# HA13127, HA13130

## 17 W Dual BTL Audio Power Amplifier

The HA13127/HA13130 are high output and low distortion dual BTL power IC designed for car stereo amplifiers.

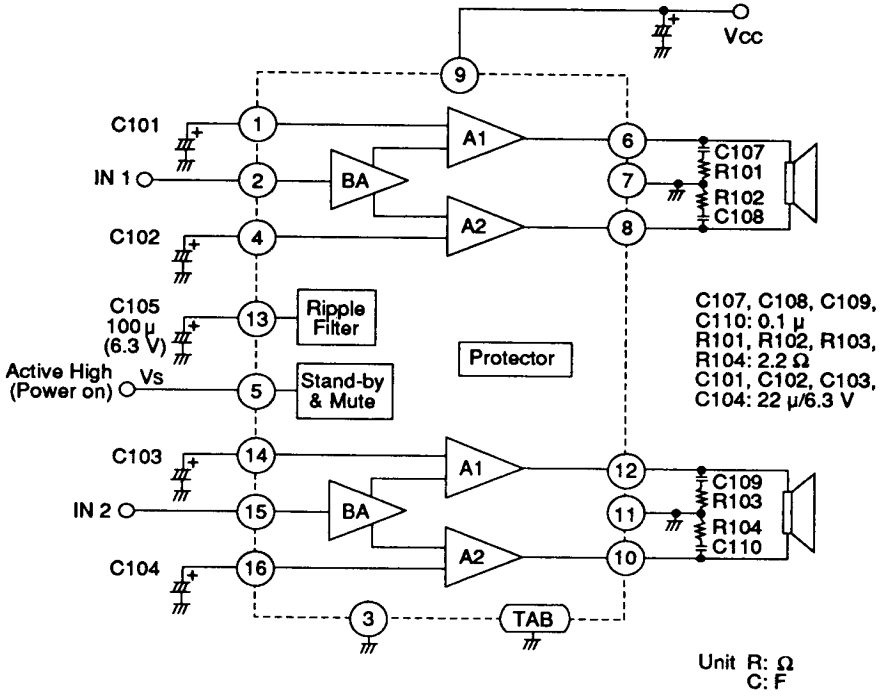
At 14.4 V to 4 Ω load, this power IC provides an output power 17 W with 10 % distortion.

### Features

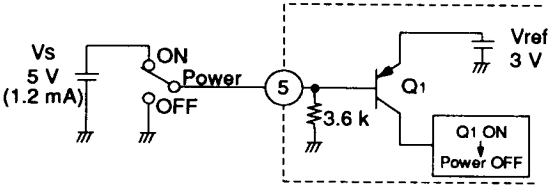
- Stand-by circuit included.
  Can be switched on & off easily by microcomputer.
- Output capacitors not required.
  These IC employ internal ASO protection circuit of high reliability current shutdown type, which can protect speaker.
- Surge protection circuit and thermal shutdown circuit are included.
  Thermal shutdown is high speed and hysteresis on & off type.
- Can be used without bootstrap capacitor.
- Low total harmonic distortion in wide frequency range
  THD = 0.05 % Typ (f = 50 Hz)
  THD = 0.05 % Typ (f = 1 kHz)
  THD = 0.07 % Typ (f = 10 kHz)
  THD = 0.1 % or less
  (Pout = 1.5 W, f = 20 Hz to 20 kHz)

### Ordering Information

| Type No. | Voltage gain | Package |
|---|---|---|
| HA13127 | 50 dB | 16 pin SIP with heat sink |
| HA13130 | 40 dB | |




Notes: 1. Stand-by
1) Stand by (pin 5) removed threshold value is 5 volt and 1.2 mA current.
2) Pin 5 opened is stand by on (no output).




2. Capacitor
C107, C108, C109, C110 must be non secondary resonance type (non inductive type) polyester film capacitor for keeping stability.

**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 | Per channel |
| Power dissipation | $P_T$ | 25 | 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 wave-form (rise time t ≥ 1 ms)

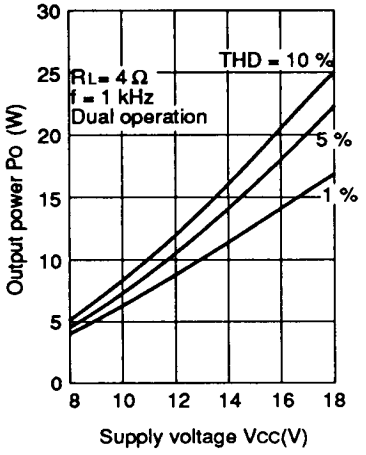
**Electrical Characteristics ($V_{CC}$ = 13.2 V, f = 1 kHz, $R_L$ = 4 Ω, dual operation, Ta = 25 °C)**

| | | HA13127 (Gv = 50 dB) | | | HA13130 (Gv = 40 dB) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Item | Symbol | Min | Typ | Max | Min | Typ | Max | Unit | Test Conditions |
| Quiescent current | $I_{Q1}$ | 60 | 150 | 250 | 60 | 150 | 250 | mA | Vin = 0 V |
| Input bias voltage | $V_B$ | — | 20 | 40 | — | 20 | 40 | mV | Vin = 0 V |
| Output offset voltage | $\Delta V_O$ | — | 0 | 150 | — | 0 | 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) | $P_{O1}$ | 10 | 14 | — | 10 | 14 | — | W | Vcc = 13.2 V<br>THD = 10 % |
| Output power (2) | $P_{O2}$ | — | 17 | — | — | 17 | — | W | Vcc = 14.4 V<br>THD = 10 % |
| Output power (3) | $P_{O3}$ | — | 6 | — | — | 11 | — | W | Vcc = 13.2 V<br>THD = 1 % |
| Total harmonic distortion | THD | — | 0.2 | 0.7 | — | 0.04 | 0.15 | % | Pout = 1.5 W |

**Electrical Characteristics** ($V_{CC}$ = 13.2 V, f = 1 kHz, $R_L$ = 4 Ω, dual operation, Ta = 25 °C) (cont)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Noise output (1) | $WBN_1$ | — | 1.0 | 2.0 | — | 0.35 | 0.7 | mV | $R_g$ = 10 kΩ<br>BW = 20 Hz to 20 kHz |
| Noise output (2) | $WBN_2$ | — | 0.8 | 1.7 | — | 0.25 | 0.5 | mV | $R_g$ = 0<br>BW = 20 Hz to 20 kHz |
| Supply voltage rejection ratio | SVR | 32 | 40 | — | 45 | 60 | — | dB | f = 500 Hz,<br>Vripple = 0 dBm |
| Low roll-off Frequency | $f_{L\alpha}$ | — | 20 | — | — | 10 | — | Hz | Δ Gv = −3 dB from |
| High roll-off frequency | $f_{R\ \alpha}$ | — | 20 | — | 30 | 70 | 140 | kHz | f = 1 kHz |
| Stand-by current | $I_{O2}$ | — | 50 | 200 | — | 50 | 200 | μA | V 5 Open |
| Stand-by | $V_{TH\ (H)}$ | 5 | — | Vcc−1 | 5 | — | Vcc−1 | V | Vin=50 dBm Output on |
| threshold voltage | $V_{TH\ (L)}$ | 0 | — | 1 | 0 | — | 1 | V | Output off |
| Stand-by (Mute) signal reduction level | ATT | 45 | 60 | — | 45 | 60 | — | dB | Vin = −50 dBm |
| Stand-by (Mute) on time | $t_F$ | — | 10 | — | — | 10 | — | μs | V1 = 3 V to Open<br>(Power on to off) |
| Stand-by (Mute) off time | $t_R$ | — | 0.2 | — | — | 0.2 | — | sec | V1 = Open to 3 V<br>(Power off to on) |
| Input impedance | Rin | 20 | 30 | 40 | 20 | 30 | 40 | kΩ | |
| Channel cross-talk | CT | — | 60 | — | 45 | 60 | — | dB | Vout = 0 dBm |
| Output power (4) | $P_{O4}$ | — | 10 | — | — | 10 | — | W | THD = 10 %<br>$R_L$ = 8 Ω |
| Output power (5) | $P_{O5}$ | — | 7 | — | — | 7 | — | W | THD = 1 %<br>$R_L$ = 8 Ω |

Output power vs. supply voltage (1)




Output power vs. supply voltage (2)

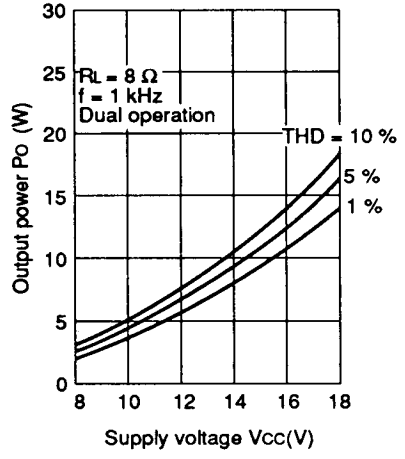
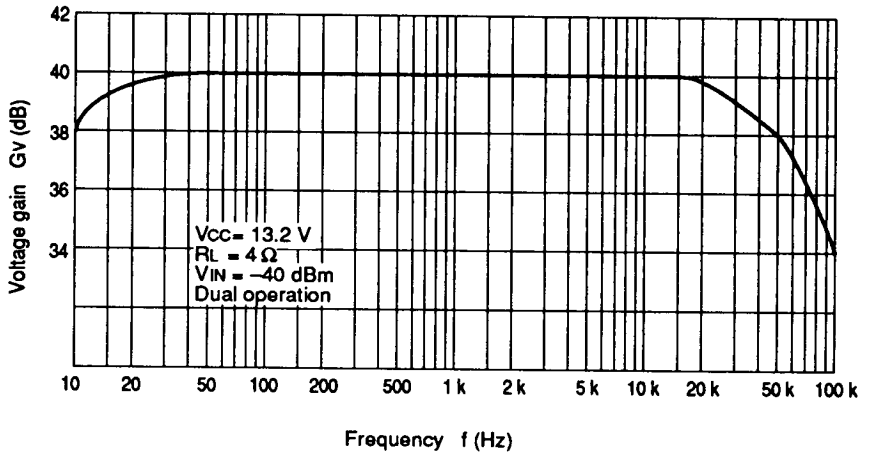



**Figure 2 HA13130 Characteristic Curves**

Voltage gain vs. frequency




Total harmonic distortion vs. frequency

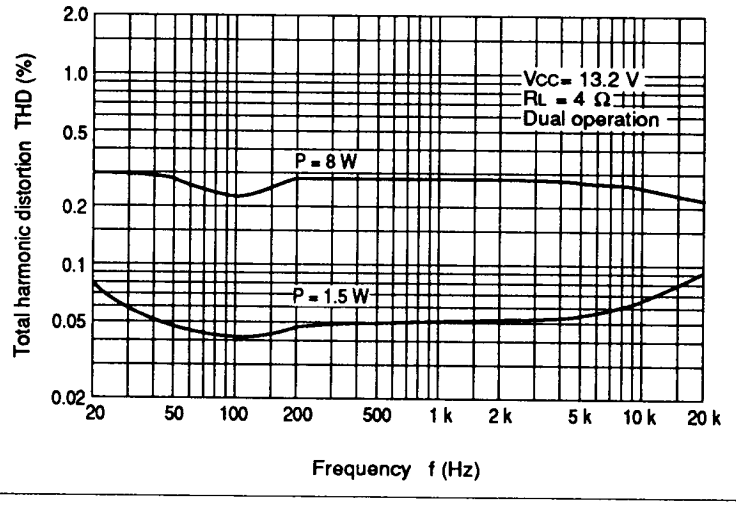
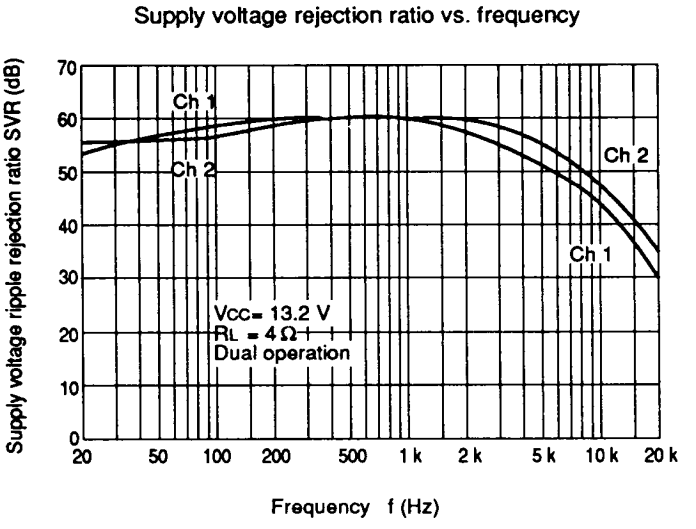



**Figure 2 HA13130 Characteristic Curves (cont)**



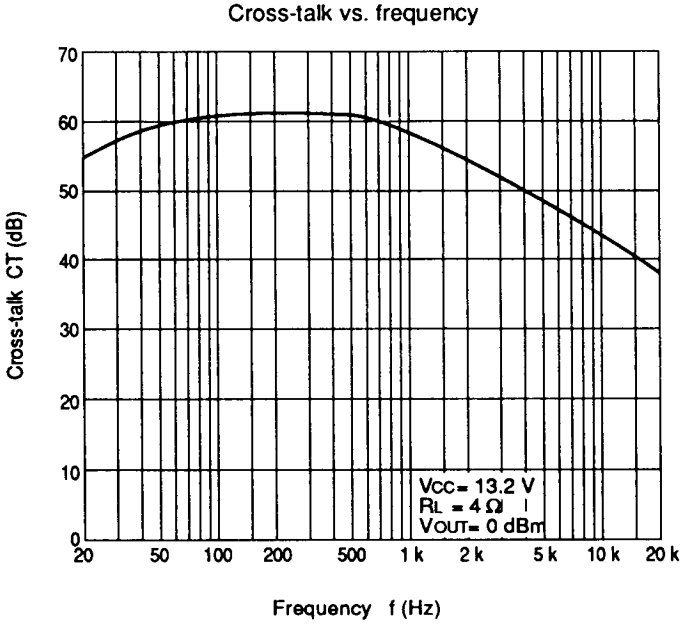
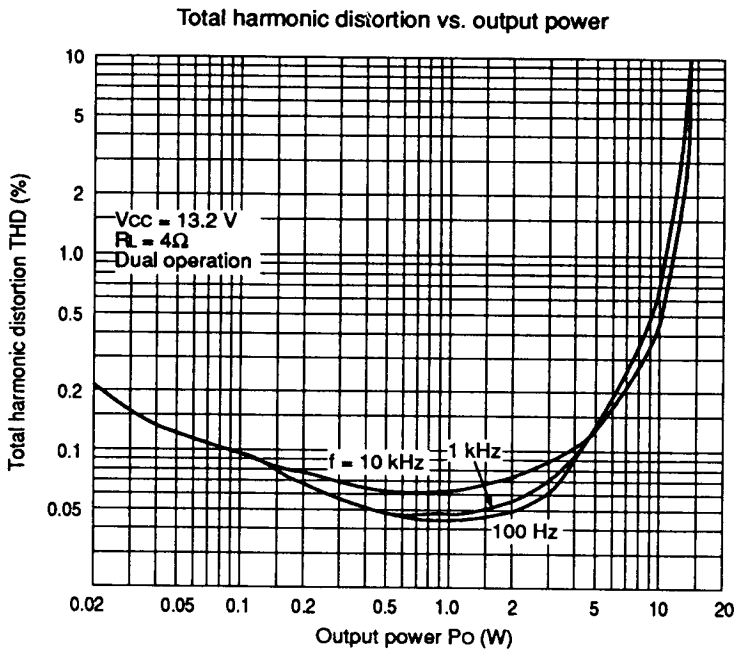




**Figure 2 HA13130 Characteristic Curves (cont)**



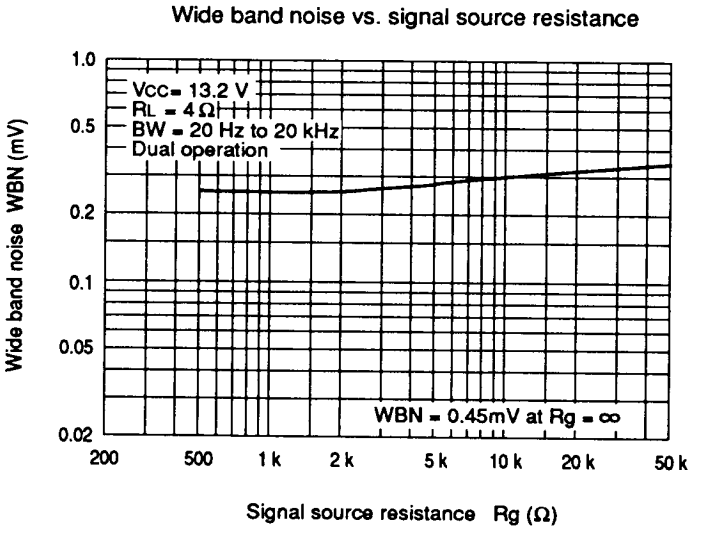




**Figure 2 HA13130 Characteristic Curves (cont)**

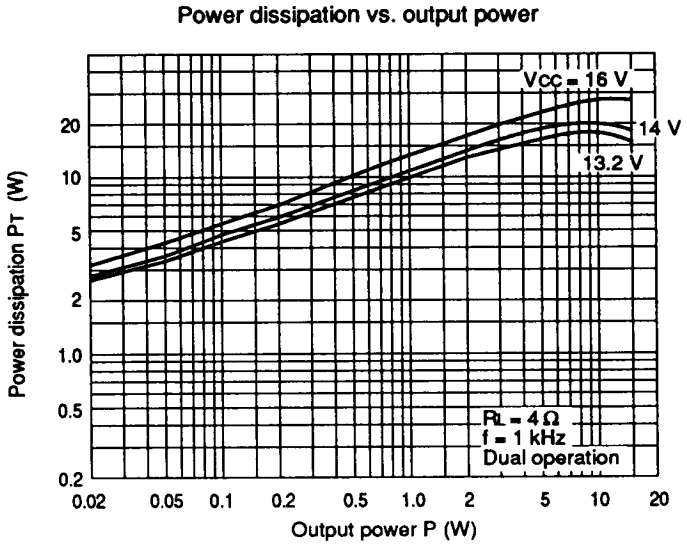
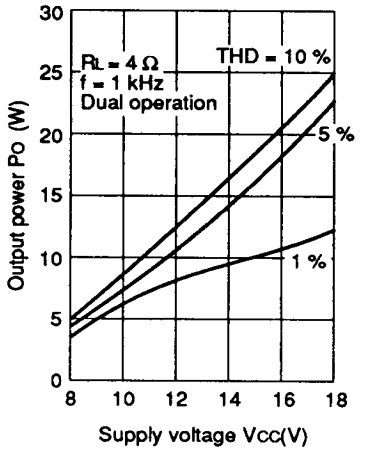



**Figure 2 HA13130 Characteristic Curves (cont)**

Power dissipation vs. output power (1)




Power dissipation vs. output power (2)

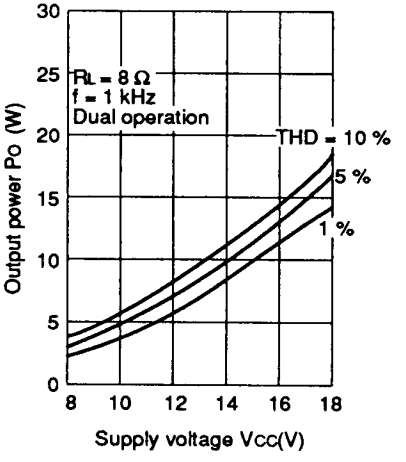
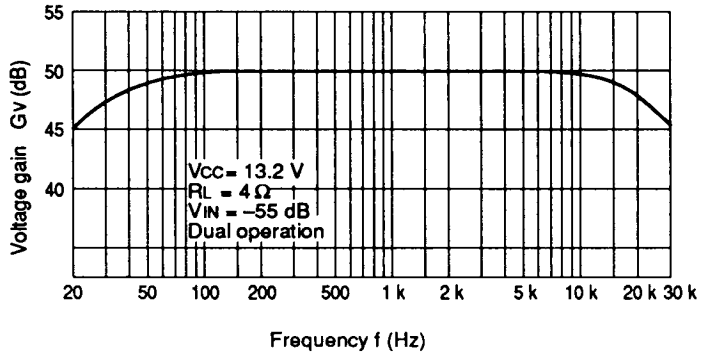



**Figure 3 HA13127 Characteristic Curves**

Voltage gain vs. frequency




Total harmonic distortion vs. frequency

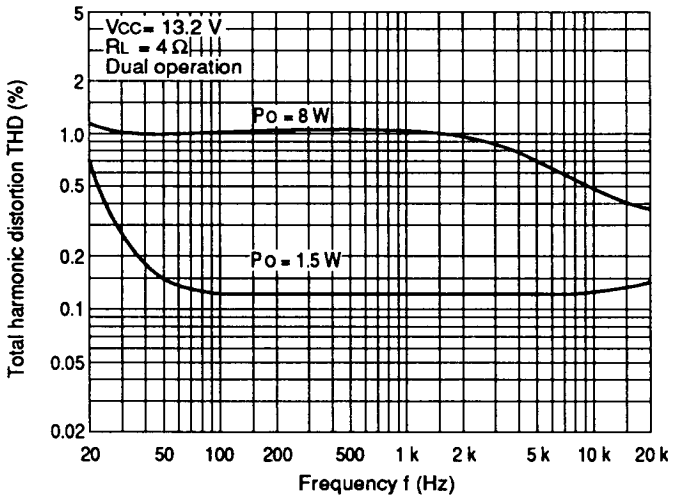



**Figure 3 HA13127 Characteristic Curves (cont)**

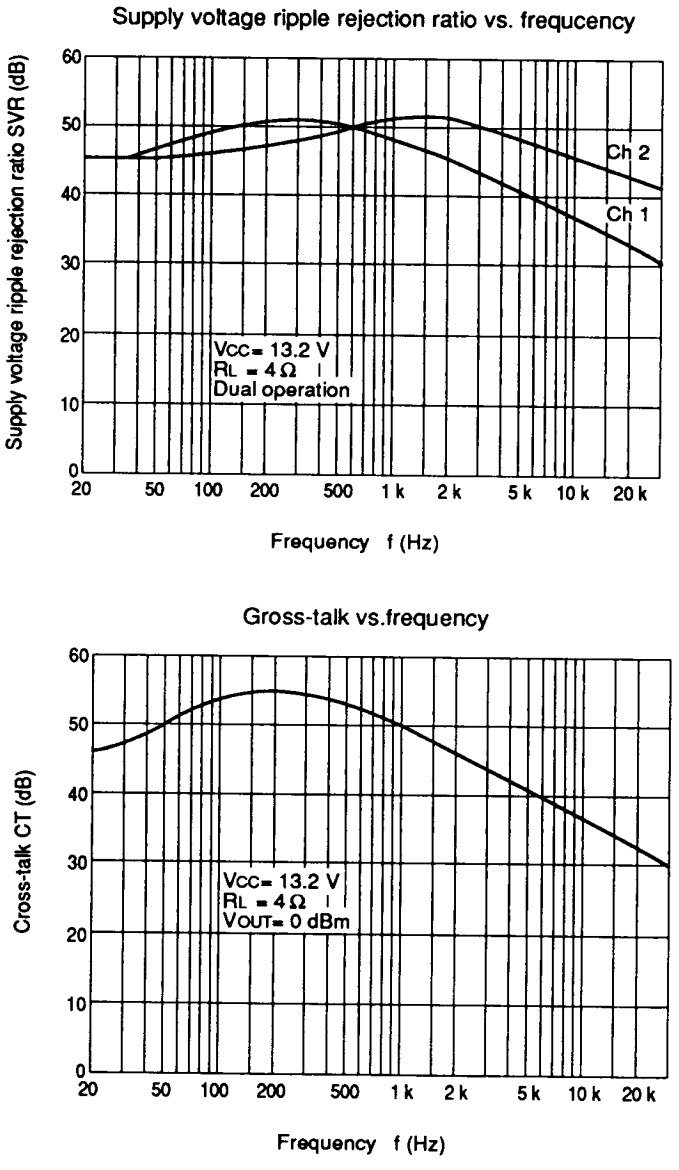
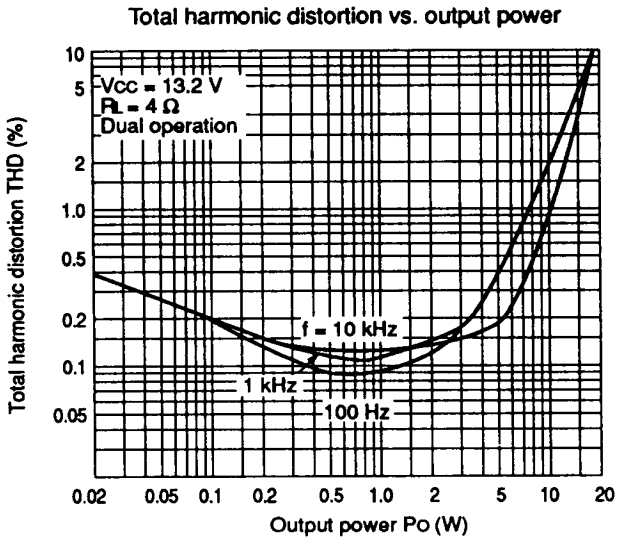



**Figure 3 HA13127 Characteristic Curves (cont)**



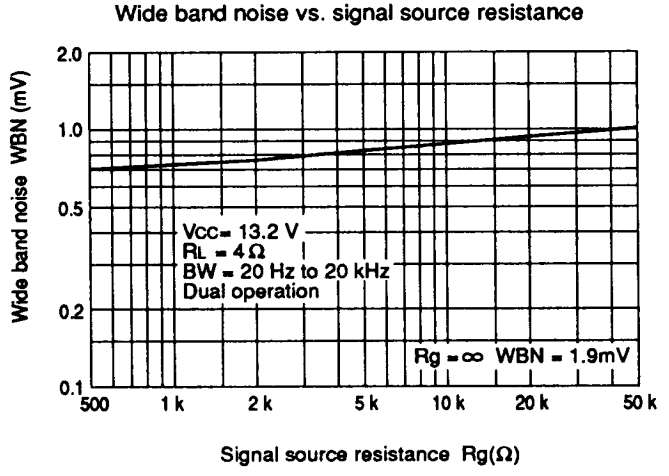




**Figure 3 HA13127 Characteristic Curves (cont)**