RV32IMA L1 AHB	Microchip	Documentation , IDE , Development Environment	Rocket RV32IMA	Apache 2.0
MIV RV32IMA L1 AXI	Microchip	Documentation , IDE , Development Environment	Rocket RV32IMA	Apache 2.0
MIV RV32IMAF L1 AHB	Microchip	Documentation , IDE , Development Environment	Rocket RV32IMAF	Apache 2.0
FreeStart AE250	Andes	Website	N22	Andes FreeStart: Free for Evaluation
Standard AE250	Andes	Website , IDE	N22	Andes Commerical License
AE350	Andes	Website , IDE	N25F, D25F, A25, A25MP, NX25F, AX25, AX25MP	Andes Commerical License
SCR1 SDK	Syntacore	GitHub	SCR1, SCR _x	SHL 2.0
ESP	SLD Group, Columbia University	Website , GitHub	Ariane	Apache 2.0
Chipyard	UCB BAR	GitHub , Documentation	Rocket, BOOM	BSD
PQSoC	PQShield	Website	Pluto	PQShield Commercial License

SoCs

Include a chip if it has been fabricated and is either available for sale, available for preorder, or running production workloads internally, and if it has at least one RISC-V hard core (no FPGAs, but non-"SoC" products with controller cores are allowed).

Name	Supplier	Links	Core	ISA	OS	Devkit	Avai
FE310-G000	SiFive	Datasheet	E31	RV32IMAC	RTOS	HiFive1	publ since 2016
FE310-G002	SiFive	Product page	E31	RV32IMAC	RTOS	HiFive1 Rev B	ann 2019 avail for preo
Freedom U540	SiFive	Product page	U54 (4 cores), E51 (1 management core)	RV64GC (application cores), RV64IMAC (management core)	Linux	HiFive Unleashed development board	publ since 2018
GAP8	GreenWaves Technologies	Product page	PULP / 1 + 8 RISCY	RV32IMC (+ Priviledged and custom ISA extensions)	RTOS	GAPuino development board	publ since 2018
K210	Kendryte	Product page , Datasheet , GitHub	K210	RV64GC	RTOS	KD233 development board, Sipeed MAIX/M1 development boards	publ since 2018
RV32M1	NXP	Reference Manual and Datasheet	RI5CY + Zero RI5CY + Arm Cortex M4F + Arm Cortex M0+	RV32IMC	RTOS	VEGAboard	avail for preo as of 2018
RavenRV32	efabless	Datasheet , GitHub	PicoRV32	RV32IMAC	RTOS	RavenRV32 DevKit	Limit Quai
PolarFire SoC	Microchip	Product Page , IDE with Renode platform	U54 (4 cores), E51 (management core)	RV64GC(U54), RV64IMAC(E51)	Linux	HiFive Unleashed Expansion Board , PolarFire SoC	HiFiv Unle Expa Boar 2018 Pola SoC - ann Dece 2018
GD32VF103	GigaDevice	Product listing , Datasheets	Bumblebee Core	RV32IMAC	RTOS	GD32VF103V- EVAL, Longan Nano etc.	Publ since 2019