PRELIMINARY

F(●)CUS™
BY SRS LABS

SRS A/V Focus SPEAKER ELEVATION AUDIO PROCESSOR

■ GENERAL DESCRIPTION

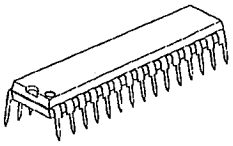
The **NJM2189** is a speaker elevation audio processor with A/V Focus Filter, based on SRS Focus technology. It is capable of raising sound image.

In addition, the **NJM2189** includes the A/V Focus Filter to reduce harsh sound when speakers are directly put on hard-surface floor.

The Bypass and Focus Mode inputs are separate to be the same sound volume in both Bypass and Focus mode.

The **NJM2189** is suitable for almost all car audio, Projection TV, radio cassette, and then.

■ PACKAGE OUTLINE



NJM2189L

NJM2189M

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■ FEATURES

- ●Operating Voltage (4.7 to 13V)
- ●Low Operating Current (7.0mA typ.)
- ●Low Output Noise (15μVrms typ.)
- ●Adjusted by LF/HF Elevation, and Bass Compensation Volume
- ●Internal A/V Focus Filter
- ●Independent Audio Input for Bypass Mode
- ●Bipolar Technology
- ●Package Outline SDIP30, SDMP30

The A/V Focus technology incorporated in the **NJM2189** is owned by SRS Labs, a US Corporation. The A/V Focus technology is protected under U.S. Patent No.xxxxx,No.xxxxx,No.xxxxx with numerous additional issued and pending foreign patents. The trademarks "SRS", "the SRS symbol" are registered in the U.S. and selected foreign countries.

In order to purchase and implement the **NJM2189**, all customers must enter into a license agreement directly with SRS Labs for the payment of royalties and to ensure proper trademark usage . Neither the purchase of the **NJM2189** , nor the corresponding sale of audio enhancement equipment conveys the right to commercialized recordings made with the A/V Focus.

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Tel 714-442-1070 Fax 714-852-1099 http://www.srslabs.com.

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	15	V
Power Dissipation	P_D	(SDIP30) 700 (SDMP30) 700	mW
Operating Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C

■ ELECTRICAL CHARACTERISTICS (V^+=12V, Ta=25°C, Connect Bypass Mode input and Focus Mode input)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+			4.7	12.0	13.0	V
Supply Current	I_{CC}	No Signal		—	7.0	10.5	mA
Reference Voltage	V_{REF}	$V^+/2$		5.8	6.0	6.2	V
Maximum Input Voltage	V_{INMAX}	f=1kHz at T.H.D.=3%	Bypass Mode	7.79 (2.45)	11.8 (3.88)	—	dBV (Vrms)
			Focus Mode	-4.71 (0.58)	-1.21 (0.87)	—	
			A/V Focus Mode	-5.21 (0.55)	-1.71 (0.82)	—	
		f=70Hz at T.H.D.=3% Controls ∞	Bypass Mode	—	11.8 (3.88)	—	
			Focus Mode	—	0.77 (1.1)	—	
			A/V Focus Mode	—	0.77 (1.1)	—	
		f=10kHz at T.H.D.=3% Controls ∞	Bypass Mode	—	11.8 (3.88)	—	
			Focus Mode	—	-8.71 (0.37)	—	
			A/V Focus Mode	—	-8.71 (0.37)	—	
Output Noise	V_{NOISE}	Vin=V_{REF} A-weight Controls ∞	Focus Mode	—	-94.0 (20.0)	-88.0 (40.0)	dBV (μVrms)
			A/V Focus Mode	—	-94.0 (20.0)	-88.0 (40.0)	
		Vin=V_{REF} A-weight Controls Center	Focus Mode	—	-96.5 (15.0)	—	
			A/V Focus Mode	—	-96.5 (15.0)	—	
		Vin=V_{REF} A-weight Controls 0	Focus Mode	—	-96.5 (15.0)	—	
			A/V Focus Mode	—	-96.5 (15.0)	—	

■ ELECTRICAL CHARACTERISTICS (V^+=12V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Noise	V_{NOISE}	Vin=V_{REF} DIN-AUDIO Controls ∞	Focus Mode	—	-90.1 (30.0)	—	dBV (μVrms)
			A/V Focus Mode	—	-90.1 (30.0)	—	
		Vin=V_{REF} DIN-AUDIO Controls Center	Focus Mode	—	-94.0 (20.0)	—	
			A/V Focus Mode	—	-94.0 (20.0)	—	
		Vin=V_{REF} DIN-AUDIO Controls 0	Focus Mode	—	-94.0 (20.0)	—	
			A/V Focus Mode	—	-96.5 (15.0)	—	
Channel Balance	CH_{BAL}	Vin=-17.2dBu f=1kHz Controls ∞	Focus Mode	-1.0	0.0	1.0	dB
			A/V Focus Mode	-1.0	0.0	1.0	
Total Harmonic Distortion	THD	Vin=-17.2dBu Lch f=1kHz Controls ∞	Focus Mode	—	0.05	0.20	%
			A/V Focus Mode	—	0.09	0.30	
BYPASS Gain	G_{BYP}	Vin=-17.2dBu f=1kHz	Bypass Mode	-1.0	0.0	1.0	dB
FOCUS Gain1	G_{FOC1}	Vin=-17.2dBu f=70Hz Controls ∞	Focus Mode	8.5	10.5	12.5	dB
FOCUS Gain2	G_{FOC2}	Vin=-17.2dBu f=20kHz Controls ∞	Focus Mode	19.0	21.0	23.0	dB
AVF Gain	G_{AVF}	Vin=-17.2dBu f=800Hz Controls 0	A/V Focus Mode	-12.0	-10.0	-8.0	dB
MODE Select Control Voltage	V_{MODE}	Vin=High Level		2.0	—	V^+	V
		Vin=Low Level		0.0	—	0.7	

■ MODE SWITCH

	MODE1	MODE2
Bypass Mode	L	—
Focus Mode	H	L
A/V Focus Mode	H	H

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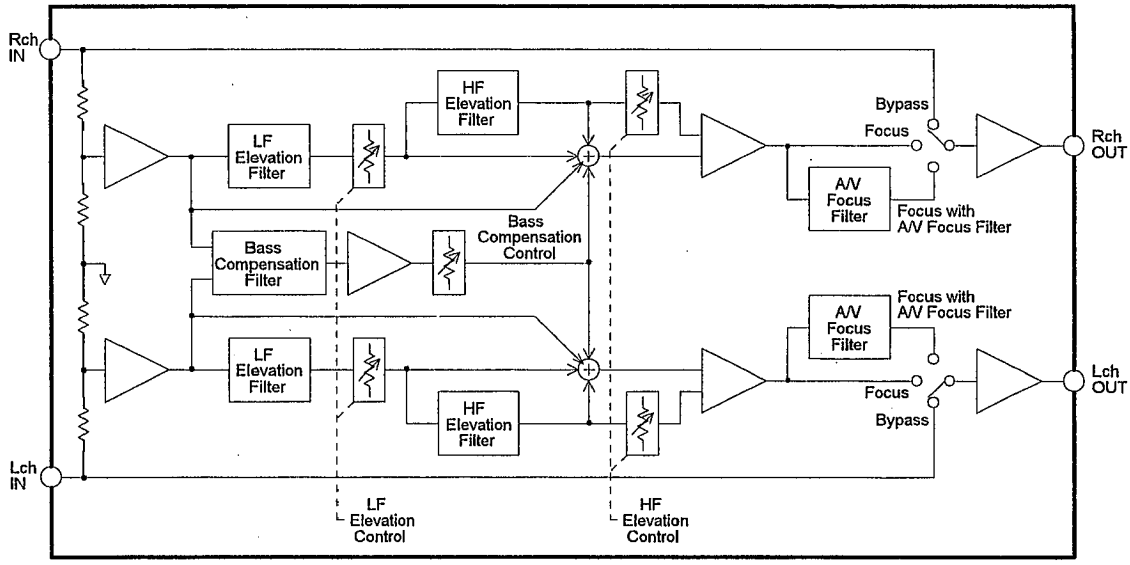
■ PIN FUNCTION

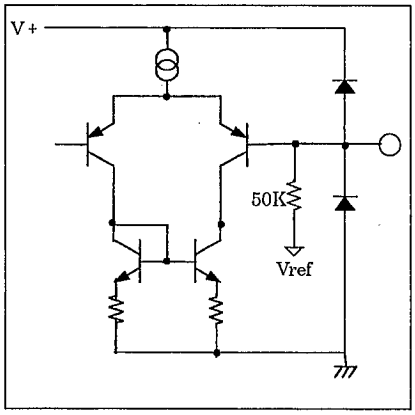
Bypass Mode Lch Input	1	Lin1	Rin1	30	Bypass Mode Rch Input
Focus Mode Lch Input	2	Lin2	Rin2	29	Focus Mode Rch Input
Lch LF Elevation Control Output	3	LFoutL	LFoutR	28	Rch LF Elevation Control Output
Lch LF Elevation Control Input	4	LFinL	LFinR	27	Rch LF Elevation Control Input
Lch HF Elevation Control Input 1	5	HFinL1	HFinR1	26	Rch HF Elevation Control Input 1
Lch HF Elevation Control Input 2	6	HFinL2	HFinR2	25	Rch HF Elevation Control Input 2
Bass Compensation Control Output	7	BCout	LPFout	24	LPF Output
Bass Compensation Control Input	8	BCin	LPFin	23	LPF Input
Lch Focus Output	9	FoutL	FoutR	22	Rch Focus Output
Lch A/V Focus filter Input	10	AVFFinL	AVFFinR	21	Rch A/V Focus filter Input
Lch A/V Focus filter Output	11	AVFFoutL	AVFFoutR	20	Rch A/V Focus filter Output
Lch Output	12	Lout	Rout	19	Rch Output
Vref Input	13	REFin	MODE1	18	Focus/Bypass Mode Select
V+/2	14	Vref	MODE2	17	A/V Focus filter ON/OFF Select
Ground	15	GND	V+	16	4.7 to 13.0V Supply

■BLOCK DIAGRAM

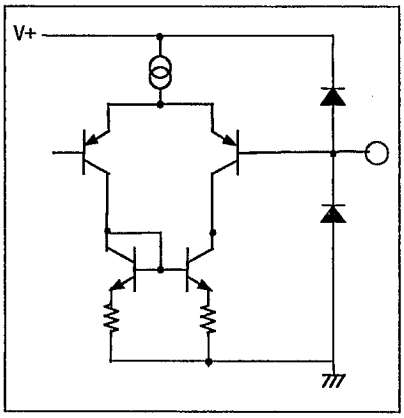


■PIN DESCRIPTION

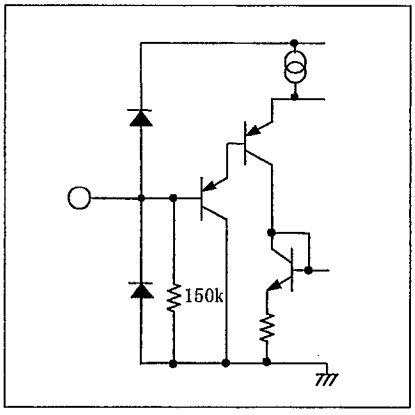
Lin1, Rin1



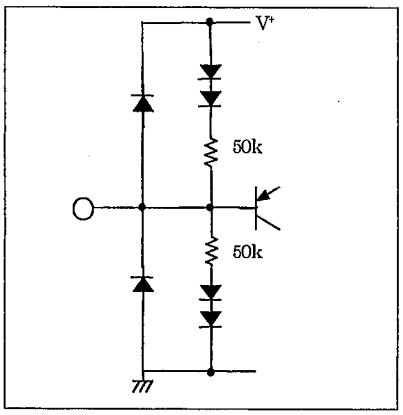
Lin2, Rin2



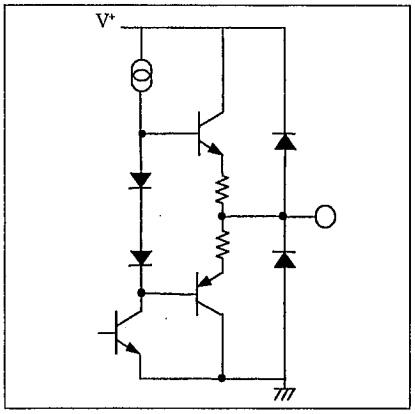
MODE1, MODE2



REFin



Lout, Rout, Vref



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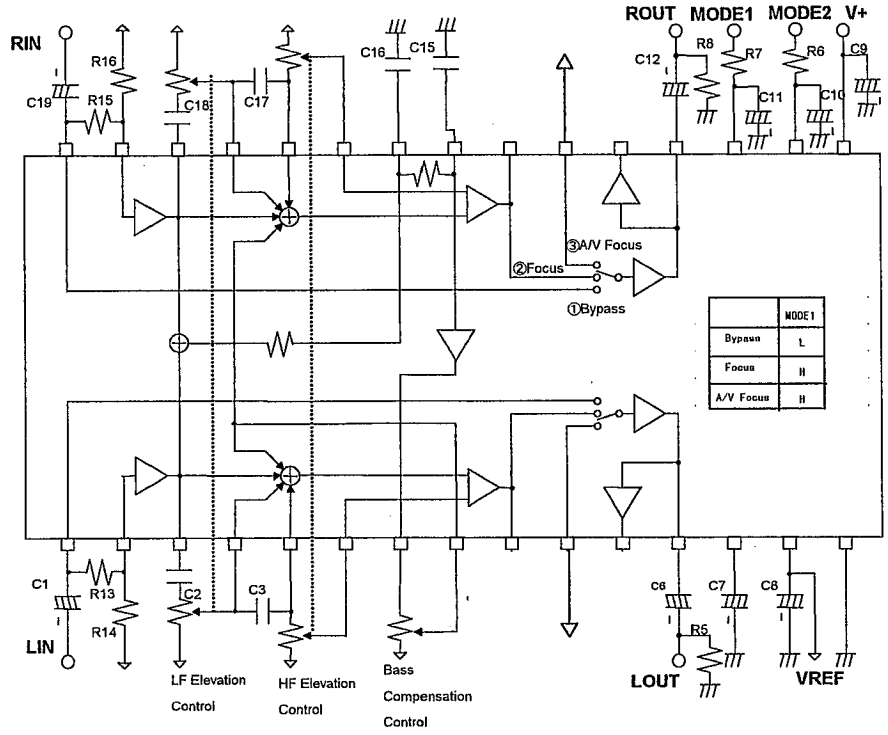
■APLICATION CIRCUIT

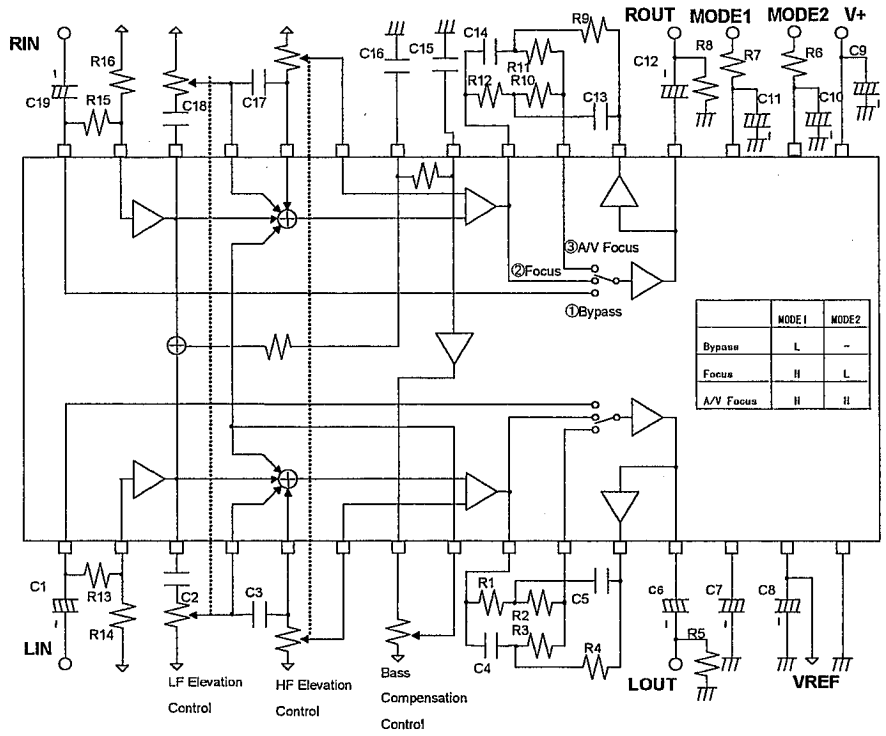


PART No.	VALUE	Tolerance	PART No.	VALUE	Tolerance
C1, C6, C7	10μF		R5, R6, R8	10kΩ	
C10, C11, C12, C19	10μF		R7	22kΩ	±5%
C8	33μF				
C9	100μF				
C2, C18	0.22μF	±5%			
C3, C17	3900pF	±5%			
C15	0.01μF	±5%			
C16	0.1μF	±5%			

● R13(R15), R14(R16)
The R13(R15) and R14(R16) control sound pressure level when between Bypass and Focus MODE switch.
R13+R14≧20kΩ
R13=R15, R14=R16

● LF Elevation Control : 1kB Single-shaft Dual-unit
● HF Elevation Control : 10kB Single-shaft Dual-unit
● Bass Compensation Control : 1kB Single-shaft Single-unit

■APLICATION CIRCUIT(Without A/V Focus filter)



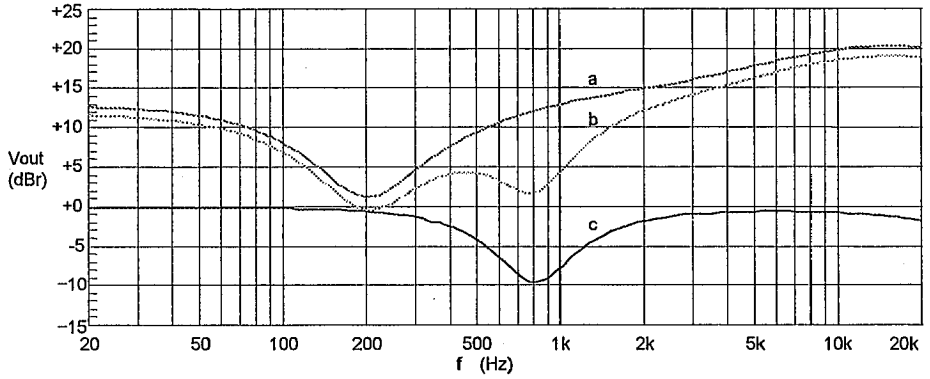
PART No.	VALUE	Tolerance	PART No.	VALUE	Tolerance
C1, C6, C7	10μF		R5, R6, R8	10kΩ	
C10, C11, C12, C19	10μF		R1, R12	1.8kΩ	±5%
C8	33μF		R2, R3, R7, R10, R11	22kΩ	±5%
C9	100μF		R4, R9	5.6kΩ	±5%
C2, C18	0.22μF	±5%			
C3, C17	3900pF	±5%			
C4, C14, C15	0.01μF	±5%			
C5, C13	0.47μF	±5%			
C16	0.1μF	±5%			

● R13(R15), R14(R16)
The R13(R15) and R14(R16) control sound pressure level when between Bypass and Focus MODE switch.
R13+R14≧20kΩ
R13=R15, R14=R16

● LF Elevation Control : 1kB Single-shaft Dual-unit
● HF Elevation Control : 10kB Single-shaft Dual-unit
● Bass Compensation Control : 1kB Single-shaft Single-unit

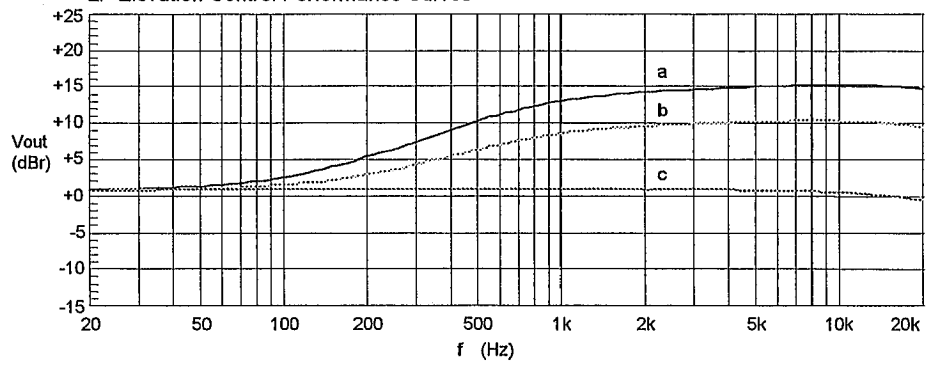
■CHARACTERISTICS

Performance Curves



V+=12V Vin=-20dBV(=0dBr) Left in Left Out
a:Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)＊
b:A/V Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)
c:A/V Focus Filter Curve (A/V Focus Mode Controls 0) (HF:0Ω LF:0Ω BC:0Ω)

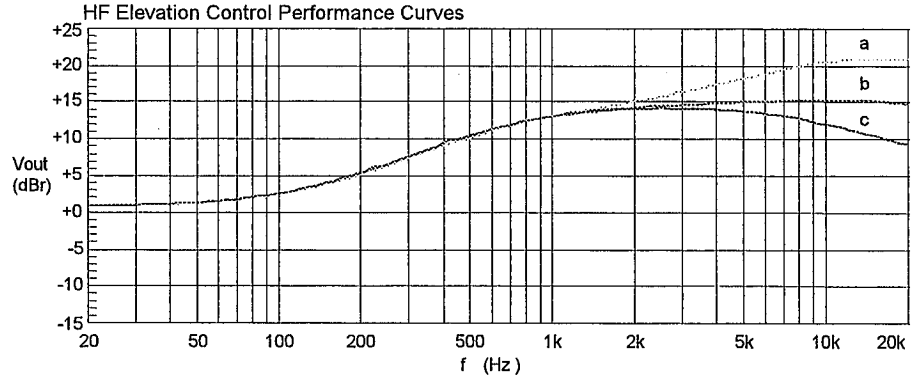
LF Elevation Control Performance Curves



V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode Bass Compensation : Minimum (0Ω) HF Elevation : Center (5kΩ)
a:LF Elevation Control Maximum (1kΩ)
b:LF Elevation Control Center (0.5kΩ)
c:LF Elevation Control Minimum (0Ω)

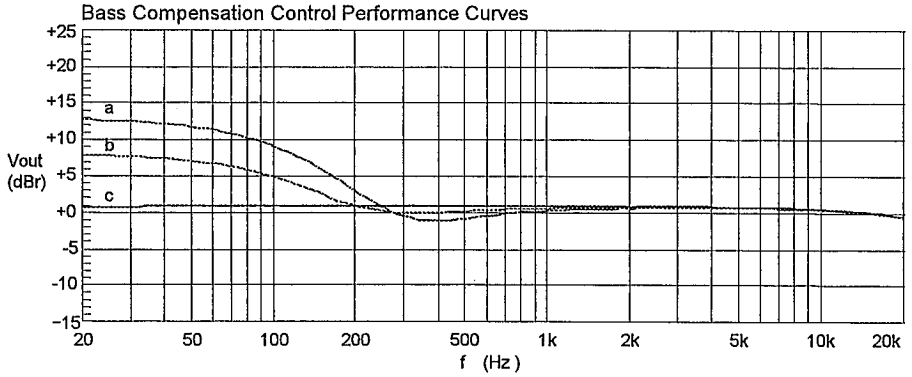
■CHARACTERISTICS

HF Elevation Control Performance Curves



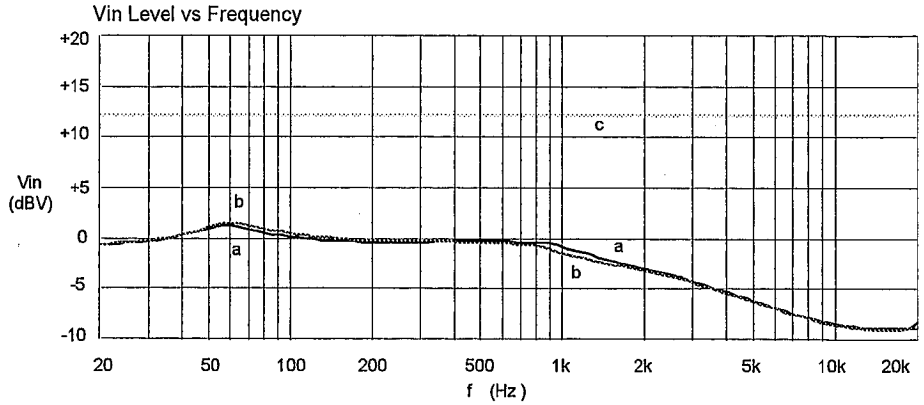
V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode bass Compensation : Minimum (0Ω) LF Elevation : Maximum (1kΩ)
a:HF Elevation Control Maximum (10kΩ)
b:HF Elevation Control Center (5kΩ)
c:HF Elevation Control Minimum (0Ω)

Bass Compensation Control Performance Curves



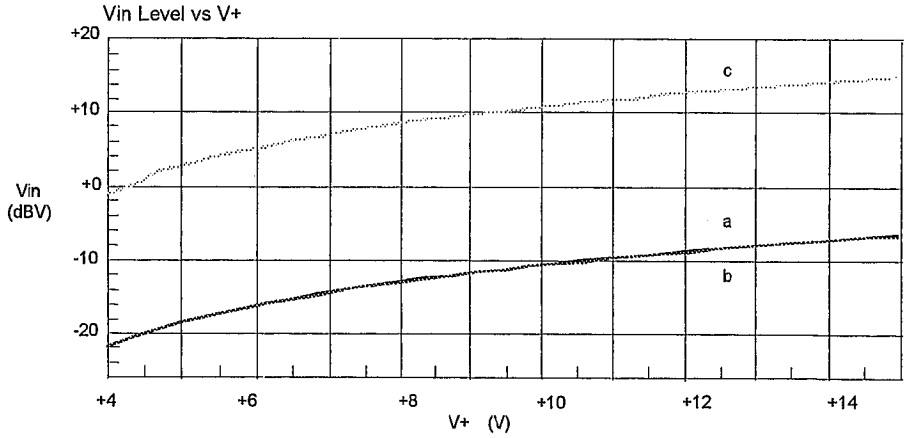
V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode LF Elevation : Minimum (0Ω)
a:Bass Compensation Control Maximum (1kΩ)
b:Bass Compensation Control Center (0.5kΩ)
c:Bass Compensation Control Minimum (0Ω)

■CHARACTERISTIC



V+=12V , THD=3%

a:Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)
b:A/V Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)
c:Bypass Mode



f=20kHz , THD=3%

a:Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)
b:A/V Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)
c:Bypass Mode

* HF:HF Elevation
LF:LF Elevation
BC:Bass Compensation

MEMO