SPEAKER ELEVATION AUDIO PROCESSOR with A/V Focus Filter

■ GENERAL DESCRIPTION

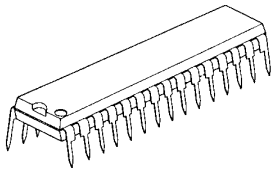
The **NJM2189** is a speaker elevation audio processor with A/V Focus Filter, based on SRS Focus technology. It is capable of raising sound image.

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

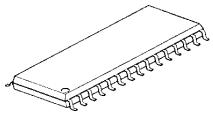
The Bypass and Focus Mode inputs are separate to be the same sound volume in both Bypass and Focus mode.

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 (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

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■ **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)	-	

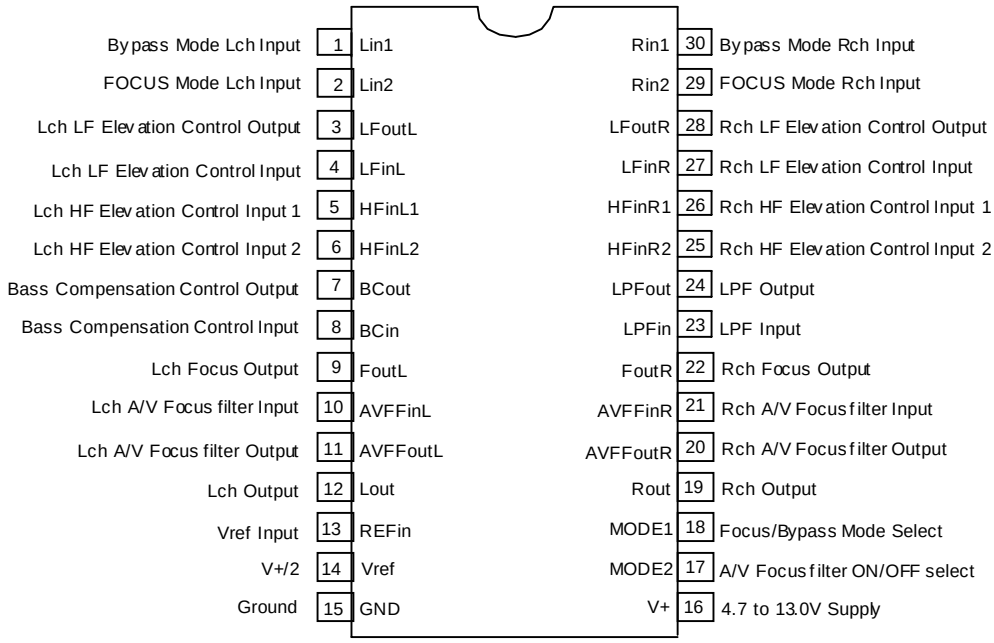
■ **ELECTRICAL CHARACTERISTICS**(V^+=12V,Ta=25°C)

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=-17.2dBV 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=-17.2dBV Lch f=1kHz Controls ∞	Focus Mode	-	0.05	0.20	%
			A/V Focus Mode	-	0.09	0.30	
BYPASS Gain	G_{BYP}	Vin=-17.2dBV f=1kHz	Bypass Mode	-1.0	0.0	1.0	dB
FOCUS Gain1	G_{FOC1}	Vin=-17.2dBV f=70Hz Controls ∞	Focus Mode	8.5	10.5	12.5	dB
FOCUS Gain2	G_{FOC2}	Vin=-17.2dBV f=20kHz Controls ∞	Focus Mode	19.0	21.0	23.0	dB
AVF Gain	G_{AVF}	Vin=-17.2dBV 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	

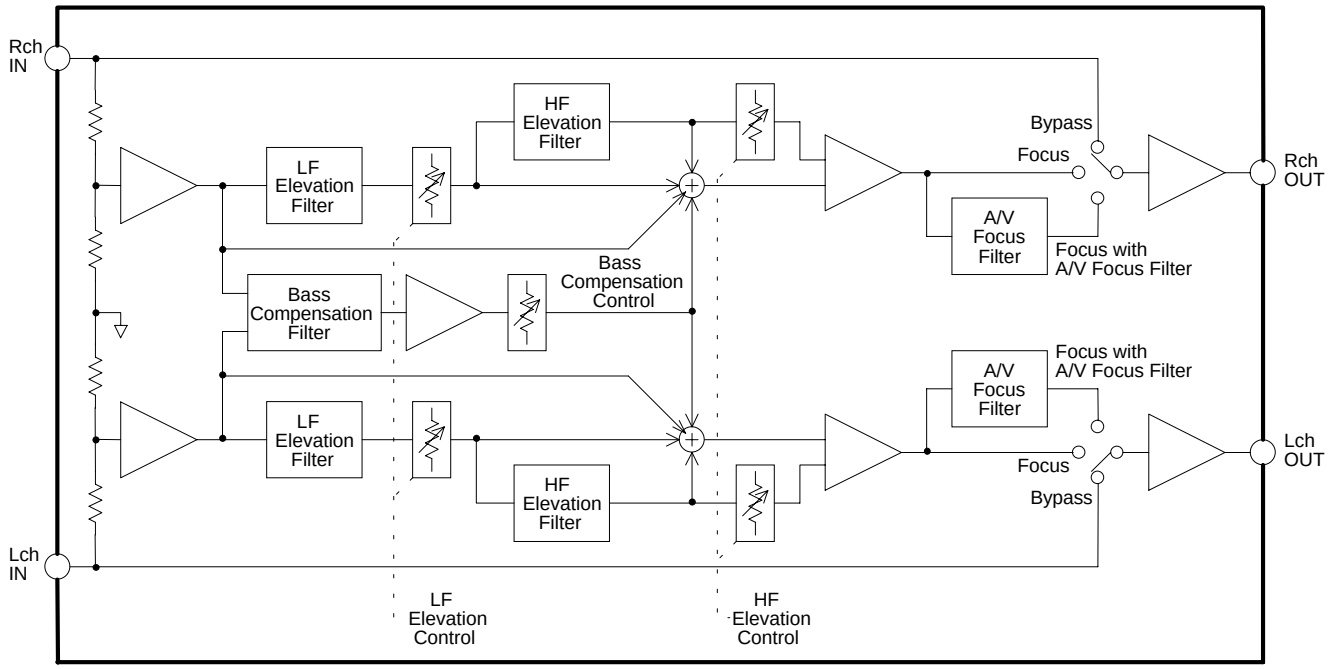
■ **MODE SWITCH**

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

■ PIN FUNCTION

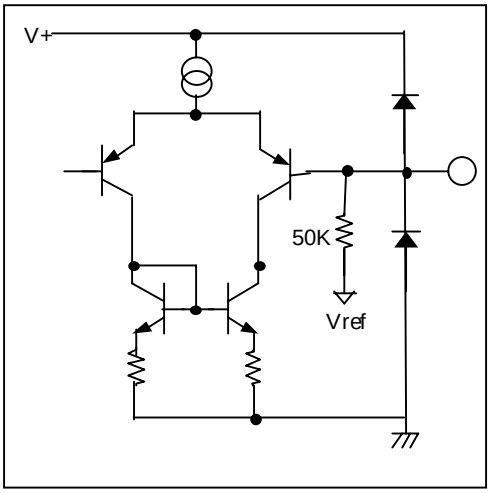


■BLOCK DIAGRAM

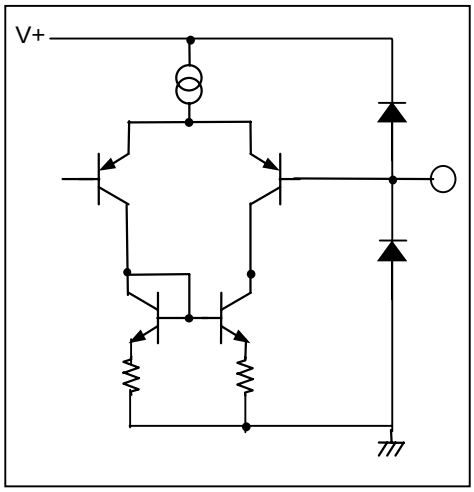


■**PIN DESCRIPTION**

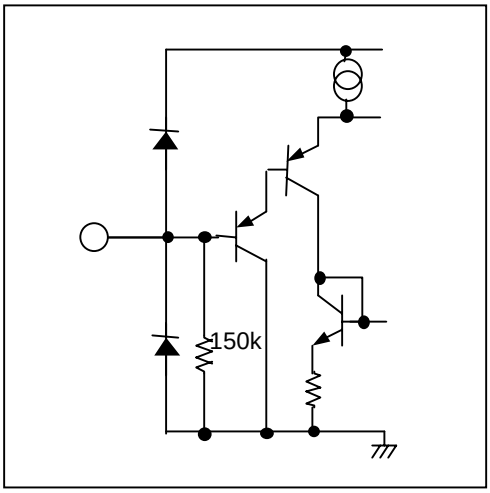
Lin1, Rin1



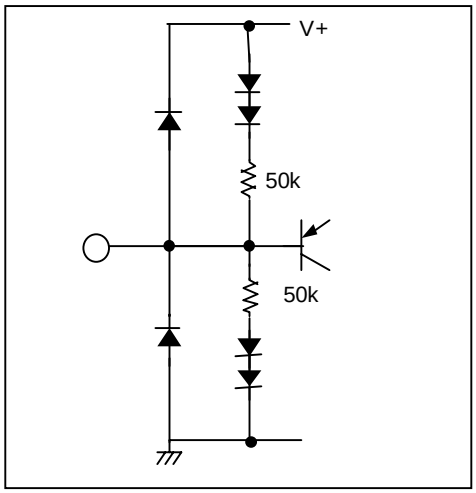
Lin2, Rin2



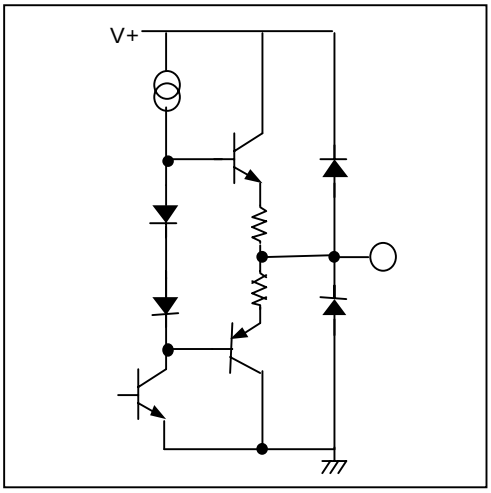
MODE1, MODE2



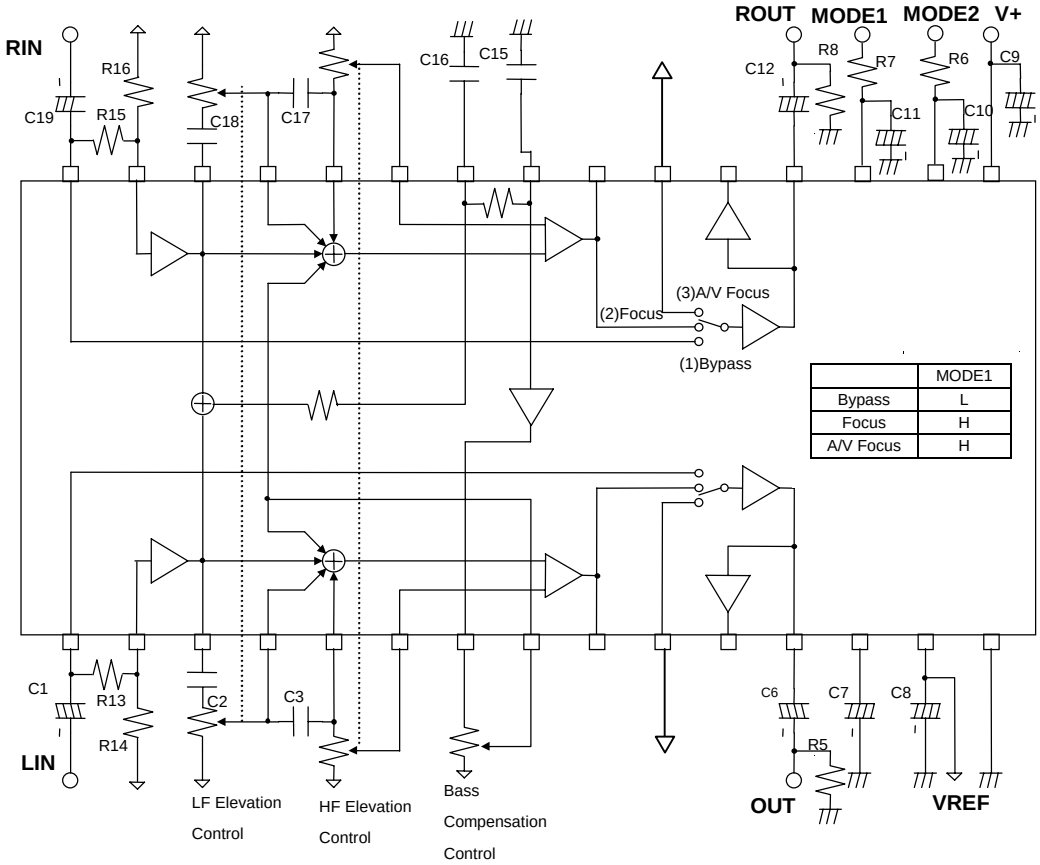
REFin



Lout,Rout,Vref



■APPLICATION CIRCUIT



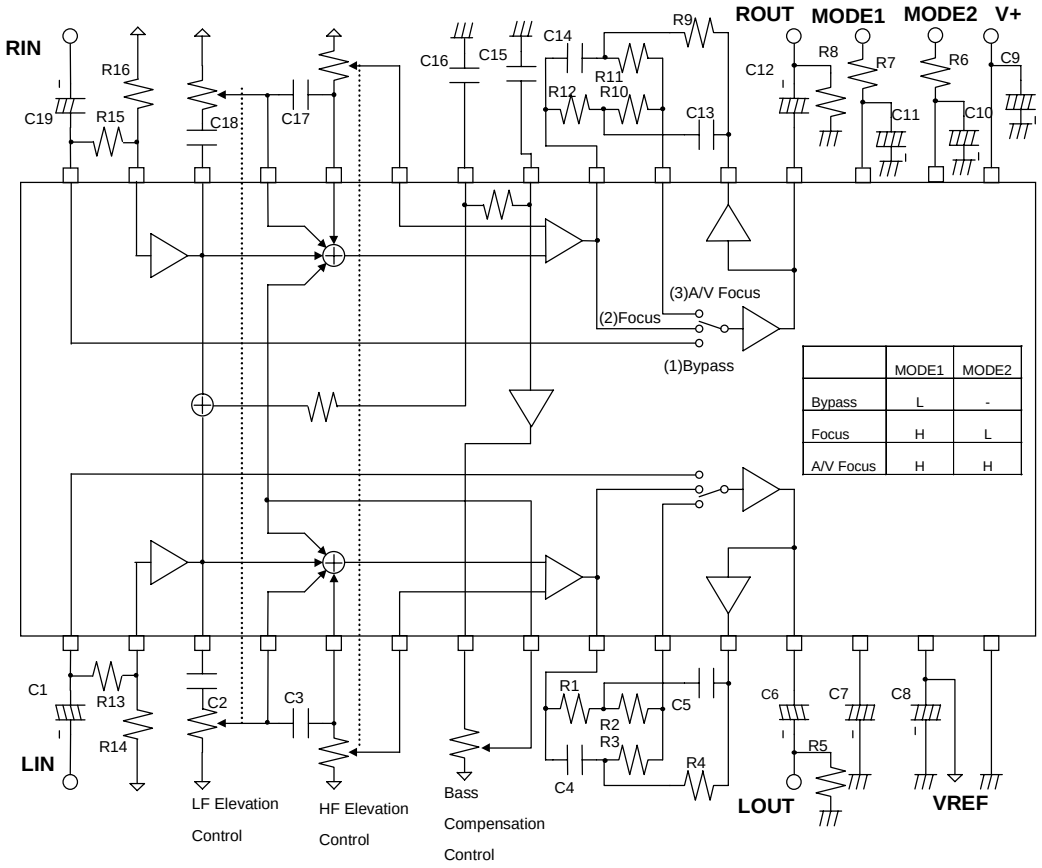
	MODE1
Bypass	L
Focus	H
A/V Focus	H

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

■APPLICATION CIRCUIT (Without A/V Focus filter)



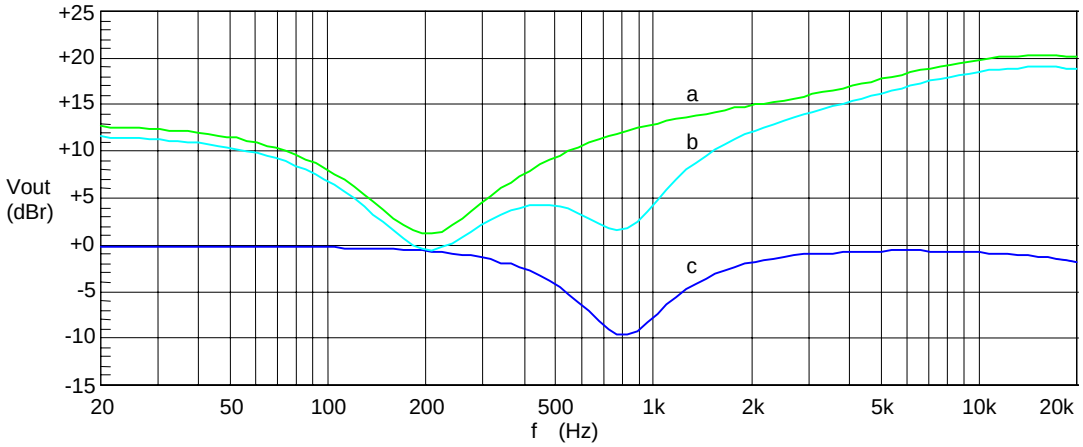
PART No.	VALUE	Tolerance	PART No.	VALUE	Tolerance
C1,C6,C7	10uF		R5,R6,R8	10kΩ	
C10,C11,C12,C19	10uF		R1,R12	1.8kΩ	±5%
C8	33uF		R2,R3,R7,R10,R11	22kΩ	±5%
C9	100uF		R4,R9	5.6kΩ	±5%
C2,C18	0.2uF	±5%			
C3,C17	3900pF	±5%			
C4,C14,C15	0.01uF	±5%			
C5,C13	0.47uF	±5%			
C16	0.1uF	±5%			

● 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

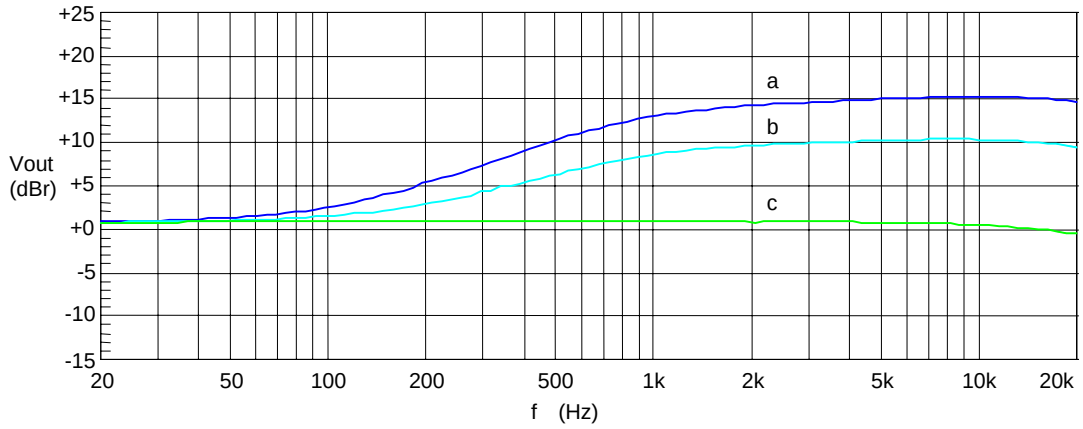
■CHARACTERISTICS

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

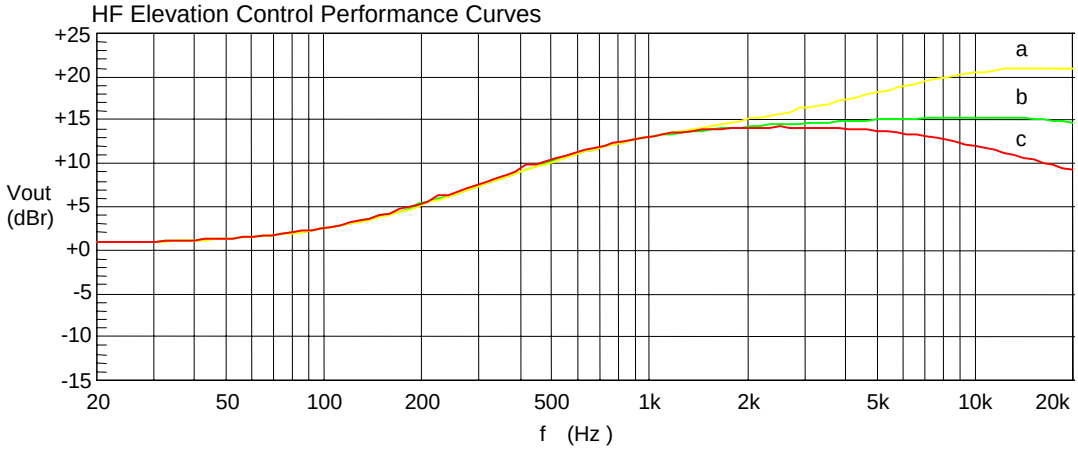


V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode Bass Compensation : Minimum (0Ω) HF Elevation : Center (5kΩ)
a:LF Elevation Control Maximum (1kΩ)
b:LF Elevation Control Center (0.5kΩ)
c:LF Elevation Control Minimum (0Ω)

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

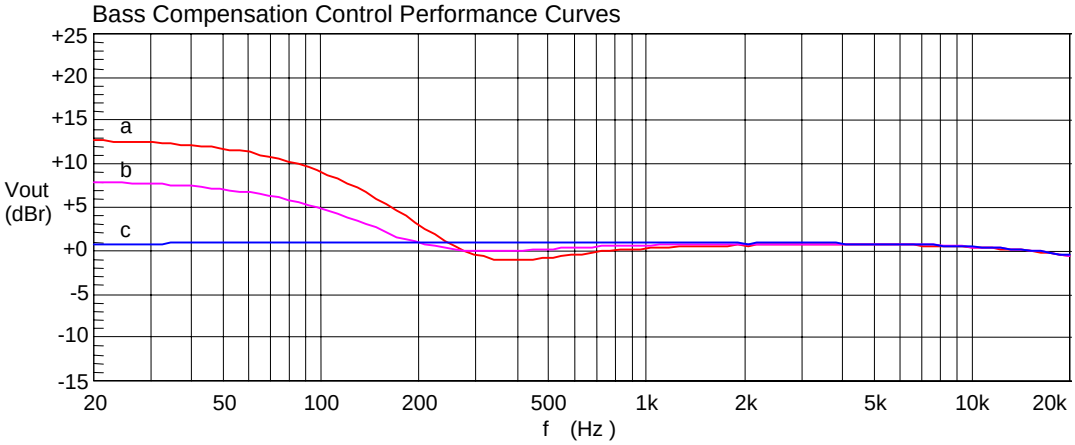
■CHARACTERISTICS

HF Elevation Control Performance Curves



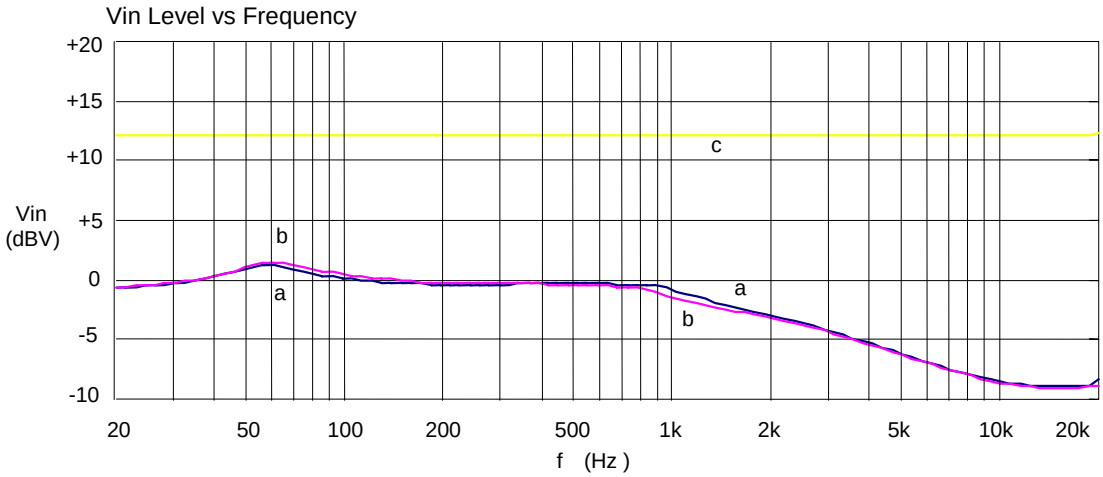
V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode bass Compensation : Minimum (0Ω) LF Elevation : Maximum (1kΩ)
a:HF Elevation Control Maximum (10kΩ)
b:HF Elevation Control Center (5kΩ)
c:HF Elevation Control Minimum (0Ω)

Bass Compensation Control Performance Curves

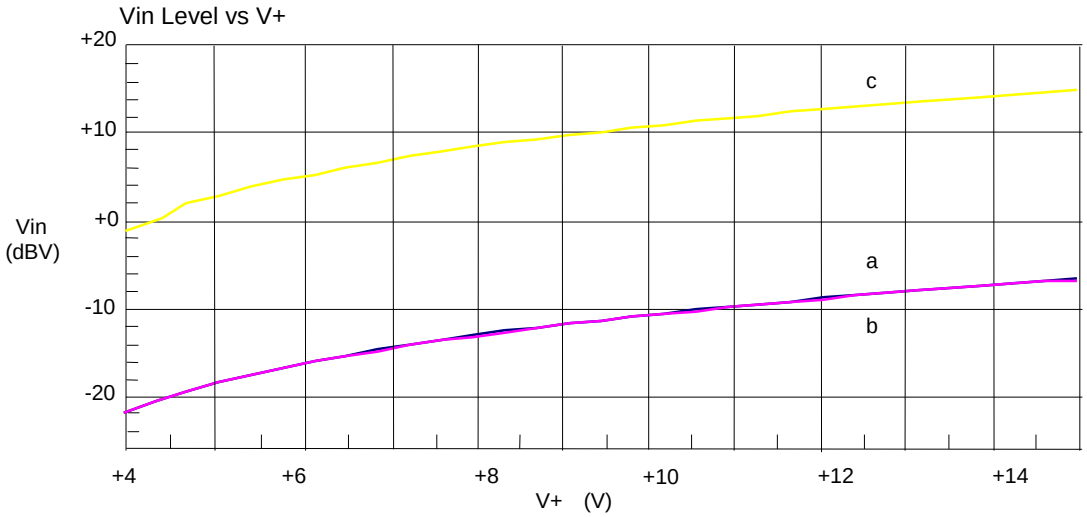


V+=12V Vin=-20dBV(=0dBr) Left in Left Out
Focus Mode LF Elevation : Minimum (0Ω)
a:Bass Compensation Control Maximum (1kΩ)
b:Bass Compensation Control Center (0.5kΩ)
c:Bass Compensation Control Minimum (0Ω)

■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 , fin=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

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