Ordering number : ENN8213

SANYO Semiconductors
DATA SHEET

Monolithic Linear IC

LA4810M — Stereo/Monaural BTL Power Amplifier

Overview

The LA4810M stereo/monaural BTL power amplifier is an IC that has been developed for portable radios and compact radio cassette players/recorders containing a preamplifier, a power amplifier, and an electronic volume control

Applications

- Audio equipment such as portable radios and compact radio cassette players/recorders

Functions & Features

- 2-channel stereo power amplifier
- Stereo/monaural BTL selector
- Electronic volume control
- Incorporates two channels of low-voltage (V_{CC}=1.8V or higher) drive power amplifiers
  EIAJ output power 1=125mW typical (V_{CC}=3V, R_L=8Ω)
  EIAJ output power 2=280mW typical (V_{CC}=4.5V, R_L=8Ω)
- Configurable as a monaural BTL power amplifier (selected at pin 2)
  EIAJ output power 3=350mW typical (V_{CC}=3V, R_L=8Ω)
  EIAJ output power 4=600mW typical (V_{CC}=4.5V, R_L=16Ω)
- Onchip electronic volume
- Onchip ripple filter

Specifications

Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		8	V
Allowable Power Dissipation	Pd max1	Ta≤60°C, when mounted on a PCB*	700	mW
Operating Temperature	Topr		-10 to +60	°C
Storage Temperature	Tstg		-40 to +150	°C

* Specified board: 114.3mm×76.1mm×1.6mm Board material: glass epoxy

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Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3.0	V
Allowable operating supply voltage range 1	$V_{CCOP}1$	R_L=8Ω	1.8 to 4.5	V
Allowable operating supply voltage range 2	$V_{CCOP}2$	R_L=16Ω	3.0 to 6.0	V

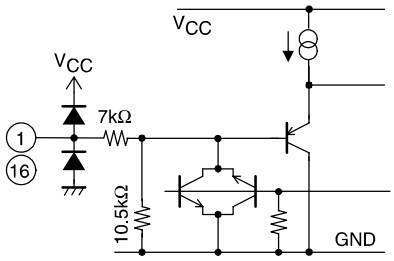
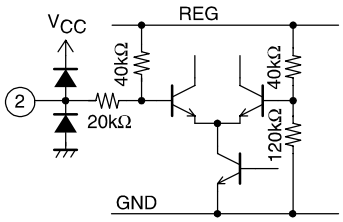
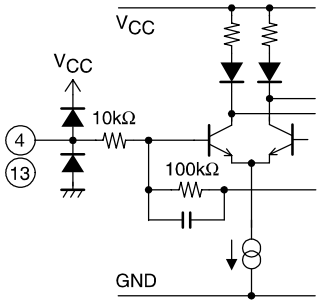
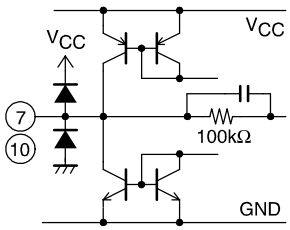
* Adequate consideration must be given to the allowable power dissipation when determining the supply voltage to be used.

Electrical Characteristics at Ta = 25°C, V_{CC}=3V, fin=1kHz, R_L=8Ω

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Quiescent current	I_{CCOP}	No signal is present.		5.5	11	mA
Voltage gain	GS	V_{IN}=–40dBm	31.3	34.3	37.3	dB
BTL voltage gain	GB	V_{IN}=–40dBm,BTL mode	36.3	40.3	44.3	dB
Channel balance	BCH		–3	0	3	dB
Output DC offset voltage difference	DCOS	BTL mode	–80	0	80	mV
Maximum output power1	POMX1	THD=10%	90	125		mW
Maximum output power2	POMX2	THD=10%,V_{CC}=4.5V	180	280		mW
Maximum output power3	POMX3	THD=10%,BTL mode	220	350		mW
Maximum output power4	POMX4	THD=10%,BTL mode, V_{CC}=4.5V,R_L=16Ω	400	600		mW
Total harmonic distortion	THDS	At V_{IN}=–20dBm, P_O=50mW		0.4	2.5	%
BTL total harmonic distortion	THDB	At V_{IN}=–20dBm, P_O=50mW, BTL mode		0.5	2.5	%
Output noise voltage	VNS	Rg=0Ω, f=20 to 20kHz		0.45	0.9	mVrms
BTL output noise voltage	VNB	Rg=0Ω, f=20 to 20kHz, BTL mode		0.6	1.2	mVrms
Channel separation	SCH	V_{IN}=–40dBm, 1kHz–BPF		–68	–58	dBm
Volume attenuation	V_{OL}	Attenuation at V_{IN}=–40dBm, V_{OL} at center position	3	7.5	14	dB

0dBm=1mW (R=600Ω)≈774.6mVrms

Pin Description

Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V_{CC}=3V	V_{CC}=4.5V	
1 16	IN2 IN1	 IL07036	0	0	Input pins
2	SW	 ILA07037	1.23	1.23	MONO/BTL Selector pin
3	NC				
4 13	NF2 NF1	 ILA07038	1.45	2.2	Power amplifier NF pins (Connect a NF capacitor across these pins.)
5 12	GND2 GND1		0	0	Preamplifier GND pins
6 11	PGND2 PGND1		0	0	Power amplifier GND pins
7 10	OUT2 OUT1	 ILA07039	1.45	2.2	Power amplifier output pins

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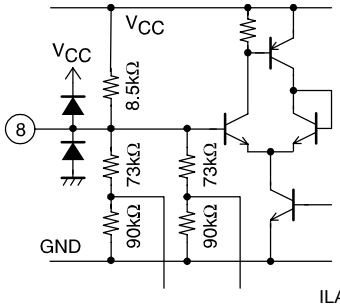
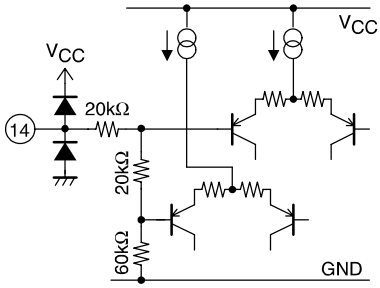
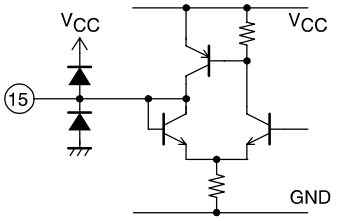
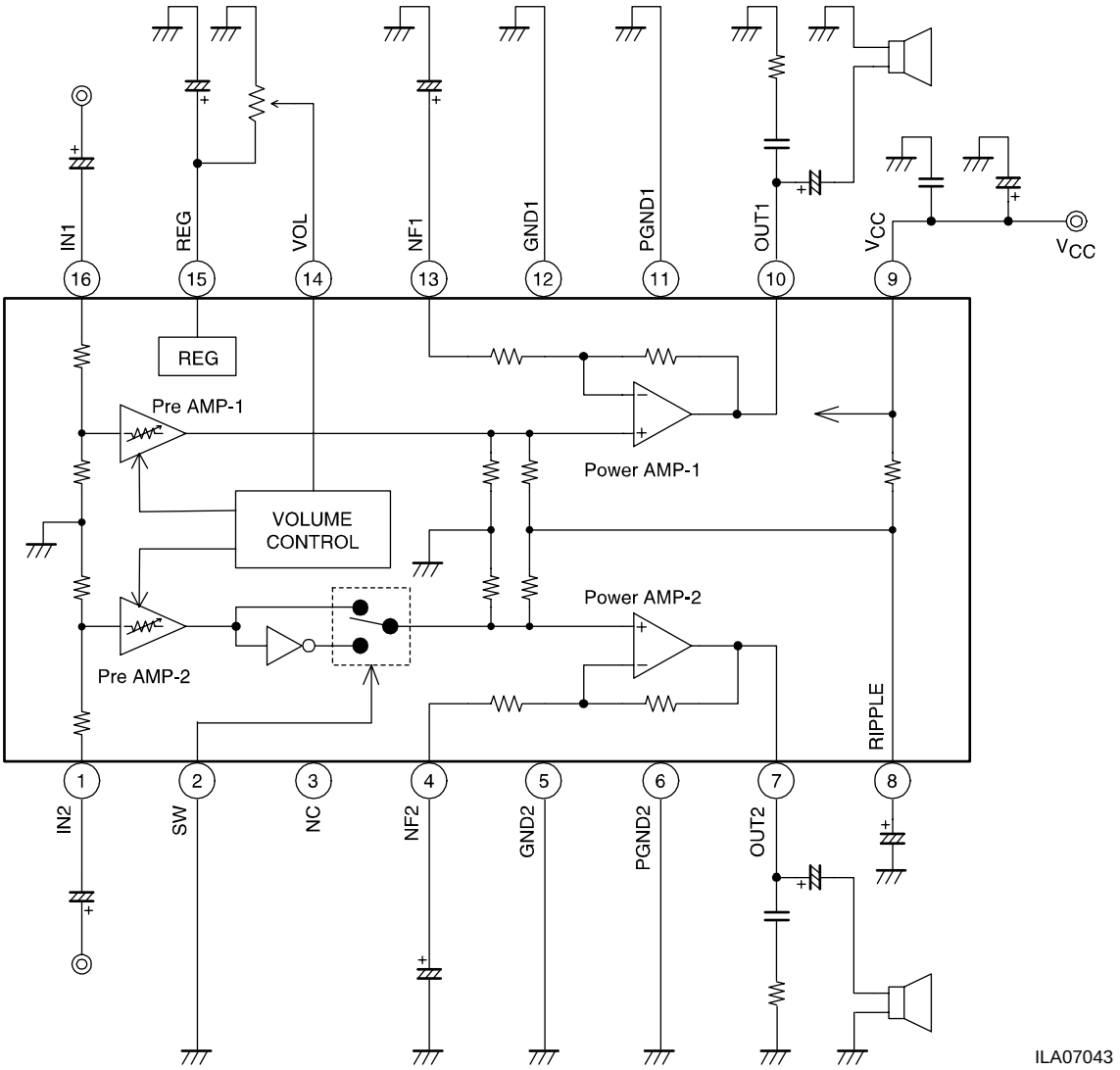
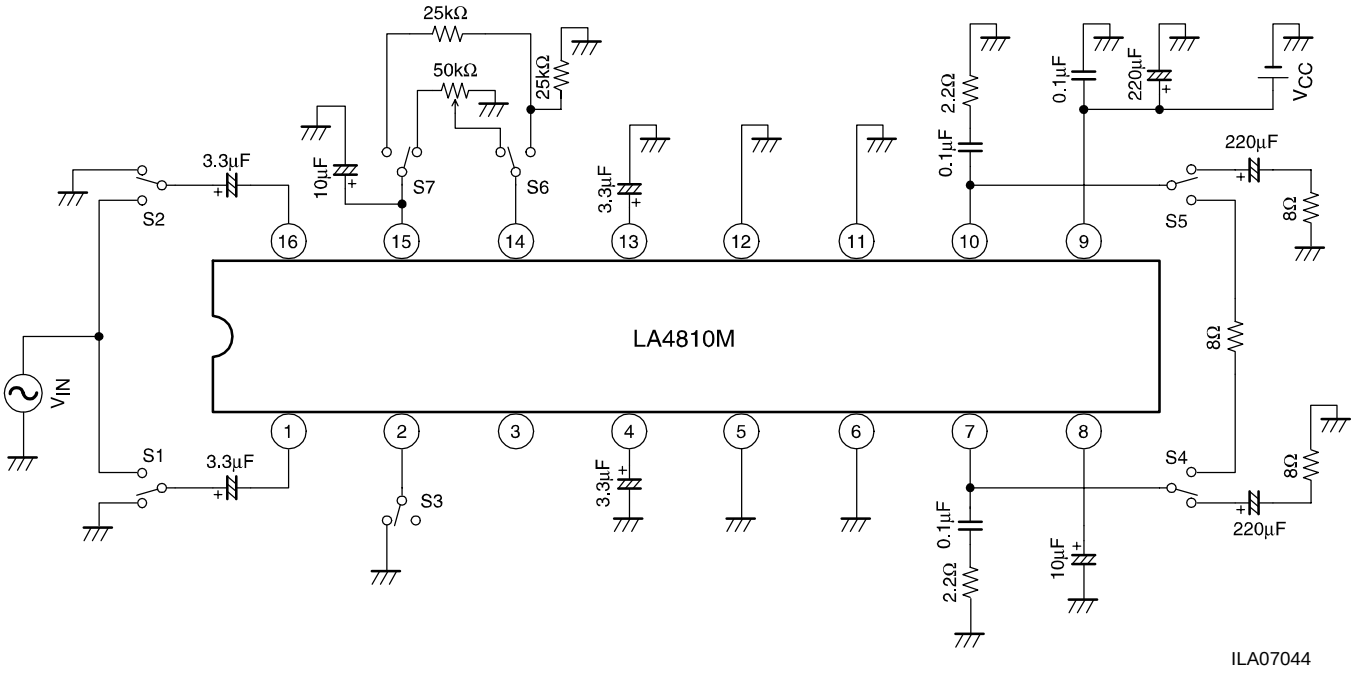
Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V_{CC}=3V	V_{CC}=4.5V	
8	RIPPLE	 ILA07040	2.71	4.07	Ripple filter pin (Connect a filter capacitor.)
9	V_{CC}		3	4.5	Power pin
14	V_{OL}	 ILA07041	0 to 1.23 (Apply)	0 to 1.23 (Apply)	Volume control pin
15	REG	 ILA07042	1.23	1.23	Internal regulator pin (Connect a stabilization capacitor.)

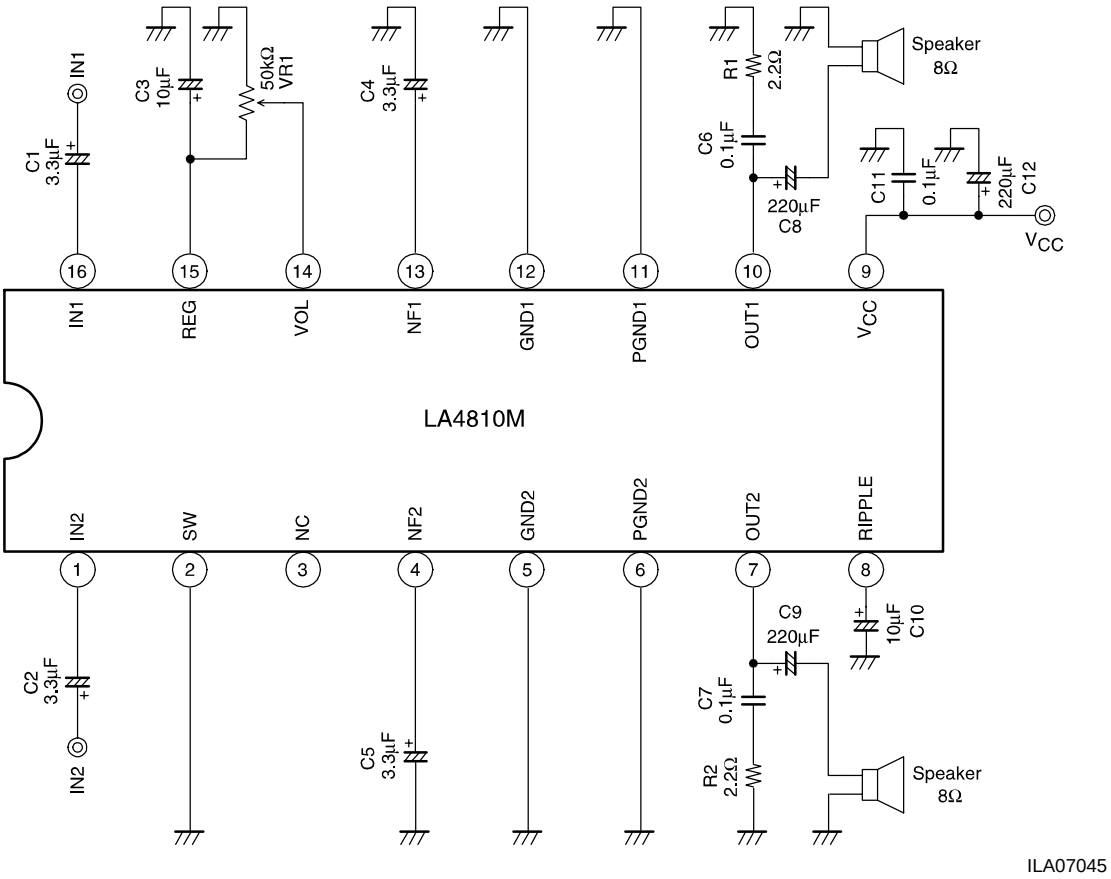
Block Diagram



Test Circuit Diagram

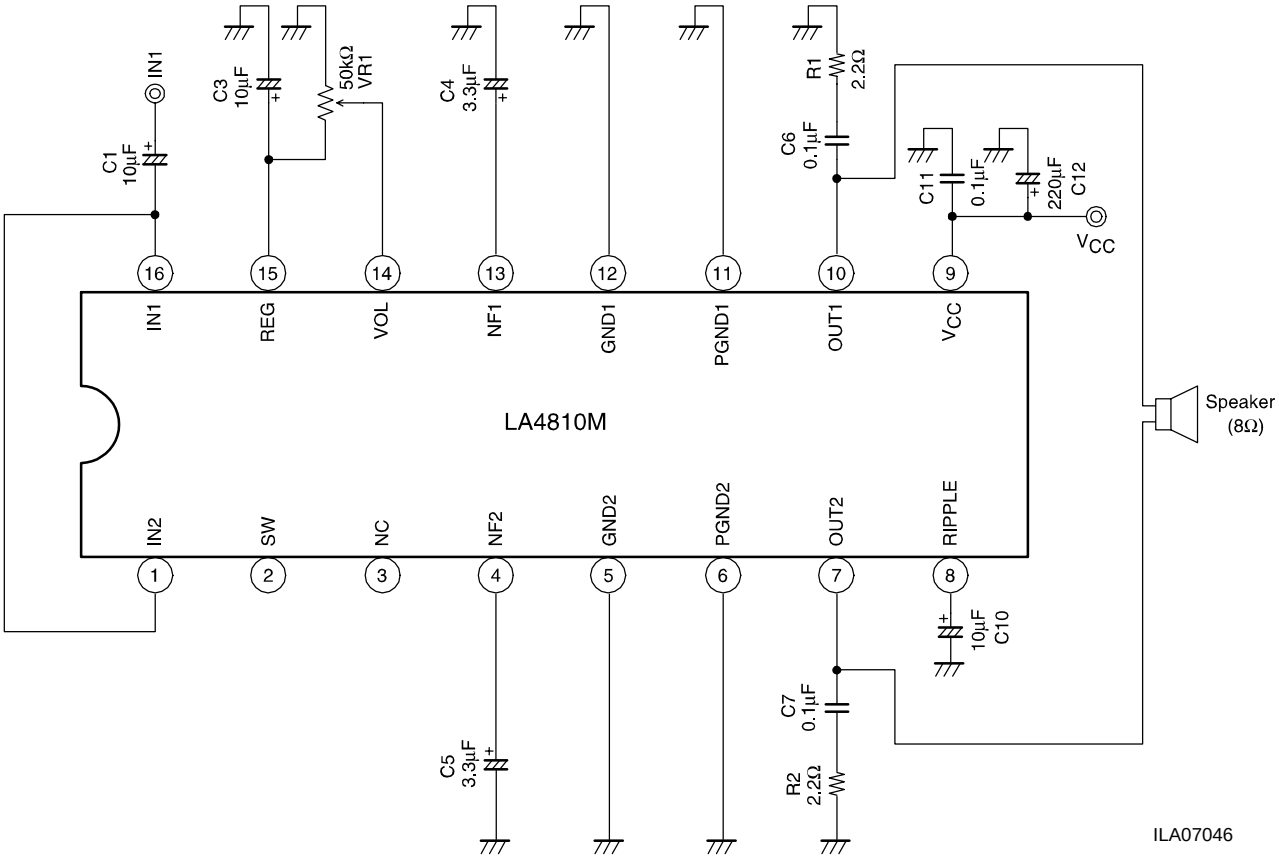


Application Circuit Example (Stereo Mode)



ILA07045

Application Circuit Example (BTL Mode)



ILA07046

Operating Precautions

1. Electronic volume control (pin 14)

The voltage gain of the variable gain preamplifier can be changed by controlling the dc voltage at pin 14 (max. gain is approx. 13.5 dB). Pin 14 must be connected to GND when the internal electronic volume control is not to be used. The recommended resistance of the external variable resistor is 20 kΩ or greater.

Maximum gain → V14=0V (GND)
Minimum gain → V14=1.25V (voltage at pin 15)

2. Stereo/BTL selector pin (pin 2)

The stereo and monaural BTL modes can be selected by controlling pin 2.

Stereo mode Pin 2 → Connect to GND (or 0.3V or below).
BTL mode Pin 2 → Keep open.

3. Phase compensation components (C6, R1, C7, and R2)

Note that the values of the phase compensation capacitors and resistors to be connected to the output pins (pins 7 and 10) vary depending on their print pattern.

C6, C7: 0.1 μF or greater
R1, R2: 1.5 to 4.7 Ω

4. Power supply bypass capacitor (C11)

The bypass capacitor C11 must be placed as close to the power pin (pin 9) as possible.

5. Ground of the power amplifier output stage

Pins 6 and 11 serve as GND pins for the power amplifier output stage. Their print pattern must be designed so that the pins are kept as low in impedance as possible.

6. Short-circuit across pins

Turning on the IC with some of its pins short-circuited may cause characteristic deterioration of or fatal damage to the IC. After installing the IC on a board and before turning on power, make sure that its pins are not short-circuited by solder or other foreign materials.

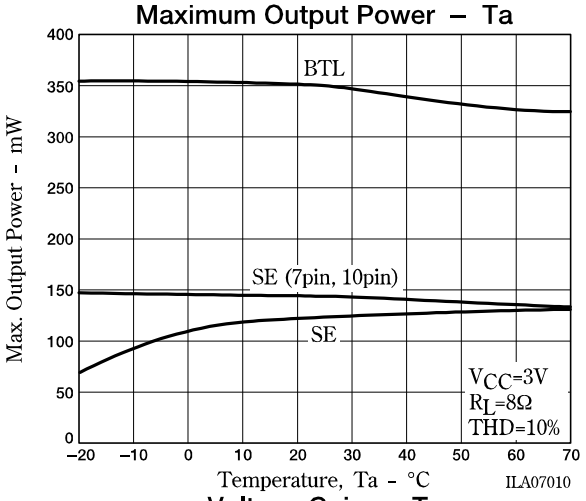
7. Short-circuit of the load

Keeping the IC with its load short-circuited for an extended period of time may cause characteristic deterioration of or fatal damage to the IC. Never short-circuit the load of the IC.

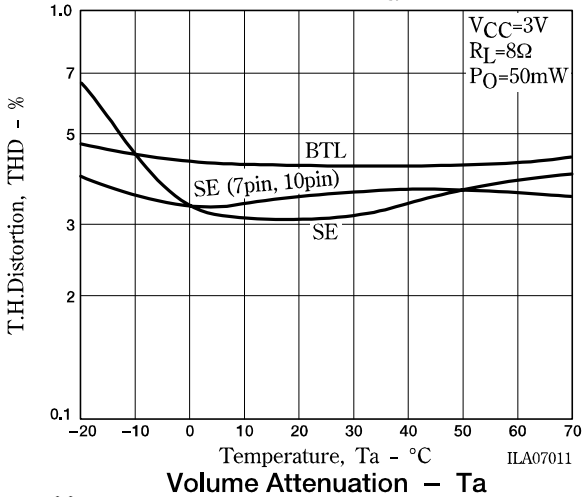
8. Maximum ratings

It is likely that the maximum ratings of the IC may be exceeded on a slight change in operating conditions if the IC is used at or near its ratings. Since such a condition may lead to a fatal failure accident, allow for adequate margins for fluctuations in supply voltage and to make sure that the IC is used within its maximum ratings range.

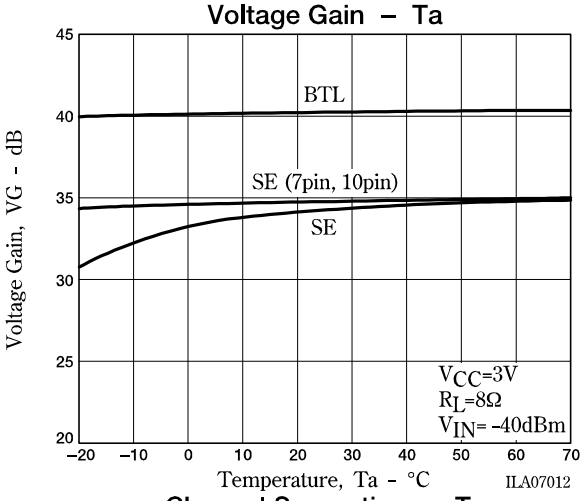
Maximum Output Power – Ta



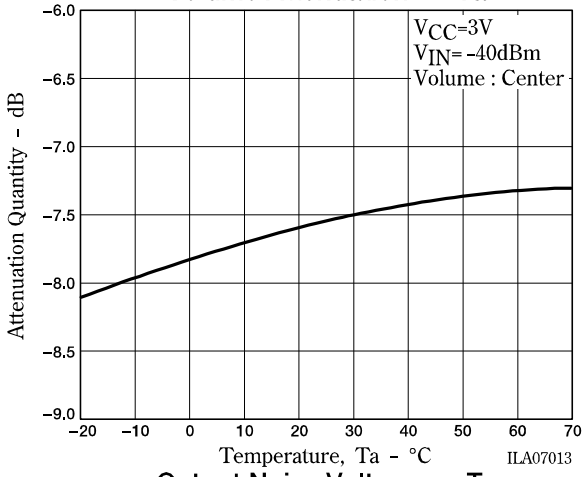
T.H.D – Ta



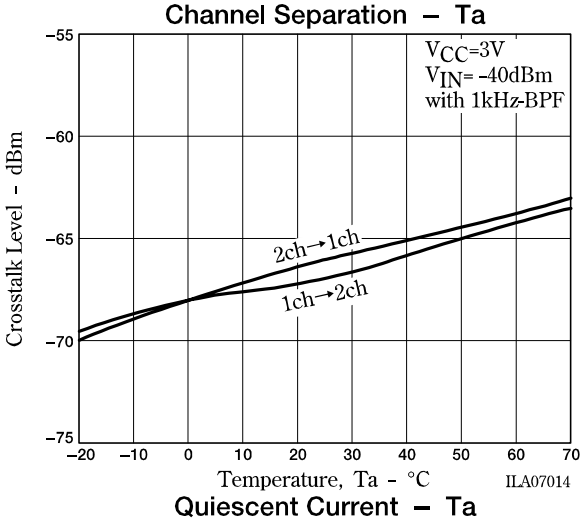
Voltage Gain – Ta



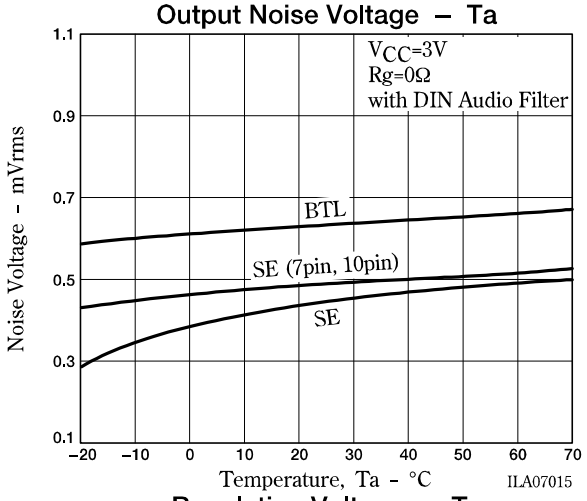
Volume Attenuation – Ta



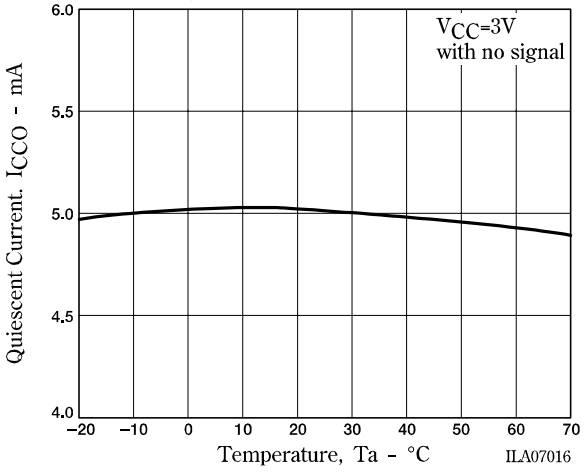
Channel Separation – Ta



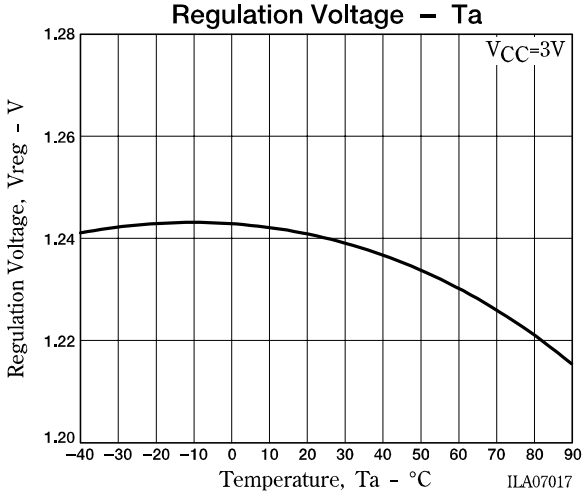
Output Noise Voltage – Ta



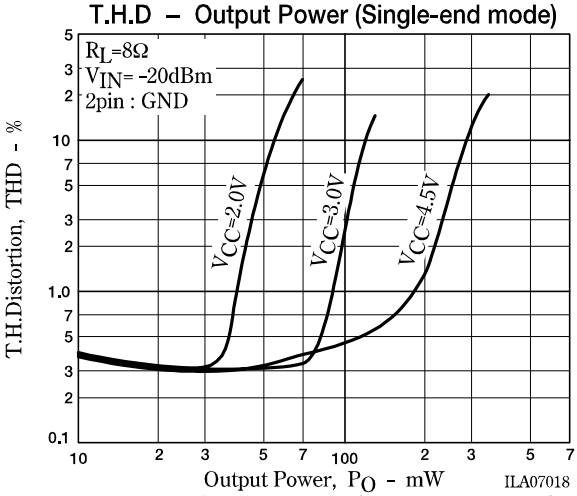
Quiescent Current – Ta



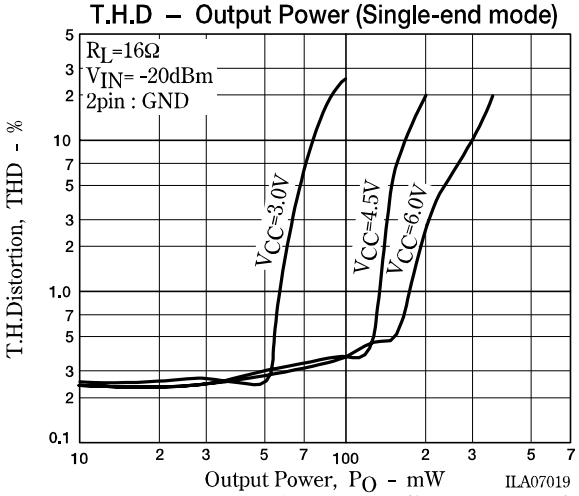
Regulation Voltage – Ta



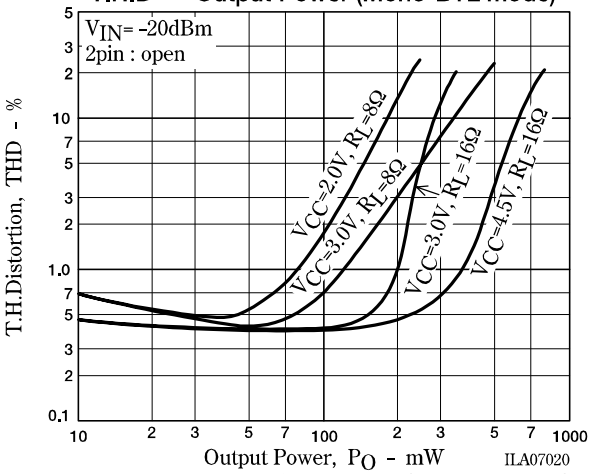
T.H.D – Output Power (Single-end mode)



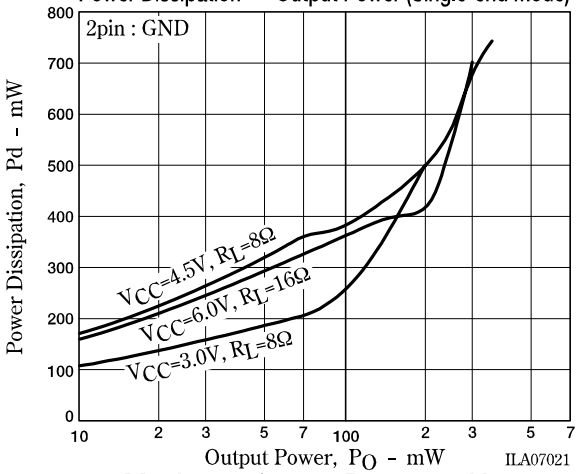
T.H.D – Output Power (Single-end mode)



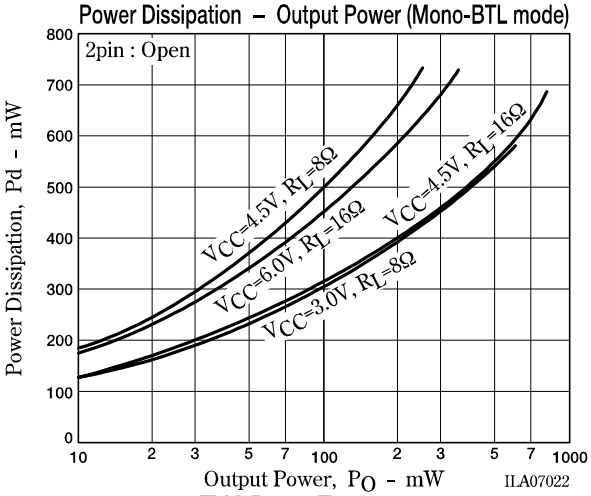
T.H.D – Output Power (Mono-BTL mode)



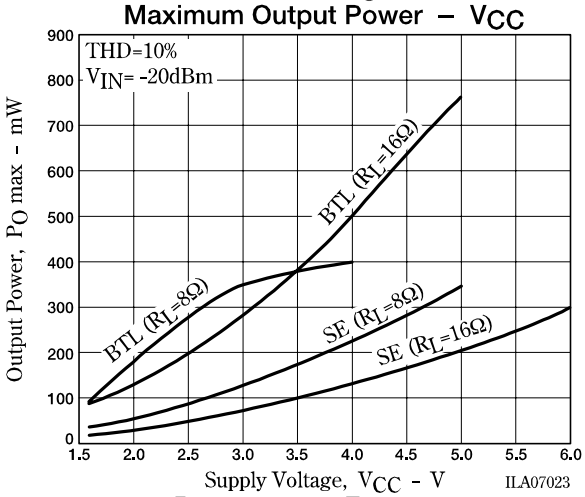
Power Dissipation – Output Power (Single-end mode)



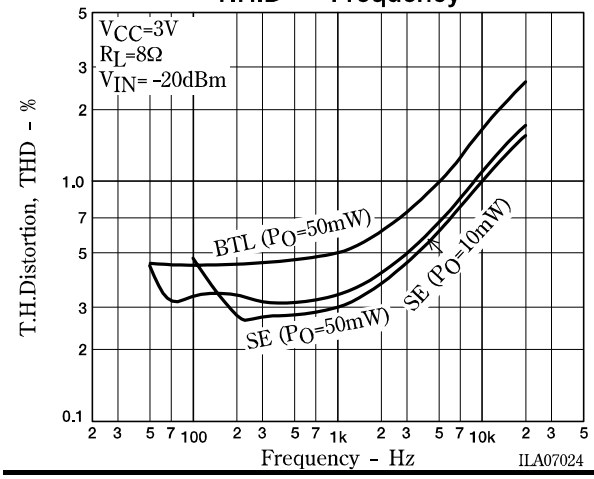
Power Dissipation – Output Power (Mono-BTL mode)



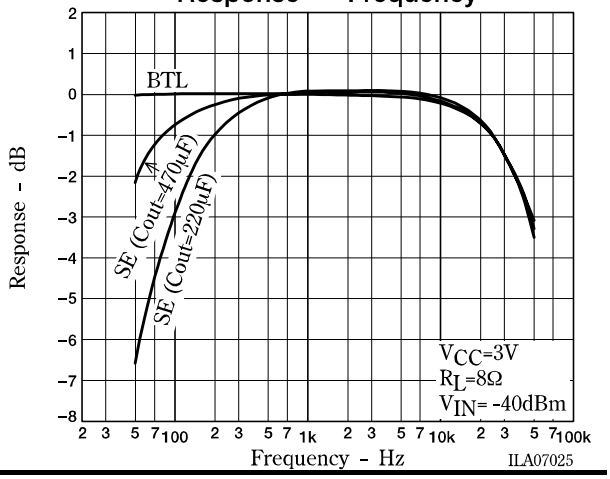
Maximum Output Power – V_{CC}



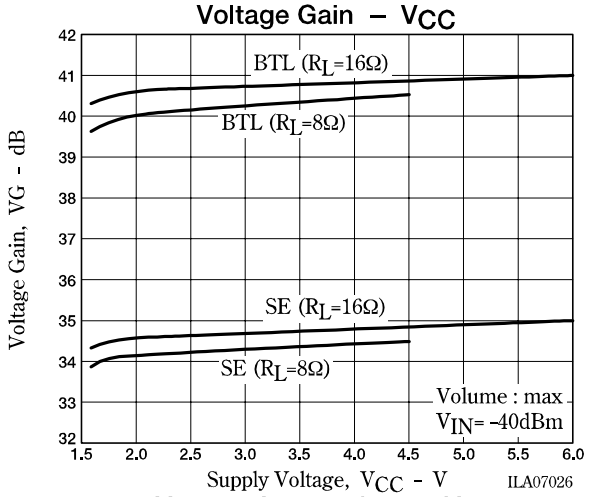
T.H.D – Frequency



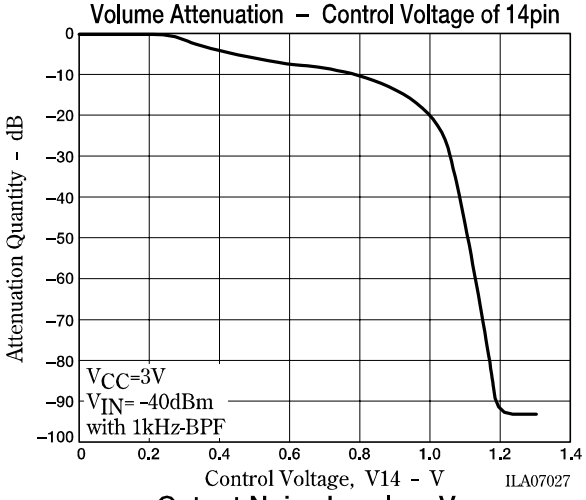
Response – Frequency



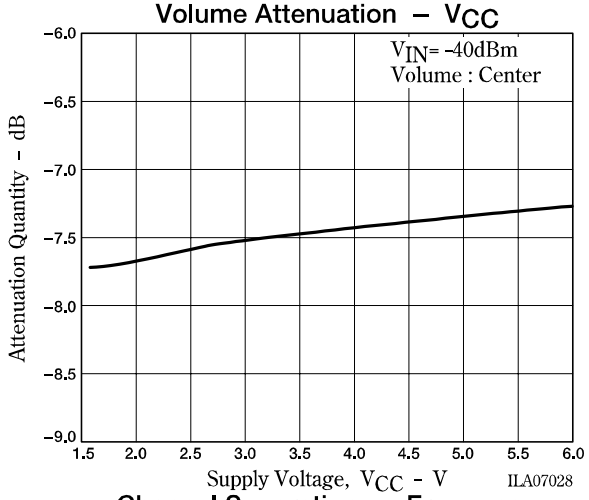
Voltage Gain – V_{CC}



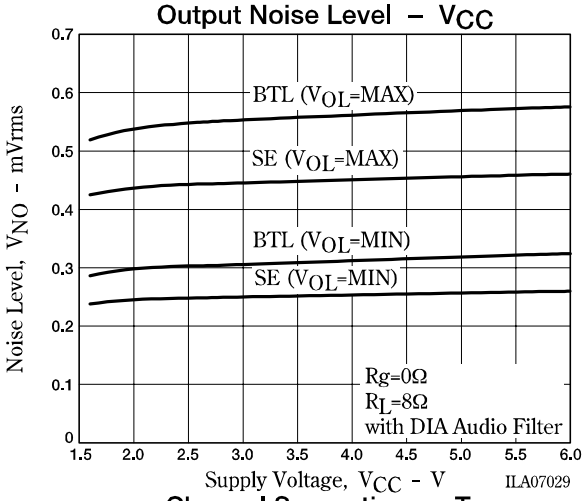
Volume Attenuation – Control Voltage of 14pin



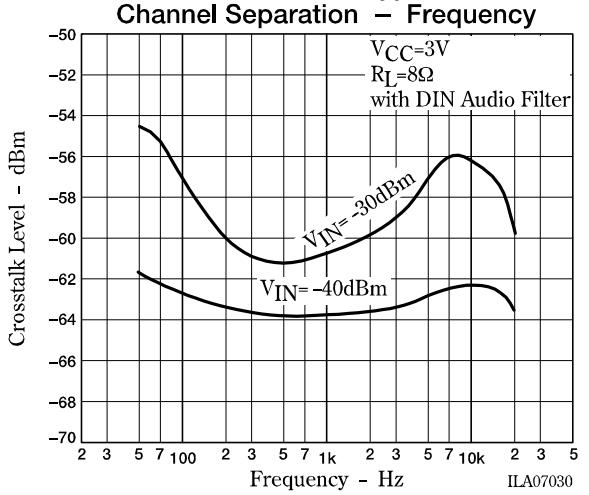
Volume Attenuation – V_{CC}



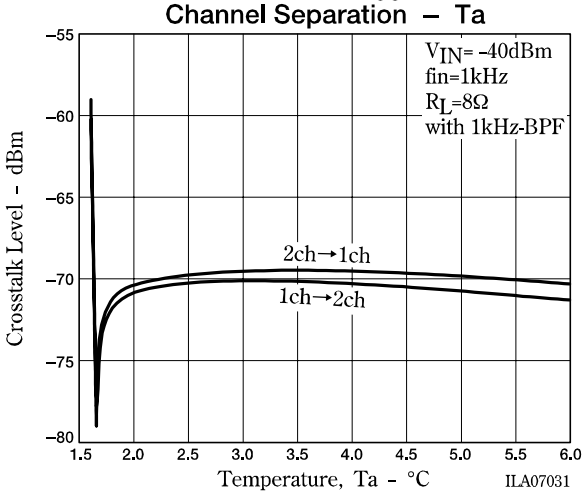
Output Noise Level – V_{CC}



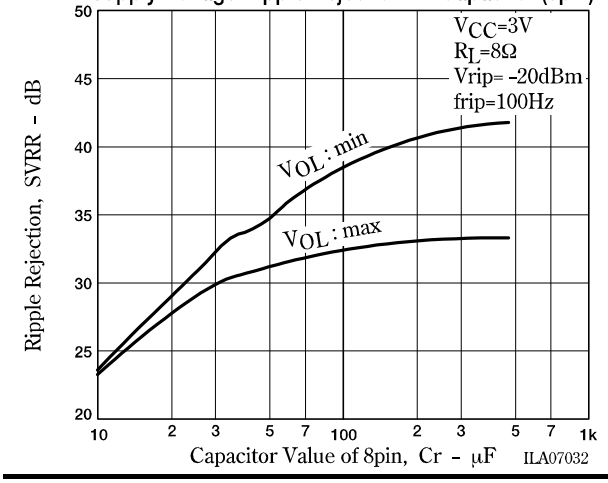
Channel Separation – Frequency



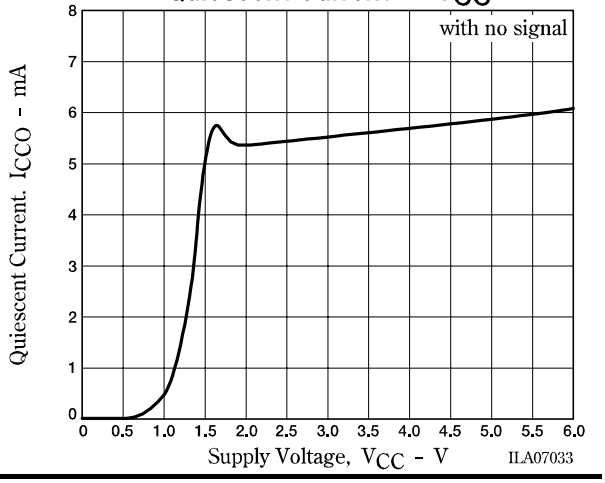
Channel Separation – Ta

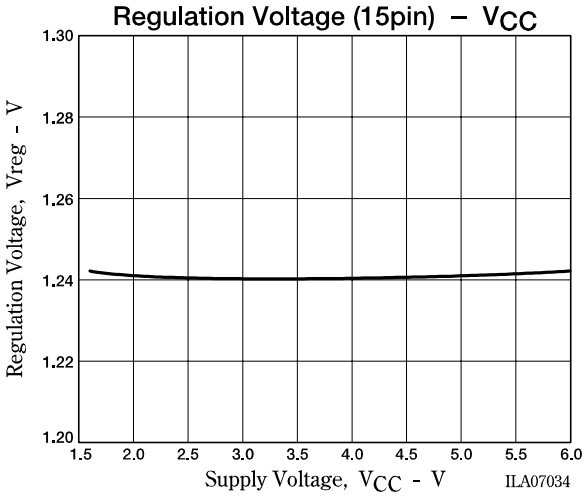


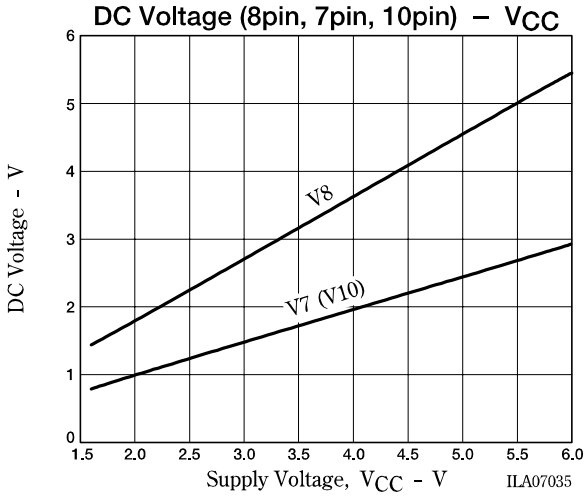
Supply Voltage Ripple Rejection – Capacitor (8pin)



Quiescent Current – V_{CC}




Regulation Voltage (15pin) – VCC
Regulation Voltage, Vreg - V
1.30
1.28
1.26
1.24
1.22
1.20
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Supply Voltage, VCC - V
ILA07034


DC Voltage (8pin, 7pin, 10pin) – VCC
DC Voltage - V
6
5
4
3
2
1
0
V8
V7 (V10)
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Supply Voltage, VCC - V
ILA07035

Package Dimensions

unit : mm
3035B