



## SRS A/V Focus SPEAKER ELEVATION AUDIO PROCESSOR

### ■ GENERAL DESCRIPTION

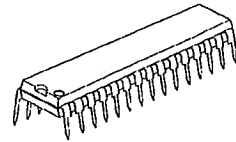
The NJM2189 is a speaker elevation audio processor with A/V Focus Filter, based on SRS Focus technology. It is capable of raising sound image.

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

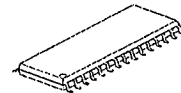
The Bypass and Focus Mode inputs are separate to be the same sound volume in both Bypass and Focus mode.

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

### ■ PACKAGE OUTLINE



NJM2189L



NJM2189M

### ■ FEATURES

- Operating Voltage (4.7 to 13V)
- Low Operating Current (7.0mA typ.)
- Low Output Noise (15 $\mu$ Vrms 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.

For further information, please contact:

SRS Labs, Inc. : 2909 Daimler Street • Santa Ana, CA92705 USA  
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 <sup>+</sup>	15	V
Power Dissipation	P <sub>D</sub>	(SDIP30) 700 (SDMP30) 700	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

## ■ ELECTRICAL CHARACTERISTICS (V<sup>+</sup>=12V, Ta=25°C, Connect Bypass Mode input and Focus Mode input)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Operating Voltage	V <sup>+</sup>		4.7	12.0	13.0	V	
Supply Current	I <sub>CC</sub>	No Signal	—	7.0	10.5	mA	
Reference Voltage	V <sub>REF</sub>	V <sup>+</sup> /2	5.8	6.0	6.2	V	
Maximum Input Voltage	V <sub>INMAX</sub>	f=1kHz at T.H.D.=3%	Bypass Mode	7.79 (2.45)	11.8 (3.88)	—	dBV (V <sub>rms</sub> )
			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 <sub>NOISE</sub>	Vin=V <sub>REF</sub> A-weight Controls ∞	Focus Mode	—	-94.0 (20.0)	-88.0 (40.0)	dBV (μV <sub>rms</sub> )
			A/V Focus Mode	—	-94.0 (20.0)	-88.0 (40.0)	
		Vin=V <sub>REF</sub> A-weight Controls Center	Focus Mode	—	-96.5 (15.0)	—	
			A/V Focus Mode	—	-96.5 (15.0)	—	
		Vin=V <sub>REF</sub> A-weight Controls 0	Focus Mode	—	-96.5 (15.0)	—	
			A/V Focus Mode	—	-96.5 (15.0)	—	

■ ELECTRICAL CHARACTERISTICS ( $V^+=12V, T_a=25^\circ C$ )

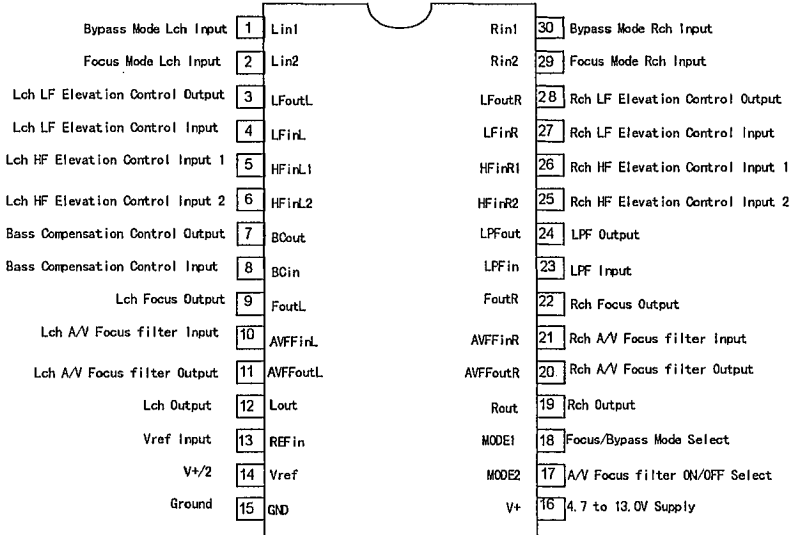
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Noise	$V_{NOISE}$	Vin= $V_{REF}$ DIN-AUDIO Controls $\infty$	Focus Mode	—	-90.1 (30.0)	—	dBV ( $\mu V_{rms}$ )
			A/V Focus Mode	—	-90.1 (30.0)	—	
		Vin= $V_{REF}$ DIN-AUDIO Controls Center	Focus Mode	—	-94.0 (20.0)	—	
			A/V Focus Mode	—	-94.0 (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 $\infty$	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 $\infty$	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 $\infty$	Focus Mode	8.5	10.5	12.5	dB
FOCUS Gain2	$G_{FOC2}$	Vin=-17.2dBu f=20kHz Controls $\infty$	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

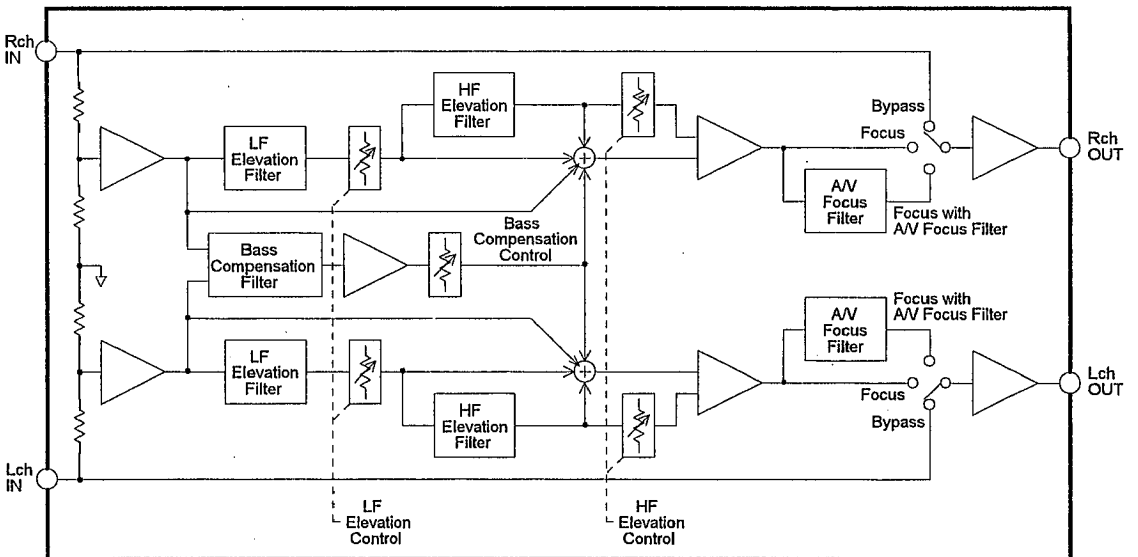
	MODE1	MODE2
Bypass Mode	L	—
Focus Mode	H	L
A/V Focus Mode	H	H

4

## PIN FUNCTION

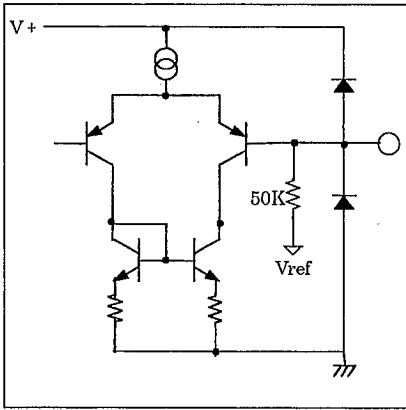


## BLOCK DIAGRAM

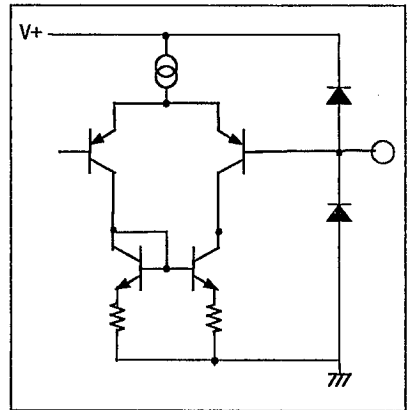


■ PIN DESCRIPTION

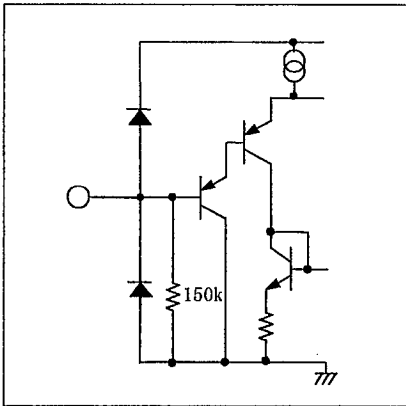
Lin1, Rin1



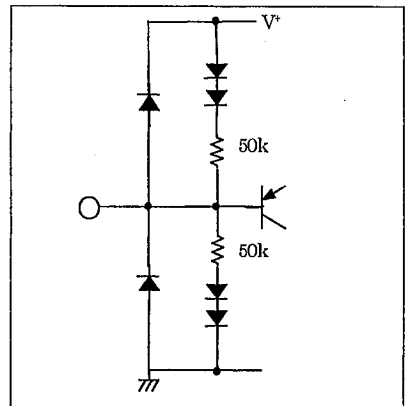
Lin2, Rin2



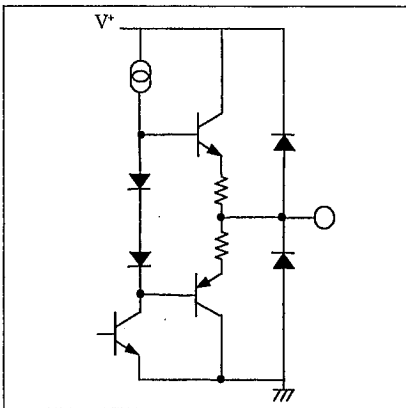
MODE1, MODE2



REFin

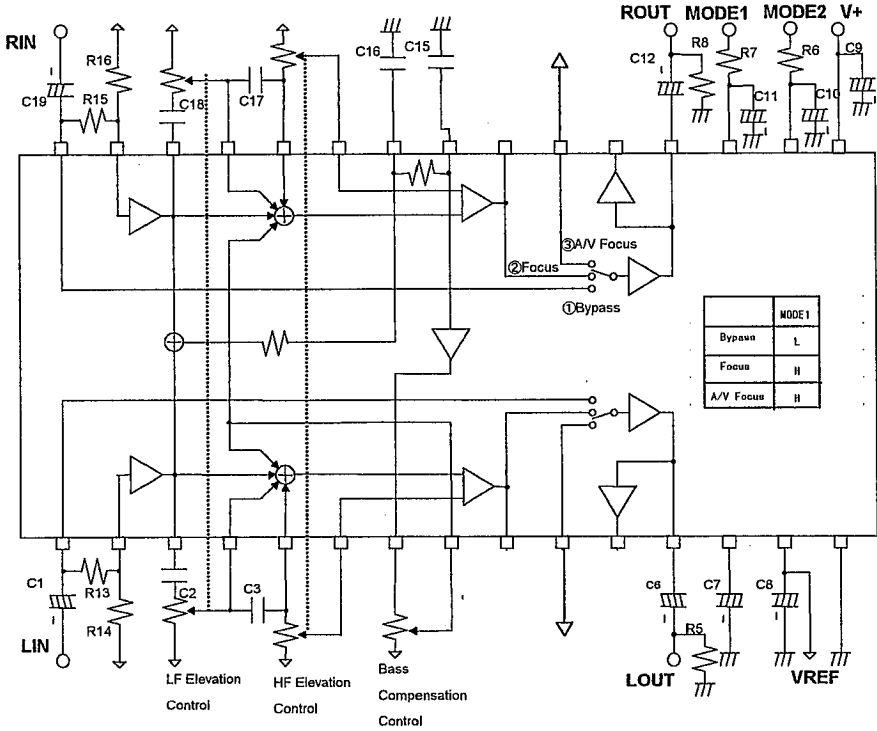


Lout, Rout, Vref



4

## APPLICATION CIRCUIT



	MODE1
Bypass	L
Focus	H
A/V Focus	H

PART No.	VALUE	Tolerance	PART No.	VALUE	Tolerance
C1, C6, C7	10 $\mu$ F		R5, R6, R8	10k $\Omega$	
C10, C11, C12, C19	10 $\mu$ F		R7	22k $\Omega$	$\pm 5\%$
C8	33 $\mu$ F				
C9	100 $\mu$ F				
C2, C18	0.22 $\mu$ F	$\pm 5\%$			
C3, C17	3900pF	$\pm 5\%$			
C15	0.01 $\mu$ F	$\pm 5\%$			
C16	0.1 $\mu$ F	$\pm 5\%$			

● R13(R15), R14(R16)

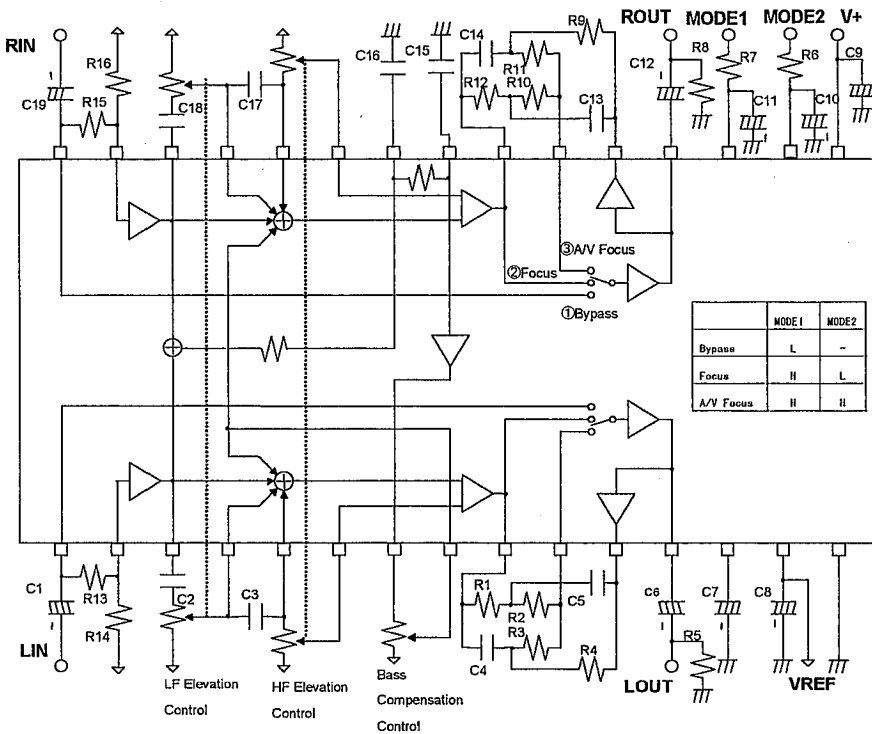
The R13(R15) and R14(R16) control sound pressure level when between Bypass and Focus MODE switch.

$$R13+R14 \geq 20k \Omega$$

$$R13=R15, R14=R16$$

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

APPLICATION CIRCUIT(Without A/V Focus filter)

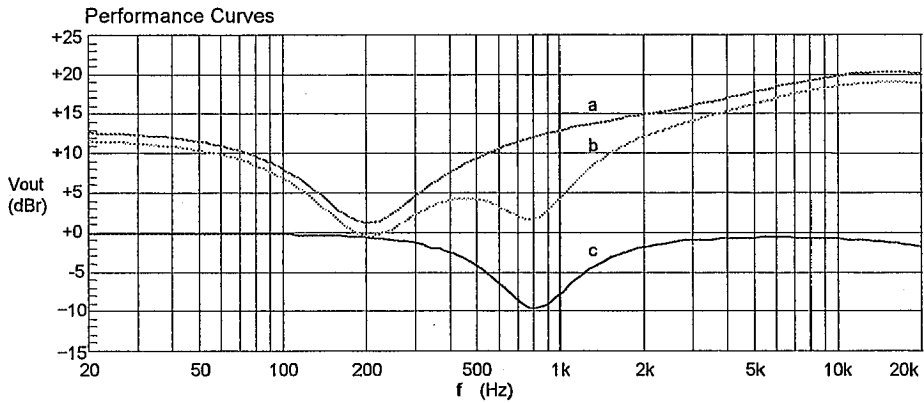


PART No.	VALUE	Tolerance	PART No.	VALUE	Tolerance
C1, C6, C7	10 $\mu$ F		R5, R6, R8	10k $\Omega$	
C10, C11, C12, C19	10 $\mu$ F		R1, R12	1.8k $\Omega$	$\pm 5\%$
C8	33 $\mu$ F		R2, R3, R7, R10, R11	22k $\Omega$	$\pm 5\%$
C9	100 $\mu$ F		R4, R9	5.6k $\Omega$	$\pm 5\%$
C2, C18	0.22 $\mu$ F	$\pm 5\%$			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

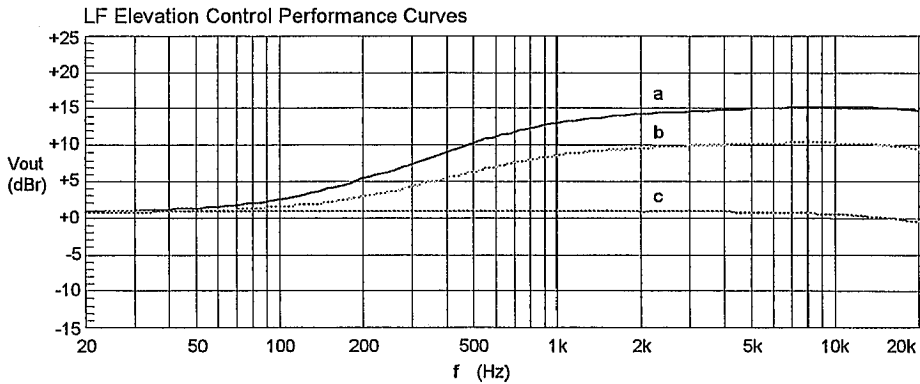
- R13(R15), R14(R16)  
The R13(R15) and R14(R16) control sound pressure level when between Bypass and Focus MODE switch.  
 $R13+R14 \geq 20k \Omega$   
 $R13=R15, R14=R16$
- LF Elevation Control : 1kB Single-shaft Dual-unit
- HF Elevation Control : 10kB Single-shaft Dual-unit
- Bass Compensation Control : 1kB Single-shaft Single-unit

4

## CHARACTERISTICS



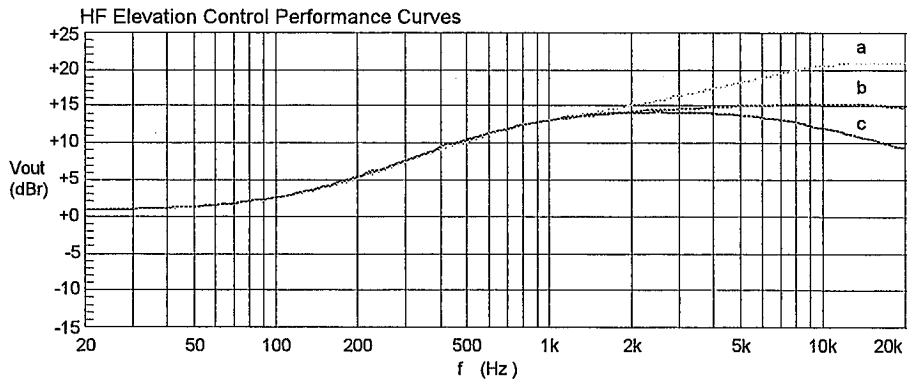
V+=12V Vin=-20dBV(=0dBr) Left in Left Out  
 a: Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)\*  
 b: A/V Focus Mode (Controls Maximum) (HF:10kΩ LF:1kΩ BC:1kΩ)  
 c: A/V Focus Filter Curve (A/V Focus Mode Controls 0) (HF:0Ω LF:0Ω BC:0Ω)



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)

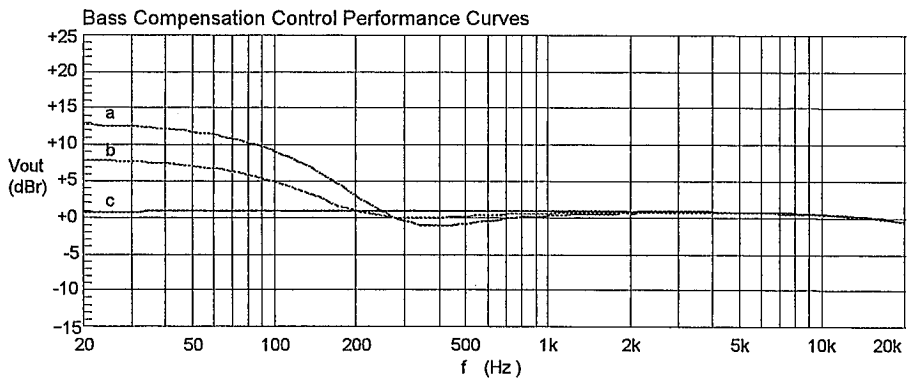


■ CHARACTERISTICS



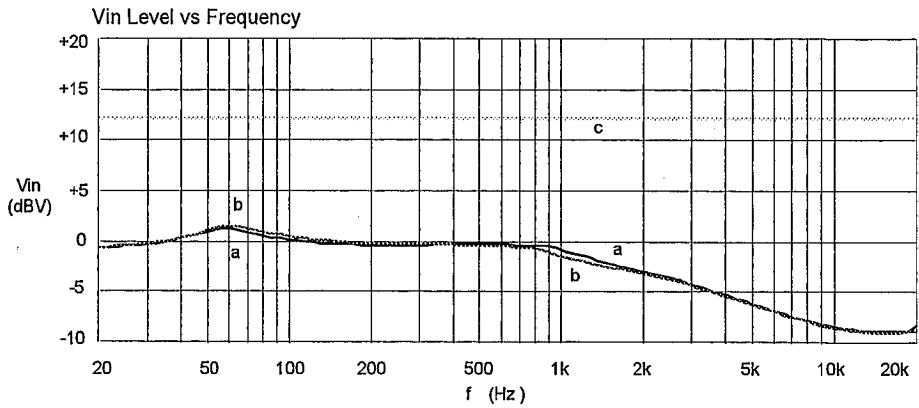
V+=12V Vin=-20dBV(=0dBr) Left in Left Out  
 Focus Mode bass Compensation : Minimum (0Ω) LF Elevation : Maximum (1kΩ)  
 a:HF Elevation Control Maximum (10kΩ)  
 b:HF Elevation Control Center (5kΩ)  
 c:HF Elevation Control Minimum (0Ω)

4



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)

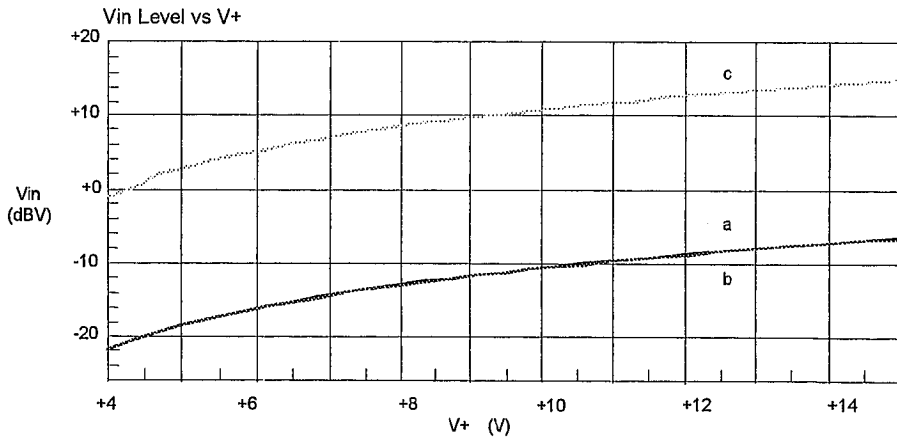
## CHARACTERISTIC



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

4



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

[CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.