Structure: Silicon Monolithic Integrated Circuit

Product: Sound Processor for car audio

Type: BD37515FS

Package: SSOP-A20

●Feature

1. Reduce switching noise of input gain control, mute, main volume, fader volume, bass, treble, loudness by using advanced switch circuit [Possible to control all steps]
2. Built-in ground isolation amplifier inputs, ideal for external stereo input.
3. Built-in input gain controller reduce switching noise for volume of a portable audio input.
4. Decrease the number of external components by built-in 2-band equalizer filter, LPF for subwoofer, loudness filter. And, possible to control Q, Gv, fo of 2-band equalizer and fc of LPF,and Gv of loudness by I^2C BUS control freely.
5. It is possible for the bass, treble to the gain adjustment quantity of ±20dB and 1 dB step gain adjustment.
6. Bi-CMOS process is suitable for the design of low current and low energy. And it provides more quality for small scale regulator and heat in a set.
7. Package is SSOP-A20. Putting input-terminals together and output-terminals together can make PCB layout easier and can makes area of PCB smaller.)
8. It is possible to control by 3.3V / 5V for I^2C BUS.

●Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit
Power supply Voltage	VCC	10.0	V
Input voltage	VIN	VCC+0.3～GND-0.3	V
Power Dissipation	Pd	940 ※1	mW
Storage Temperature	Tastg	-55～+150	℃

※1 At Ta＝25°C or higher, this value is decreaced to 7.5mW/°C
When Rohm standard board is mounted.
Rohm standard board: Size：70×70×1.6(mm^3)
material：FR4 glass-epoxy substrate (copper foil area: not more than 3%).

●Operating Range

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply Voltage	VCC	7.0	－	9.5	V
Temperature	Topr	-40	－	+85	℃

※Design against radiation-proof isn't made.

●**Function**

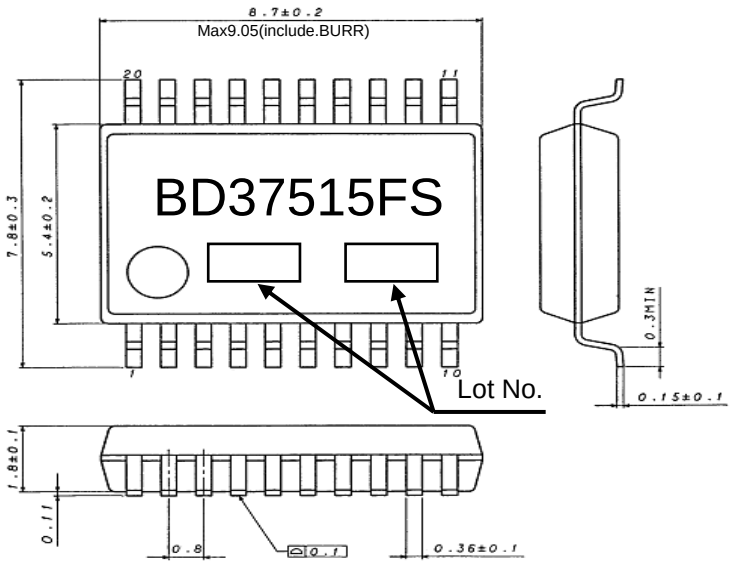
Function	Specifications
Input selector	Stereo 3 single-end input and 1differential input
Input gain	0～20dB (1dB step), Possible to use “Advanced switch” for prevention of switching noise
Mute	Possible to use “Advanced switch” for prevention of switching noise.
Volume	+15dB～−79dB (1dB step), −∞dB Possible to use “Advanced switch” for prevention of switching noise.
Bass	−20～+20dB (1dB step), Q=0.5, 1, 1.5, 2, fo=60, 80, 100, 120Hz Possible to use advanced switch at changing gain
Treble	−20～+20dB (1dB step), Q=0.75, 1.25 fo=7.5k, 10k, 12.5k, 15kHz , Possible to use advanced switch at changing gain
Fader	+15dB～−79dB (1dB step), −∞dB Possible to use “Advanced switch” for prevention of switching noise.
Loudness	0dB～20dB (1dB step), fo=800Hz Possible to use “Advanced switch” for prevention of switching noise.
LPF	fc=55/85/120/160Hz, pass Phase shift (0°/180°)

●**Electrical Characteristic**

(Unless specified particularly, Ta=25℃, VCC=8.5V, f=1kHz, Vin=1Vrms, Rg=600Ω, R_L=10kΩ, A input,
Input gain 0dB, Mute OFF, Volume 0dB, Tone control 0dB, Loudness 0dB, Fader 0dB, LPF OFF)

Item	Symbol	Limit			Unit	Condition
		Min.	Typ.	Max.		
Current upon no signal	I_Q	−	38	48	mA	No signal
Voltage gain	G_V	-1.5	0	1.5	dB	Gv=20log(VOUT/VIN)
Channel balance	CB	-1.5	0	1.5	dB	CB = GV1-GV2
Total harmonic distortion 1 (FRONT,REAR)	THD+N1	−	0.001	0.05	%	VOUT=1Vrms BW=400-30KHz
Total harmonic distortion 2 (SUBWOOFER)	THD+N2	−	0.002	0.05	%	VOUT=1Vrms BW=400-30KHz
Output noise voltage 1 (FRONT,REAR)	V_{NO1}	−	3.8	15	μVrms	Rg = 0Ω BW = IHF-A
Output noise voltage 2 (SUBWOOFER)	V_{NO2}	−	4.8	15	μVrms	Rg = 0Ω BW = IHF-A
Residual output noise voltage	V_{NOR}	−	1.8	10	μVrms	Fader=−∞dB Rg=0Ω BW=IHF-A
Cross-talk between channels	CTC	−	-100	-90	dB	Rg=0Ω CTC=20log(VOUT/VIN) BW=IHF-A
Ripple rejection	RR	−	-70	-40	dB	f=100Hz VRR=100mVrms RR=20log(VOUT/VCCIN)
Common mode rejection ratio	CMRR	50	65	−	dB	DP1 and DN input DP2 and DN input CMRR=20log(VIN/VOUT) BW = IHF-A
Maximum input voltage	V_{IM}	2.1	2.3	−	Vrms	VIM at THD+N(VOUT)=1% BW=400-30kHz
Maximum gain	$G_{V\ MAX}$	13	15	17	dB	Volume = 15dB VIN=100mVrms Gv=20log(VOUT/VIN)
Maximum attenuation	$G_{V\ MIN}$	−	-100	-85	dB	Volume=−∞dB Gf=20log(VOUT/VIN) BW=IHF-A
Maximum output voltage	V_{OM}	2.0	2.2	−	Vrms	THD+N=1% BW=400-30kHz

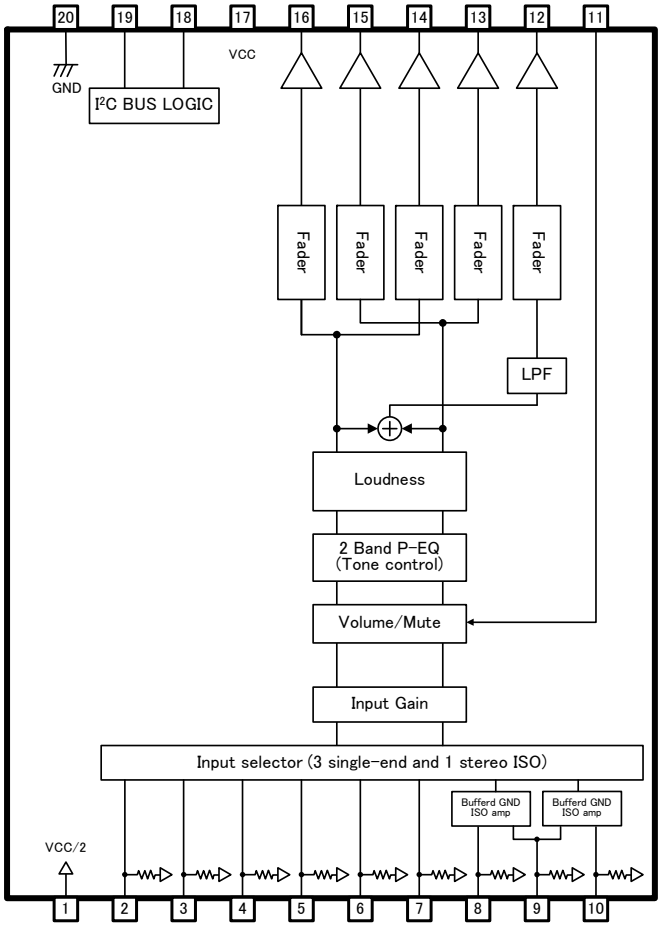
●Dimensional outline drawing



SSOP-A20 (Unit : mm)

(UNIT:mm)

●Block Diagram



●Descriptions of terminal

Terminal No.	Terminal Name
1	FIL
2	A1
3	A2
4	B1
5	B2
6	C1
7	C2
8	DP1
9	DN
10	DP2
11	MUTE
12	OUTS
13	OUTR2
14	OUTR1
15	OUTF2
16	OUTF1
17	VCC
18	SCL
19	SDA
20	GND

●Cautions on use

(1) Absolute maximum ratings
If applied voltage, operating temperature range, or other absolute maximum ratings are exceeded, the LSI may be damaged. Do not apply voltages or temperatures that exceed the absolute maximum ratings. If you think of a case in which absolute maximum ratings are exceeded, enforce fuses or other physical safety measures and investigate how not to apply the conditions under which absolute maximum ratings are exceeded to the LSI.
(2) GND potential
Make the GND pin voltage such that it is the lowest voltage even when operating below it. Actually confirm that the voltage of each pin does not become a lower voltage than the GND pin, including transient phenomena.
(3) Thermal design
Perform thermal design in which there are adequate margins by taking into account the allowable power dissipation in actual states of use.
(4) Shorts between pins and misinstallation
When mounting the LSI on a board, pay adequate attention to orientation and placement discrepancies of the LSI. If it is misinstalled and the power is turned on, the LSI may be damaged. It also may be damaged if it is shorted by a foreign substance coming between pins of the LSI or between a pin and a power supply or a pin and a GND.
(5) Operation in strong magnetic fields
Adequately evaluate use in a strong magnetic field, since there is a possibility of malfunction.

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