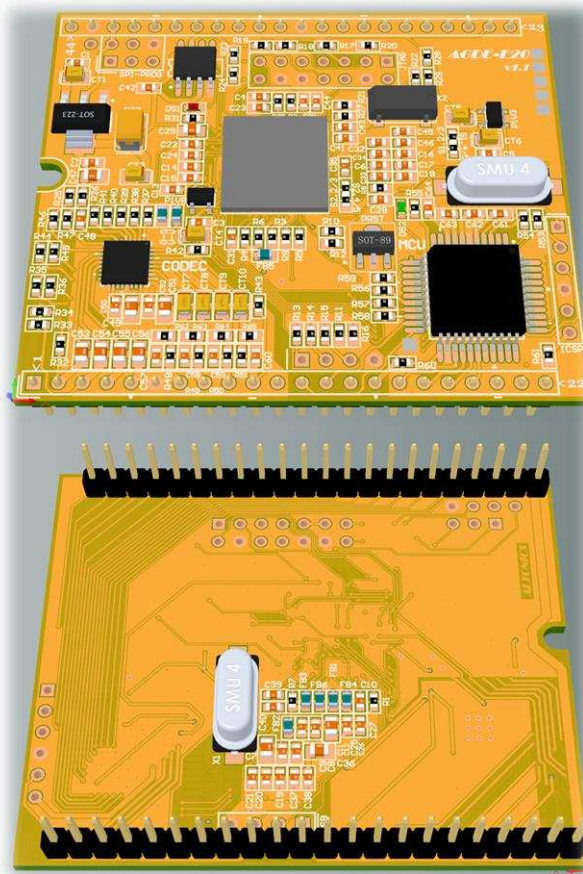


Premium Digital Audio Signal Processing Module

AGDE-E20



Datasheet

document version : 1.2

AGDE-E20 Overview

The AGDE, Altonics Genuine Digital Effect is Altonics' newest line of high-quality/performance multi effects processors. Although many users of the AGDE-E20 will be looking for a solution for high-end multi-effectors or guitar & bass related sound processing, the wide range of effects provided by the AGDE-E20 is suitable for various applications including mixers, karaoke amplifiers and other sound enhancement products.

Instilled with Altonics' about 20 years of know-how in digital sound processing, the AGDE-E20 provides the best audio quality and performance possible for whichever application you choose. With the Altonics name behind it, you know you can trust the quality of this audio signal processor.

The AGDE-E20 is an all-in-one effects solution. It supports filters that can be used for such as EQ, spatial effects such as delay and reverb, the whole range of modulation effects including chorus, flanger, phaser, wah-wah, tremolo, auto pan, vibrato and more. It also encompasses dynamics processing with a noise gate, compressor, and limiter. Fuzz, overdrive, and distortion are all provided in their full crunchiness while still maintaining crisp clear digital sound. Of course, a chromatic tuner can be provided. By real-time 32-bit digital processing, and you won't need to look any further for all your sound enhancement needs.

In the following pages you will find our reference design implementing AGDE-E20's functions to the fullest. Just pick the functions you want and match them with your custom control and display.

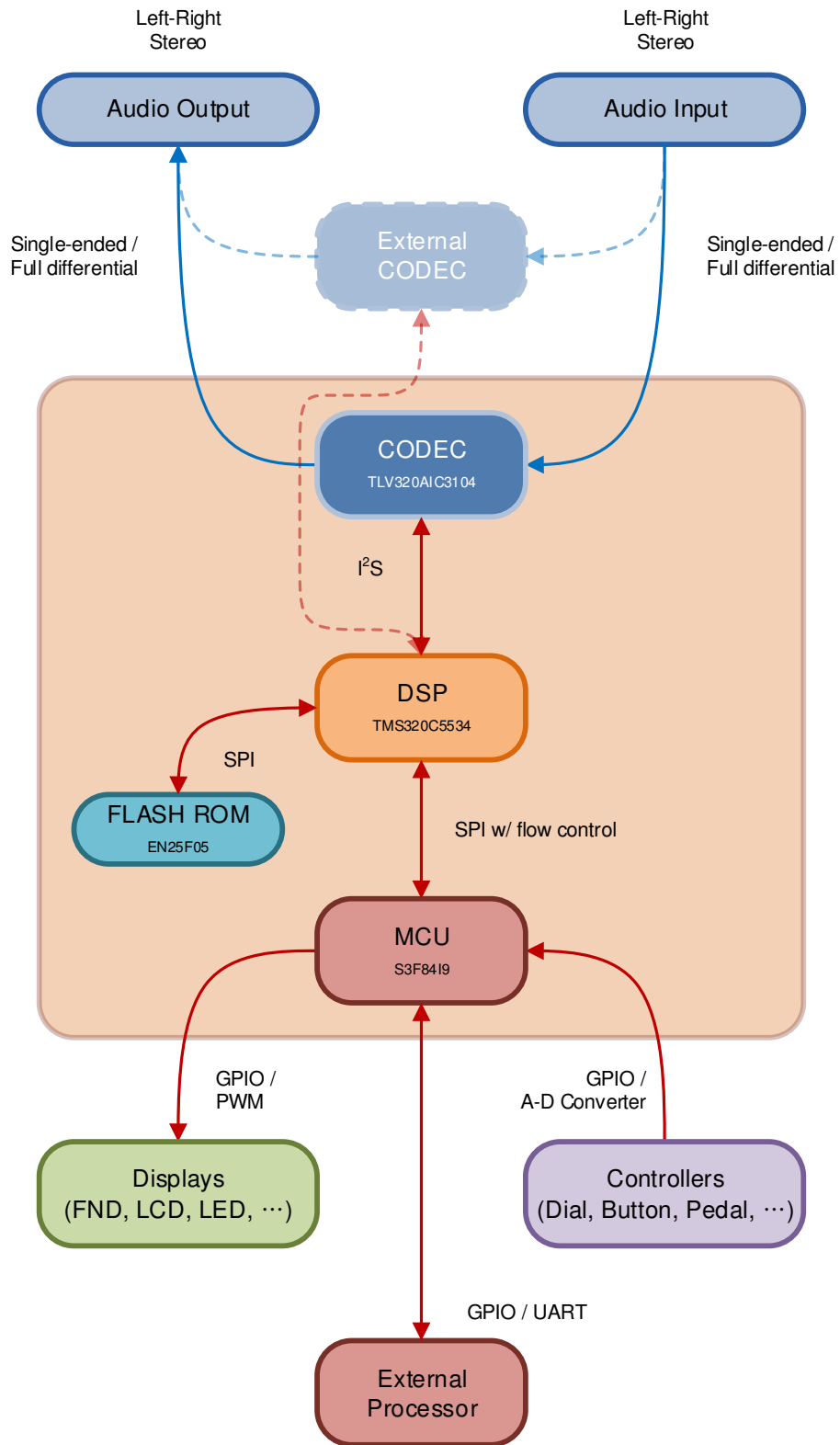
AGDE-E20 Features

- Premium effects solution for guitar/bass amplifiers, multi-effectors, mixers and more.
- Accurate simulation of the hottest effectors, amplifiers and signature sounds from top musicians.
- 32-bit full digital processing, 24-bit AD/DA conversion, and sampling rates of up to 96 kHz.
- RoHS (PB-free)

AGDE-E20 Specification

- Analog Audio Input / Output : 2-in 2-out
 - Fully Differential Input and Output (or Single-ended Input and Fully Differential Output)
 - Nominal Level : $1.414V_{rms} = 4V_{pp}$ (Fully Differential I/O) / $0.707V_{rms} = 2V_{pp}$ (Single-ended Input)
 - Frequency Response : 20Hz - 20kHz +/- 0.5 dB
 - S/N Ratio : >90dB
- Internal AD/DA converter : 24-bit / 48kHz, up to 96kHz
 - External AD/DA can be used (AGDE-E20-□D□)
- DSP arithmetic: 32-bit
- 5V single-powered
- 3.3V power outputs for analog/digital peripherals
- 24 general-purpose I/O with pull-up, and up to 7 A-D converting (10-bit) inputs
- 1x UART
- Connection: Single-line 22-pin Header, 2.54mm-pitch, Down-sided (optional 22-pin available)
- Power Consumption : 45mA (module only)
- Operating Temperature : -10 to 70 °C
- Dimension : 60mm x 50mm

Block Diagram



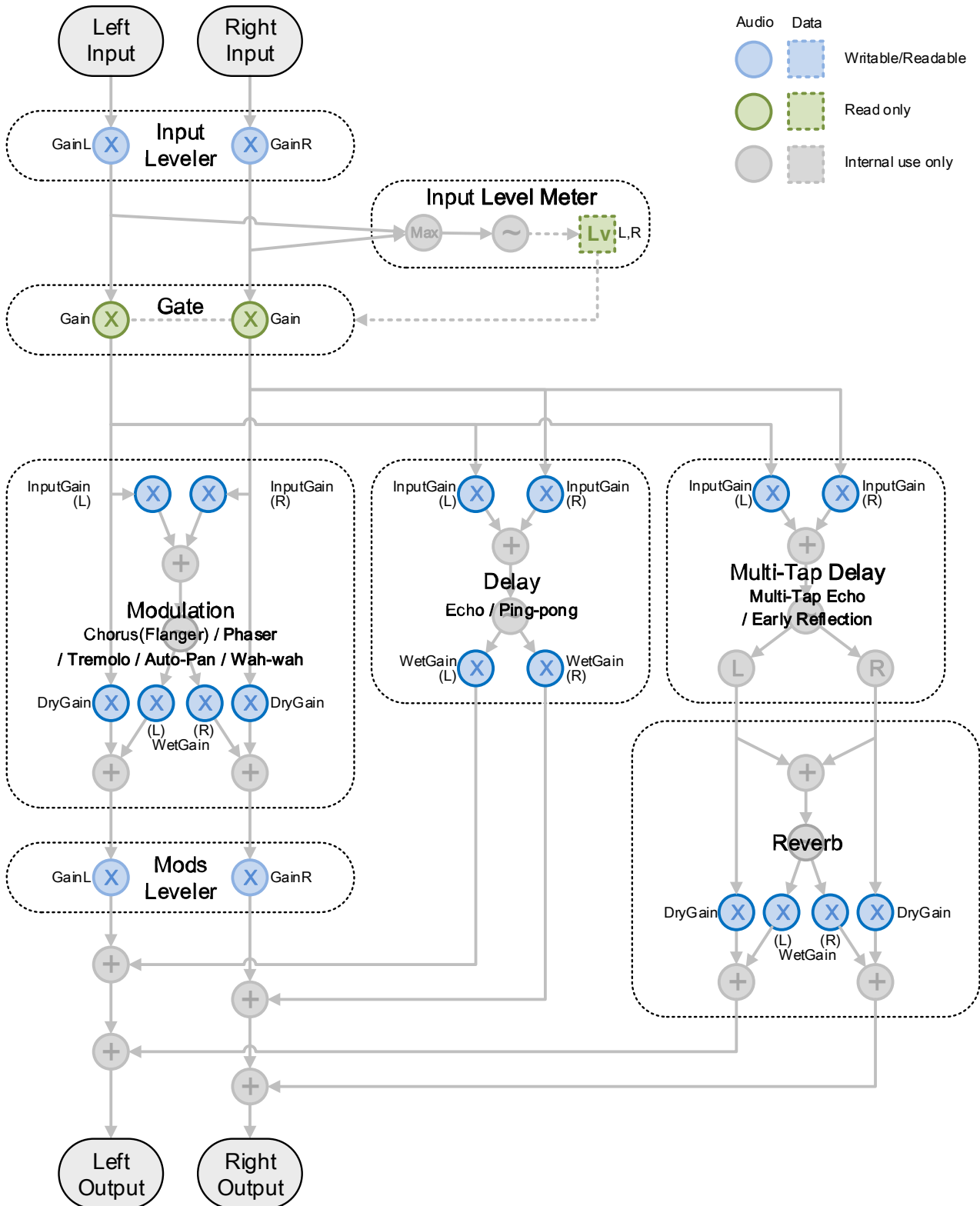
Processing Algorithms

Category	Type	Remark
Filter/EQ	FIR filter	
	Parametric	Lo/Hi/Band-Pass, Peaking-EQ, Notch, Lo/Hi-Shelving
	Graphic	3/4/5/7-band, 15/31-band, or any-band
Dynamics	Noite-gate	
	Compressor	
	Expander	
	Limiter	
	Multi-band	Multi-band Compressor
Non-linear	Overdrive	TS808, TS9, OD-1, ...
	Distortion	Fuzz Face, Octavia, DOD 250, RAT, DS-1, MT-2, ...
	Crusher	Downsampling, Down Bit-depth
Modulation	Chorus	Rich Emsemble Sound
	Flanger	Jet plane-like Sound
	Phaser	Modulation with Phase Shifting
	Rotary Speaker	Leslie Speaker Simulation
	Tremolo	Volume Vibrato
	Auto-Pan	Panning Vibrato
	Vibrato	Pitch Vibrato
	Wah-wah	Auto Wah, LFO Wah, Pedal Wah
	Octave Doubler	OC-2 (1-octave down, 2-octave down)
Delay	Digital Delay	
	BBD Delay	BBD Circuit Simulation
	Tape Echo	Analog Reel Tape Simulation
	Ping-pong Delay	Stereo Delay
	Reverse Delay	Reversed Feedback
	Ducking Delay	Delay with Side-chain Compressing
	Multi-tap Delay	Custom Rhythm Delay
Reverb	Hall/Room Reverb	Representing Good-sounding Space
	Plate Reverb	Metal Plate Reverb Unit in Studio
	Spring Reverb	Spring Reverb Unit in Vintage Guitar Amp
	Gated Reverb	Reverb with Gating Wet-tail
	Shimmer	Reverb with Higher-octave Harmonics
	Early Reflection	Short Sequence for Real Ambiance
Monitoring / Detecting	Level Meter	Peak Level, RMS Level, VU Meter, Clip Detecting
	Pitch Detecting	Chromatic Tuner
etc.	Stereo Image	Mono/Stereo Process for Width and Depth
	Vocal Remover	Virutal Center Extraction in Stereo Signal
	Analog Circuit Simulation	R/L/C, Vaccum Tube, OP-amp, ...
	Convolution	Time-invariant System Simulation
	Pitch Detecting	Chromatic Tuner
	Pitch Shifting (Simple)	Fast Response Pitch Shifting
	Pitch Shifting (Music)	Hi-quality Pitch Shifting (in development)
	Feedback Destroyer	Howling Canceling (in development)

* Custom algorithm can be applied.

MDR20 DSP-ware

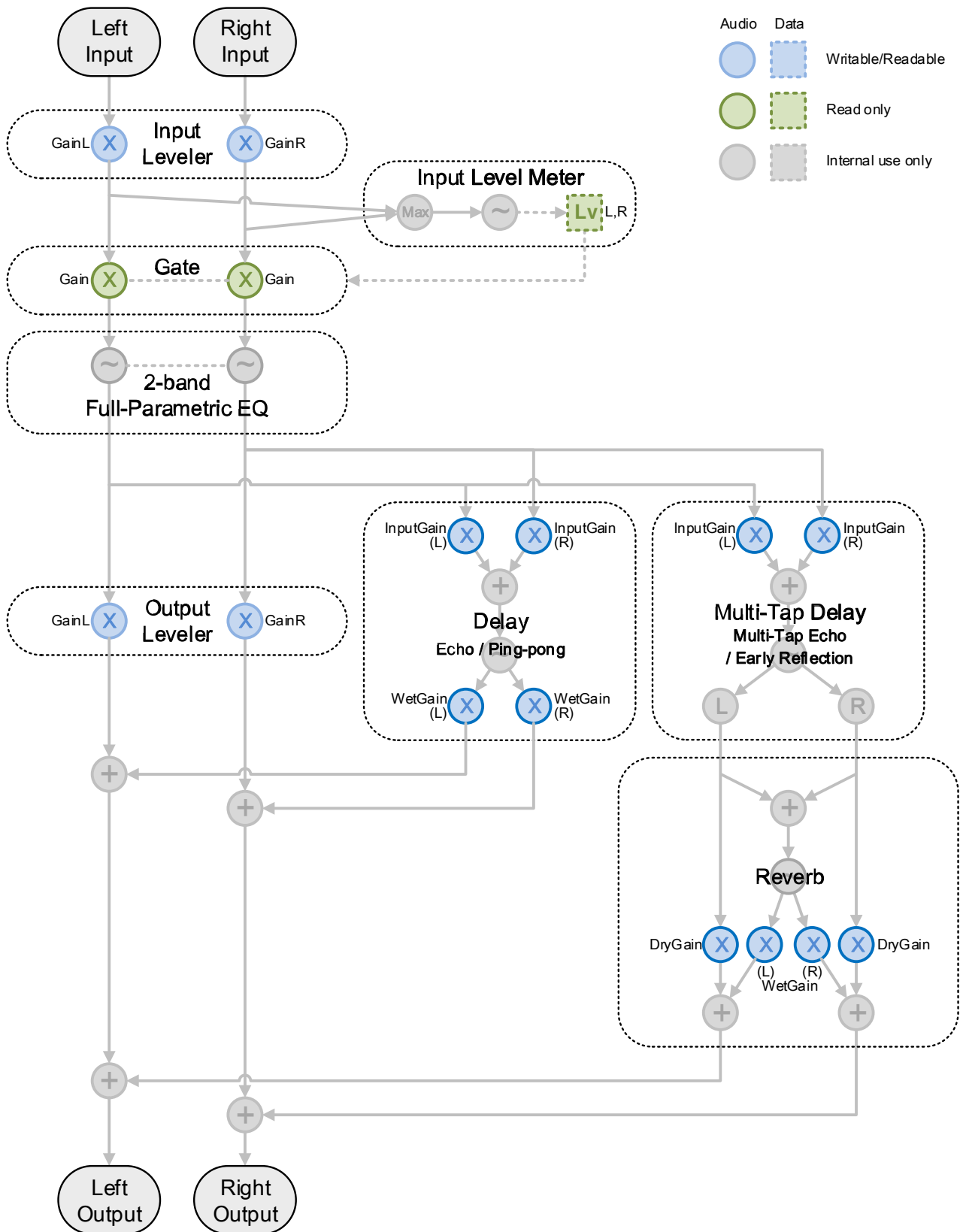
AGDE-E20 is offered with various DSP-wares. MDR20 DSP-ware has selectable modulation effects with high-quality delay and reverb for multi-purpose process.



* Above audio flow chart can be customized.

SPC20 DSP-ware

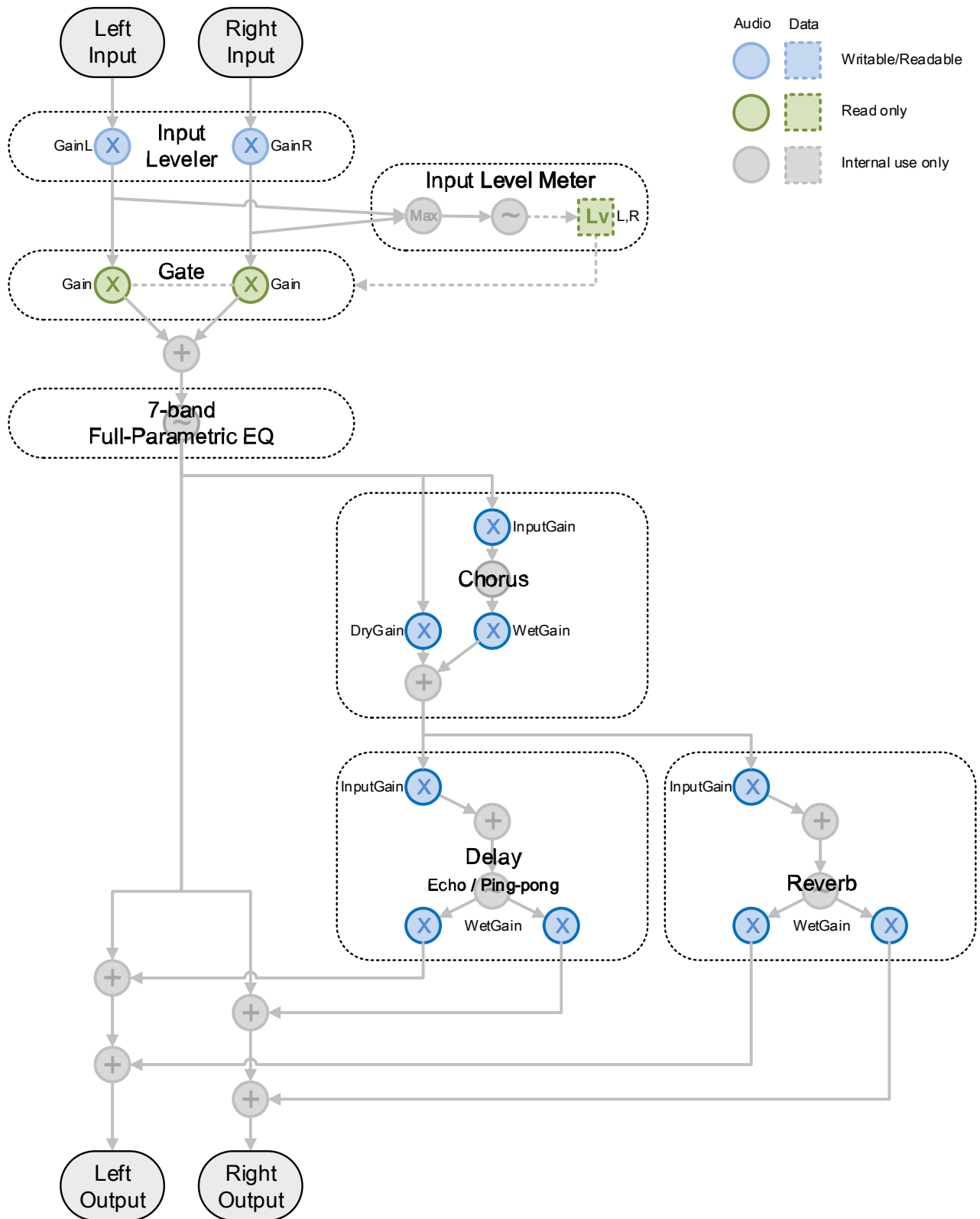
SPC20 DSP-ware offers high-quality delay and reverb for time-space effect process.



* Above audio flow chart can be customized.

MIC20 DSP-ware

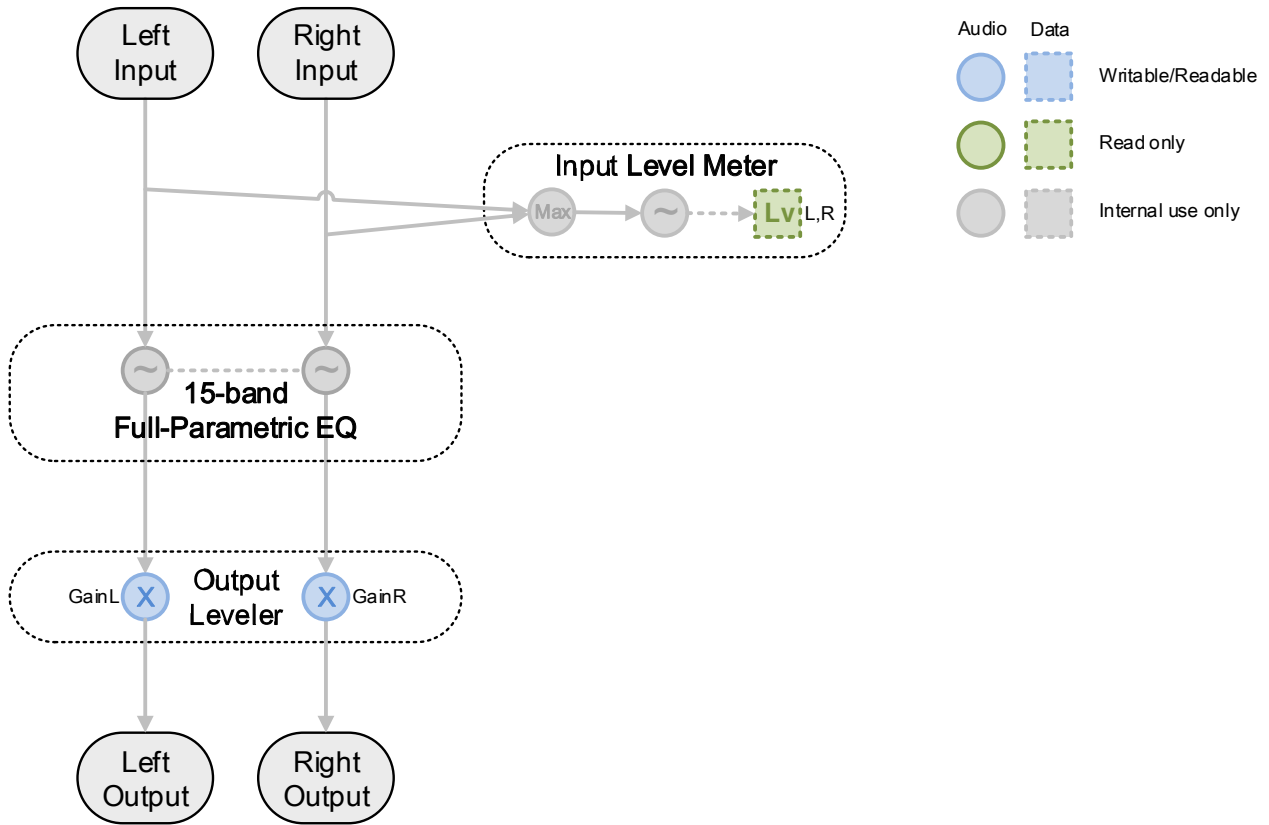
MIC20 DSP-ware provides a channel strip functions for microphone and instrument inputs.



* Above audio flow chart can be customized.

PEQ15 DSP-ware

PEQ15 is designed for sound conditioning and mastering EQ.



* Above audio flow chart can be customized.

Drive & Sound Models

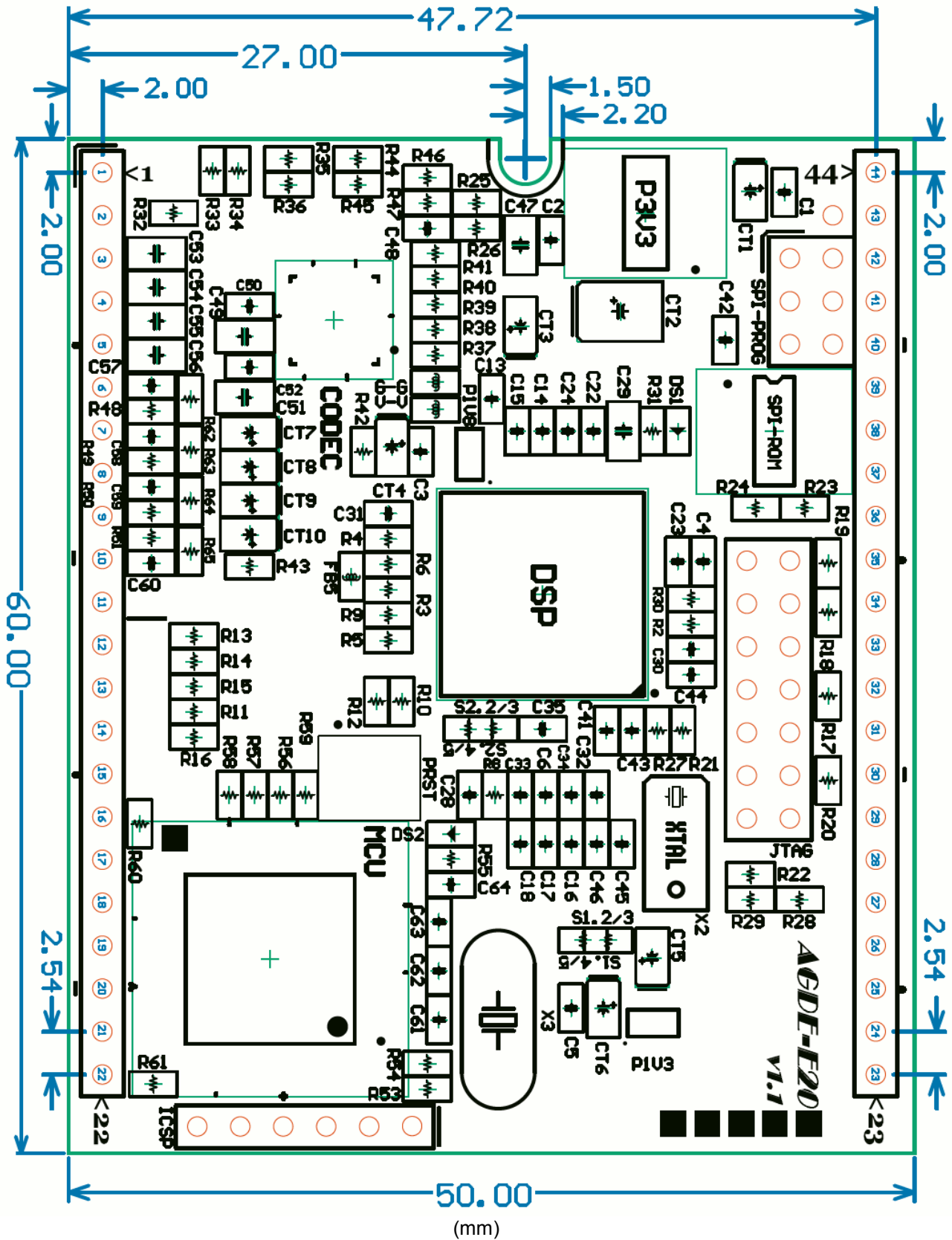
No.	Model	Remark
1	JC	Based on Roland JC-120 Jazz Chorus Amp
2	TS	Model from Ibanez TS808
3	FF	Model from Dallas-Arbeiter Fuzz Face
4	OC	Model from Tycobrahe Octavia
5	DD	Model from DOD 250
6	RT	Model from ProCo RAT
7	DS	Model from Boss DS-1
8	MT	Model from Boss MT-2

* More drive & sound models would be added.

AGDE-E20 : Premium Digital Audio Signal Processing Module

Dimension

(Top-side View, Pin header: Bottom-side)



Pin Connection – Audio I/O : **ANALOG** (AGDE-E20-□ A □)

CN1

No.	Name	Remark
1	5V	5V input
2	AIL+	Analog audio input – left, positive
3	AIL-	Analog audio input – left, negative (can be shorted to AGND)
4	AILR+	Analog audio input – right, positive
5	AINR-	Analog audio input – right, negative (can be shorted to AGND)
6	AGND	Analog ground
7	AOUTL+	Analog audio output – left, positive
8	AOUTL-	Analog audio output – left, negative (can be ignored)
9	AOUTR+	Analog audio output – right, positive
10	AOUTR-	Analog audio output – right, negative (can be ignored)
11	A3V3	3.3V output for analog circuit
12	TxD	UART Tx
13	RxD	UART Rx
14	DGND	Digital ground
15	D3V3	3.3V output for digital circuit
16	GPIO1	General-purpose I/O with 10-bit A-D converter, and pull-up
17	GPIO2	General-purpose I/O with 10-bit A-D converter, and pull-up
18	GPIO3	General-purpose I/O with 10-bit A-D converter, and pull-up
19	GPIO4	General-purpose I/O with 10-bit A-D converter, and pull-up
20	GPIO5	General-purpose I/O with 10-bit A-D converter, and pull-up
21	GPIO6	General-purpose I/O with 10-bit A-D converter, and pull-up
22	GPIO7	General-purpose I/O with 10-bit A-D converter, and pull-up

CN2 (optional)

No.	Name	Remark
23 (1)	GPIO8	General-purpose I/O with external interrupt, and pull-up
24 (2)	D3V3	3.3V output for digital circuit
25 (3)	EXIO1	General-purpose I/O with pull-up
26 (4)	EXIO2	General-purpose I/O with pull-up
27 (5)	EXIO3	General-purpose I/O with pull-up
28 (6)	EXIO4	General-purpose I/O with pull-up
29 (7)	EXIO5	General-purpose I/O with pull-up
30 (8)	EXIO6	General-purpose I/O with pull-up
31 (9)	EXIO7	General-purpose I/O with pull-up
32 (10)	EXIO8	General-purpose I/O with pull-up
33 (11)	DGND	Digital ground
34 (12)	MSIO1	General-purpose I/O with pull-up
35 (13)	MSIO2	General-purpose I/O with pull-up
36 (14)	MSIO3	General-purpose I/O with pull-up
37 (15)	MSIO4	General-purpose I/O with pull-up
38 (16)	MSIO5	General-purpose I/O with pull-up
39 (17)	MSIO6	General-purpose I/O with pull-up
40 (18)	MSIO7	General-purpose I/O with pull-up
41 (19)	MSIO8	General-purpose I/O with pull-up
42 (20)	D3V3	3.3V output for digital circuit
43 (21)	DGND	Digital ground
44 (22)	5V	5V input

Pin Connection – Audio I/O : DIGITAL (AGDE-E20-□ D □)

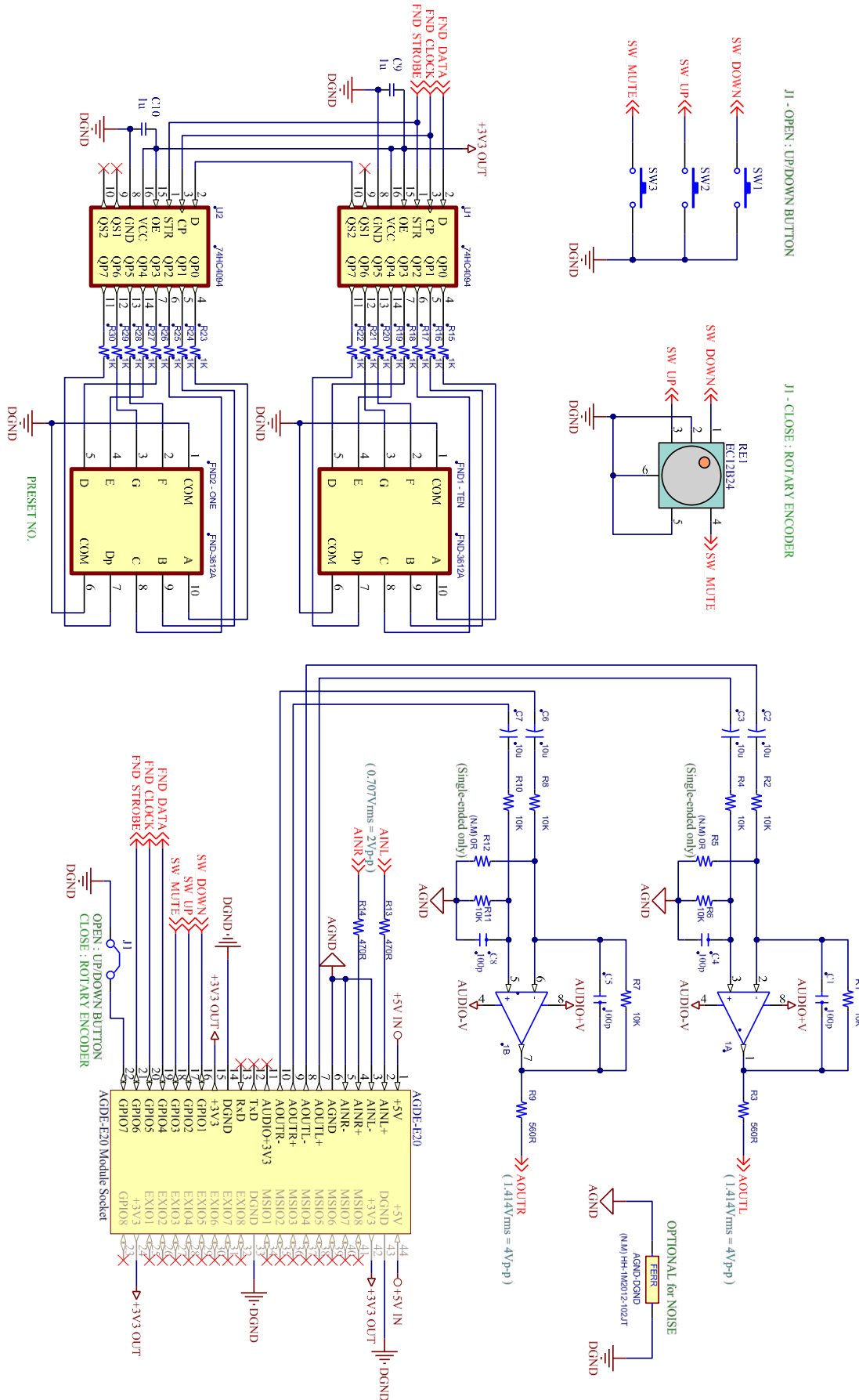
CN1

No.	Name	Remark
1	5V	5V input
2	MCLK	Master clock output
3	BCLK	Audio serial data bus bit clock input/output
4	WCLK	Audio serial data bus word clock input/output
5	DIN	Audio serial data bus data input
6	AGND	Analog ground
7	DOUT	Audio serial data bus data output
8	SDA	I2C serial data input/output
9	SCL	I2C serial clock output
10	1V8	1.8V output for digital circuit
11	A3V3	3.3V output for analog circuit
12	TxD	UART Tx
13	RxD	UART Rx
14	DGND	Digital ground
15	D3V3	3.3V output for digital circuit
16	GPIO1	General-purpose I/O with 10-bit A-D converter, and pull-up
17	GPIO2	General-purpose I/O with 10-bit A-D converter, and pull-up
18	GPIO3	General-purpose I/O with 10-bit A-D converter, and pull-up
19	GPIO4	General-purpose I/O with 10-bit A-D converter, and pull-up
20	GPIO5	General-purpose I/O with 10-bit A-D converter, and pull-up
21	GPIO6	General-purpose I/O with 10-bit A-D converter, and pull-up
22	GPIO7	General-purpose I/O with 10-bit A-D converter, and pull-up

CN2 (optional)

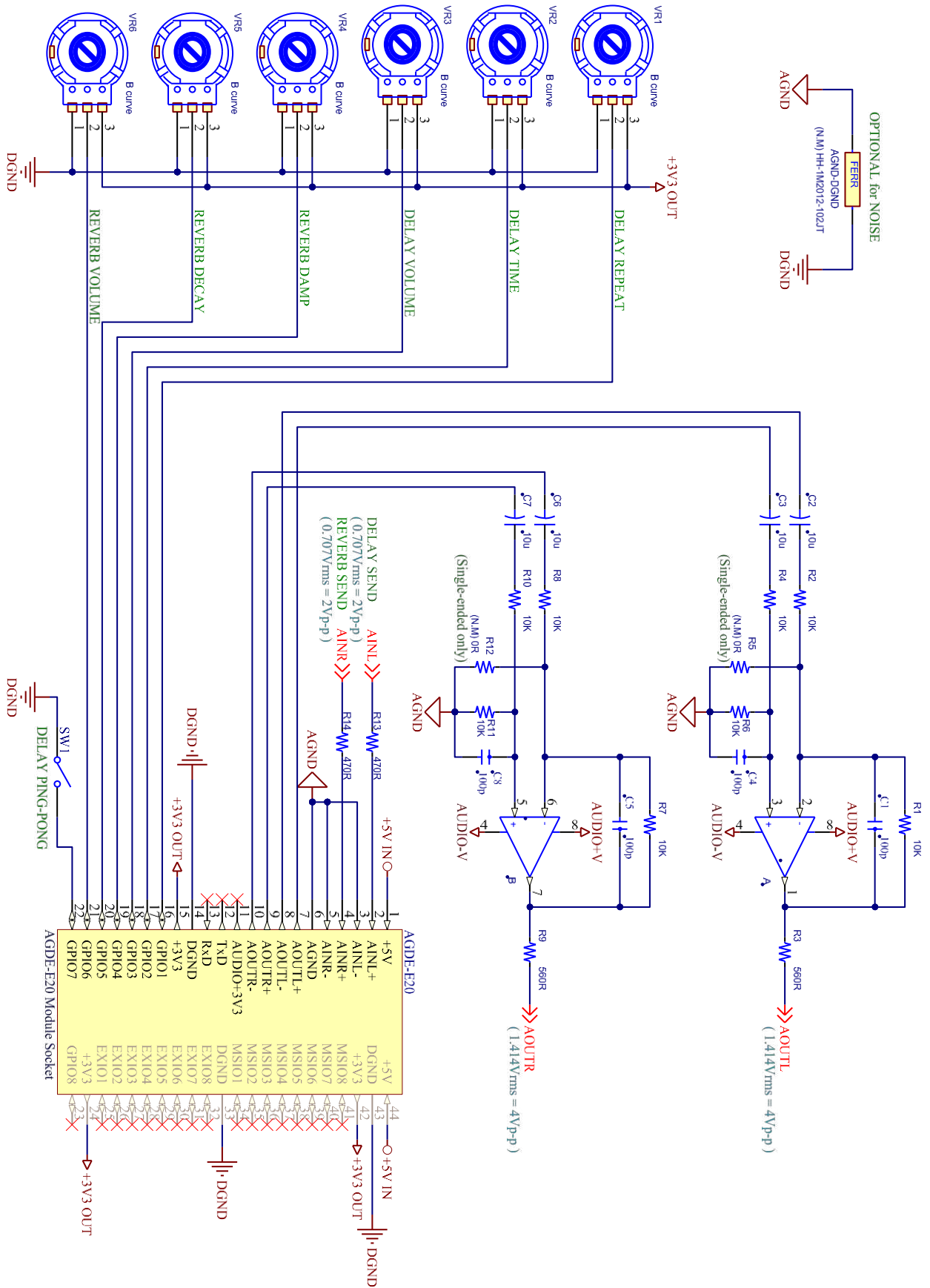
No.	Name	Remark
23 (1)	GPIO8	General-purpose I/O with external interrupt, and pull-up
24 (2)	D3V3	3.3V output for digital circuit
25 (3)	EXIO1	General-purpose I/O with pull-up
26 (4)	EXIO2	General-purpose I/O with pull-up
27 (5)	EXIO3	General-purpose I/O with pull-up
28 (6)	EXIO4	General-purpose I/O with pull-up
29 (7)	EXIO5	General-purpose I/O with pull-up
30 (8)	EXIO6	General-purpose I/O with pull-up
31 (9)	EXIO7	General-purpose I/O with pull-up
32 (10)	EXIO8	General-purpose I/O with pull-up
33 (11)	DGND	Digital ground
34 (12)	MSIO1	General-purpose I/O with pull-up
35 (13)	MSIO2	General-purpose I/O with pull-up
36 (14)	MSIO3	General-purpose I/O with pull-up
37 (15)	MSIO4	General-purpose I/O with pull-up
38 (16)	MSIO5	General-purpose I/O with pull-up
39 (17)	MSIO6	General-purpose I/O with pull-up
40 (18)	MSIO7	General-purpose I/O with pull-up
41 (19)	MSIO8	General-purpose I/O with pull-up
42 (20)	D3V3	3.3V output for digital circuit
43 (21)	DGND	Digital ground
44 (22)	5V	5V input

Application Schematic – Presets



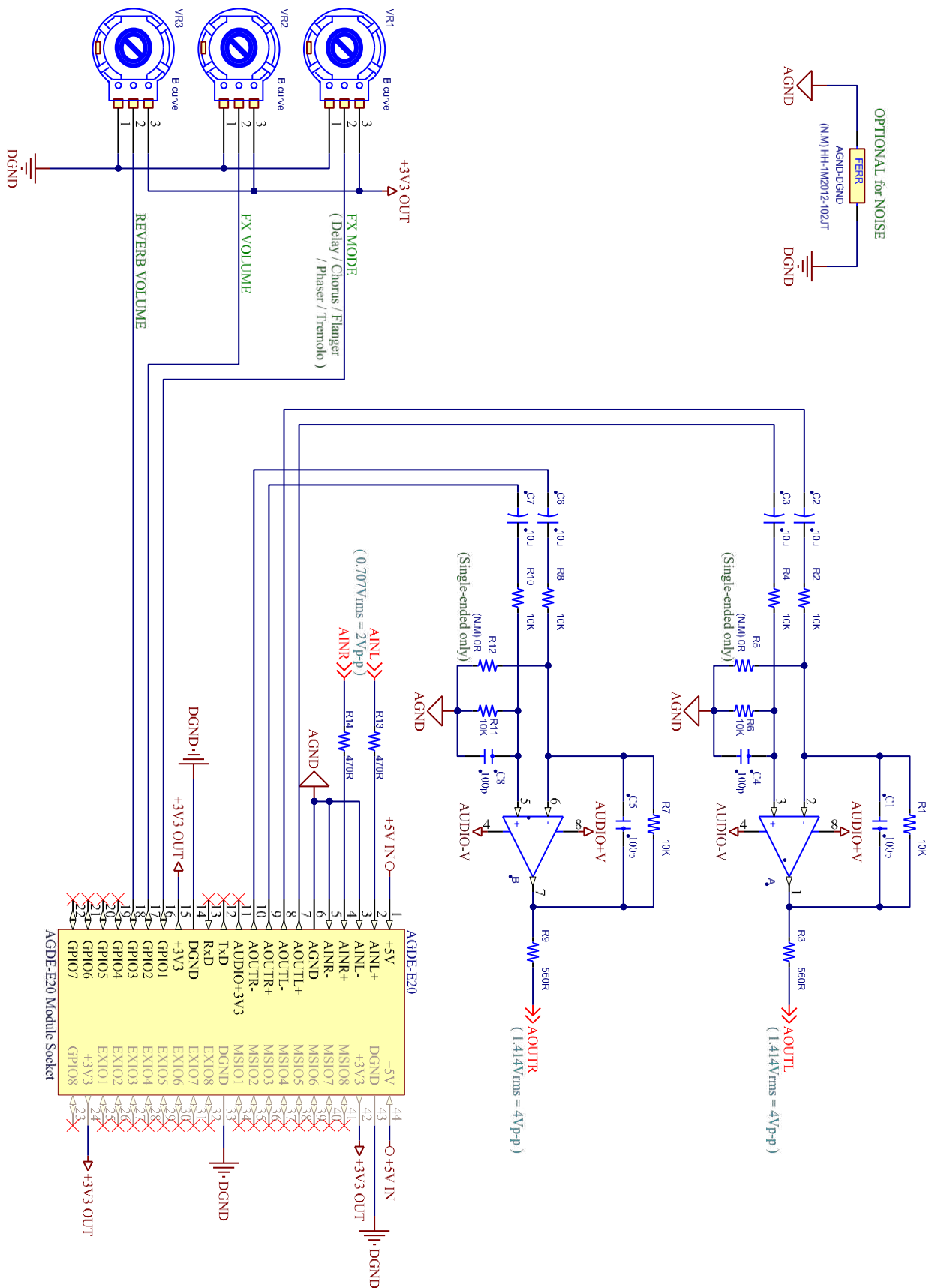
* Above schematic is an example for presets. Proper schematic will be offered for requested functions.

Application Schematic – Delay & Reverb



* Above schematic is an example for delay & reverb. Proper schematic will be offered for requested functions.

Application Schematic – 5-type FX & Reverb



* Above schematic is an example for 5-type FX & reverb. Proper schematic will be offered for requested functions.

Ordering Information

Part Number :

AGDE-E20-①②③

Max Delay Time (approx., in millisecond at 48kHz)			
①	Delay only	+ Reverb	+ Chorus + Reverb
2	500		
3	1,100	550	500
4	2,500	1,900	1,850
5	3,200	2,600	2,550

②	Audio I/O
A	analog signal
D	digital serial interface

Pin Header		
③	CN1	CN2
S	O	X
C	O	O

Ex> AGDE-E20-3AC : max delay time = about 500ms, audio I/O = analog, CN1 and CN2

Contact Point

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Datasheet Revision History

v 0.1	12 July 2013	The first release.
v 0.2	19 August 2013	+ Application schematic
v 0.3	29 August 2013	* Application schematic
v 0.4	4 September 2013	* Cover image * SPC20 DSP-ware * Module dimension
v 0.5	17 October 2013	* Cover image
v 0.6	22 October 2013	+ MDR20 DSP-ware * SPC20 DSP-ware * MIC20 DSP-ware * PEQ13 DSP-ware
v 0.7	23 October 2013	* Power Consumption * MDR20 DSP-ware * SPC20 DSP-ware * MIC20 DSP-ware
v 0.8	25 October 2013	+ Application Schematic – Presets + Application Schematic – 5-type FX & Reverb
v 0.9	14 November 2013	+ Ordering Information – Part Number
v 1.0	26 November 2013	* Cover image * Pin Connection – Analog/Digital
v 1.1	16 December 2013	+ Operating Temperature
v 1.2	11 August 2014	* Brand-Logo * Processing Algorithms

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AGDE-E20