Ordering number : ENA0078

SANYO Semiconductors
DATA SHEET

Monolithic Linear IC

LA42352 — 5W 2-Channel AF Power Amplifier With DC Volume Control

Overview

LA42352 is 5W 2-channel AF power amplifier with DC volume control intended for televisions.
LA42000 series is power IC which made Pin compatible possible altogether in 3 to 15W. They consist of four kinds of power ICs. (mono, stereo, mono with volume function, stereo with volume function.). They realized PCB layout communalization of an audio power block of TV.

	PO	Channel		Volume
		Mono	Stereo	
LA42051	5W	O		
LA42052	5W		O	
LA42351	5W	O		O
LA42352	5W		O	O
LA42071	7W	O		
LA42072	7W		O	
LA42152	15W		O	

Feature

- P_O 5W×2ch (V_{CC} = 18V, R_L = 8Ω, THD = 10%)
- Built-in DC Volume Control.
- Built-in Standby function.
- Built-in overheat protection.

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Specitications

Maximum Ratings at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	No signal	24	V
Allowable power dissipation	Pd max	Infinite heat sink	15	W
Maximum junction temperature	Tj max		150	°C
Thermal resistance	θjc		3	°C/W
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		18	V
Recommended load resistance	R_L		8	Ω
Allowable operating voltage range	V_{CC} op		10 to 22	V

Operating Characteristics at Ta = 25°C, V_{CC} = 18V, R_L = 8Ω, Volume = 5V, f = 1kHz, Rg = 600Ω

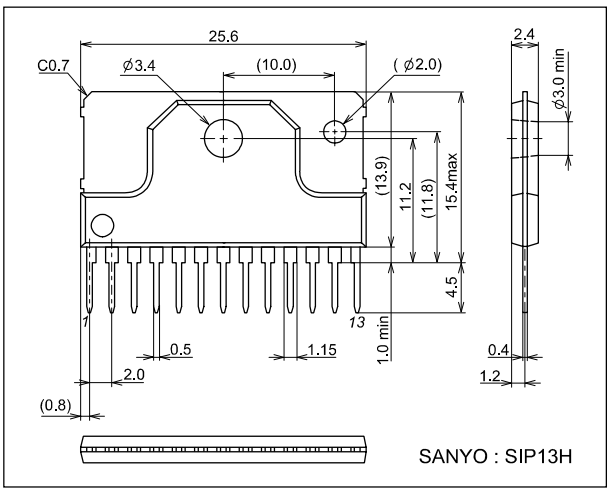
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	I_{STB}	Amplifier off		1	10	μA
Quiescent current	I_{CCO}	Rg = 0, Volume = 0V	35	65	130	mA
Output power	P_O	THD = 10%	4	5		W
Total harmonic distortion	THD	P_O = 1W		0.1	0.8	%
Voltage gain	VG	V_O = 0dBm	32.5	34.5	36.5	dB
Output noise voltage	V_{NO}	Rg = 0, Volume = 0V, BPF = 20Hz to 20kHz		0.13	0.4	mVrms
Volume Attenuation	Att	V_{IN} = 100mV, Vcont = 0V, with 1k-BPF	70	80		dB
Channel separation	Sep.	Rg = 10kΩ, V_O = 0dBm	48	55		dB
Standby control voltage (The Pin 5 voltage)	V_{STB}-H	Amplifier on	2.5		10	V
	V_{STB}-L	Amplifier off	0		0.5	V
Input resistance	Ri		14	20	26	kΩ

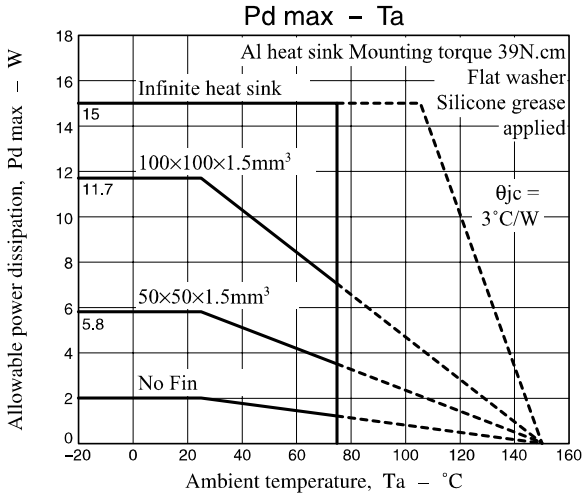
*0dBm = 1mW (600Ω) = 774.6mVrms

Package Dimensions

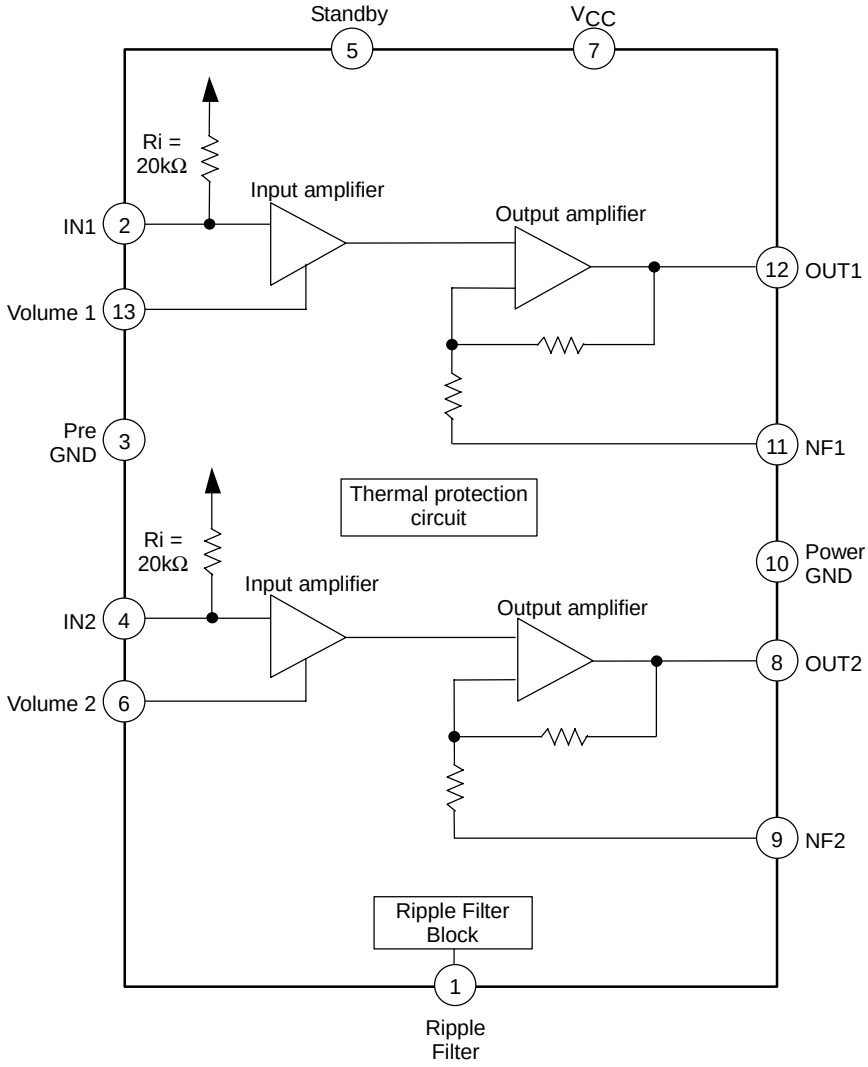
unit : mm

3107B

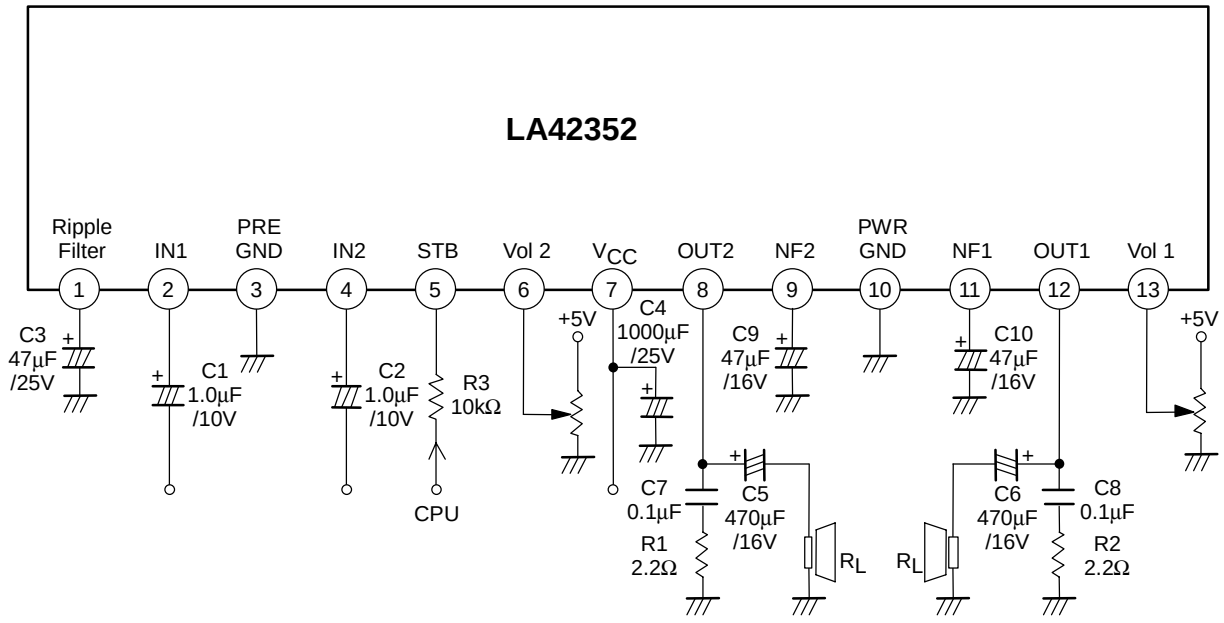




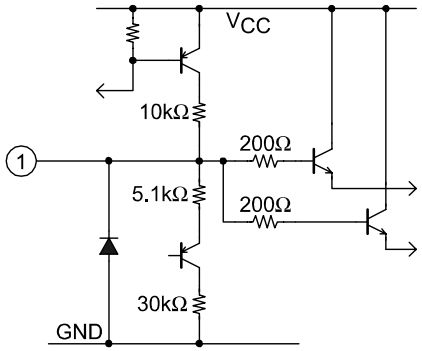
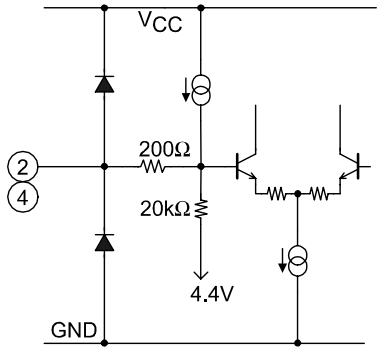
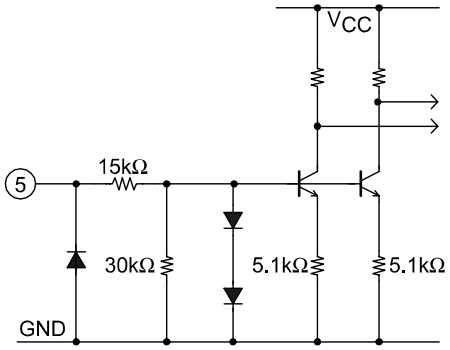
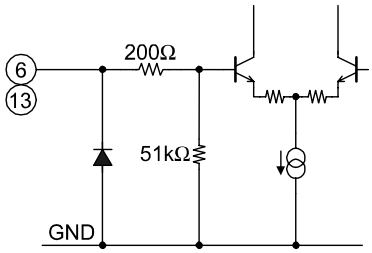
Block Diagram



Sample Application Circuit



Pin Descriptions

Pin No	Symbol	Pin Voltage V_{CC} = 18V	Equivalent Circuit	Description
1	RF	17.6		• Ripple filter reference
2 4	IN1 IN2	4.4		• Input pin
3	PRE_GND	0		• Pre GND pin
5	STB	0 to 5V (Input voltage)		• Standby pin • The standby function is on when this pin at ground level
6 13	Vol 2 Vol 1	0 to 5V (Input voltage)		• Control Volume
7	V_{CC}	18		• Power supply

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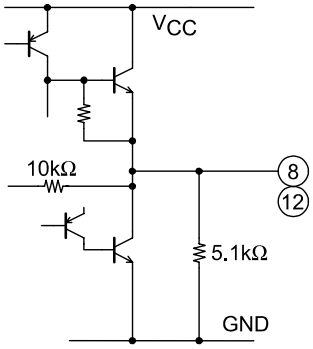
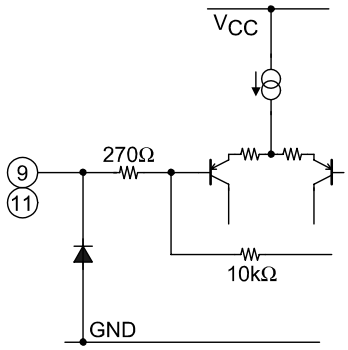
Pin No	Symbol	Pin Voltage V_{CC} = 18V	Equivalent Circuit	Description
8 12	OUT2 OUT1	8.9		• Output pin
9 10	NF2 NF1	8.8		• Negative feedback pin at Power amplifier • Connect NF capacitor
10	PWR_GND	0		• Power GND pin

Description of External parts

C1, C2 : Input capacitors. A value of 1.0μF is recommended for capacitors. Note that the low-frequency area characteristics can be adjusted by changing f_L.

C3 : Ripple filter capacitor. A value of 47μF is recommended for capacitors. Decreasing the capacitance value excessively or removing this capacitor causes ripple to occur. However, increasing the capacitance value does not always cause ripple to reduced. Decreasing the capacitance value makes the starting time earlier.

C4 : Power capacitor.

C5, C6 : Output capacitors. A value of 470μF is recommended for capacitors.

C7, C8 : Oscillation blocking capacitor. Use a polyester film capacitor that is good in high frequency response and temperature characteristic.

C9, C10 : Feedback capacitor. A value of 47μF is recommended for capacitors. Decreasing the capacitance value lowers the low frequency response. Increasing the capacitance value makes the starting time later.

R1, R2 : Resistor connected in series with oscillation blocking capacitor. Prevents phase shift attributable to the oscillation blocking capacitor so that oscillation is hard to occur.

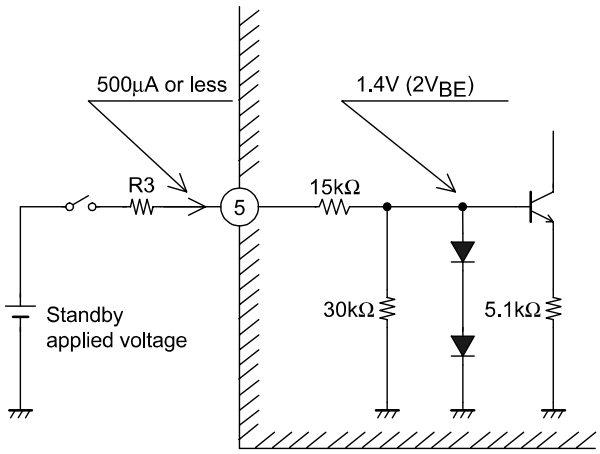
R3 : Standby switch current limiting resistor. A value of 10kΩ is recommended for resistance (when the applied voltage for the standby switch is 3V to 10V). This resistor cannot be removed.

Features of IC Inside and Usage Note

Standby function

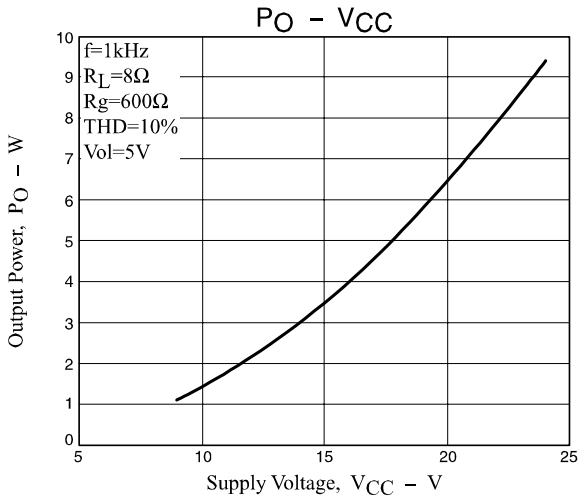
- Pin 5 is the standby switch pin. The amplifier is turned on by applying approximately 3V or more to this pin through an external resistor (R3).
- If voltage in excess of 10V is to be applied to the standby switch, calculate the value of R3 using the following formula so that the current flowing into pin 5 is 500μA or less:

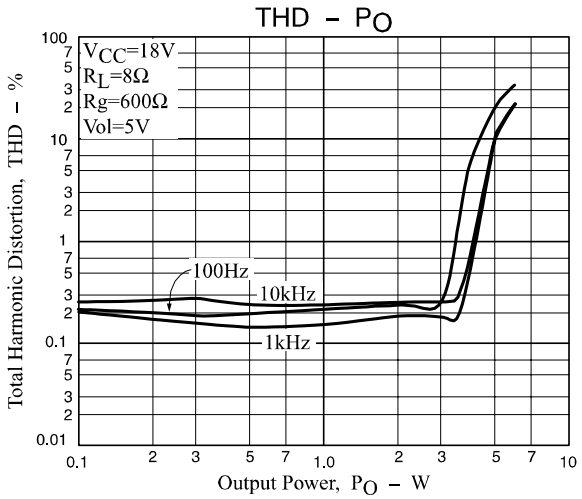
$$R3 = \frac{(\text{Applied voltage} - 2V_{BE}\ (\approx 1.4V))}{500\mu A} - 15k\Omega$$

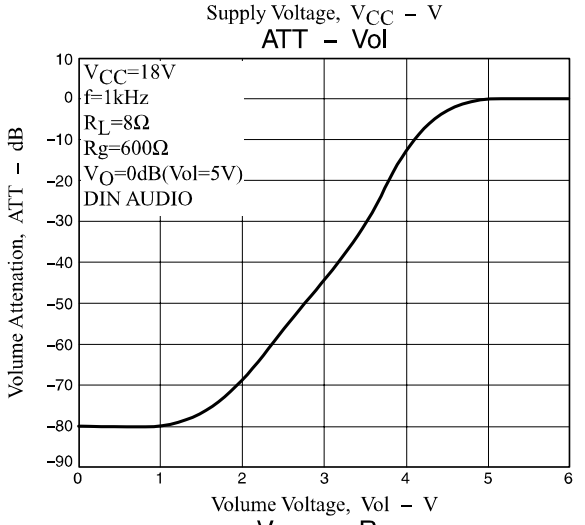


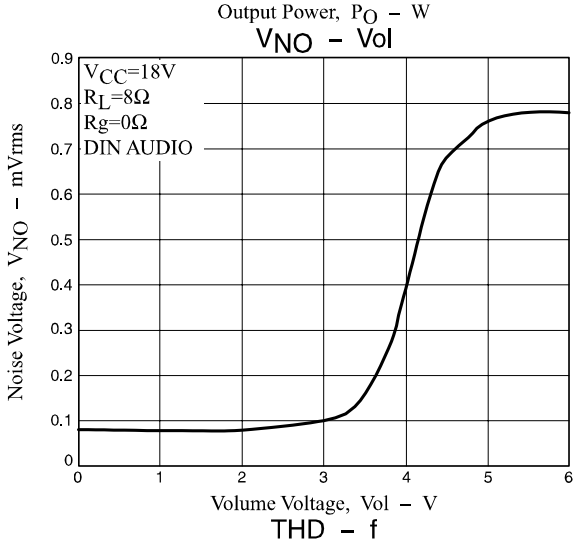
Protector

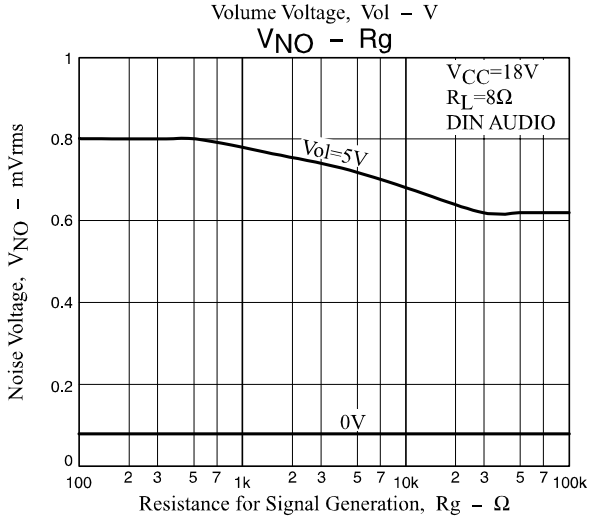
- In order to prevent damage or degradation which may be caused by abnormally heated IC, the LA42352 has a thermal shutdown protector. Accordingly, if the IC junction temperature (Tj) climbs to around 160°C due to inadequate heat dissipation, the thermal shutdown protector will operate to control the output gradually into attenuation.

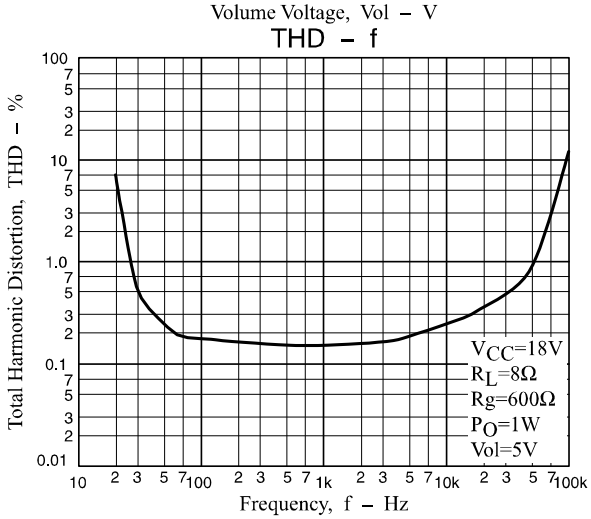

PO – VCC
f=1kHz
RL=8Ω
Rg=600Ω
THD=10%
Vol=5V
Output Power, PO – W
Supply Voltage, VCC – V

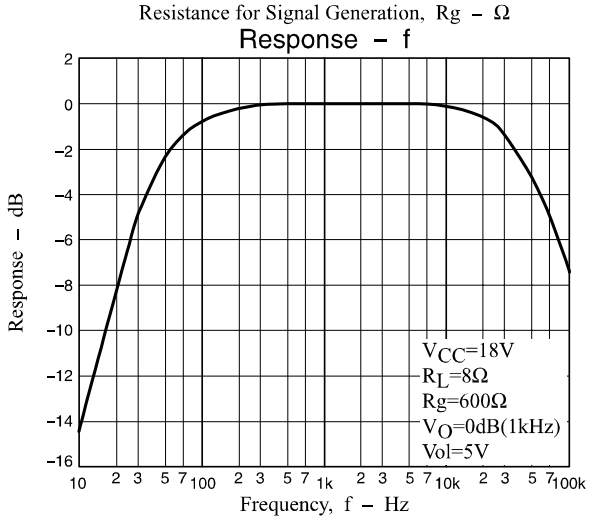

THD – PO
VCC=18V
RL=8Ω
Rg=600Ω
Vol=5V
100Hz
10kHz
1kHz
Total Harmonic Distortion, THD – %
Output Power, PO – W

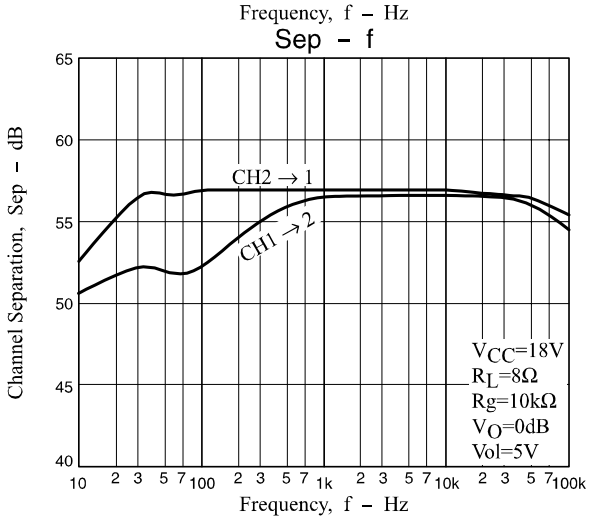

ATT – Vol
VCC=18V
f=1kHz
RL=8Ω
Rg=600Ω
VO=0dB(Vol=5V)
DIN AUDIO
Volume Attenation, ATT – dB
Volume Voltage, Vol – V


VNO – Vol
VCC=18V
RL=8Ω
Rg=0Ω
DIN AUDIO
Noise Voltage, VNO – mVrms
Volume Voltage, Vol – V

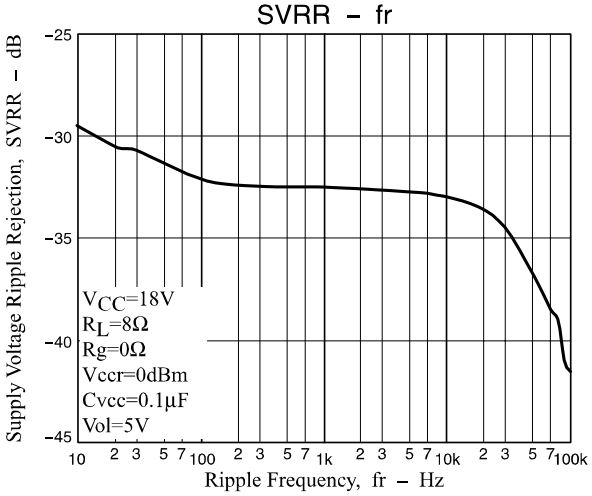

VNO – Rg
VCC=18V
RL=8Ω
DIN AUDIO
Vol=5V
0V
Noise Voltage, VNO – mVrms
Resistance for Signal Generation, Rg – Ω


THD – f
VCC=18V
RL=8Ω
Rg=600Ω
PO=1W
Vol=5V
Total Harmonic Distortion, THD – %
Frequency, f – Hz

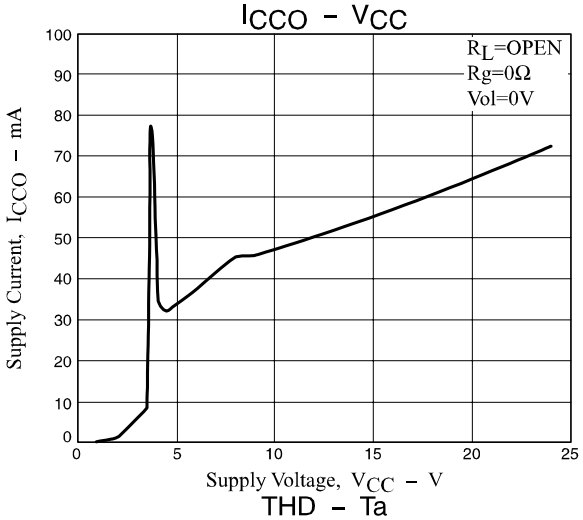

Response – f
VCC=18V
RL=8Ω
Rg=600Ω
VO=0dB(1kHz)
Vol=5V
Response – dB
Frequency, f – Hz


Sep – f
CH2 → 1
CH1 → 2
VCC=18V
RL=8Ω
Rg=10kΩ
VO=0dB
Vol=5V
Channel Separation, Sep – dB
Frequency, f – Hz

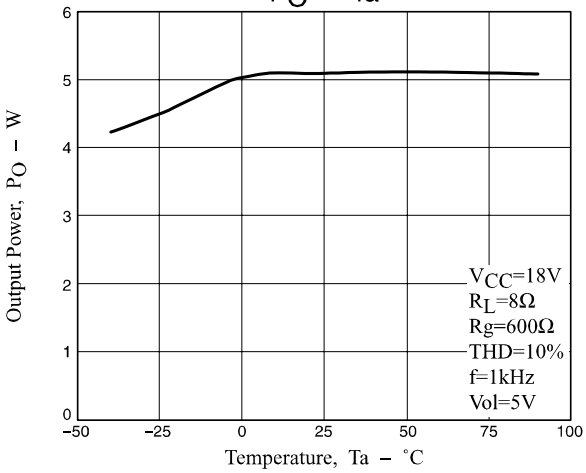
SVRR – fr



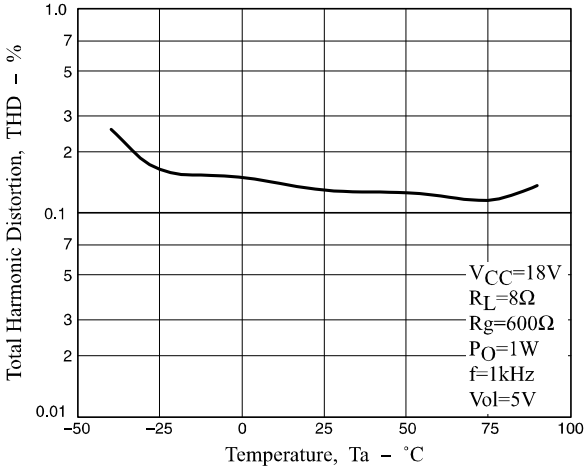
ICCO – VCC



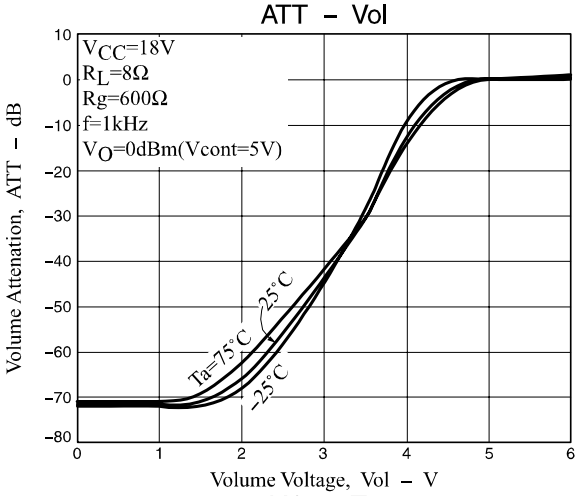
PO – Ta



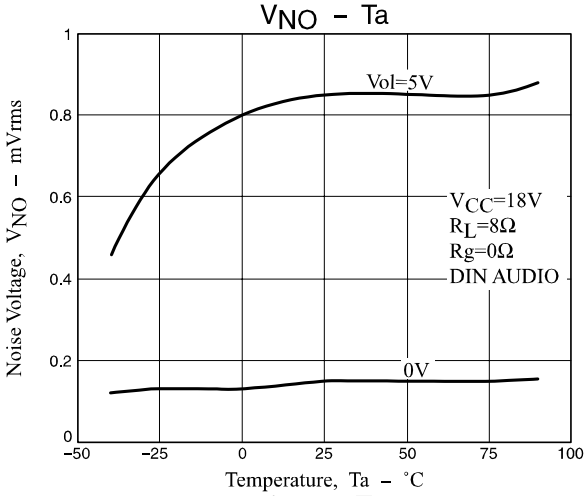
THD – Ta



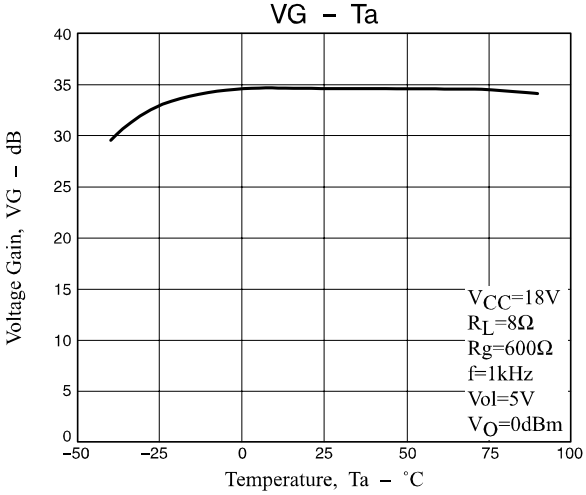
ATT – Vol



VNO – Ta



VG – Ta



Sep – Ta