



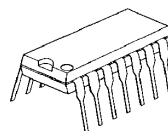
3D SURROUND AUDIO PROCESSOR

■ GENERAL DESCRIPTION

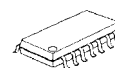
The **NJM2702** is a 3D surround audio processor regenerating the 3D surround sound with only two speakers.

The **NJM2702** is suitable for audio applications, which are speaker system for mini components, CD radio cassette, multimedia speaker systems, TV and others.

■ PACKAGE OUTLINE



NJM2702D



NJM2702M

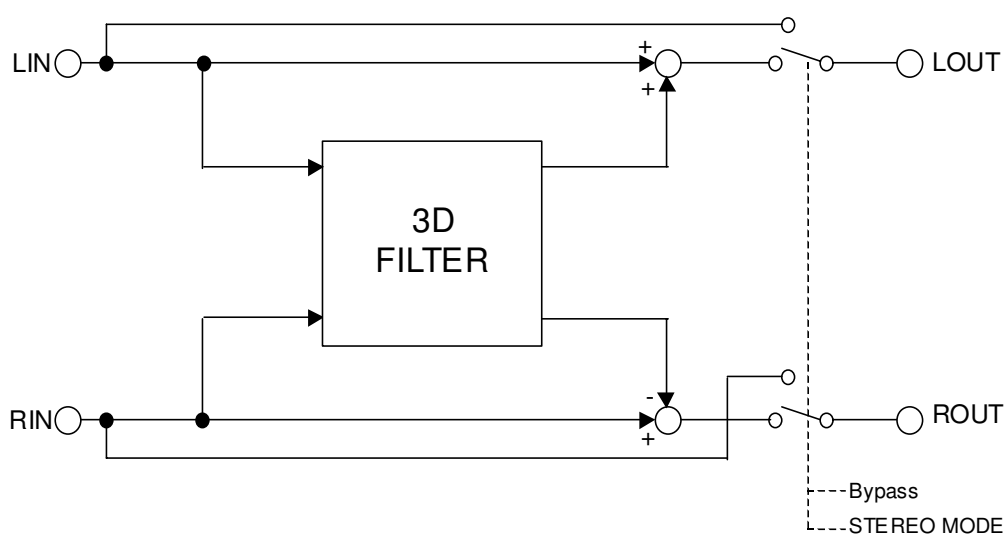


NJM2702V

■ FEATURES

- Operating Voltage (4.7 to 13V)
- Stereo mode
 - Stable center image with natural sound field
 - High quality Surround
 - Free speaker interval
- Surround control
- Internal Mode Control Switch
- Bipolar Technology
- Package Outline DIP14, DMP14, SSOP10

■ BLOCK DIAGRAM



NJM2702

■ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	14	V
Power Dissipation	P _D	(DIP14) 500 (DMP14) 350 (SSOP10) 250	mW
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-40 to +125	°C

■OPERATING VOLTAGE

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ₊	-	4.7	12.0	13.0	V

■ELECTRICAL CHARACTERISTICS (V₊=12V, Ta=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION						MIN.	TYP.	MAX.	UNIT
		INPUT		OUTPUT	MODE	VR					
		L	R								
Operating Current	I _{cc}	No Signal	0	0	-	BYPASS	-	3.0	6.0	9.0	mA
			0	0	-	Stereo	MAX	3.0	6.0	9.0	

●AC CHARACTERISTICS

(V₊=12V, Ta=25°C, V_{IN}=-10dBV(316mVrms), f=1kHz, RL=4.7kΩ, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION						MIN.	TYP.	MAX.	UNIT
		INPUT		OUTPUT	MODE	VR					
		L	R								
Maximum Input Voltage	V _{IM}	f=1kHz T.H.D.=3%	V _{IN} 0	0 V _{IN}	L R	BYPASS	-	9.9 (3.1)	11.9 (3.9)	-	dBV (V _{rms})
		f=100Hz T.H.D.=3%	V _{IN} 0	0 V _{IN}	L R	Stereo	MAX	-3.8 (0.6)	-1.8 (0.8)	-	
Output Noise	V _{NO}	R _G =0Ω A-Weighted	0	0	L R	BYPASS	-	-	-112 (2.5)	-106 (5.0)	dBV (μV _{rms})
		R _G =0Ω A-Weighted	0	0	L R	Stereo	MAX	-	-100 (10)	-94 (20)	
Total Harmonic Distortion	T.H.D	f=1kHz	V _{IN} 0	0 V _{IN}	L R	BYPASS	-	-	0.005	0.01	%
		f=1kHz V _{in} =-20dBV	V _{IN} 0	0 V _{IN}	L R	Stereo	MAX	-	0.1	0.5	
Bypass Gain	G _{VBYP}	f=1kHz	V _{IN} 0	0 V _{IN}	L R	BYPASS	-	-1.0	0.0	1.0	dB

●AC CHARACTERISTICS

($V_+ = 12V$, $T_a = 25^\circ C$, $V_{IN} = -10dBV$ (316mVrms), $f = 1kHz$, $R_L = 4.7k\Omega$, unless otherwise specified)

V _F =1.2V, I _A =25 μA, V _{IN} =100dBV (G _{100mVrms}), f=1KHz, R _L =4.7KΩ, unless otherwise specified											
PARAMETER	SYMBOL	TEST CONDITION						MIN.	TYP.	MAX.	UNIT
		INPUT		OUTPUT	MODE	VR					
		L	R								
Surround Gain	G _{VSUR}	f=100Hz Vin=-20dBV	V _{IN} 0	0 V _{IN}	L R	Stereo	MAX	10.7	12.7	14.7	dB
		f=100Hz Vin=-20dBV	0 V _{IN}	V _{IN} 0	L R	Stereo	MAX	8.4	10.4	12.4	
		f=100Hz Vin=-20dBV	V _{IN} 0	0 V _{IN}	L R	Stereo	MIN	3.6	5.6	7.6	

●CONTROL CHARACTERISTICS ($V_+ = 12V$, $T_a = 25^\circ C$ unless otherwise specified)

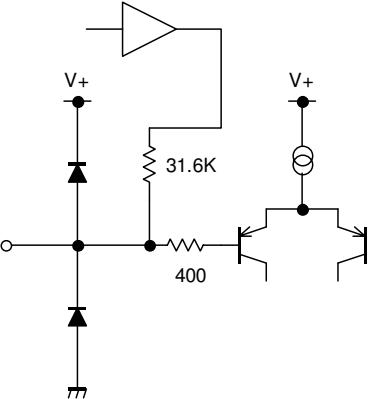
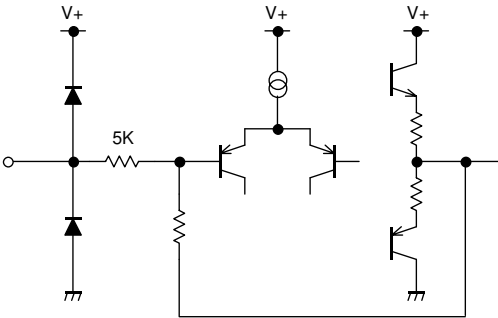
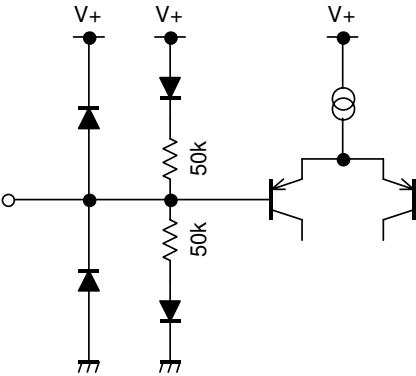
CONTROL CHARACTERISTICS (V _I =12V, I _A =250 μA unless otherwise specified)											
PARAMETER	SYMBOL		TEST CONDITION					MIN.	TYP.	MAX.	UNIT
			INPUT		OUTPUT	MODE	VR				
			L	R							
Mode Select Control Voltage	V _{MODE}	V _{IN} = High Level	-	-	-	-	-	2.0	-	V+	V
		V _{IN} = Low Level	-	-	-	-	-	0.0	-	0.7	

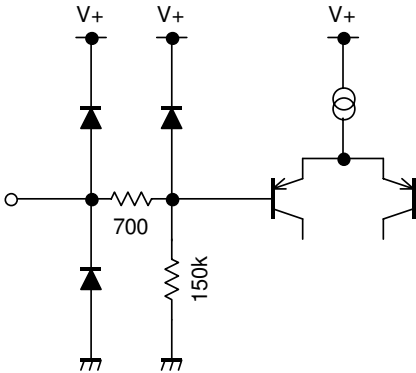
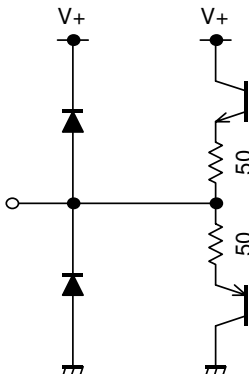
■MODE SWITCH

MODE	SW	NOTES
BYPASS	L	Input Through
Stereo	H	Surround Mode (Stereo Input)

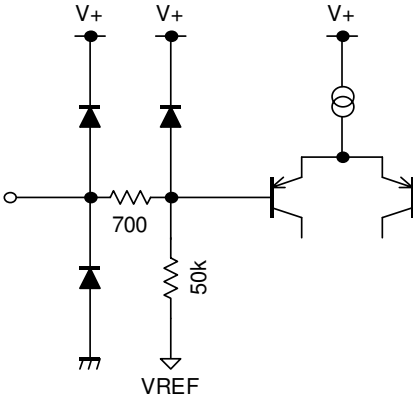
NJM2702

■TERMINAL DESCRIPTION

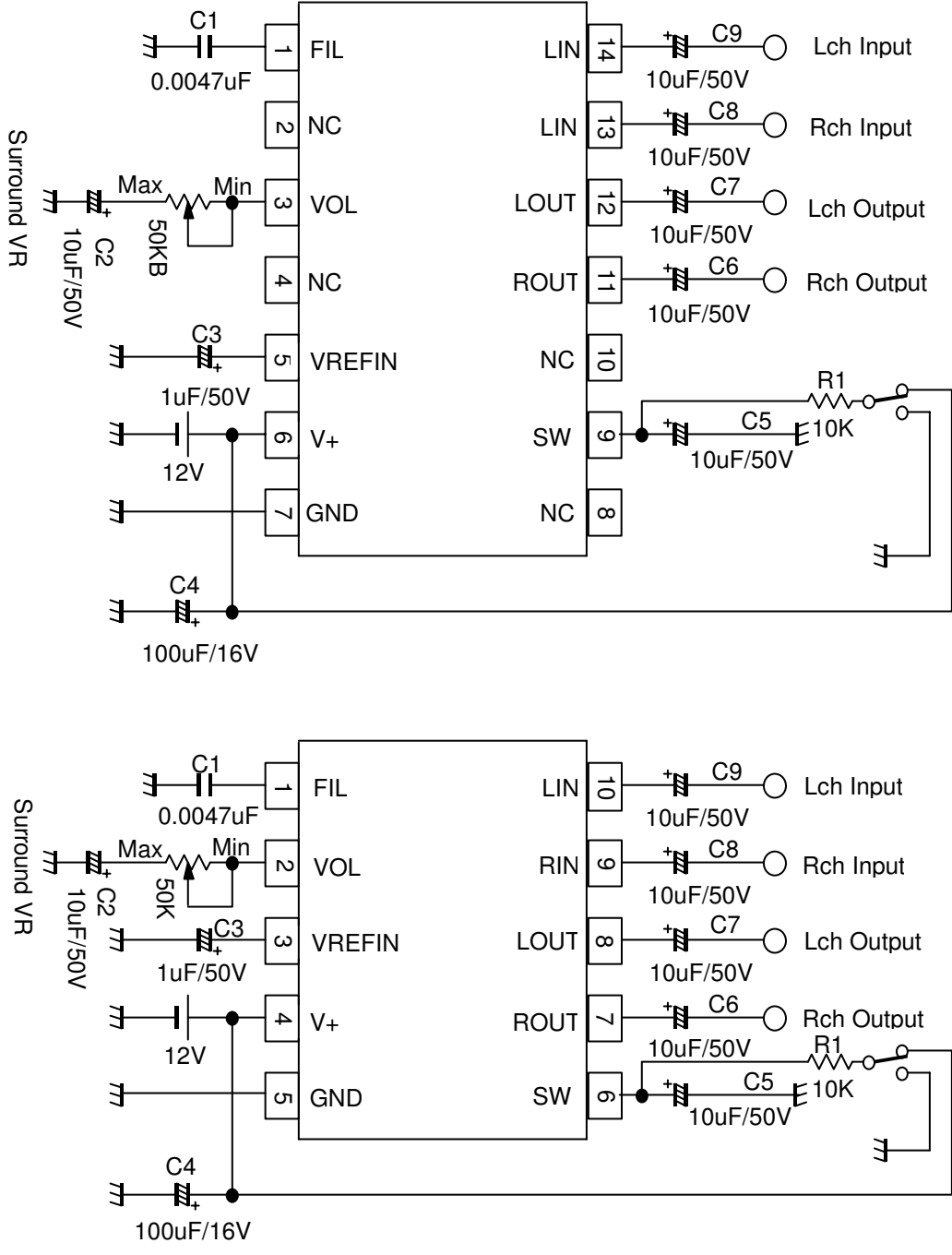
PIN NO.		SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
DIP14 DMP14	SSOP10				
1	1	FIL	Filter Input		$V_{+}/2$
2 4 8 10	-	NC	Test pin		
3	2	VOL	Surround VR		$V_{+}/2$
5	3	VREFIN	Reference Voltage Input		$V_{+}/2$

PIN NO.		SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
DIP14 DMP14	SSOP10				
6	4	V+	Power Supply		V+
7	5	GND	GND		0V
9	6	SW	Mode Control Switch		0V
11 12	7 8	ROUT LOUT	Rch Output Lch Output		V+/2

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PIN NO.		SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
DIP14 DMP14	SSOP10				
13 14	9 10	RIN LIN	Rch Input Lch Input		$V+/2$

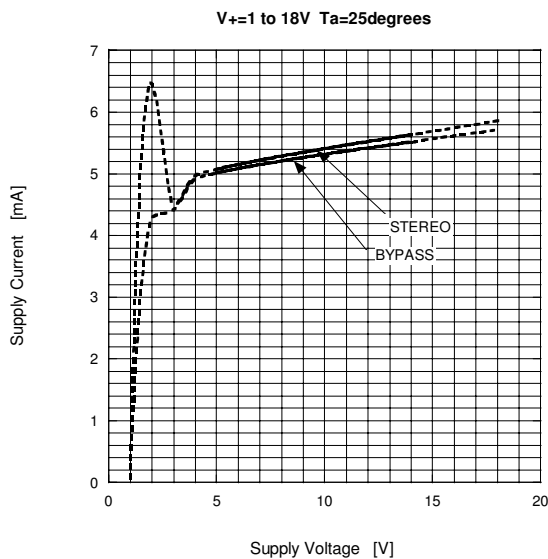
APPLICATION CIRCUIT



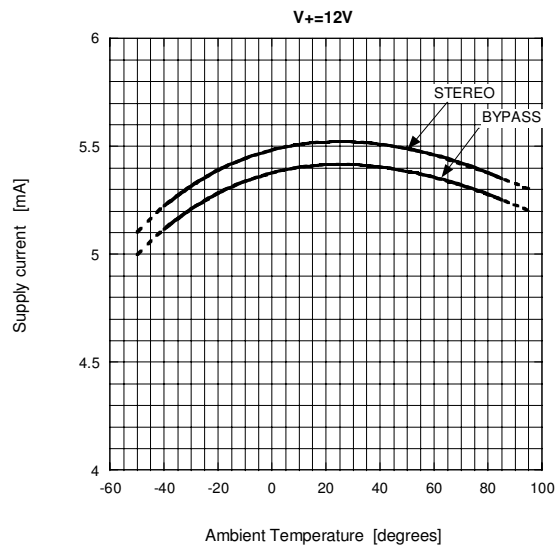
Parts No.	Value	Tolerance	Parts No.	Value	Tolerance
R1	10K Ω	5%	C3	1 μ F	20%
C1	0.0047 μ F	5%	C4	100 μ F	20%
C2,C5,C6,C7,C8,C9	10 μ F	20%			

TYPICAL CHARACTERISTICS

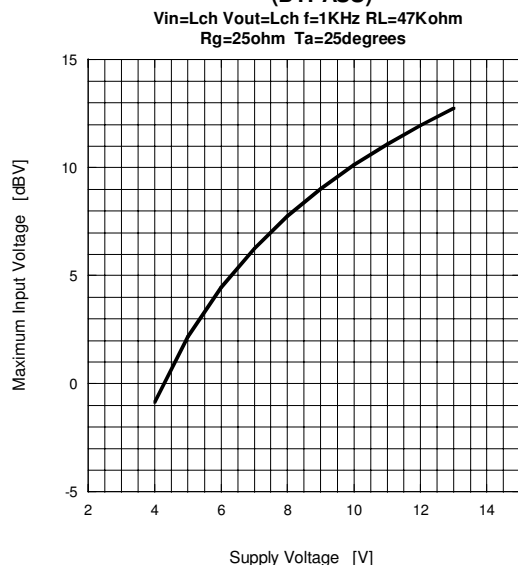
Supply Current vs Supply Voltage



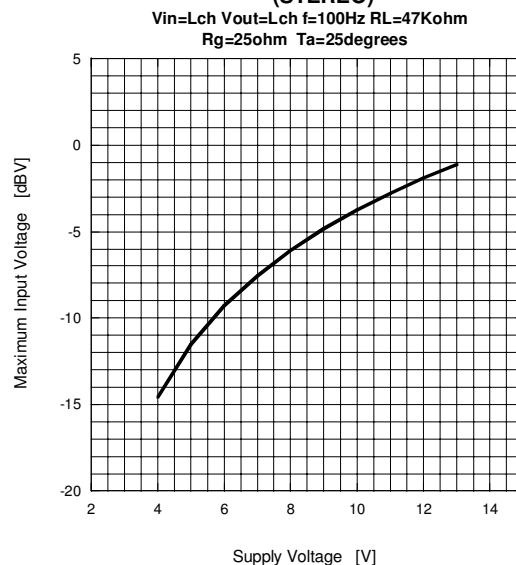
Supply Current vs Ambient Temperature



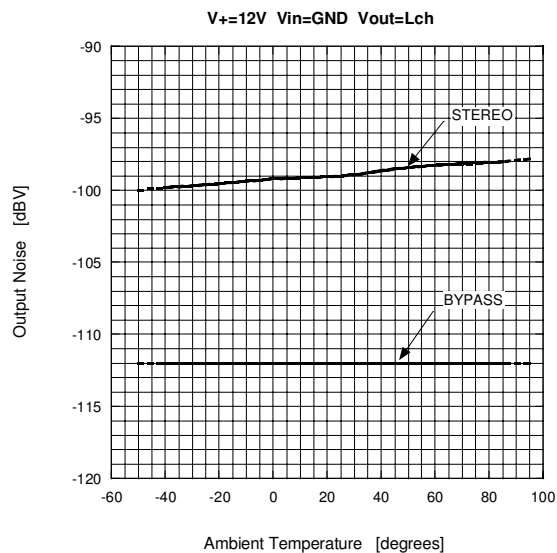
Maximum Input Voltage vs Supply Voltage
(BYPASS)



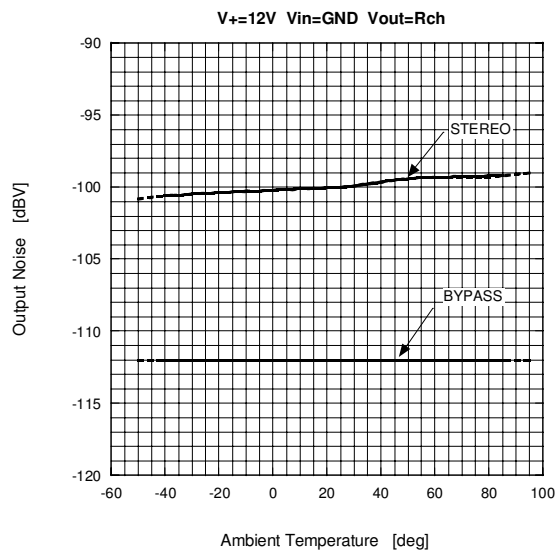
Maximum Input Voltage vs Supply Voltage
(STEREO)



Output Noise vs Ambient Temperature



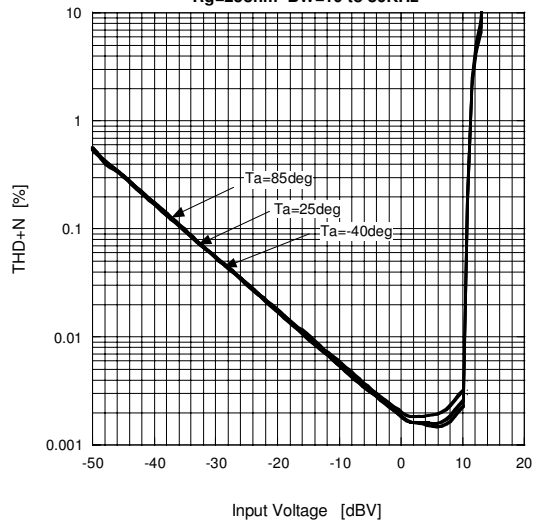
Output Noise vs Ambient Temperature



TYPICAL CHARACTERISTICS

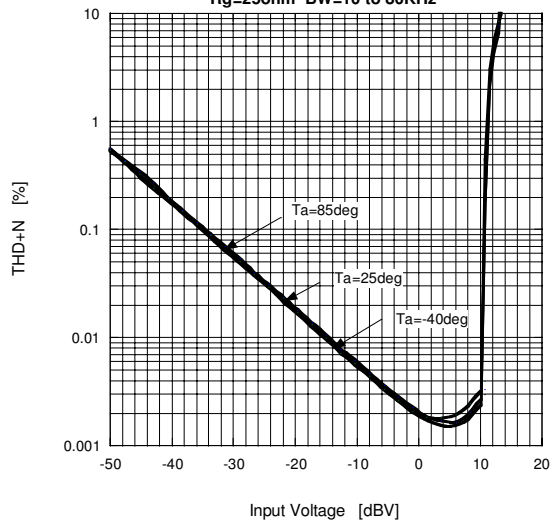
Total Harmonic Distortion vs Input Voltage (BYPASS)

V₊=12V f=100Hz RL=47Kohm
R_g=25ohm BW=10 to 80KHz



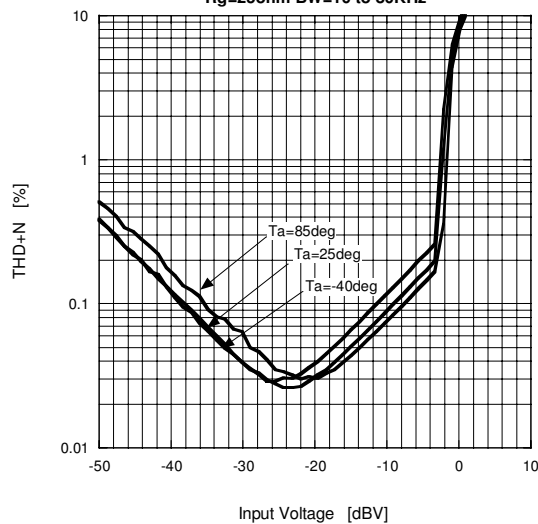
Total Harmonic Distortion vs Input Voltage (BYPASS)

V₊=12V f=1KHz RL=47Kohm
R_g=25ohm BW=10 to 80KHz



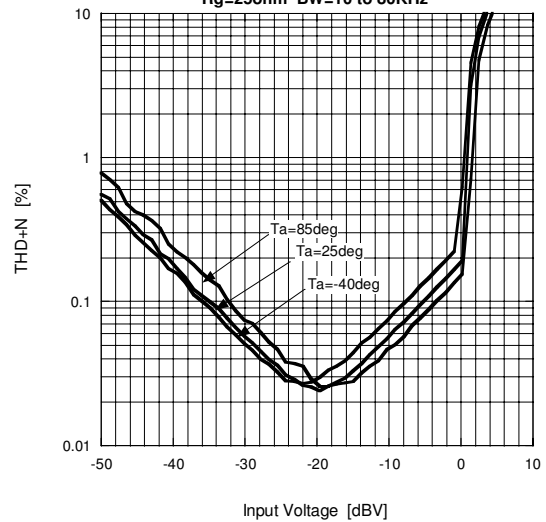
Total Harmonic Distortion vs Input Voltage (STEREO)

V₊=12V f=100Hz RL=47Kohm
R_g=25ohm BW=10 to 80KHz



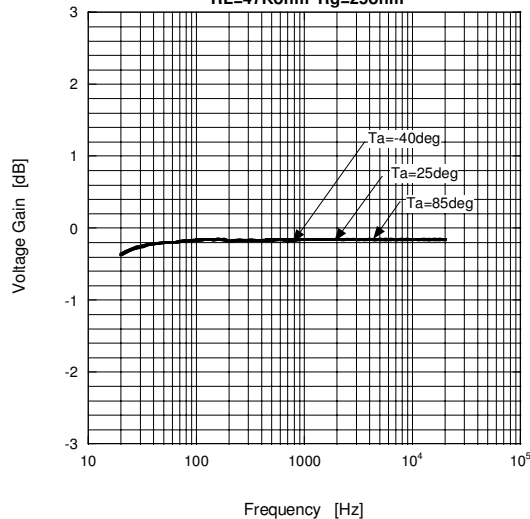
Total Harmonic Distortion vs Input Voltage (STEREO)

V₊=12V f=1KHz RL=47Kohm
R_g=25ohm BW=10 to 80KHz



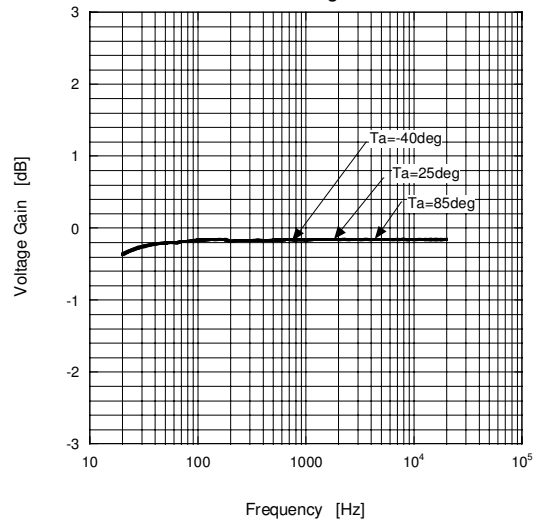
Voltage Gain vs Frequency Response (BYPASS)

V₊=12V Vin=-10dBV Lch Vout=Lch
RL=47Kohm R_g=25ohm

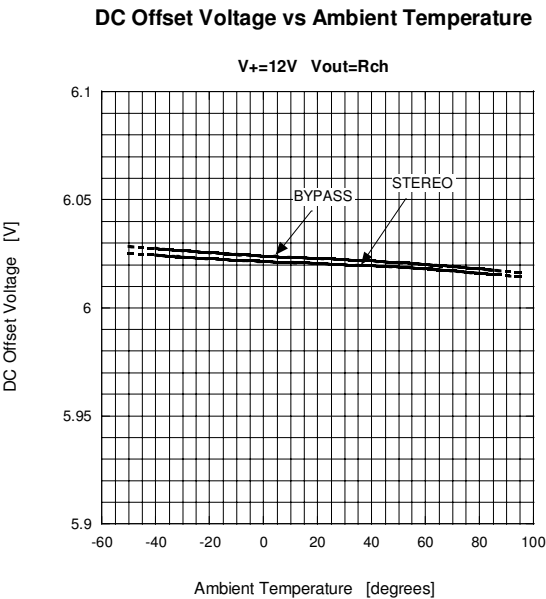
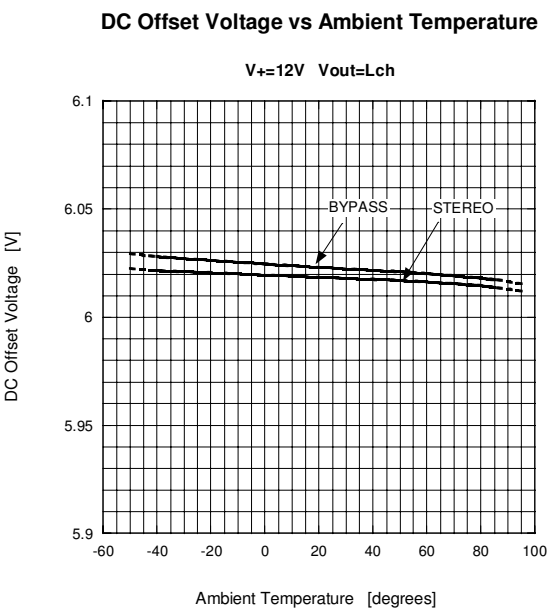
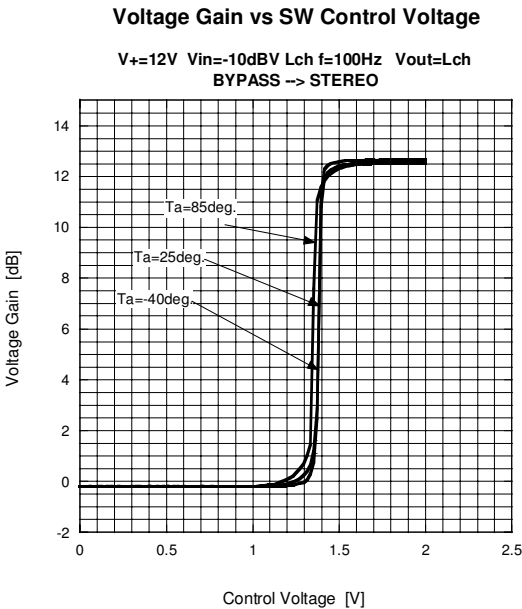
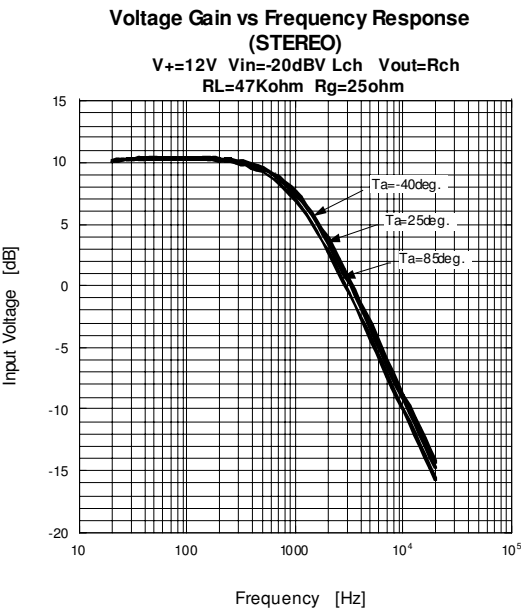
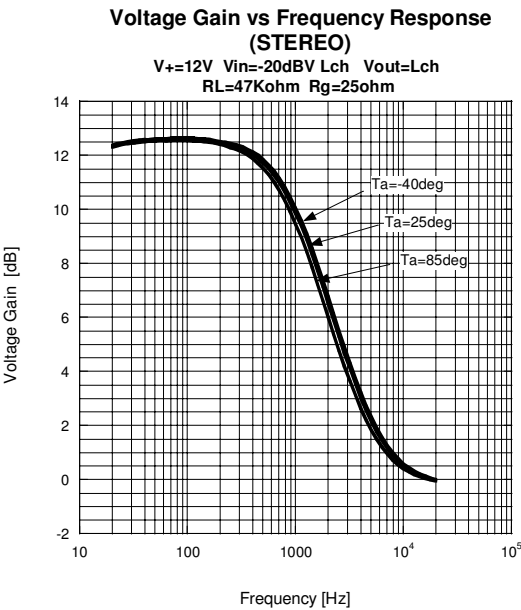


Voltage Gain vs Frequency Response (BYPASS)

V₊=12V Vin=-10dBV Rch Vout=Rch
RL=47Kohm R_g=25ohm



TYPICAL CHARACTERISTICS



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