

Structure : Silicon Monolithic Integrated Circuit

Product : 7ch Volume with 7ch input selector

Type : **BD3816K1**

- Feature :
1. Dynamic range: 132dB (Volume Direct Mode, VOL=MUTE, IHF-A).
 2. Independent 7 channels for Master Volume (0 to -95 dB, MUTE 1dB/Step).
 3. Low current consumption design achieved by adopting the Bi-CMOS process.

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power Supply Voltage	VCC-VEE	15	V
Input Signal Voltage	VIN	VCC+0.3~VEE-0.3	V
Power Dissipation	Pd	1200 ※	mW
Operating Temperature	Topr	-20~+75	°C
Storage Temperature	Tastg	-55~+125	°C

※ Over Ta=25°C, derating at the rate of 12mW/°C.

□ When installed on the standard board (size: 70x70x1.6mm).

Operating Voltage Range

(It must function normally at Ta=25°C.)

Parameter	Symbol	Limit	Unit
Power Supply (Positive)	VCC-GND	5~7.3	V
Power Supply (Negative)	VEE-GND	-5~-7.3	V

Application example

Note that ROHM cannot provide adequate confirmation of patents.

The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys).

Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Electrical Characteristics

Ta=25°C, VCC=7V, f=1kHz, Vin=1Vrms, RL=10kΩ, Rg=600Ω, Input Gain=0dB, Volume=0dB, Output Gain=0dB, Bass=0dB, Treble=0dB, Mixing c/sw=OFF, unless otherwise noted.

	Symbol	Parameter		Limits			Unit	Condition
				Min.	Typ.	Max.		
	IQ	Circuit Current	72pin 71pin	—	24	40	mA	No signal
Total output (Measure : Pin53,54)	Gv	Output Voltage Gain		-2	0	2	dB	
	THD	Total Harmonic Distortion Ratio		—	0.001	0.03	%	BW=400~30kHz
	Vomax	Maximum Output Voltage		3.6	4.2	—	Vrms	THD=1%
	Vno	Output Noise Voltage	—	2.0	12	μ Vrms	*OM= Tone ON(Output gain ON), BW=IHF-A, Rg=0 Ω	
			—	1.5	8	μ Vrms	*OM=Output gain ON(ToneOFF) BW=IHF-A, Rg=0 Ω	
			—	1.2	8	μ Vrms	OM=Volume Direct, BW=IHF-A, Rg=0 Ω	
	CTC	Cross-talk between Channels	—	-95	-80	dB	Rg=0 Ω , BW=IHF-A Reference : Pin54(OUTFR),53(OUTFL) =1Vrms	
CTS	Cross-talk between Selectors	—	-95	-80	dB	Rg=0 Ω , BW=IHF-A		
Master volume output (Measure : Pin 46,48,49,50,51)	GVV	Volume Output Voltage		-2	0	2	dB	
	THDV	Volume Total Harmonic Distortion Ratio		—	0.001	0.03	%	BW=400~30kHz
	VnoV	Volume Output Noise Voltage		—	1.2	8	μ Vrms	BW=IHF-A, Rg=0 Ω
	VOL	Volume Control Range		-97.5	-95	-92.5	dB	VIN=3Vrms, OM=Volume Direct
	VOLE1	Volume Setting Error 1		-1.5	0	1.5	dB	0 to -53dB, VIN=3Vrms OM=Volume Direct
	VOLE2	Volume Setting Error 2		-2.5	0	2.5	dB	-54 to -95dB, VIN=3Vrms OM=Volume Direct
	VOLmin	Maximum Attenuation		—	-115	-105	dB	VIN=3Vrms, BW=IHF-A OM=Volume Direct
Treble	GTB	Treble Maximum Boost Gain		12	14	16	dB	f=15kHz, VIN=0.4Vrms
	GTC	Treble Maximum Cut Gain		-16	-14	-12	dB	f=15kHz, VIN=0.4Vrms
	TR	Treble Step Resolution		—	2	—	dB	f=15kHz, VIN=0.4Vrms
	TE	Treble Gain Setting Error		-2	0	2	dB	f=15kHz, VIN=0.4Vrms
Bass	GBB	Bass Maximum Boost Gain		12	14	16	dB	f=100Hz, VIN=0.4Vrms
	GBC	Bass Maximum Cut Gain		-16	-14	-12	dB	f=100Hz, VIN=0.4Vrms
	BR	Bass Step Resolution		—	2	—	dB	f=100Hz, VIN=0.4Vrms
	BE	Bass Gain Setting Error		-2	0	2	dB	f=100Hz, VIN=0.4Vrms
Mixing	GMCG	C Mixing Gain Control Range		-6.5	-4.5	-2.5	dB	VIN=Pin 17,28, *OM=Volume Direct
	GMCE	C Mixing Gain Setting Error		-2	0	2	dB	VIN=Pin 17,28, OM=Volume Direct
	GMSWG	SW Mixing Gain Control Range		-6.5	-4.5	-2.5	dB	VIN=Pin 21,32, OM=Volume Direct
	GMSWE	SW Mixing Gain Setting Error		-2	0	2	dB	VIN=Pin 21,32, OM=Volume Direct
Input gain	GIG	Input Gain Control Range		5	7	9	dB	VIN=0.4Vrms,OM=Volume Direct
	GIE	Input Gain Setting Error		-2	0	2	dB	VIN=0.4Vrms,OM=Volume Direct
Output gain	GOG	Output Gain Control Range		15	17	19	dB	VIN=0.4Vrms, OM=Output gain ON (Tone OFF)
	GOE	Output Gain Setting Error		-2	0	-2	dB	VIN=0.4Vrms, OM=Output gain ON (Tone OFF)
REC output (Measure : Pin 74~79)	RoutR	ROUT Output Impedance		—	20	100	Ω	
	GVR	ROUT Voltage Gain		-2	0	2	dB	RL=47k Ω
	THDR	ROUT Total Harmonic Distortion Ratio		—	0.005	0.09	%	RL=47k Ω , BW=400~30kHz

※OM=Output mode

24.0±0.3
20.0±0.2
64
41
40
65
14.0±0.2
80
25
1
2⁺
LOT No.
0.15±0.01
2.7±0.1
0.05
0.8
0.35±0.1

QFP80 (Unit:mm)

Pin number•Pin name

Pin number	Pin name	Pin number	Pin name	Pin number	Pin name	Pin number	Pin name
1	AGND1	21	INDVDSW	41	GOUTSR	61	AGND10
2	INA1	22	AGND3	42	VINSR	62	VINFL
3	INA2	23	OUT1	43	GOUTC	63	GOUTFL
4	INB1	24	OUT2	44	VINC	64	VINFR
5	INB2	25	AGND4	45	AGND7	65	GOUTFR
6	INC1	26	INDSPFR	46	OUTSW	66	THGND
7	INC2	27	INDSPFL	47	AGND8	67	MUTE
8	IND1	28	INDSPC	48	OUTCB	68	CL
9	IND2	29	INDSPSR	49	OUTSL	69	DA
10	INE1	30	INDSPSL	50	OUTSR	70	AGND11
11	INE2	31	INDSPCB	51	OUTC	71	VEE
12	INF1	32	INDSPSW	52	AGND9	72	VCC
13	INF2	33	AGND5	53	OUTFL	73	AGND12
14	AGND2	34	GOUTSW	54	OUTFR	74	ROUTA1
15	INDVDFR	35	VINSW	55	BNFB2	75	ROUTA2
16	INDVDFL	36	AGND6	56	BNFA2	76	ROUTB1
17	INDVDC	37	GOUTCB	57	BNFB1	77	ROUTB2
18	INDVDSR	38	VINCB	58	BNFA1	78	ROUTC1
19	INDVDSL	39	GOUTSL	59	TNF2	79	ROUTC2
20	INDVDCB	40	VINSL	60	TNF1	80	AGND13

Cautions on use

- Operating power supply voltage range
Basic circuit function and operation can be guaranteed within the operating temperature range and within the operating power supply voltage range. Upon use, check those ranges carefully and specify the constant, element, voltage and temperature.
- Operating temperature range
Circuit function and operation can be guaranteed for the time being within the operating temperature range and within the operating voltage range. Please note that the conditions of allowable dissipation interlock with the temperature.
Although specified value cannot be guaranteed under any conditions other than those specified by the electrical characteristics within this range, the original function is maintained.
- About power ON/OFF
(1) When the power supply voltage is about $\pm 1V$, this IC occurs abnormal oscillation from output pins. Therefore, please use mute at set side.
(2) At power ON/OFF, a shock sound will be generated and, therefore, MUTE shall be applied on the set.
(3) When turning on power supplies, VEE and VCC should be powered on simultaneously or VEE first; then followed by VCC. If the VCC side is started up first, an excessive current may pass VCC through VEE.
- About serial control
For the CL and DA terminals, the patterned and other wirings should be routed not to cause interference with the analog-signal-related lines.
- About function switching
For the functions except Master Volume, Treble, and Bass Gain Settings, MUTE shall be applied on the set.

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