C64 SID Chip Synthesizer Features

The MOS SID (Sound Interface Device) 8580 (and 6581) is a 28 pin DIP integrated circuit developed in the early 1980s for use in the Commodore 64 and 128 home computers. It features 3 audio channels, each with 16 bits defining frequency, 4 waveforms (with any possible combination of 3 of them), ring modulation, hard sync between oscillators, a fully controllable ADSR envelope generator, global volume control, and an analog filter, with programmable cutoff frequency, resonance, and LP/BP/HP selection. Additionally, by externally biasing the output of the chip with a DC voltage through the external audio-in pin, the output volume can be set at a very fast rate to produce low quality digital audio.

- MIDI Plug and Play USB Device
- Intelligent "Last Note" Pull Off: (Keeps track of the order notes are held down and always defaults to the most recently played note.)
- Glide/Portamento Legato: When a note is played while another note is held down, the pitch will glide to the new note. (Pitch will also glide linearly with respect to musical notes, not frequency.) With adjustable glide speed.
- Pitch Bend, mapped linearly with respect to musical notes, not frequency. Adjustable pitch bend range, from +/-1 semitone to +/-12 semitones (1 octave).
- Arpeggiator with adjustable speed. Ability to switch arpeggiator on and off while playing without affecting the intelligent pull off.
- 3 monophonic channels.
- Vibrato on monophonic modes.
- 4 waveforms (square/pulse, saw, triangle, and noise) with 8 total combinations. (The noise waveform cannot be combined with other waveforms, otherwise the chip will become unstable.)
- Ring modulation between channels 1 and 3.
- Hard sync between channels 1 and 3.
- ADSR (Attack, Decay, Sustain, and Release) envelope for each channel.
- Ability to play 4 bit 4ks/s drum samples from embedded PCM data, (audio data is actually 8 bit, but the chip only has 16 levels of volume) with adjustable sample playback rate. The output must be biased with DC through the external audio in pin in order to use the global volume to reproduce PCM audio.
- Polyphonic mode, utilizing all three channels. Polyphonic mode also replaces oldest notes with newer notes when polyphony limit is reached.
- Tremolo feature available on polyphonic mode.
- Two monophonic channels on chip #4.
- Analog filter with programmable cutoff frequency, resonance, and filter type.
- Onboard LED shows MIDI commands received (excluding note-off commands).

C64 SID Chip Synthesizer Channel / CC Guide

CH	1	2	3	4	5
	Channel 1 Legato	Channel 2 Legato	Channel 3 Legato	Drum Samples	Polyphonic Mode
CC#					
1	Vibrato	Vibrato	Vibrato	Sample Rate Normal → Slower	Tremolo
2	Global Bend Range				
3	N/A	N/A	N/A	N/A	N/A
4	Arpeggiator On/Off	Arpeggiator On/Off	Arpeggiator On/Off	N/A	N/A
5	Arpeggiator Speed	Arpeggiator Speed	Arpeggiator Speed	N/A	N/A
6	Basic Waveform Selection	Basic Waveform Selection	Basic Waveform Selection	N/A	Basic Waveform Selection
7	Waveform Modifier	Waveform Modifier	Waveform Modifier	N/A	Waveform Modifier
8	Attack	Attack	Attack	N/A	Attack
9	Decay	Decay	Decay	N/A	Decay
10	Sustain	Sustain	Sustain	N/A	Sustain
11	Release	Release	Release	N/A	Release
12	PWM 50%-0%	PWM 50%-0%	PWM 50%-0%	N/A	PWM 50%-0%
13	Filter Inclusion	Filter Inclusion	Filter Inclusion	N/A	Filter Inclusion
14	GLOBAL FILTER: Set Cutoff Frequency				
15	GLOBAL FILTER: Set Resonance				
16	GLOBAL FILTER: Set Volume (Used to create drum samples)				
17	GLOBAL FILTER: Set Filter Type (LP/BP/HP)				
18	GLOBAL FILTER: Mute Channel 3				
20	Portamento Speed	Portamento Speed	Portamento Speed	N/A	N/A
Pitch Bend	Pitch Bend	Pitch Bend	Pitch Bend	Sample Rate Normal → Faster	N/A