M61538FP

6-Channel Electronic Volume

REJ03F0103-0100Z
Rev.1.0
Mar.23.2004

Description

The M61538FP is 6ch electronic volume. This IC is controlled by 2-wire serial bus and is suitable for Home Audio System.

Features

- Electronic Volume 0 to –95dB, –∞/1dBstep
  6-Channel independent Electronic Volume
- MUC I/F Controlled by serial data from microcomputer
- Low Noise 0.85µVrms: typ. [Volume = 0dB, Rg = 0Ω, IHF-A]
- Low Distortion 0.0012%: typ. [Vi:0.3Vrms, f:1kHz, BW:400Hz to 30kHz]
- Power Supply ±Power supplies or Single power supply

Applications

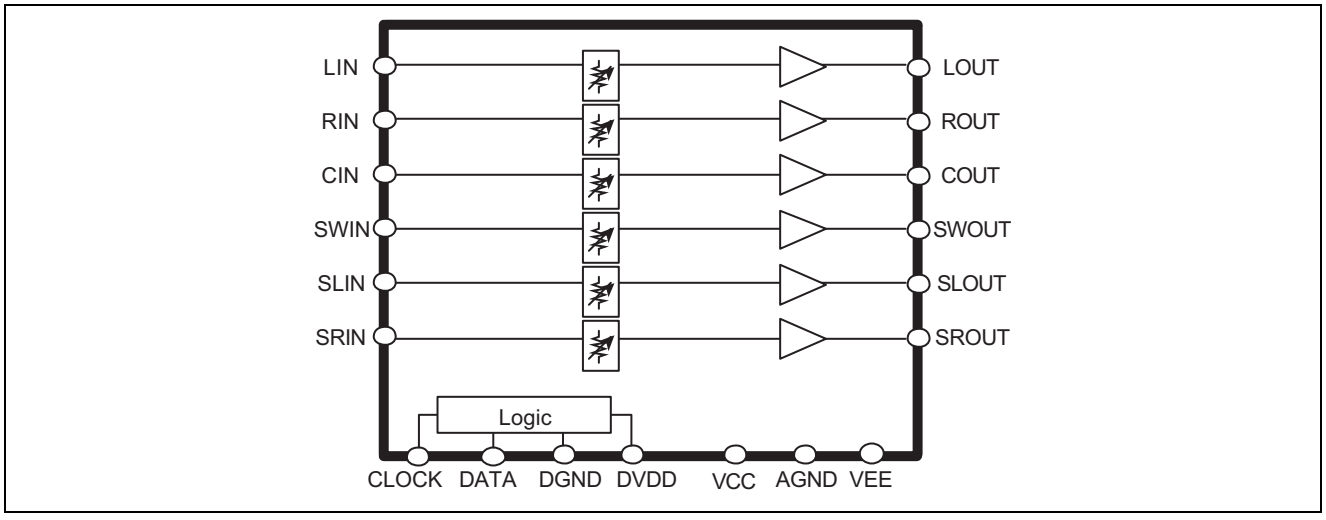
- Receiver, AV Amp, Mini Stereo etc.

Recommended Operating Condition

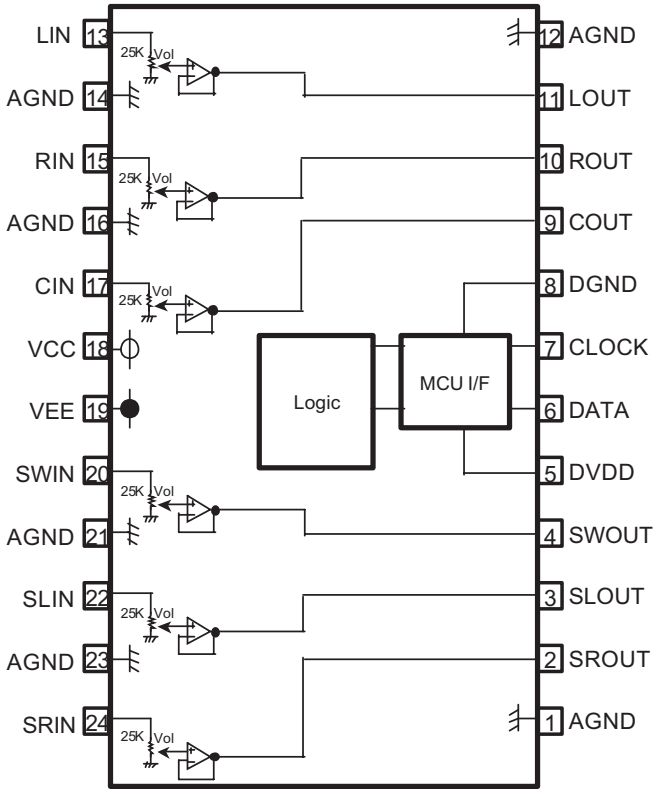
- Supply Voltage Range
  — ±Power supplies VCC: +4.5 to +7.5V [Typ: 7V], VEE: –4.5 to –7.5V[Typ: –7V],
  DVDD: +2.7 to + 5.5V [Typ:5V]
  — Single power supply VCC: +9 to +12V[Typ: 10V], DVDD: 4.5 to +5.5V[Typ: 5V]

System Block Diagram

(±Power supplies used)



Block Diagram and Pin Configuration



(Top View)

Pin Description

(±Power supplies used)

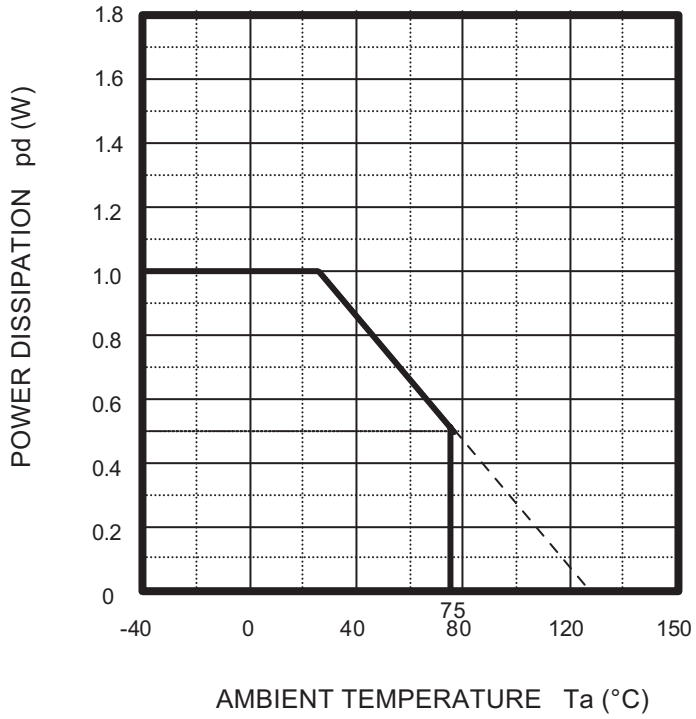
PIN No.	Name	Function
1, 23	AGND	Analog ground of SW/SL/SR volume
2	SROUT	Output pin of SR channel
3	SLOUT	Output pin of SL channel
4	SWOUT	Output pin of SW channel
5	DVDD	Digital Power supply (Typ: 5V)
6, 7	DATA, CLOCK	Input pin of Control data/clock
8	DGND	Digital ground
9	COUT	Output pin of C channel
10	ROUT	Output pin of R channel
11	LOUT	Output pin of L channel
12, 14	AGND	Analog ground of L/R/C volume
13	LIN	Input pin of L channel
15	RIN	Input pin of R channel
16, 21	AGND	Analog ground of all channels
17	CIN	Input pin of C channel
18	VCC	Positive Power supply (Typ: +7V)
19	VEE	Negative Power supply (Typ: –7V)
20	SWIN	Input pin of SW channel
22	SLIN	Input pin of SL channel
24	SRIN	Input pin of SR channel

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Condition
Analog Power supply	VCC-VEE	16	V	VCC-VEE (±Power supplies used)
Digital Power supply	DVDD-DGND	7	V	DVDD-DGND
Power dissipation	Pd	1.0	W	Ta ≤ 25°C
Thermal derating	K	10.0	mW/°C	Ta > 25°C
Operating temperature	Topr	–20 to +75	°C	
Storage temperature	Tstg	–40 to +125	°C	

Note: VEE ≤ DGND < DVDD ≤ VCC

Thermal Deratings (Maximum Rating)



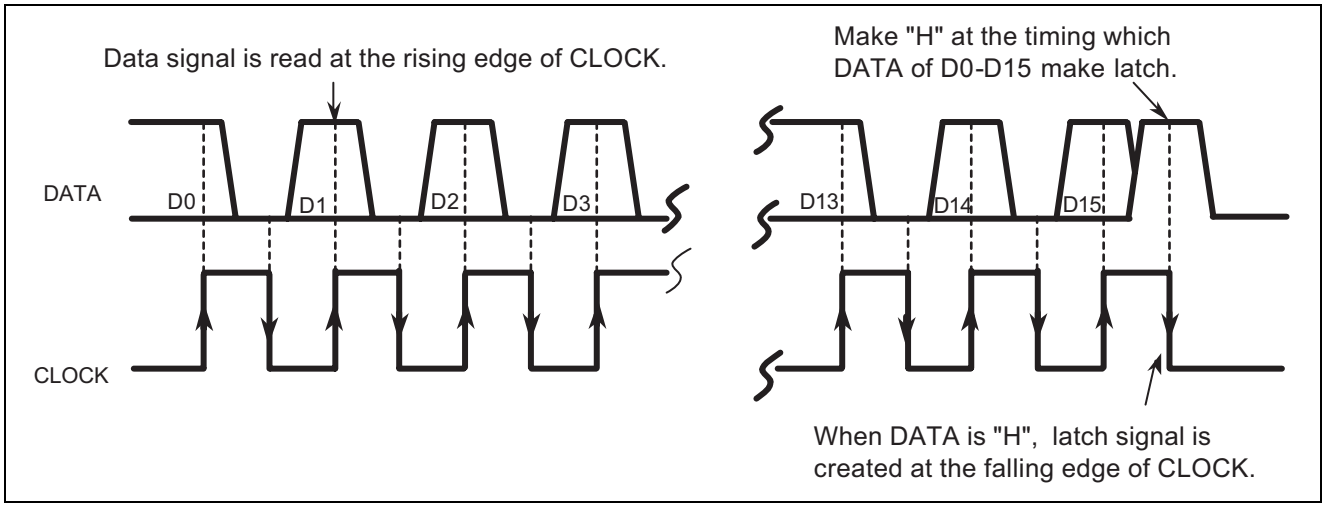
Recommended Operating Conditions

(Ta = 25°C, unless otherwise noted)

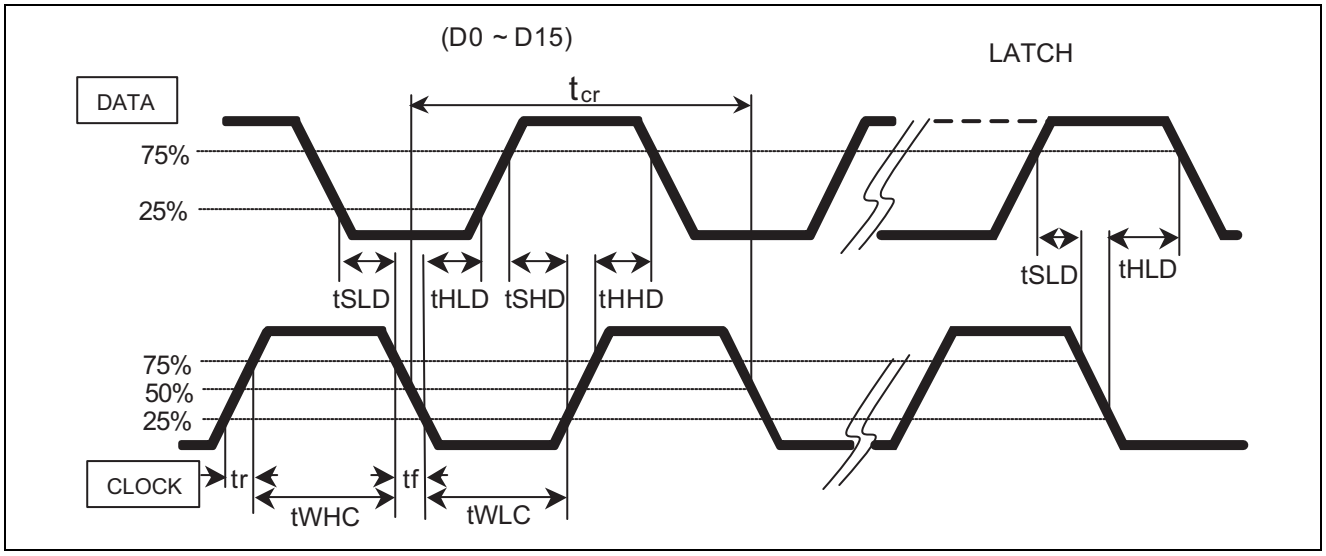
Parameter	Symbol	Limits			Units	Conditions
		Min	Typ	Max		
Analog supply voltage (Positive)	VCC	4.5	7	7.5	V	±Power supplies used
Analog supply voltage (Negative)	VEE	–7.5	–7	–4.5	V	±Power supplies used
Analog supply voltage	VCC	9	10	12	V	Single power supply used
Digital supply voltage	VDD	2.7	5	5.5	V	±Power supplies used, DGND = 0V
		4.5	5	5.5	V	Single power supply used, DGND = 0V
Logic “H” level input voltage	VIH	DVDD ×0.7	—	DVDD	V	DGND = 0V
Logic “L” level input voltage	VIL	DGND	—	DVDD ×0.3	V	DGND = 0V

Notes: 1. VEE ≤ DGND < DVDD ≤ VCC
2. Apply VCC, VEE and DVDD at the same time.

Relationship between Data and Clock



Clock and Data Timings



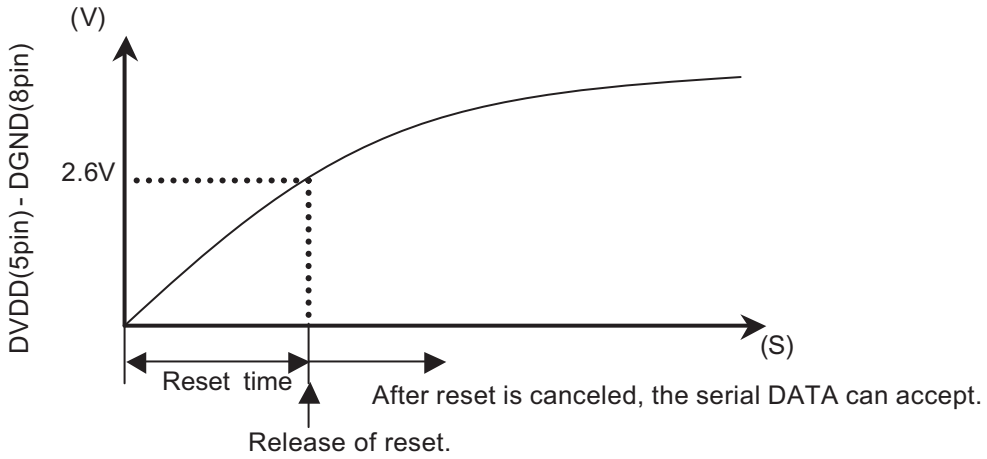
Timing Definition of Digital Block

Parameter	Symbol	Limits			Units
		Min	Typ	Max	
CLOCK cycle time	tcr	8	—	—	µs
CLOCK pulse width (“H” level)	tWHC	3.2	—	—	
CLOCK pulse width (“L” level)	tWLC	3.2	—	—	
Rising time of clock and data	tr	—	—	0.8	
Falling time of clock and data	tf	—	—	0.8	
DATA setup time (Rising time of clock)	tSHD	1.6	—	—	
DATA setup time (Falling time of clock)	tSLD	1.6	—	—	
DATA hold time (“H” level)	tHHD	1.6	—	—	
DATA hold time (“L” level)	tHLD	1.6	—	—	

Power on Reset

This IC built-in the power on reset function.

The voltage of DVDD (5 pin) -DGND (8 pin) less than 2.6V, the serial DATA can not accept.



Data Control Specification

Three types of input format can be selected by changing the D14/D15 slot setting status.

(Initialize all data of the 3 formats when power supply (DVDD) turn on.)

(1)

D0a	D1a	D2a	D3a	D4a	D5a	D6a	D7a	D8a	D9a	D10a	D11a	D12a	D13a	D14	D15
L Channel volume							R Channel volume							0	0

(2)

D0b	D1b	D2b	D3b	D4b	D5b	D6b	D7b	D8b	D9b	D10b	D11b	D12b	D13b	D14	D15
C Channel volume							SW Channel volume							0	1

(3)

D0c	D1c	D2c	D3c	D4c	D5c	D6c	D7c	D8c	D9c	D10c	D11c	D12c	D13c	D14	D15
SL Channel volume							SR Channel volume							1	0

(4)

D0c	D1c	D2c	D3c	D4c	D5c	D6c	D7c	D8c	D9c	D10c	D11c	D12c	D13c	D14	D15
Test Mode														1	1

Setting Code

L/R/C/SW/SL/SR Channel Volume

It's initial setting when DVDD turn on.

L	D0a	D1a	D2a	D3a	D4a	D5a	D6a
R	D7a	D8a	D9a	D10a	D11a	D12a	D13a
C	D0b	D1b	D2b	D3b	D4b	D5b	D6b
SW	D7b	D8b	D9b	D10b	D11b	D12b	D13b
SL	D0c	D1c	D2c	D3c	D4c	D5c	D6c
SR	D7c	D8c	D9c	D10c	D11c	D12c	D13c
0dB	0	0	0	0	0	0	0
-1dB	0	0	0	0	0	0	1
-2dB	0	0	0	0	0	1	0
-3dB	0	0	0	0	0	1	1
-4dB	0	0	0	0	1	0	0
-5dB	0	0	0	0	1	0	1
-6dB	0	0	0	0	1	1	0
-7dB	0	0	0	0	1	1	1
-8dB	0	0	0	1	0	0	0
-9dB	0	0	0	1	0	0	1
-10dB	0	0	0	1	0	1	0
-11dB	0	0	0	1	0	1	1
-12dB	0	0	0	1	1	0	0
-13dB	0	0	0	1	1	0	1
-14dB	0	0	0	1	1	1	0
-15dB	0	0	0	1	1	1	1
-16dB	0	0	1	0	0	0	0
-17dB	0	0	1	0	0	0	1
-18dB	0	0	1	0	0	1	0
-19dB	0	0	1	0	0	1	1
-20dB	0	0	1	0	1	0	0
-21dB	0	0	1	0	1	0	1
-22dB	0	0	1	0	1	1	0
-23dB	0	0	1	0	1	1	1
-24dB	0	0	1	1	0	0	0
-25dB	0	0	1	1	0	0	1
-26dB	0	0	1	1	0	1	0
-27dB	0	0	1	1	0	1	1
-28dB	0	0	1	1	1	0	0
-29dB	0	0	1	1	1	0	1
-30dB	0	0	1	1	1	1	0
-31dB	0	0	1	1	1	1	1
-32dB	0	1	0	0	0	0	0
-33dB	0	1	0	0	0	0	1
-34dB	0	1	0	0	0	1	0
-35dB	0	1	0	0	0	1	1
-36dB	0	1	0	0	1	0	0
-37dB	0	1	0	0	1	0	1
-38dB	0	1	0	0	1	1	0
-39dB	0	1	0	0	1	1	1
-40dB	0	1	0	1	0	0	0
-41dB	0	1	0	1	0	0	1
-42dB	0	1	0	1	0	1	0
-43dB	0	1	0	1	0	1	1
-44dB	0	1	0	1	1	0	0
-45dB	0	1	0	1	1	0	1
-46dB	0	1	0	1	1	1	0
-47dB	0	1	0	1	1	1	1

L	D0a	D1a	D2a	D3a	D4a	D5a	D6a
R	D7a	D8a	D9a	D10a	D11a	D12a	D13a
C	D0b	D1b	D2b	D3b	D4b	D5b	D6b
SW	D7b	D8b	D9b	D10b	D11b	D12b	D13b
SL	D0c	D1c	D2c	D3c	D4c	D5c	D6c
SR	D7c	D8c	D9c	D10c	D11c	D12c	D13c
-48dB	0	1	1	0	0	0	0
-49dB	0	1	1	0	0	0	1
-50dB	0	1	1	0	0	1	0
-51dB	0	1	1	0	0	1	1
-52dB	0	1	1	0	1	0	0
-53dB	0	1	1	0	1	0	1
-54dB	0	1	1	0	1	1	0
-55dB	0	1	1	0	1	1	1
-56dB	0	1	1	1	0	0	0
-57dB	0	1	1	1	0	0	1
-58dB	0	1	1	1	0	1	0
-59dB	0	1	1	1	0	1	1
-60dB	0	1	1	1	1	0	0
-61dB	0	1	1	1	1	0	1
-62dB	0	1	1	1	1	1	0
-63dB	0	1	1	1	1	1	1
-64dB	1	0	0	0	0	0	0
-65dB	1	0	0	0	0	0	1
-66dB	1	0	0	0	0	1	0
-67dB	1	0	0	0	0	1	1
-68dB	1	0	0	0	1	0	0
-69dB	1	0	0	0	1	0	1
-70dB	1	0	0	0	1	1	0
-71dB	1	0	0	0	1	1	1
-72dB	1	0	0	1	0	0	0
-73dB	1	0	0	1	0	0	1
-74dB	1	0	0	1	0	1	0
-75dB	1	0	0	1	0	1	1
-76dB	1	0	0	1	1	0	0
-77dB	1	0	0	1	1	0	1
-78dB	1	0	0	1	1	1	0
-79dB	1	0	0	1	1	1	1
-80dB	1	0	1	0	0	0	0
-81dB	1	0	1	0	0	0	1
-82dB	1	0	1	0	0	1	0
-83dB	1	0	1	0	0	1	1
-84dB	1	0	1	0	1	0	0
-85dB	1	0	1	0	1	0	1
-86dB	1	0	1	0	1	1	0
-87dB	1	0	1	0	1	1	1
-88dB	1	0	1	1	0	0	0
-89dB	1	0	1	1	0	0	1
-90dB	1	0	1	1	0	1	0
-91dB	1	0	1	1	0	1	1
-92dB	1	0	1	1	1	0	0
-93dB	1	0	1	1	1	0	1
-94dB	1	0	1	1	1	1	0
-95dB	1	0	1	1	1	1	1
-∞dB	1	1	1/0	1/0	1/0	1/0	1/0

Electrical Characteristics (Supply current)

(Unless otherwise noted, Ta = 25°C, VCC(18pin) = 7V, VEE(19pin) = –7V, DVDD(5pin) = 5V, RL = 10kΩ)

		Limits				
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Test Condition**
Positive Supply current	ICC	—	11	20	mA	when no signal is provided
Negative Supply current	IEE	–20	–11	—	mA	when no signal is provided
Digital Supply current	IDD	—	0.5	2	mA	when no signal is provided

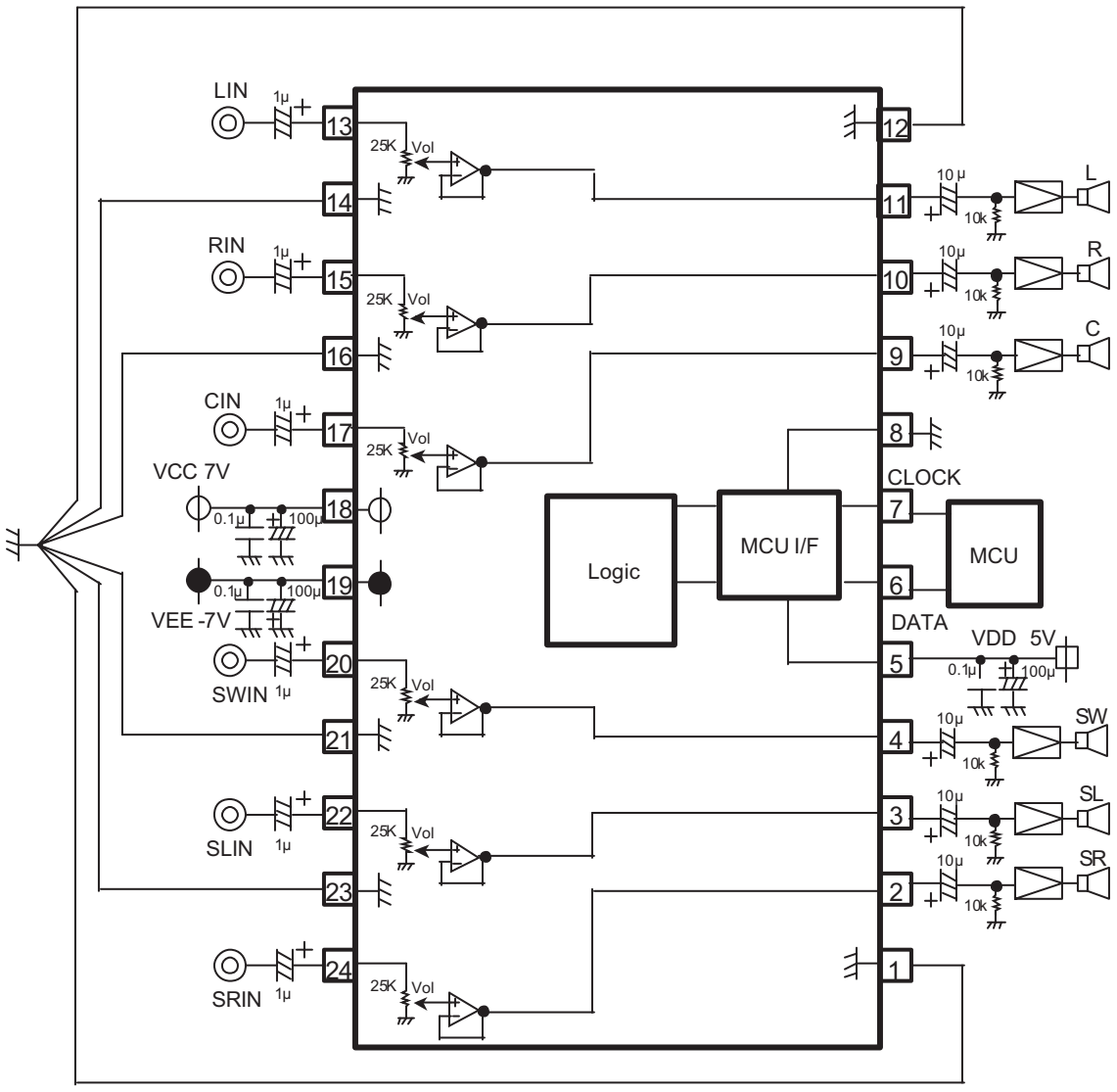
Electrical Characteristics (Input/Output)

(Unless otherwise noted, Ta = 25°C, VCC(18pin) = 7V, VEE(19pin) = –7V, DVDD(5pin) = 5V, f = 1kHz, RL = 10kΩ)

		Limits				
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Test Condition**
Input resistance	Rin	17	25	33	kΩ	13, 15, 17, 20, 22, 24pin, Volume = 0 to –∞dB
Maximum output voltage	VOM	4.0	4.5	—	Vrms	2, 3, 4, 9, 10, 11pin output, RL = 10kΩ, THD = 1%
Pass gain	Gv	–2	0	2	dB	13, 15, 17, 20, 22, 24pin input, 2, 3, 4, 9, 10, 11pin output
Distortion	THD	—	0.0012	0.009	%	BW = 400Hz to 30kHz, Vi = 0.3Vrms, RL=10kΩ
Output noise voltage	Vno	—	0.85	8	μVrms	Volume = 0dB , Rg = 0Ω, IHF-A
Maximum attenuation	ATTmax	—	–120	–70	dB	Vi = 2Vrms, Volume = –∞dB, IHF-A
Volume gain between channels	Dvol	–1	0	1	dB	Volume = 0, IHF-A
Cross talk between channels	CT	—	–110	–70	dB	Vi = 2Vrms, RL = 10kΩ, IHF-A, Rg = 0Ω

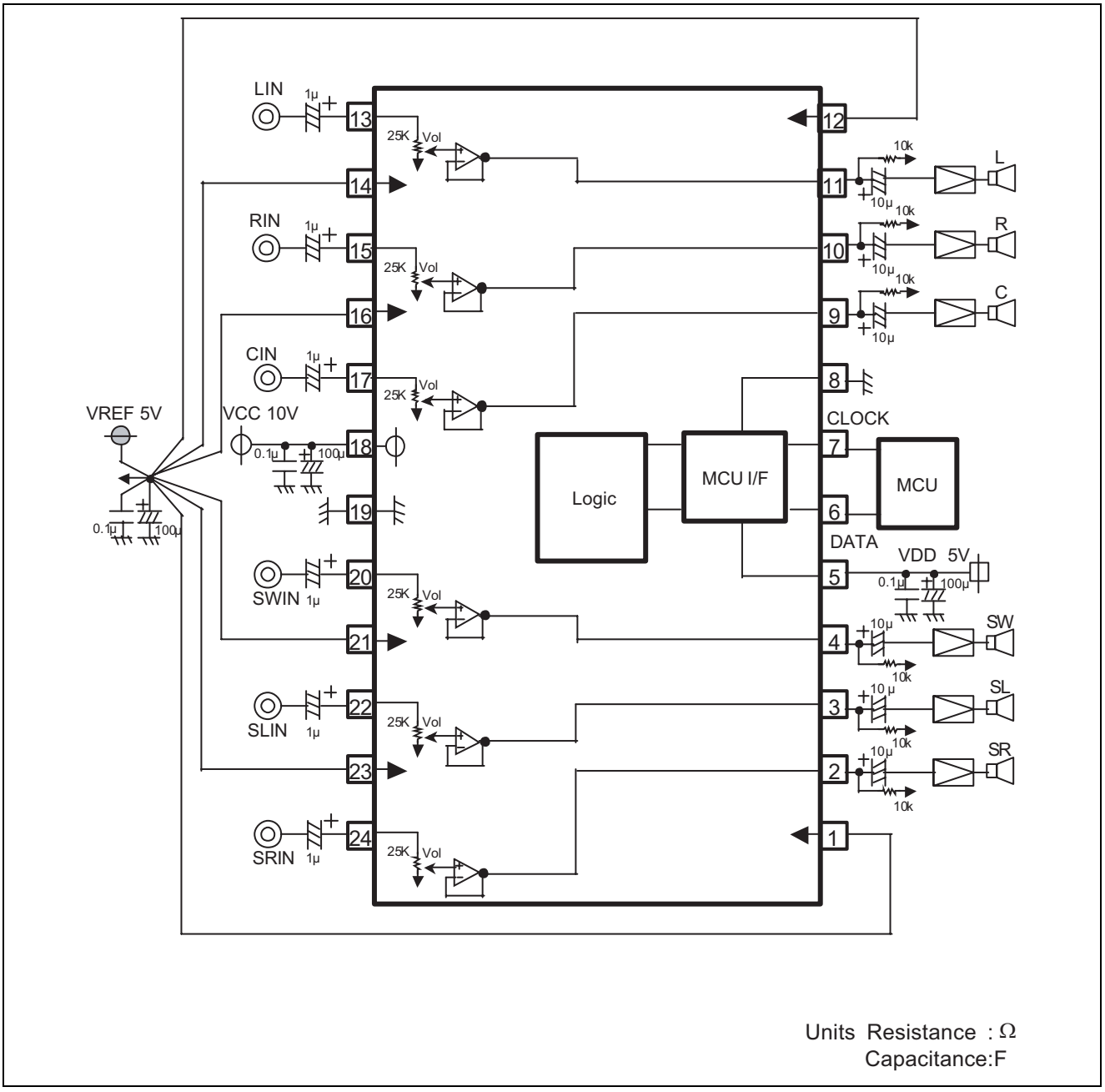
Application Example 1

(±Power supplies used)

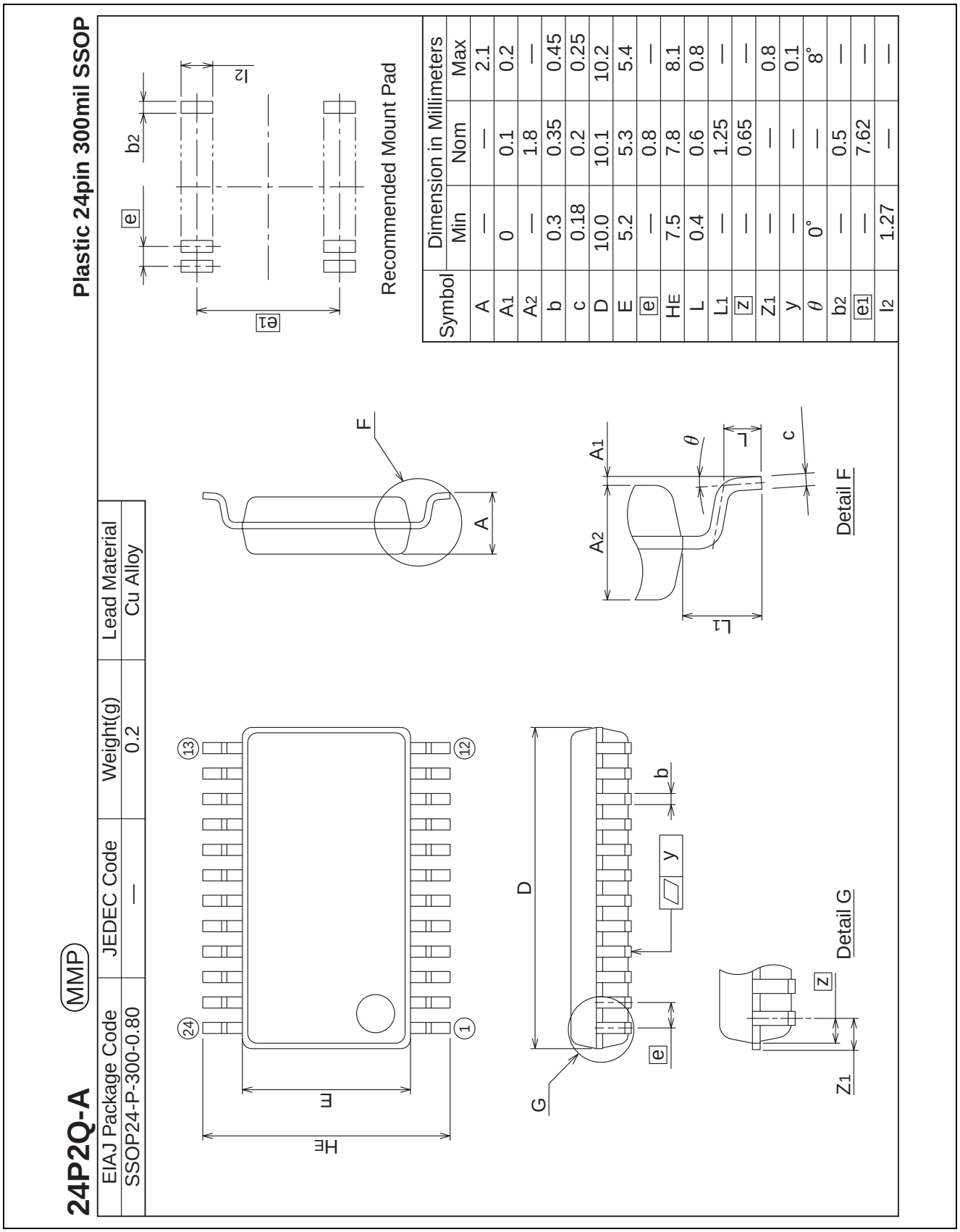


Application Example 2

(Single power supply used)



Package Dimensions



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Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Colophon .1.0

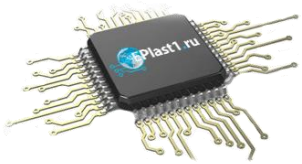
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.