QSurround 5.1

QSurround Multi-Speaker System with Digital Delay

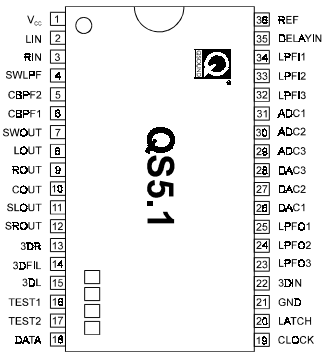
Device Specifications - Preliminary Information

Overview:

The QSurround5.1 integrated circuit audio processor synthesizes 5.1-channel surround output, with 3D and digital reverberation effects, from regular mono or stereo input signals. QSurround5.1 employs QSound Labs' QSurround™ technology

Features:

- QSurround Multi-Speaker System
- Built in SRAM for digital delay
- Digital delay
  - — Delay time; 20, 30, 40, 50msec
  - — Frequency response; 3kHz/7kHz
  - — 3D effect on/off
- Built in 3 wire mcu interface
- DC 4.5 to 5.5 volt supply
- 36-pin SSOP packaging

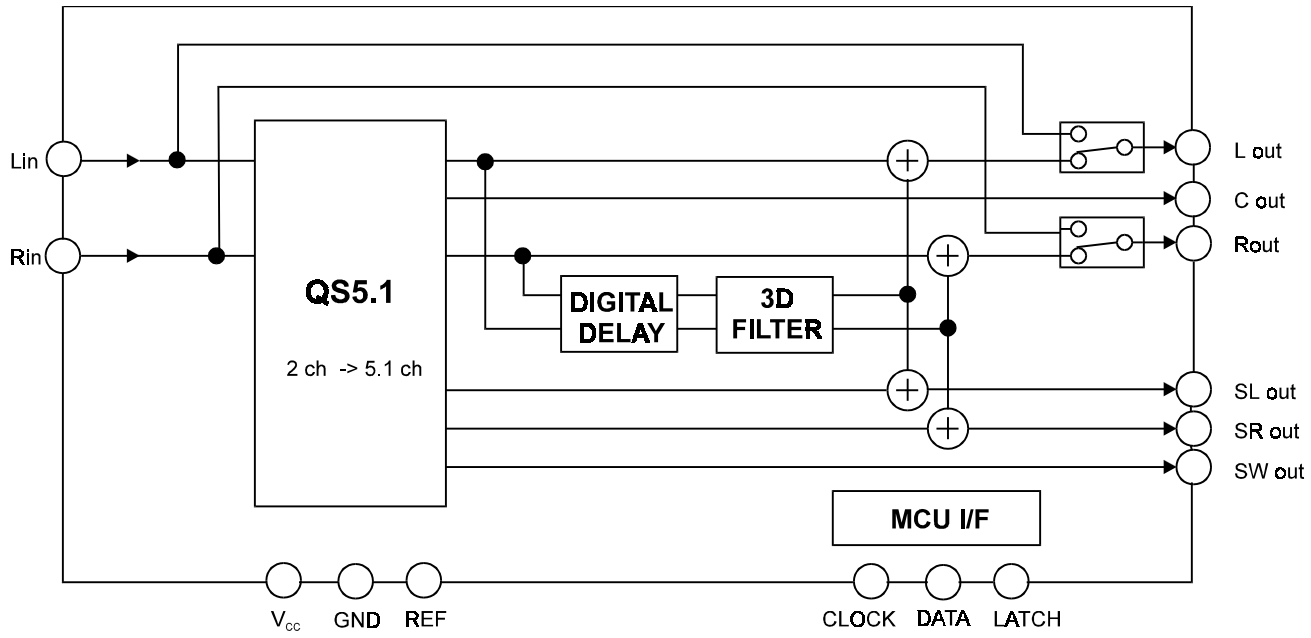


36P2R-A
0.8mm pitch 450mil SSOP
(8.4mm X 15.0mm X 2.0mm)

Application:

- Audio systems including TV, AV Amp, Mini System, VCR, DVD, VCD, SVCD and MP3 player
- Computer-based multimedia products, including sound cards and powered loudspeakers
- Car Audio

System Block Diagram:



Electrical Specification:

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	6.0	V
Input voltage	V_I	-0.3 to V_{CC}+0.3	V
Thermal derating	K_θ	9.6	mW/°C
Power dissipation	Pd	960	mW
Operating temperature	T_{OPR}	-20 to 75	°C
Storage temperature range	T_{STG}	-40 to 125	°C
Soldering temperature	T_{SLD}	255	°C
Soldering time	t_{SLD}	10	Sec

Recommended Operating Condition

Parameter	Symbol	Limits			Unit
		min.	typ.	max.	
Supply voltage	V_{CC}	4.5	5.0	5.5	V
Logic "H" level input voltage	V_{IH}	V_{CC} X 0.7	-	V_{CC}	V
Logic "L" level input voltage	V_{IL}	GND	-	V_{CC} X 0.3	V

Electrical Characteristics

(Ta = 25deg., V_{CC} = 5V, unless otherwise noted)

Symbol	Parameter	Condition	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit Current	No Signal	-	30	50	mA
G_V	Voltage Gain	Vi = 200m Vrms, f = 1kHz Bypass, L/Rch	-3	0	3	dB
THD	Total Harmonic Ditortion	Vi = 200m Vrms, f = 1kHz Bypass, L/Rch	-	0.006	0.06	%
Vimax	Maximum Input Voltage	THD = 1%, f = 1kHz Bypass, L/Rch	1.0	1.4	-	Vrms
Vomax	Maximum Output Voltage	THD = 1%, f = 1kHz Bypass, L/Rch	1.0	1.4	-	Vrms
Vno	Output Noise Voltage	Rg = 0, JIS-A Bypass, L/Rch	-	4	10	µVrms
CS	Channel Separation	Vi = 200m Vrms, f = 1kHz Bypass, L/Rch	-	-80	-65	dB
G_V-D	Digital Delay Voltage Gain	Vi = 200m Vrms, f = 1kHz pin 34 input, pin21 output Td = 40ms	-3	0	3	dB
THD-D	Digital Delay Total Harmonic Distortion	Vi = 200m Vrms, f = 1kHz pin 34 input, pin21 output Td = 40ms	-	0.6	1.8	%
Vomax-D	Digital Delay Maximum Output Voltage	THD = 10%, f = 1kHz pin 34 input, pin21 output Td = 40ms	0.7	1.0	-	Vrms
Vno-D	Digital Delay Output Noise Voltage	Rg = 0, JIS-A Pin21 output Td = 40ms	-	50	300	µVrms

Control Data Specification

D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF
Mode	Input mode	Center On/Off	Rear effect	Surround effect	Delay time		Delay LPF	Delay On/Off	Delay gain		Delay feed back			1	0

Setting Data

(1) Mode (QS5.1)

Mode	D0
QSurround5.1	1

(2) Input

Input	D1
Mono	0
Stereo	1

(3) Center

Input	D2
Off	0
On	1

(4) Surround output

Surround output	D3
Off	0
On	1

(5) Surround effect

Surround effect	D4
Narrow	0
Wide	1

(6) Delay time

Delay time (msec)	D5	D6
20	0	0
30	1	0
40	0	1
50	1	1

(7) Delay LPF cut-off frequency

Cut-off frequency	D7
fc = 3kHz	0
7kHz	1

(8) Delay effect

Delay effect	D8
Off	0
On	1

(9) Delay gain

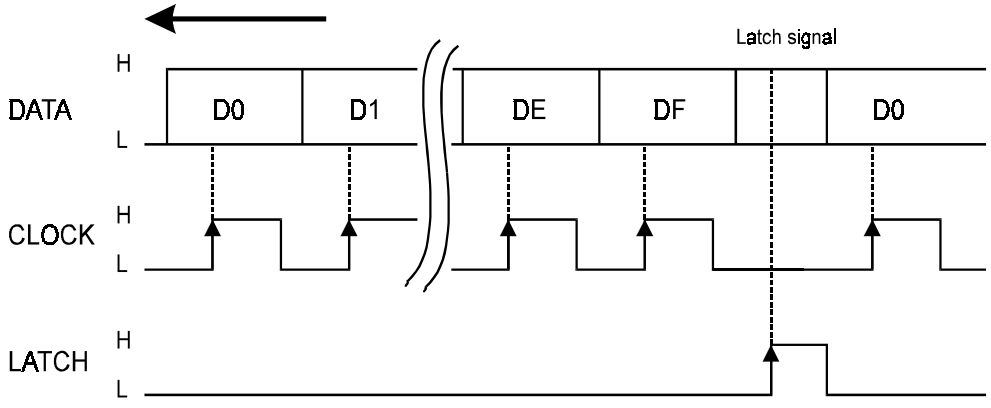
Delay gain	D9	DA
Gain 1 Low	0	0
2	1	0
3	0	1
4 High	1	1

(10) Delay feed back gain

Feedback gain	DB	DC	DD
-3dB	0	0	0
-6dB	1	0	0
-9dB	0	1	0
-12dB	1	1	0

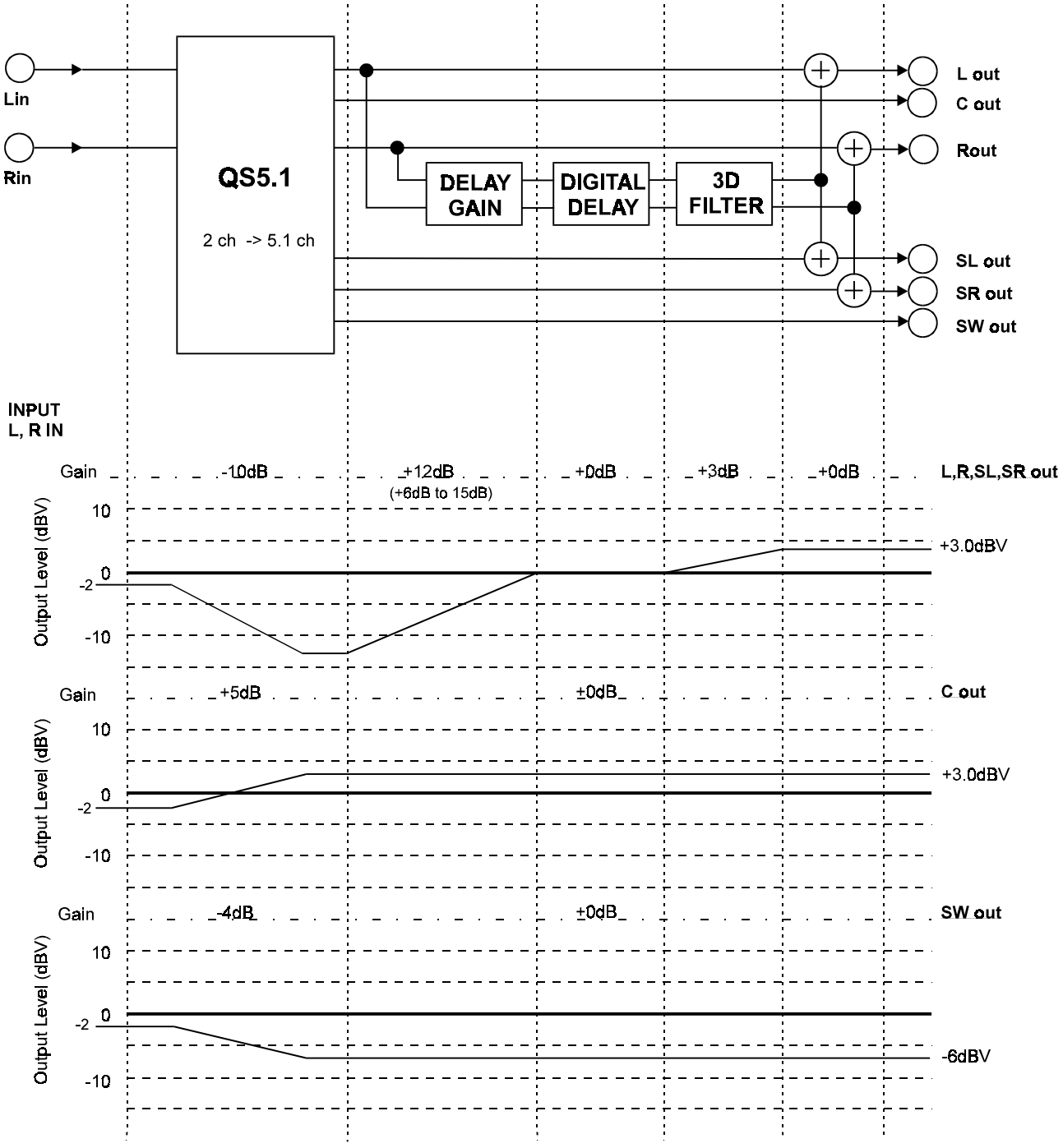
Set D2, D3 and D8 to zero for bypass

Data and Clock

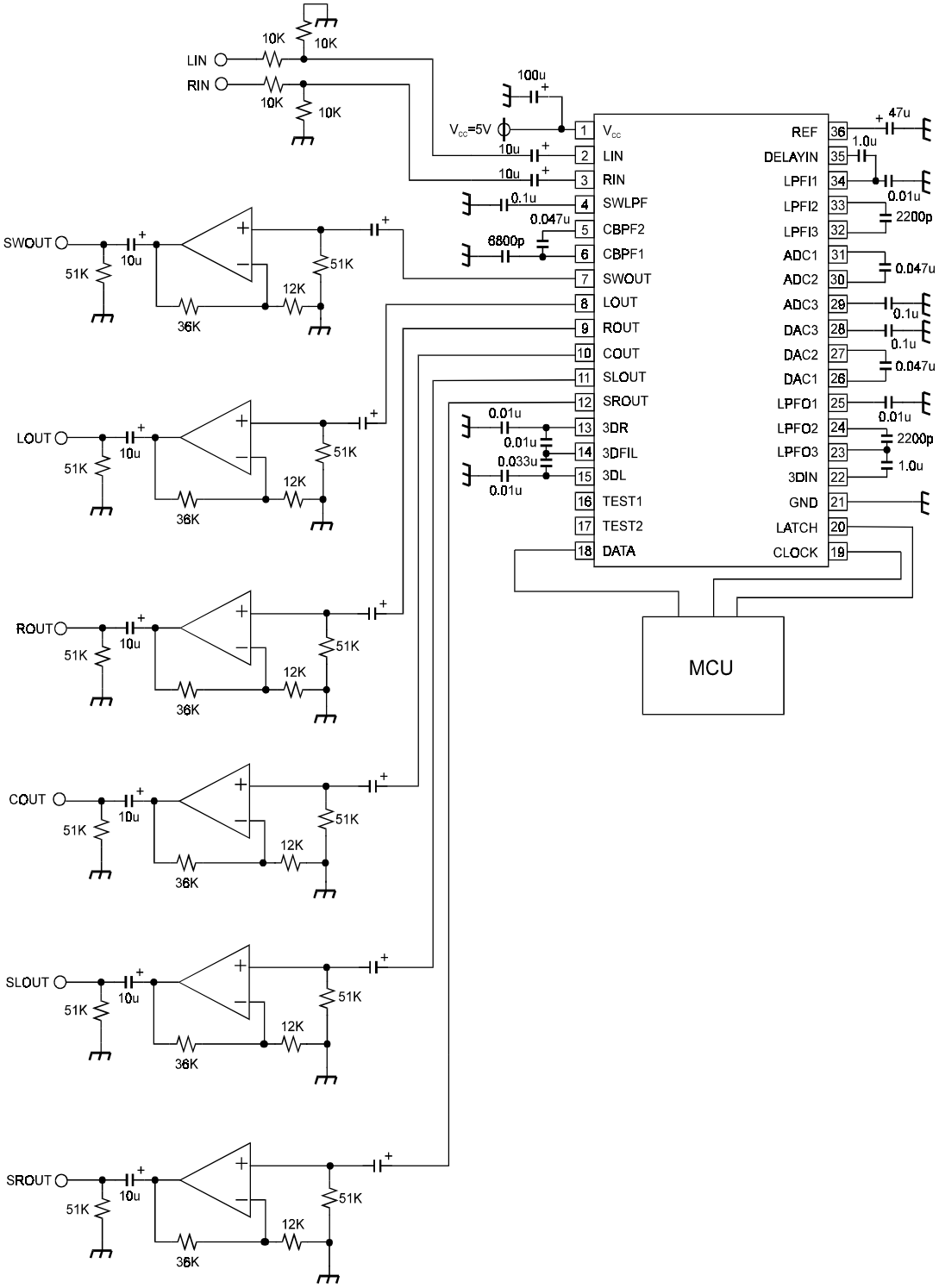


DATA is read by rising edge of CLOCK signal,
and loaded by rising edge of LATCH signal.

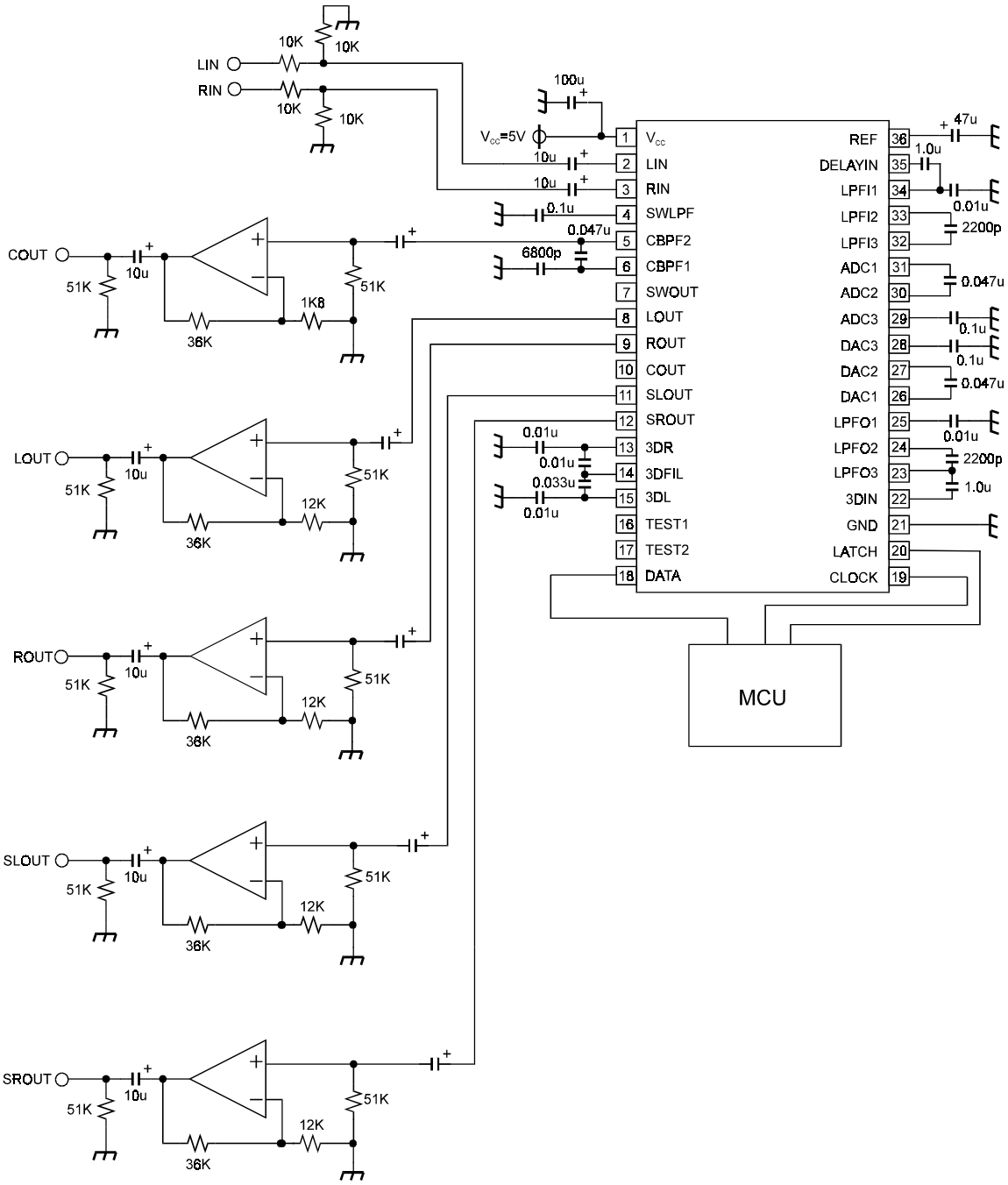
Level Diagram
QS5.1 Mode



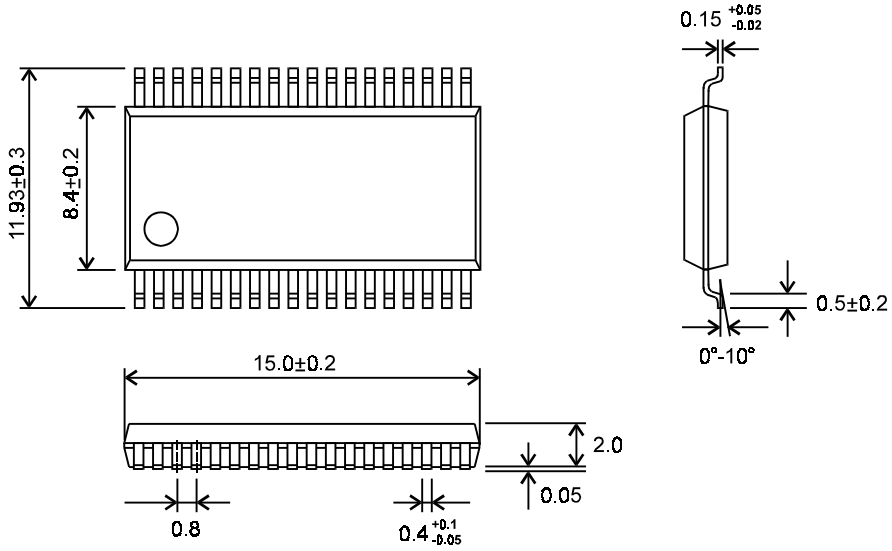
Application Example:



Application Example 2 for no Subwoofer:



Packaging Dimension:



Note: All dimensions in millimeters.