

# HA13128, HA13135

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## 22 W Dual BTL Audio Power Amplifier

The HA13128/HA13135 provide high output power 22 W with 10 % THD at  $V_{CC} = 14.4$  V,  $R_L = 4 \Omega$ , and built-in 2ch BTL amplifiers, stand-by circuit and 4 type protectors.

HA13128/HA13135 are pin to pin with HA13127/130, 17 W output power.

### Features

- Small pop noise
- Less external component counts
- Smaller size package and easy to mount (16 pins)
- Built-in 4 type protectors (Surge protector, TSD, output to GND short protect, output to  $V_{CC}$  short protect)
- Built-in stand-by (Mute) circuit

### Ordering Information

Type No.	Voltage gain	Package
HA13128	50 dB	16 pin SIP with heat sink
HA13135	40 dB	

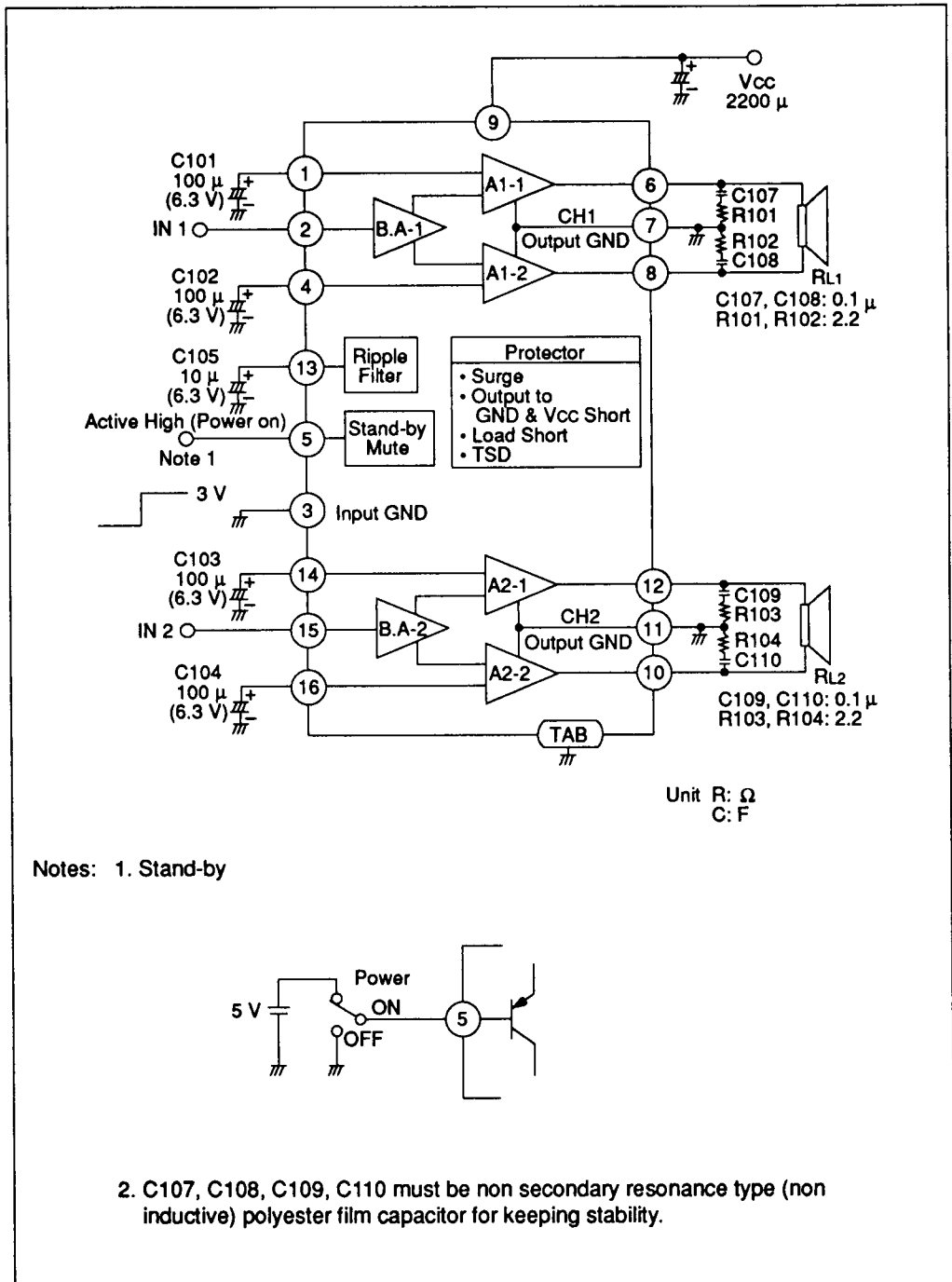


Figure 1 Block Diagram



**Absolute Maximum Ratings (Ta = 25 °C)**

Item	Symbol	Rating	Unit	Notes
Operating supply voltage	Vcc	18	V	
DC supply voltage	Vcc (DC)	26	V	1
Peak supply voltage	Vcc (peak)	50	V	2
Output current	Io (peak)	4	A	3
Power dissipation	PT	25	W	
Thermal resistance	θj-c	3	°C/W	
Junction temperature	Tj	150	°C	
Operating temperature	Topr	-30 to +85	°C	
Storage temperature	Tstg	-55 to +125	°C	

- Notes: 1. Value at t ≤ 30 sec  
 2. Value at surge pulse width ≤ 200 ms (rise time tr ≥ 1 ms)  
 3. Value at per channel

**Electrical Characteristics (Vcc = 13.2 V, f = 1 kHz, RL = 4 Ω)**

HA13128 (Gv = 50 dB) HA13135 (Gv = 40 dB)

Item	Symbol	HA13128 (Gv = 50 dB)			HA13135 (Gv = 40 dB)			Unit	Test Condition
		Min	Typ	Max	Min	Typ	Max		
Quiescent current	Iq1	60	150	250	60	150	250	mA	Vin=0 V
Input bias voltage	Vb	—	20	40	—	20	40	mA	Vin=0 V
Output offset voltage	ΔVo	—	—	150	—	—	150	mV	Vin=0 V
Voltage gain	Gv	48.5	50	51.5	38.5	40	41.5	dB	
Difference of voltage gain	ΔGv	—	—	1.5	—	—	1.5	dB	
Output power (1)	Po1	14	18	—	14	18	—	W	THD=10 %, RL=4 Ω
Output power (2)	Po2	—	13	—	—	14	—	W	THD=1 %, RL=4 Ω
Total harmonic distortion	THD	—	0.15	0.7	—	0.04	0.15	%	Po=3 W 1 kHz
		—	0.18	—	—	0.15	—		Po=1.5 W 20 kHz

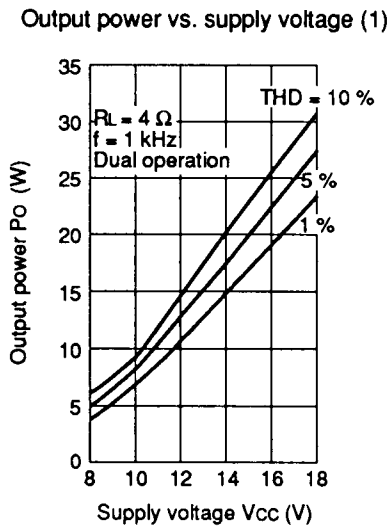
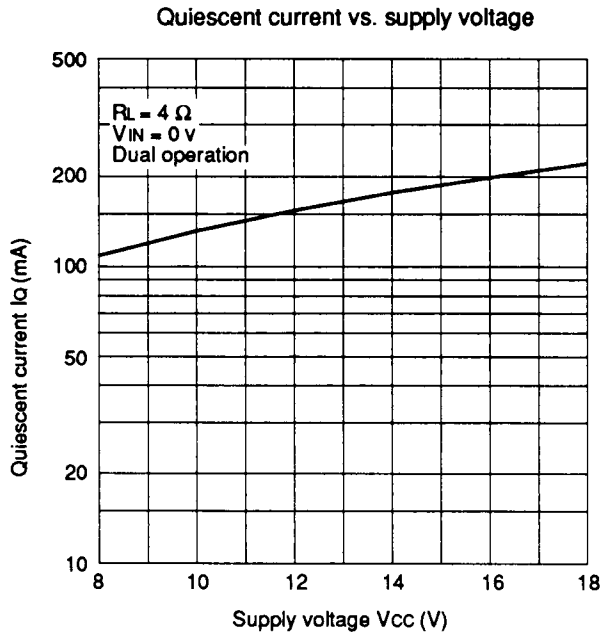


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## Electrical Characteristics ( $V_{CC} = 13.2 \text{ V}$ , $f = 1 \text{ kHz}$ , $R_L = 4 \Omega$ ) (cont)

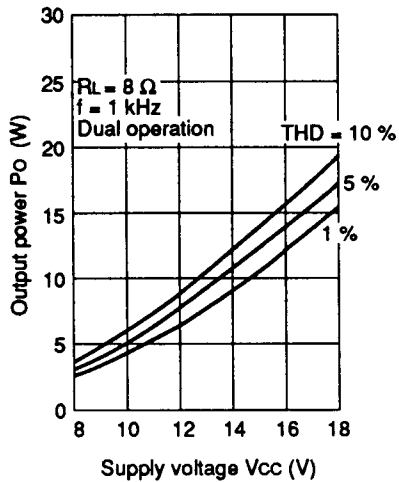
Noise Output	WBN <sub>1</sub>	—	1.0	2.0	—	0.35	0.7	mV	R <sub>g</sub> =10 kΩ, BW=20 Hz to 20 kHz
	WBN <sub>2</sub>	—	0.8	1.7	—	0.25	0.5	mV	R <sub>g</sub> =0, BW=20 Hz to 20 kHz
Supply voltage ripple rejections	SVR	32	40	—	45	60	—	dB	f=500 Hz
Roll-off frequency		—	20	—	—	10	—	Hz	ΔGv=-3 dB from f=1 kHz Low High
		10	20	40	30	70	140	kHz	
Stand-by (Mute) current	I <sub>cc</sub>	—	50	200	—	50	200	μA	V <sub>in</sub> =0, V <sub>⊕</sub> =1.0 V
Stand-by (Mute) threshold voltage	V <sub>TH</sub> (H)	5	—	V <sub>CC</sub> -1	5	—	V <sub>CC</sub> -1	V	V <sub>in</sub> =-40 dBm Output on Output off
	V <sub>TH</sub> (L)	0	—	1.0	0	—	1.0	V	
Mute attenuation	ATT	45	60	—	45	60	—	dB	V <sub>in</sub> =-55 dB V <sub>⊕</sub> =1.0 V
Input impedance	R <sub>in</sub>	20	30	40	20	30	40	kΩ	
Mute on time		—	10	—	—	10	—	μs	
Mute off time		—	0.8	—	—	0.8	—	sec	
V <sub>out</sub> rise time		—	0.8	—	—	0.8	—	sec	
Channel cross-talk	CT	40	50	—	45	60	—	dB	V <sub>out</sub> =0 dBm
Output power	P <sub>o</sub>	—	19	—	—	19	—	W	THD=10 % 1 channel operation
Output power (3)	P <sub>o3</sub>	—	22	—	—	22	—	W	V <sub>CC</sub> =14.4 V, THD=10 %, R <sub>L</sub> =4 Ω
Output power (4)	P <sub>o4</sub>	—	11	—	—	11	—	W	THD=10 %, R <sub>L</sub> =8 Ω
Output Power (5)	P <sub>o5</sub>	—	8	—	—	8	—	W	THD=1 %, R <sub>L</sub> =8 Ω





**Figure 2 HA13135 Characteristic Curves**

Output power vs. supply voltage (2)



Voltage gain vs. frequency

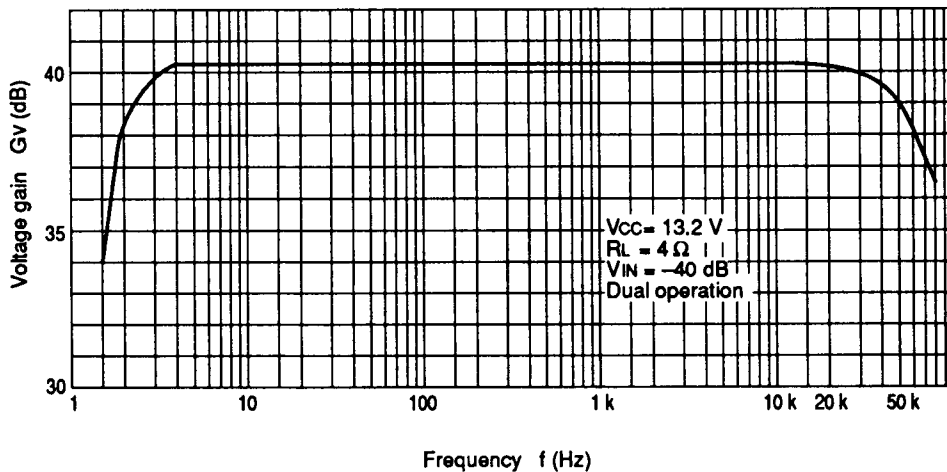
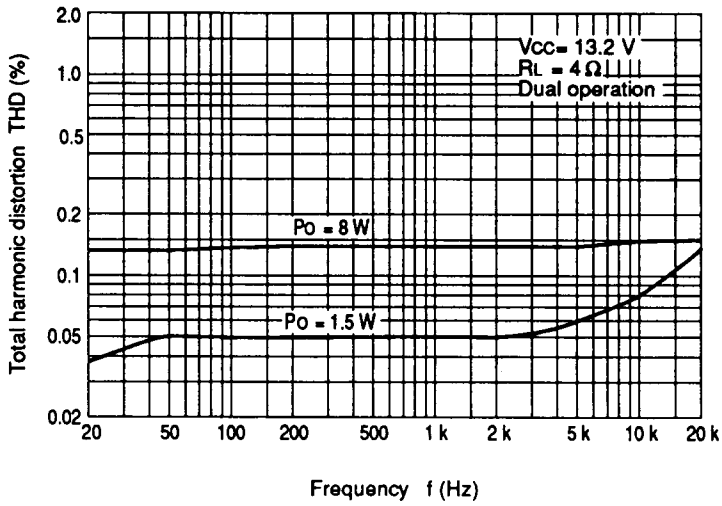


Figure 2 HA13135 Characteristic Curves (cont)



Total harmonic distortion vs. frequency



Total harmonic distortion vs. output power

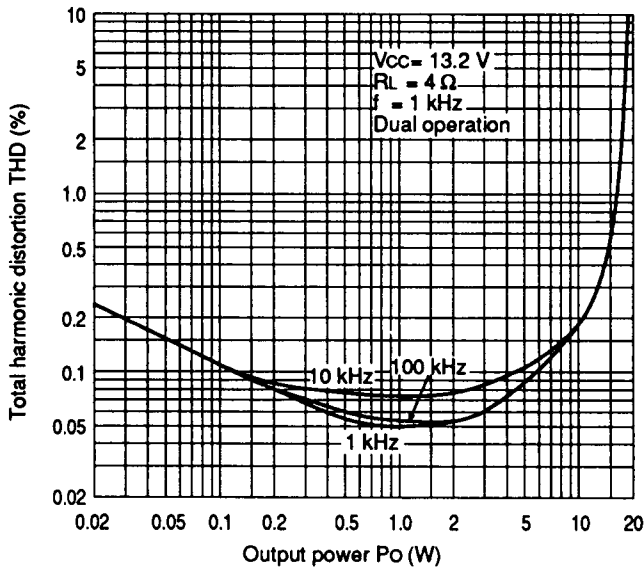
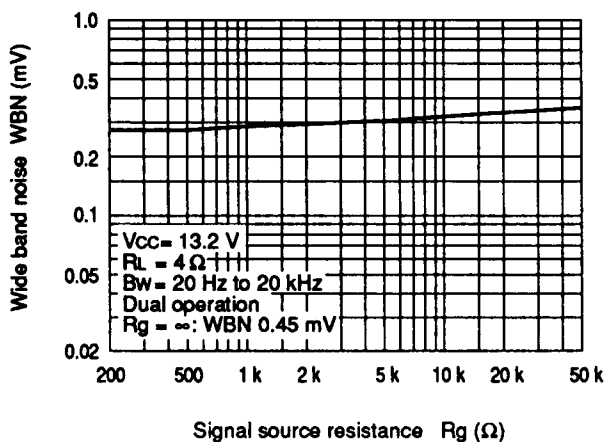


Figure 2 HA13135 Characteristic Curves (cont)



Wide band noise vs. signal source resistance



Supply voltage ripple rejection ratio vs. frequency

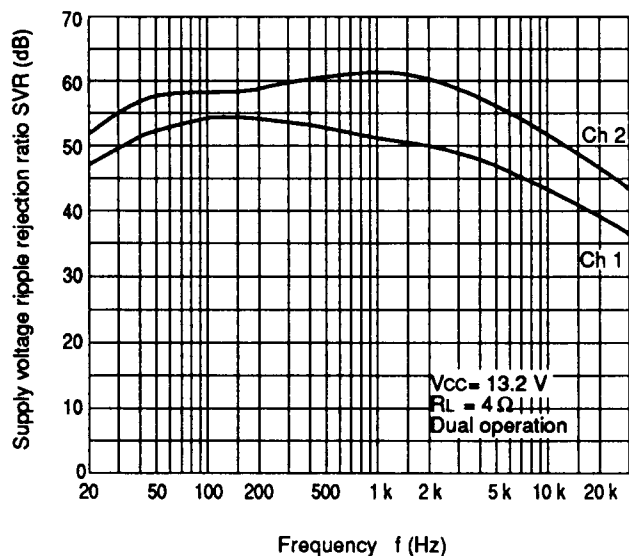
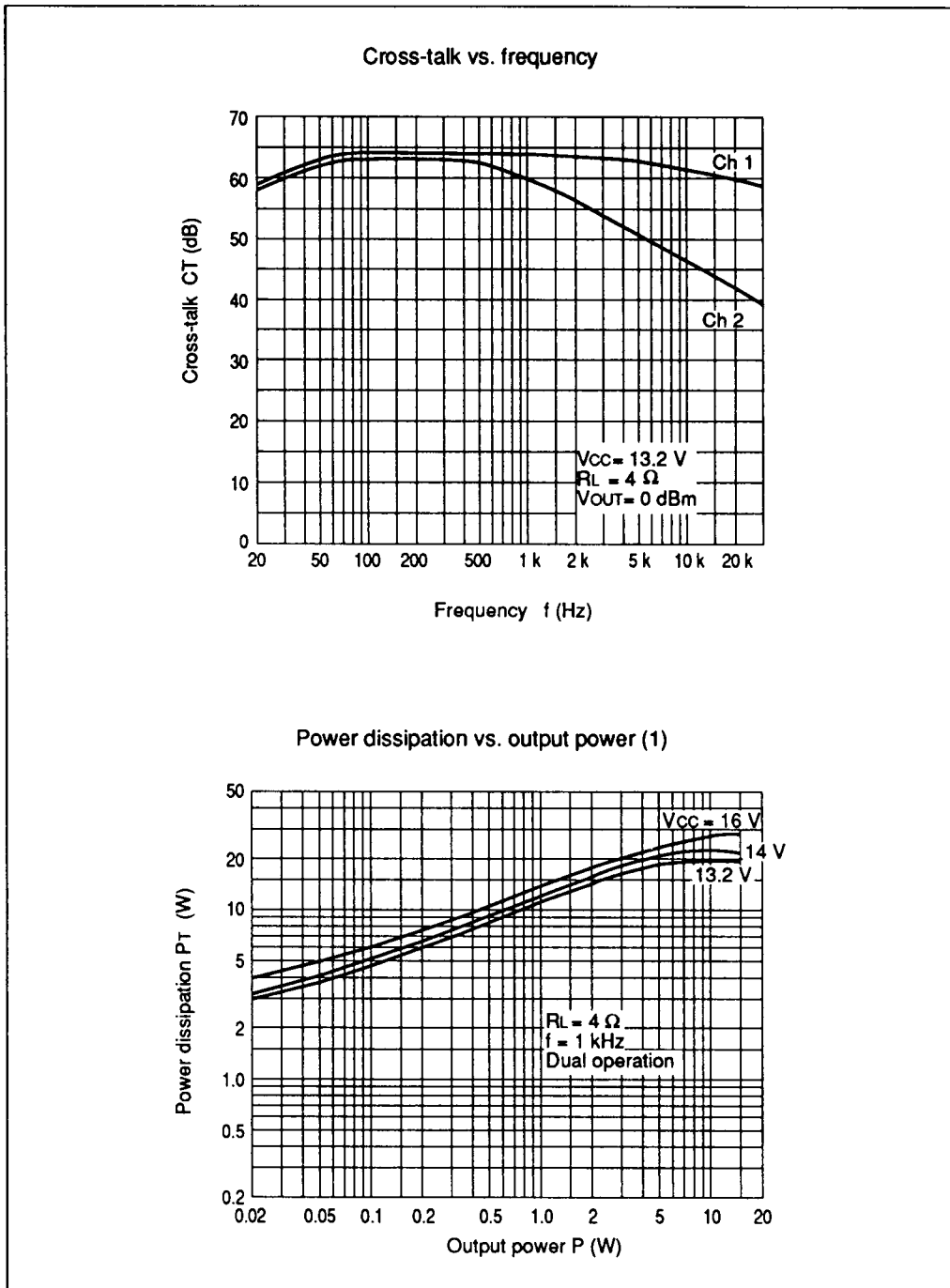


Figure 2 HA13135 Characteristic Curves (cont)







**Figure 2 HA13135 Characteristic Curves (cont)**



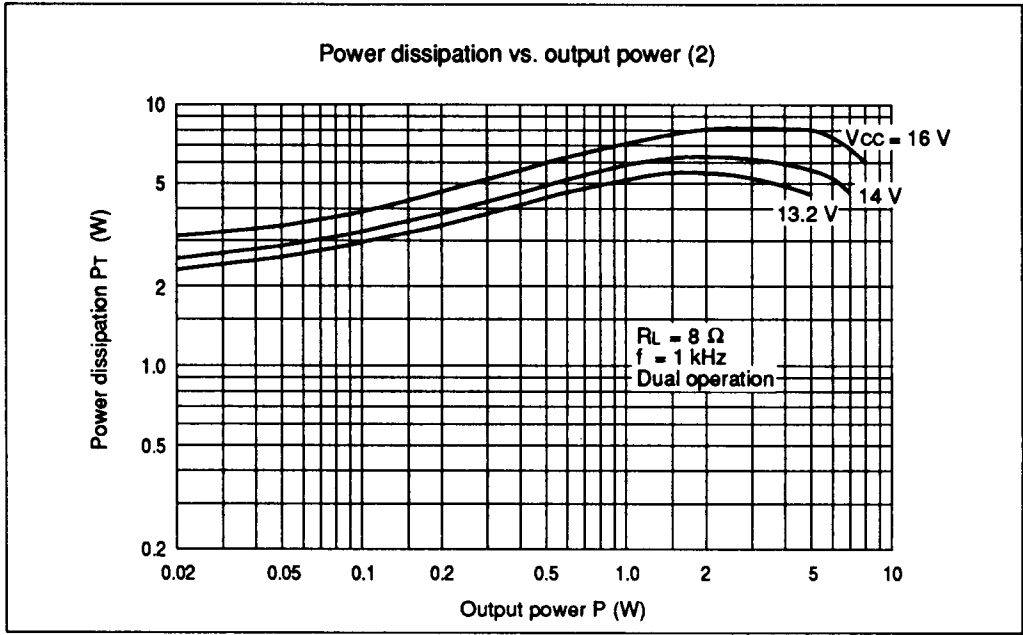


Figure 2 HA13135 Characteristic Curves (cont)

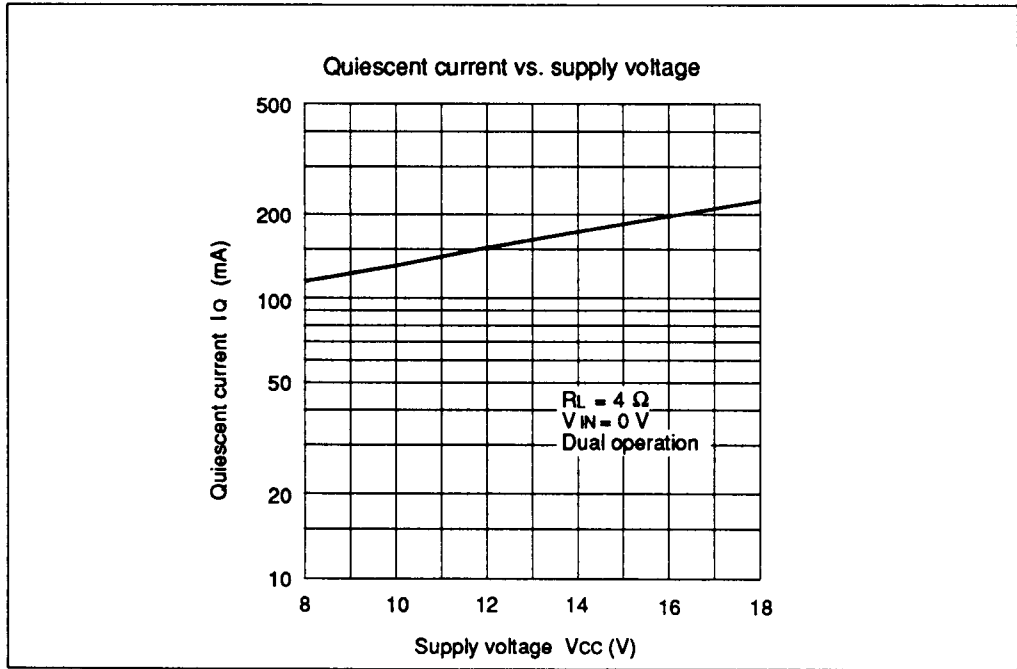


Figure 3 HA13128 Characteristic Curves



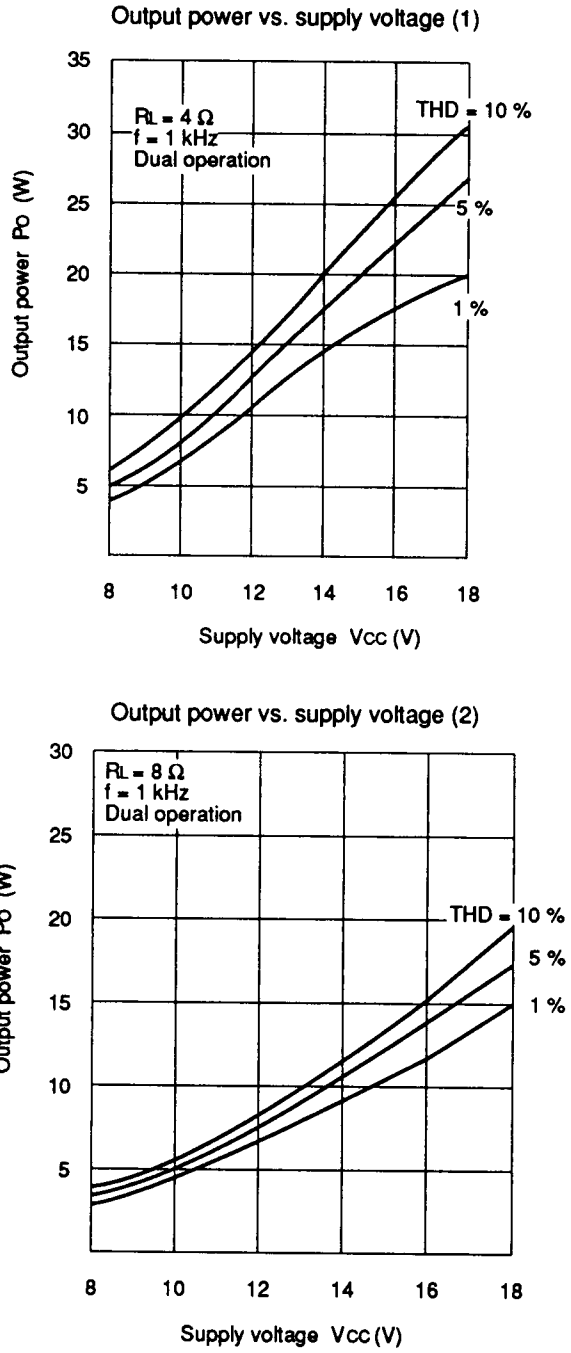
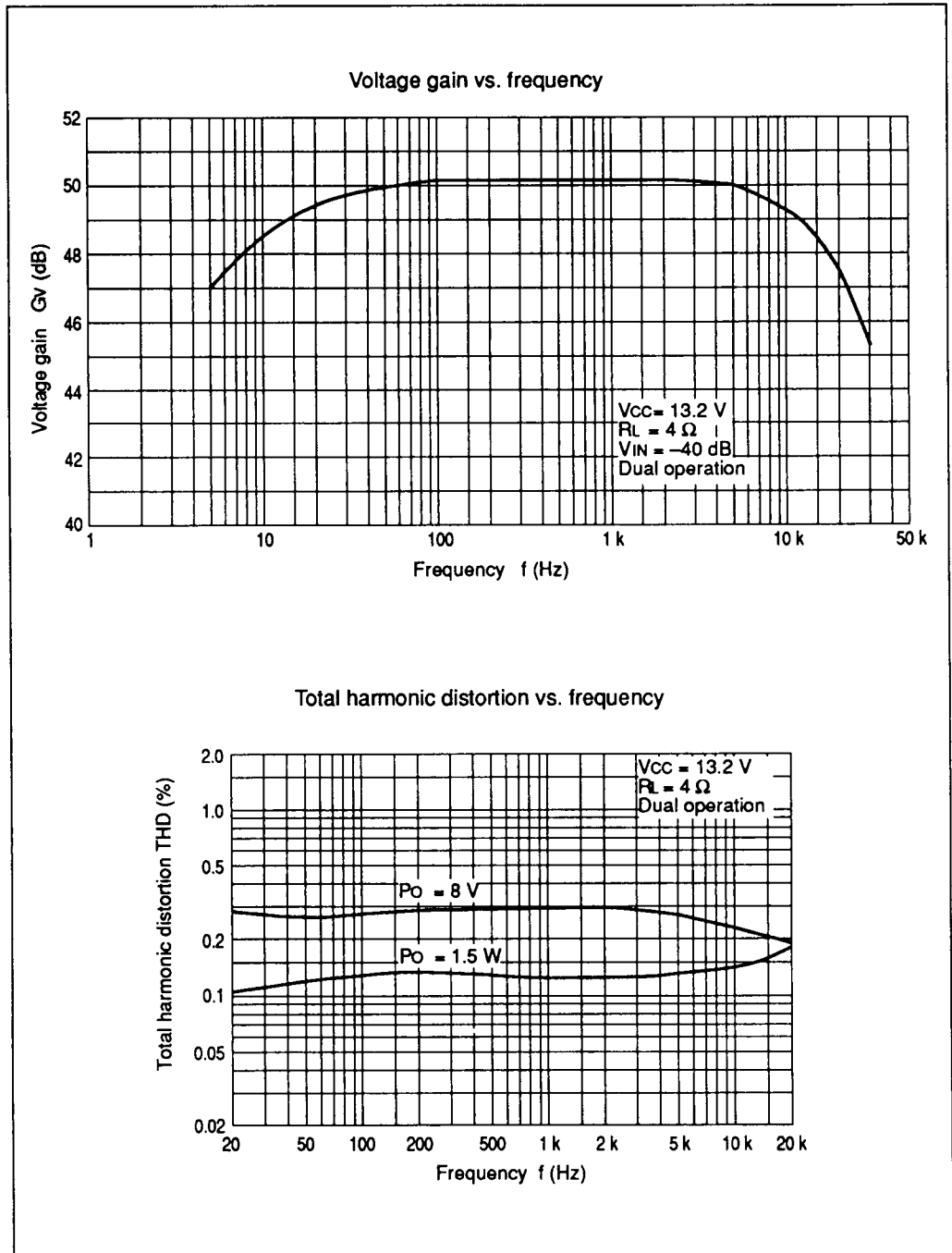
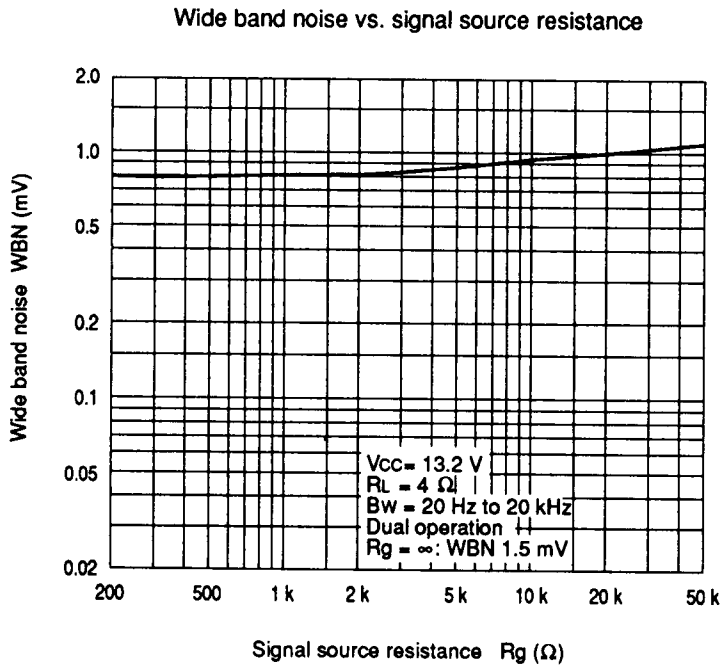
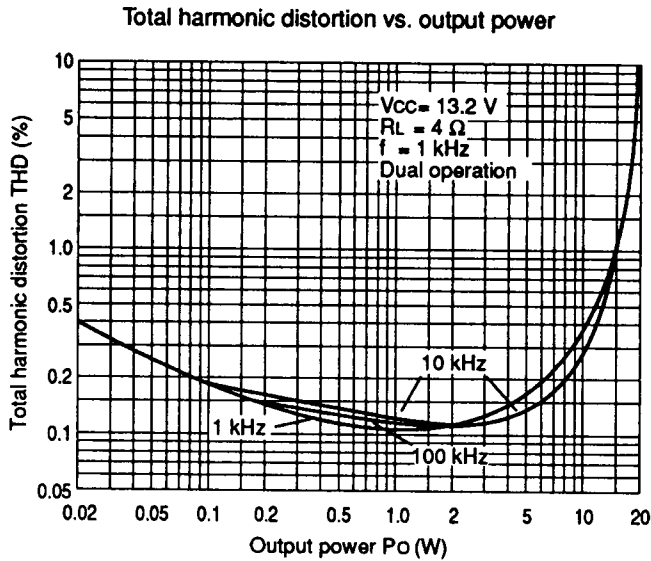


Figure 3 HA13128 Characteristic Curves (cont)







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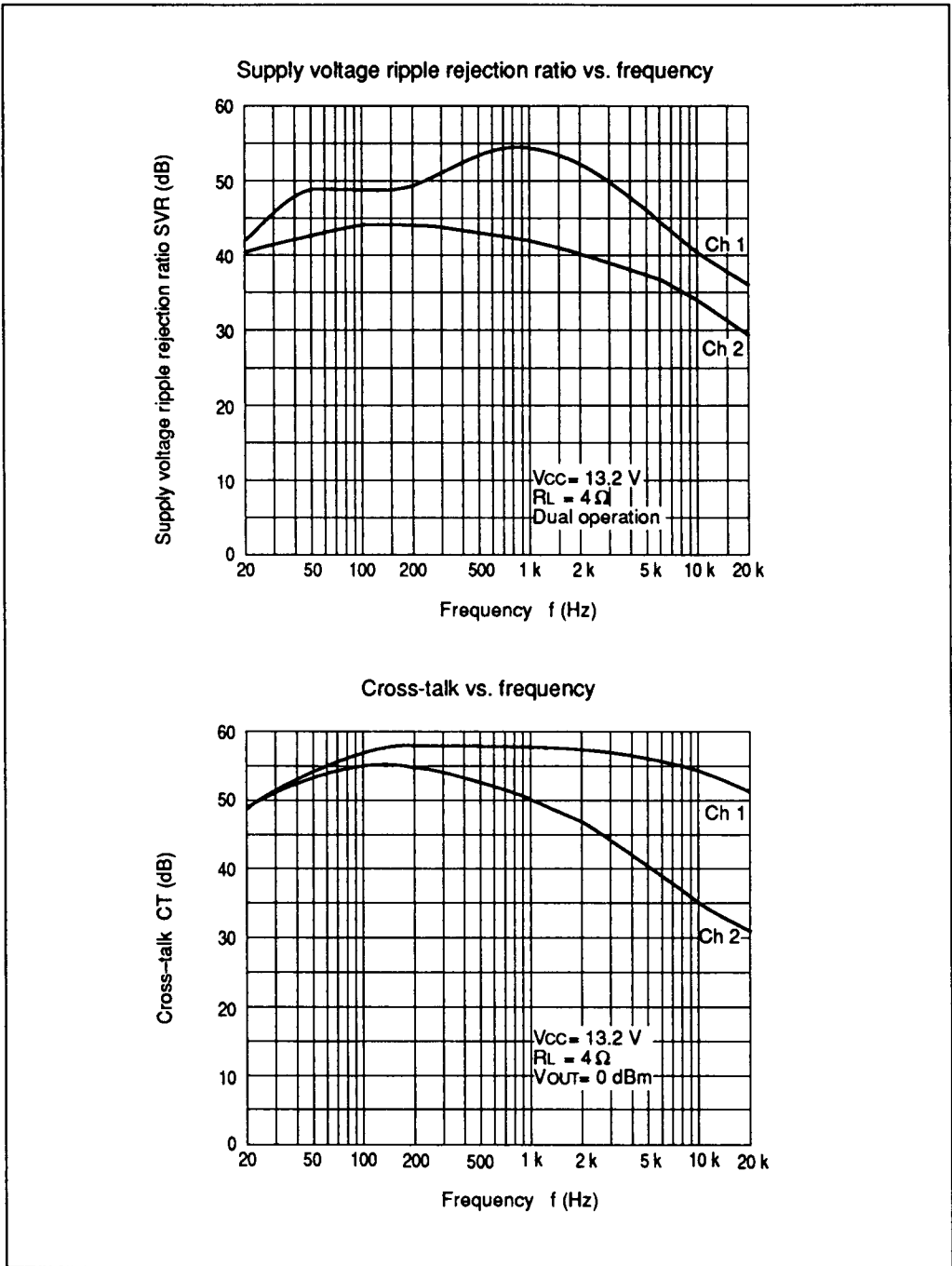


Figure 3 HA13128 Characteristic Curves (cont)



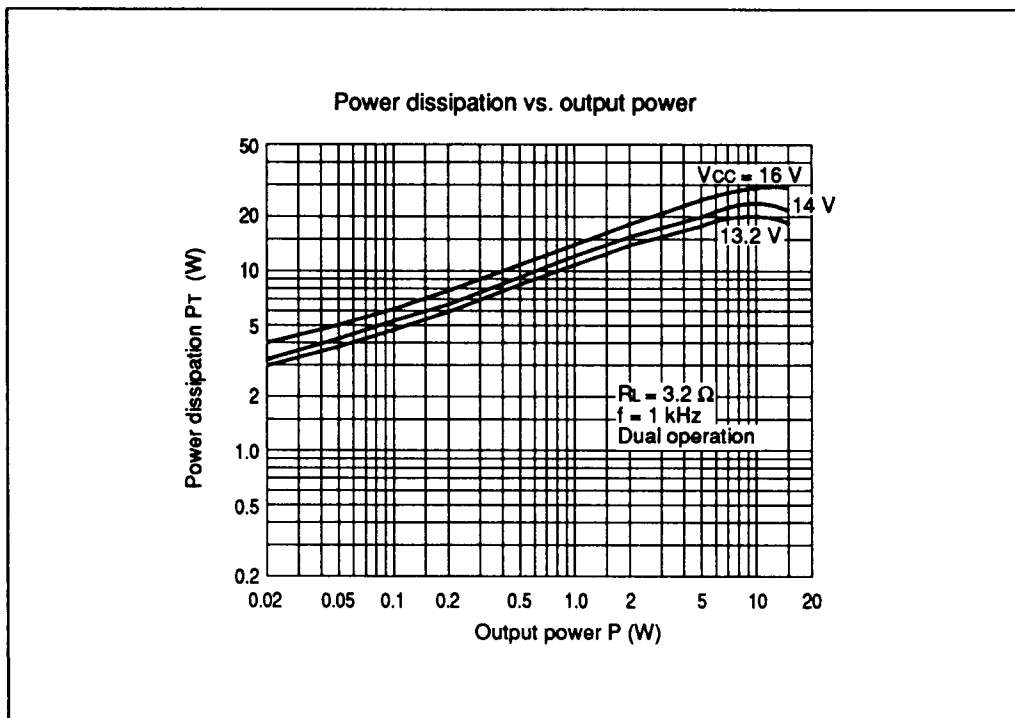


Figure 3 HA13128 Characteristic Curves (cont)

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