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The Sharp SM5xx CPU Family



Nintendo used a family of 4-bit Sharp microcontrollers across the Game & Watch product line. Each variant differs in ROM capacity, RAM layout, and peripheral features. All variants share a common instruction set and are emulated through a single inheritance hierarchy in `src/devices/cpu/sm510/`.

The table below covers the main variants you will encounter when exploring MAME drivers:

Name	ROM	RAM	Notes
SM5A	1.8 KB	5x13x4 nibbles	Oldest series, ~1980
SM510	2.7 KB	128x4 nibbles	Standard series, non-contiguous ROM map
SM511	4 KB	128x4 nibbles	Adds dedicated melody controller
SM512	4 KB	160x4 nibbles	SM511 with extended LCD RAM
SM530	2 KB	Varies	Later variant, used in select titles

The Soviet Union manufactured licensed clones of these chips, renaming them to KB1013BK1-2 (SM5A), KB1013BK4-2 (SM510), and KB1013BK7-2 (SM511). MAME supports Soviet Elektronika G&W clones through the same driver. MAME's shared SM5xx core source header also cites Sharp semiconductor data books as background documentation for the implementation ¹[2](#).

1. (1986-03) Sharp Semiconductor Data Book, MOS ed.pdf pp. 2, 74-78, 89-97
2. (1990-10) Sharp Microcomputers Data Book.pdf pp. 2, 4, 149-171

release date	Game & Watch series	model num.	Sharp CPU	title * NOT Game & Watch	MAME name	MAME description * NOT Game & Watch	title NA/UK
1980-04-28	Silver	AC-01	SM5A	Ball	gnw_ball	Ball	NA Toss-Up
1980-06-05	Silver	FL-02	SM5A	Flagman	gnw_flagman	Flagman	NA Flag Man
1980-07-10	Silver	MT-03	SM5A	Vermin	gnw_vermin	Vermin	NA The Exterminator
1980-07-31	Silver	RC-04	SM5A	Fire	gnw_fires	Fire (Silver)	NA Fireman Fireman
1980-10-04	Silver	IP-05	SM5A	Judge	gnw_judgeo	Judge (green version)	
1980-10-04	Silver	IP-05	SM5A	Judge	gnw_judge	Judge (purple version)	
1981-01-27	Gold	MH-06	SM5A	Manhole	gnw_manholeg	Manhole (Gold)	
1981-02-21	Gold	CN-07	SM5A	Helmet	gnw_helmeto	Helmet (version CN-07)	UK Headache
1981-02-21	Gold	CN-07	SM5A	Helmet	gnw_helmet	Helmet (version CN-17)	UK Headache
1981-04-27	Gold	LN-08	SM5A	Lion	gnw_lion	Lion	
1981-06-19	Wide Screen	PR-21	SM5A	Parachute	gnw_pchute	Parachute	
1981-07-16	Wide Screen	OC-22	SM5A	Octopus	gnw_octopus	Octopus	
1981-08-05	Wide Screen	PP-23	SM5A	Popeye	gnw_popeye	Popeye (Wide Screen)	
1981-09-08	Wide Screen	FP-24	SM5A	Chef	gnw_chef	Chef	
1981-10-09	Wide Screen	MC-25	SM5A	Mickey Mouse	gnw_mc25	Mickey Mouse	
1981-10-09	Wide Screen	MC-25	SM5A	Mickey Mouse	gnw_mmouse	Mickey Mouse (Wide Screen)	
1981-10-09	Wide Screen	EG-26	SM5A	Egg	gnw_eg26	Egg	
1981-10-09	Wide Screen	EG-26	SM5A	Egg	gnw_egg	Egg	
1981-12-04	Wide Screen	FR-27	SM5A	Fire	gnw_fire	Fire (Wide Screen)	
1982-02-01	Wide Screen	TL-28	SM510	Turtle Bridge	gnw_tbridge	Turtle Bridge	
1982-03-26	Wide Screen	ID-29	SM510	Fire Attack	gnw_fireatk	Fire Attack	
1982-04-28	Wide Screen	SP-30	SM510	Snoopy Tennis	gnw_stennis	Snoopy Tennis	
1982-05-28	Vertical Multi-Screen	OP-51	SM510	Oil Panic	gnw_opanik	Oil Panic	
1982-06-03	Vertical Multi-Screen	DK-52	SM510	Donkey Kong	gnw_dkong	Donkey Kong	
1982-11-12	Vertical Multi-Screen	DM-53	SM510	Mickey & Donald	gnw_dm53	Mickey & Donald	
1982-11-12	Vertical Multi-Screen	DM-53	SM510	Mickey & Donald	gnw_mickdon	Mickey & Donald	
1982-11-12	Vertical Multi-Screen	DM-53	SM510	Mickey & Donald	gnwmdon	Mickey & Donald	
1982-12-06	Vertical Multi-Screen	GH-54	SM510	Green House	gnw_ghouse	Green House	
1983-03-07	Vertical Multi-Screen	JR-55	SM510	Donkey Kong II	gnw_dkong2	Donkey Kong II	
1983-03-07	Vertical Multi-Screen	JR-55	SM510	Donkey Kong II	gnw_jr55	Donkey Kong II	
1983-03-14	Horizontal Multi-Screen	MW-56	SM510	Mario Bros.	gnw_mario	Mario Bros.	
1983-03-14	Horizontal Multi-Screen	MW-56	SM510	Mario Bros.	gnw_mw56	Mario Bros.	
1983-08-10	Horizontal Multi-Screen	LP-57	SM510	Rain Shower	gnw_rshower	Rain Shower	
1983-10-25	Horizontal Multi-Screen	TC-58	SM510	Lifeboat	gnw_lboat	Life Boat	
1983-12-05	Vertical Multi-Screen	PB-59	SM511	Pinball	gnw_pinball	Pinball	
1984-??-??	Vertical Multi-Screen	BM-501	SM511	*Bassmate Computer	bassmate	*Bassmate Computer	
1985-02-15	Vertical Multi-Screen	BJ-60	SM512	*Black Jack	gnw_bjack	*Black Jack	
1986-04-17	Vertical Multi-Screen	MG-61	SM510	Squish	gnw_squish	Squish	
1987-06-15	Vertical Multi-Screen	BD-62	SM512	Bomb Sweeper	gnw_bsweep	Bomb Sweeper	
1988-01-12	Vertical Multi-Screen	JB-63	SM511	Safebuster	gnw_sbuster	Safe Buster	
1988-10-19	Vertical Multi-Screen	MV-64	SM512	Gold Cliff	gnw_gcliff	Gold Cliff	
1989-08-26	Vertical Multi-Screen	ZL-65	SM512	Zelda	gnw_zelda	Zelda	
1982-10-26	New Wide Screen	DJ-101	SM510	Donkey Kong Jr.	gnw_dj101	Donkey Kong Jr. (new wide screen)	
1982-10-26	New Wide Screen	DJ-101	SM510	Donkey Kong Jr.	gnw_dkjr	Donkey Kong Jr. (New Wide Screen)	
1983-06-16	New Wide Screen	ML-102	SM510	Mario's Cement Factory	gnw_mariocm	Mario's Cement Factory (New Wide Screen)	
1983-06-16	New Wide Screen	ML-102	SM510	Mario's Cement Factory	gnw_ml102	Mario's Cement Factory (new wide screen)	
1983-08-24	New Wide Screen	NH-103	SM510	Manhole	gnw_manhole	Manhole (New Wide Screen)	
1985-07-08	New Wide Screen	TF-104	SM510	Tropical Fish	gnw_tfish	Tropical Fish	
1988-03-08	New Wide Screen	DR-106	SM511	Climber	gnw_climbern	Climber (New Wide Screen)	
1988-03-08	New Wide Screen	BF-107	SM511	Balloon Fight	gnw_bfightn	Balloon Fight (New Wide Screen)	
1988-03-08	New Wide Screen	YM-105	SM511	Super Mario Bros.	gnw_smbn	Super Mario Bros. (New Wide Screen)	
1991-10-14	New Wide Screen	MB-108	SM511	Mario The Juggler	gnw_mariotj	Mario The Juggler	
1983-04-28	Table Top / Color Screen	CJ-71	SM511?	Donkey Kong Jr.	[not currently emulated in MAME]		
1983-04-28	Table Top / Color Screen	CM-72	SM511	Mario's Cement Factory	gnw_mariocmt	Mario's Cement Factory (Table Top, version CM-72)	
1983-04-28	Table Top / Color Screen	CM-72	SM511	Mario's Cement Factory	gnw_mariocmta	Mario's Cement Factory (Table Top, version CM-72A)	
1983-07-05	Table Top / Color Screen	SM-73	SM511?	Snoopy	[not currently emulated in MAME]		
1983-08-17	Table Top / Color Screen	PG-74	SM511?	Popeye	[not currently emulated in MAME]		
1983-08-30	Panorama Screen	SM-91	SM511	Snoopy	gnw_snoopyp	Snoopy (Panorama Screen)	
1983-08-30	Panorama Screen	PG-92	SM511	Popeye	gnw_popeyep	Popeye (Panorama Screen)	
1983-10-07	Panorama Screen	CJ-93	SM511	Donkey Kong Jr.	gnw_dkjr	Donkey Kong Jr. (Panorama Screen)	
1983-11-10	Panorama Screen	TB-94	SM511	Mario's Bombs Away	gnw_mbaway	Mario's Bombs Away	
1984-02-28	Panorama Screen	DC-95	SM511	Mickey Mouse	gnw_mmousep	Mickey Mouse (Panorama Screen)	
1984-09-06	Panorama Screen	MK-96	SM511	Donkey Kong Circus	gnw_dkcirc	Donkey Kong Circus	
1984-02-07	Super Color	BU-201	SM510	Spitball Sparky	gnw_ssparky	Spitball Sparky	
1984-02-21	Super Color	UD-202	SM510	Crab Grab	gnw_cgrab	Crab Grab	
1984-07-31	Micro VS. System	BX-301	SM511	*Boxing	gnw_bx301	*Micro Vs. System Boxing	NA Punch Out
1984-07-31	Micro VS. System	BX-301	SM511	*Boxing	gnw_boxing	*Micro Vs. System Boxing	NA Punch Out
1984-08-20	Micro VS. System	AK-302	SM511	*Donkey Kong 3	gnw_dkong3	*Micro Vs. System Donkey Kong 3	
1984-11-13	Micro VS. System	HK-303	SM511	*Donkey Kong Hockey	gnw_dkhockey	*Micro Vs. System Donkey Kong Hockey	
1986-06-25	Crystal Screen	YM-801	SM511	Super Mario Bros.	gnw_smb	Super Mario Bros. (Crystal Screen)	
1986-07-04	Crystal Screen	DR-802	SM511	Climber	gnw_climbcs	Climber (crystal screen)	
1986-07-04	Crystal Screen	DR-802	SM511	Climber	gnw_climber	Climber (Crystal Screen)	
1986-11-19	Crystal Screen	BF-803	SM511	Balloon Fight	gnw_bfight	Balloon Fight (Crystal Screen)	
1987-08-01	Diskun Special Edition	YM-901-S	SM511	Super Mario Bros.	gnw_smbn	Super Mario Bros. (New Wide Screen)	
never released	Vertical Multi-Screen	TR-66	SM512?	Tetris Jr. (prototype)	[not currently emulated in MAME]		