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CEM and SSM chips

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CEM3360 Dual VCA

CEM and **SSM** chips are analog integrated circuits (commonly called "chips") used in many synthesizers.

Curtis Electromusic Specialties[edit]

Founded by Doug Curtis in 1979, CEM developed a family of signal processing products for electronic music synthesizers and audio equipment. In 1988, Doug migrated the company to become OnChip Systems.^[1] In 2016, it was announced that the CEM3340 VCO had been remanufactured by OnChip using the original design, the CEM3340 RevG. Other manufacturers manufactured copies of the Curtis Chips as well since the patents had expired. Cool Audio produces the V3340 and the V3320. AS ALFA RPAR released the AS3310, AS3320, AS3330, AS3340, AS3345 and AS3360 in DIP and SMD packages.

ICs[edit]

- CEM3310 ENV ADSR
- CEM3312 ADSR + VCA

- CEM3318 ADSR (microprocessor-controlled via two voltages)
- CEM3320 24 dB/Oct. VC multimode filter
- CEM3328 24 dB/Oct. VC LPF
- CEM3330 exp/lin VCA
- CEM3335 exp VCA
- CEM3340 VCO (Saw, Tri, Pulse)
- CEM3345 VCO (Saw, Tri, Pulse) with comparator
- CEM3350 12 dB/oct Multimode Filter x2 (no notch)
- CEM3360 VCA x2
- CEM3365 DAC
- CEM3371 Envelope x2
- CEM3372 24 dB/oct. Filter, Mix, VCA
- CEM3374 VCO x2 (PWMable Pulse, Tri, Saw)
- CEM3378 24 dB/oct. VCF, 2-channel mixer, VCA
- CEM3379 24 dB/oct. VCF, VCA, VC pan
- CEM3381 / PDA381 VCA x2 linear
- CEM3382 / PDA382 VCA x2 log
- CEM3385 24 dB/oct Filter (LoFi)
- CEM3387 signal processor 3-4 pole cascade Filter, VC Pan/VCA
- CEM3389 signal processor 4 pole Filter, VC resonance, VCA, VC Pan
- CEM3391 Microprocessor Controllable: VCF, VCA, Env (ADSR)
- CEM3394 Microprocessor Controllable: VCO, VCF, VCA, external input (complete synth voice)
- CEM3396 Microprocessor Controllable: Wave-Shaper x2, VCF, VCA
- CEM3397 same core design as CEM3396 but with separate external signal (noise/sub/wavetable) input and VCA to mix stage and additional Pan VCA and L/R output stage. Originally labelled MS1215 and designed for Marion Systems MSR-2. Relabeled as PA397 for DSI.
- CEM5508 / PD508 Octal Sample&Hold (8x)
- CEM5530 30ch multiplex sample&hold (Prophet VS)

Solid State Music / Solid State Micro Technology for Music[edit]

Solid State Music, later known as Solid State Microtechnology for Music or simply "SSM," was founded by Ron Dow and John Burgoon in 1974, with assistance by Dave Rossum of E-MU Systems. The company originally produced synthesizer chip sets, and provided bare boards for the hobbyist to experiment with early SSM chips. In an unusual pairing, they also produced S-100 bus computer cards, including a Sound Synthesizer Card.^[2] SSM was acquired by Precision Monolithics in 1988, who was in turn acquired by Analog Devices in 1990. New SSM-badged IC's continue to be introduced by Analog Devices, but bear little resemblance to the original SSM line. Several early members of the SSM team reformed in 2017 as Sound Semiconductor to develop audio IC's in the spirit of early SSM products.

ICs[edit]

- SSM2000 Dual Linear-Antilog Voltage Controlled Amplifier
- SSM2013 Voltage Controlled Amplifier
- SSM2014 Voltage Controlled Element
- SSM2015 Microphone Preamplifier
- SSM2020 Dual VCA
- SSM2024 Quad VCA
- SSM2030 Voltage Controlled Oscillator: Sawtooth, Triangle, Pulse (with PWM) and Soft Sync
- SSM2031 High Frequency Oscillator/Voltage to Frequency Converter
- SSM2033 Voltage Controlled Oscillator
- SSM2038 Voltage Controlled Oscillator: Sawtooth, Triangle and Pulse (with PWM)
- SSM2040 4-Section VCF (Exponentially controllable Cutoff over a 10,000 to 1 range, i.e. >13 octaves)
- SSM2044 4-Pole VCF
- SSM2045 Music Voicing System : VCF (2-Pole and 4-Pole Low Pass) and Mixer/VCA
- SSM2047 Music Voicing System
- SSM2050 Voltage Controlled Transient Generator
- SSM2056 Voltage Controlled ADSR type Envelope Generator
- SSM2100 Monolithic Log/Antilog Amplifier
- SSM2120/22 Dynamic Range Processor/Dual VCA
- SSM2164 Low Cost Quad VCA (16 pins, intended to replace the SSM2024, although not a drop-in replacement)
- SSM2300 8-Channel Multiplexed Sample&Hold

List of synthesizers and which CEM/SSM ICs they use[edit]

Akai

- AX80: 8x CEM3372 uP Signal Processor -CEM3372 Filter/Mix/VCA
- AX60: 6x CEM3394 uP Voice
- AX73: 6x CEM3394 uP Voice
- **S-950**: 8x 3387 (Marion Systems MS-9C upgrade only)
- **VX90**: 6x CEM3394 uP Voice
- VX600: 12x CEM3374B (IC1), 12x CEM3378 (IC5), 9x SSM2300 (IC 10-14 & IC 20-23)

Aries System 300 modular

- AR-338 oscillator: 1x SSM2030
- AR-341 dual oscillator: 2x SSM2030
- AR-344 dual envelope: 2x SSM2050

Banana

Banana created by Synthesizerstudio Bonn, since 1999 the SSB is closed..

 Poly Synth: 12x CEM3310 EG, 12x CEM3340 VCO, 18x CEM3360 Dual VCA, 6x SSM2044 VCF

Buchla

• 296 Programmable Spectral Processor: 8x SSM2020 VCA, 1x CEM3360 Dual VCA

Cheetah

• Cheetah MS6: 6x CEM3396 VC Waveshaper

Crumar

- Performer-2: SSM2040, SSM2050
- **Trilogy**: 6x CEM3310 EG, 6x CEM3320 VCF, 6x CEM3330 Dual VCA, 1x SSM2020 VCA
- Stratus: 6x CEM3310 EG, 6x CEM3320 VCF, 6x CEM3330 Dual VCA, 1x SSM2020 VCA, 1x SSM2055
- Composer: 2x CEM3310 EG, 2x CEM3320 VCF, 2x CEM3330 Dual VCA
- Spirit: 2x CEM3340 VCO, 2x CEM3350 Dual VCF, 3x CEM3360 Dual VCA
- Bit ONE: 6x SSM2044 VCF Early Models, 6x CEM3328 VCF Late Models
- Bit 01: 6x CEM3328 VCF
- Bit 99: 6x CEM3328 VCF

Digisound-80 modular

- 80-2 VCO: CEM3340 VCO
- 80-3 VC LFO: CEM3340 VCO
- 80-4 VC Mixer: 3x CEM3330 dual VCAs
- 80-6 VCF: CEM3320 VCF
- 80-7 VC State Variable Filter: SSM2040 VCF
- 80-7A VC State Variable Filter: CEM3320 and CEM3335
- 80-8 Dual ADSR: 2x SSM2050 EGs
- 80-9 Dual VCA: CEM3330 dual VCA
- 80-10 Voltage Controlled Envelope Generator: CEM3310 EG
- 80-16 Dual Resonant Filter: CEM3350 dual VCF
- 80-18 Dual Multi-Function EG: 2x CEM3310 VCEGs
- 80-19 Dual VC LFO: CEM3374 and CEM3360
- **80-C9 Voice Card**: 2x CEM3310 VCEGs, 2x CEM3340 VCOs, CEM3360 dual VCA, CEM3372 signal processor

Doepfer

- A-105 24db SSM Low Pass Filter: SSM2044
- A-106-6 XP Filter: CEM3379
- A-107 Morph. Filter: CEM3379
- A-109 VC Signal Processor: CEM3379
- A-111-1 High End VCO: CEM3340
- A-111-2 High End VCO II/A-111-3 Micro Precision VCO: CEM3340
- A-111-4 Quad Precision VCO: CEM3340
- A-111-5 Mini Synthesizer Voice: CEM3394
- A-121 Multi Mode Filter/A122 LPFilter/A123 HPFilter: CEM3320

- A-122 LPFilter: CEM3379 in later versions
- A-130 VCA (linear)/A-131 VCA (exp.)/A-134 VC Panning: CEM3381
- A-132-3 Dual Lin/Exp VCA: CEM3360 (early versions)

• Dark Energy, Monophonic Synthesizer: CEM3394 (original model only)

Dynacord

• Dynacord Add-one: 8x CEM3389

E-MU

- Drumulator: 2x SSM2044
- **SP-12**: 2x SSM2044
- **SP-1200**: 2x SSM2044
- Emulator-I: 4x SSM2044
- Emulator-II: 8x SSM2045 (24 dB/oct analog 4-pole low pass resonant filter (LPF))
- Emax: 4x SSM2300 (Sample/Hold Mux), 8x SSM2047 (Filter/Amp)

Elka

- Synthex: 8x CEM3320 VCF
- EK-22: 6x CEM3396 VC Waveshaper

Ensoniq

- Mirage: 8x CEM3328 VCF
- ESQ-1: 8x CEM3379 VC Signal Processor Filter/Mix/VCA, 1x CEM3360 Dual VCA, 4x SSM2300
- SQ-80: 8x CEM3379 VC Signal Processor Filter/Mix/VCA, 1x CEM3360 Dual VCA, 4x SSM2300
- SDP-1: 10x CEM3328 VCF

Fairlight

• Fairlight CMI II/IIx: 8x CEM3320 VCF in earlier versions, 8x SSM2045 VCF in later versions

Fender / Rhodes

- Chroma: 8x CEM3350 Dual VCF, 8x CEM3360 Dual VCA
- Polaris: 6x CEM3374 Dual VCO, 6x CEM3372 Filter/Mix/VCA

Forat

• Forat F9000: 4x CEM3320 VCF

Hohner

- **P120N**: 2x SSM2044
- PK120/150: 1x CEM3391, 2x SSM2024
- **PK/MR250**: 2x CEM3391, 2x SSM2024
- L/D160: 2x CEM3391, 2x SSM2024

Kawai/Teisco

• K3(m): 6x SSM2044

- **SX-210**: 8x SSM2044
- SX-240: 8x SSM2044

Keytek

• CTS-2000: 1x CEM5530 30ch S/H, 8x CEM3389 VC Signal Processor

Korg

- Mono/Poly: 4x SSM2033 VCO, 1x SSM2044 VCF
- Polysix: 6x SSM2056 EG, 6x SSM2044 VCF
- Poly-61: 6x SSM2056 EG
- Trident: 9x SSM2044 VCF

Linn

- LinnDrum: 2x CEM3320 VCF, 1x CEM3360 Dual VCA
- Linn 9000: 4x CEM3320 VCF

Moog

• Memorymoog: 19x CEM3340 VCO, 26x CEM3360 Dual VCA, 12x CEM3310 EG

Oberheim

- OB-8 & OB-Xa: 2x CEM3330 VCA (Some OB-Xa models), 2x CEM3360 Dual VCA, 16x CEM3340 VCO, 16x CEM3310 EG, OB-Xa 16x CEM3320 VCF, OB-8 8x CEM3320 VCF
- **OB-X**: 16x CEM3310 EG (2 per voice)
- OB-SX: 2x CEM3340 VCO, 1x CEM3320 VCF, 2x CEM3310 EG per voice
- Matrix-6 & Matrix-6R: 6x CEM3396
- Matrix-1000: 6x CEM3396 (narrow version)
- Matrix-12: 12 x CEM3374 Dual VCO, 12 x CEM3372 Filter/Mix/VCA
- Xpander: 6x CEM3374 Dual VCO, 6x CEM3372 Filter/Mix/VCA
- **OB-1** (same as OBI or OB-I): 2x CEM3310 EG
- Prommer: 1x CEM3328 VCF
- **DPX-1**: 1x SSM2013 VCA, 8x SSM2045 VCF, 5x SSM2300
- DX: 1x CEM3320 VCF "Toms" Voice
- DMX: 4x CEM3320 VCF "Conga", "Timbale", "Toms", "Noise" Voices
- Stretch-DX: 3x CEM3328 VCF LPF

Octave Plateau

- The Cat SRM: 1X SSM2040 VCF
- Voyetra-8: 8X SSM2024 VCA, 8X SSM2044 VCF, 16X CEM3340 VCO

PAiA

- Proteus: 2x CEM3340 VCO, 1x CEM3320 VCF, 1x CEM3310 EG, 1x CEM3330 Dual VCA
- 9601 Stereo Compressor: 1x SSM2120

PPG

- Wave 2.2 / 2.3: 8x SSM2044 VCF, 4x CEM3360 VCA
- Wave 2: 8x CEM3320 VCF, 8x CEM3310 EG

Roland

- SH-101 and MC-202: 1x CEM3340 VCO
- MKS-20: 5x CEM3360 Dual VCA
- Jupiter-6: 12x CEM3340 VCO, 6x IR3109 VCF, 6x CEM3360 Dual VCA
- MKS-80 (to serial #511799/early models): 16x CEM3340 VCO, 8x IR3109 VCF, 8x CEM3360 Dual VCA (4 for X-Mod)
- MKS-80 (serial #511800 and higher/later models): 16x IR3R03 VCO, 8x IR3R05 VCF/VCA, 4x CEM3360 Dual VCA (for X-Mod)

RSF

• Kobol Expander I: 2x SSM2050 EG, 1x SSM2040 VCF

Sequential Circuits / Dave Smith Instruments

- Evolver series: Curtis for Filters
- **Prophet-5**: the first Prophet 5 series used the SSM filter; later they were changed to CEM
 - Prophet-5 Rev 1 & 2: 11x SSM2030 VCO, 5x SSM2040 VCF, 10x SSM2050 EG, 21x SSM2020 VCA
 - Prophet-5 Rev 3: 11x CEM3340 VCO, 10x CEM3310 EG, 5x CEM3320 VCF, 14x CA3280 VCA
 - Prophet-5 **Rev 4**: CEM3320, CEM3340, SSI2140
- Prophet-10: 22x CEM3340 VCO, 20x CEM3310 EG, 10x CEM3320 VCF
- Prophet 600: 12x CEM3340 VCO, 6x CEM3372 VCF/VCA, 4x CEM3360 Dual VCA
- Pro-One: 3x CEM3340 VCO, 2x CEM3310 EG, 1x CEM3320 VCF
- Prophet T8: 16x CEM3340 VCO, 8x CEM3372 Signal Processor CEM3372 Filter/Mix/VCA
- Six-Trax: 6x CEM3394 uP Voice
- Multi-Trak: 6x CEM3394 uP Voice
- MAX: 6x CEM3394 uP Voice
- Split8: 8x CEM3394 uP Voice
- Prophet VS: 4x CEM5510 Fast Sample/Hold, 2x CEM5530 30ch S/H, 8x CEM3379/CEM3389 VC Signal Processor, 2x CEM3365 Dual DAC Multiplier, 1x CEM3360 VCA
- Prophet 2000: 8x CEM3379 VC Signal Processor
- **Prophet 3000**: CEM3387
- **Studio 440**: 8x CEM3389 VC Signal Processor, 1x CEM3360 Dual VCA, 1x CEM5530 30ch Sample/Hold
- Drumtraks: 2x CEM3320

Siel

- DK600: 2x SSM2031 VCO, 6x SSM2024 VCA, 6x SSM2056, 6x SSM2044 VCF
- DK-80: 2x SSM2045 VCF
- **EX-80**: 1x SSM2045 VCF
- Opera 6: 2x SSM2031 VCO, 6x SSM2024 VCA, 6x SSM2056, 6x SSM2044 VCF
- Kiwi: 2x SSM2031 VCO, 6x SSM2024 VCA, 6x SSM2056, 6x SSM2044 VCF

Simmons Drums

- MTX9: 1x SSM2300
- SDS9/SDS1000: 3x CEM3394 VC Synth, 1x CEM3372 (SDS9)
- **SDS8**: 5x CEM3372 VC
- SDS7: CEM3340 1x per module; CEM3372 1x per module
- SDS5: SSM2044 1x per module
- **SDS200**: 2x CEM3394
- SDS400/SDS800: 4x CEM3394

Solton

- **TS3**: 3x CEM 3360, 2x SSM 2300
- **TS4**: 1x CEM 3360, 2x SSM 2300
- **SM100** analogue synthesizer (6 voices): Each voice uses 2x SSM2056 (ADSR) and 1x SSM2045 (VCA+VCF)
- Programmer 24: 1x CEM3350 12 dB Dual VCF & 1x SSM2044 24 dB VCF

Steiner Parker

• EVI: 1x CEM3340 VCO, 1x SSM2040 VCF

Suzuki

• **SX-500**: 1x SSM2045 (this synth module is a clone of the SIEL EX-80)

Synton

• Syrinx: 2x CEM3310 EG, 2x CEM3340 VCO, 2x CEM3350 Dual VCF, 1x CEM3360 Dual VCA

Waldorf

- **Wave**: 16x CEM PD508 Multiplexer/S&H, 16x CEM 3387 VCA/VCF, 1x Quad VCA SSM2024 for 4 voices.
- Microwave1: 8x CEM3389 VCF,VCA,VCP in Rev A, 8x CEM3387 VCF,VCA,VCP in Rev B

Wersi

• Spectra-DX series : 1x SSM2045

See also_[edit]

Early clients

- E-MU Systems
- Oberheim Electronics (founded by Tom Oberheim)
- Sequential Circuits (founded by Dave Smith)

Synthesis & signal processing

- Polyphonic synthesizer
- Synthesizer
- Signal processing
- Integrated Circuit

References[edit]

- ABOUT Curtis Electromusic Specialties
- ^ "Solid State Music History". S100 Computers. Retrieved 2022-10-13.

General[edit]

- Curtis Electromusic
- Synthesizer Database

External links[edit]

- Keyboard, A tribute to chip designer Doug Curtis
- Celebrating Silicon Valley's role 'n rock Archived 2017-09-12 at the Wayback Machine
- Synthmuseum.com paia
- SSM & Curtis Chips Inside out