



LA4810M

Monolithic Linear IC

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 ($V_{CC}=3V$, $R_L=8\Omega$)
 - EIAJ output power 2=280mW typical ($V_{CC}=4.5V$, $R_L=8\Omega$)
- Configurable as a monaural BTL power amplifier (selected at pin 2)
 - EIAJ output power 3=350mW typical ($V_{CC}=3V$, $R_L=8\Omega$)
 - EIAJ output power 4=600mW typical ($V_{CC}=4.5V$, $R_L=16\Omega$)
- Onchip electronic volume
- Onchip ripple filter

Specifications

Maximum Ratings at $T_a=25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		8	V
Allowable Power Dissipation	P_d max1	$T_a \leq 60^\circ C$, when mounted on a PCB*	700	mW
Operating Temperature	T_{opr}		-10 to +60	$^\circ C$
Storage Temperature	T_{stg}		-40 to +150	$^\circ C$

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

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Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3.0	V
Allowable operating supply voltage range 1	V_{CCOP1}	$R_L=8\Omega$	1.8 to 4.5	V
Allowable operating supply voltage range 2	V_{CCOP2}	$R_L=16\Omega$	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 $T_a = 25^\circ\text{C}$, $V_{CC}=3\text{V}$, $f_{in}=1\text{kHz}$, $R_L=8\Omega$

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Quiescent current	I_{CCOP}	No signal is present.		5.5	11	mA
Voltage gain	GS	$V_{IN}=-40\text{dBm}$	31.3	34.3	37.3	dB
BTL voltage gain	GB	$V_{IN}=-40\text{dBm}$, 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%, $V_{CC}=4.5\text{V}$	180	280		mW
Maximum output power3	POMX3	THD=10%, BTL mode	220	350		mW
Maximum output power4	POMX4	THD=10%, BTL mode, $V_{CC}=4.5\text{V}$, $R_L=16\Omega$	400	600		mW
Total harmonic distortion	THDS	At $V_{IN}=-20\text{dBm}$, $P_O=50\text{mW}$		0.4	2.5	%
BTL total harmonic distortion	THDB	At $V_{IN}=-20\text{dBm}$, $P_O=50\text{mW}$, BTL mode		0.5	2.5	%
Output noise voltage	VNS	$R_g=0\Omega$, $f=20$ to 20kHz		0.45	0.9	mVrms
BTL output noise voltage	VNB	$R_g=0\Omega$, $f=20$ to 20kHz , BTL mode		0.6	1.2	mVrms
Channel separation	SCH	$V_{IN}=-40\text{dBm}$, 1kHz -BPF		-68	-58	dBm
Volume attenuation	V_{OL}	Attenuation at $V_{IN}=-40\text{dBm}$, V_{OL} at center position	3	7.5	14	dB

0dBm=1mW ($R=600\Omega$) \approx 774.6mVrms

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Pin Description

Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V _{CC} =3V	V _{CC} =4.5V	
1 16	IN2 IN1	<p style="text-align: center;">IL07036</p>	0	0	Input pins
2	SW	<p style="text-align: center;">ILA07037</p>	1.23	1.23	MONO/BTL Selector pin
3	NC				
4 13	NF2 NF1	<p style="text-align: center;">ILA07038</p>	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	<p style="text-align: center;">ILA07039</p>	1.45	2.2	Power amplifier output pins

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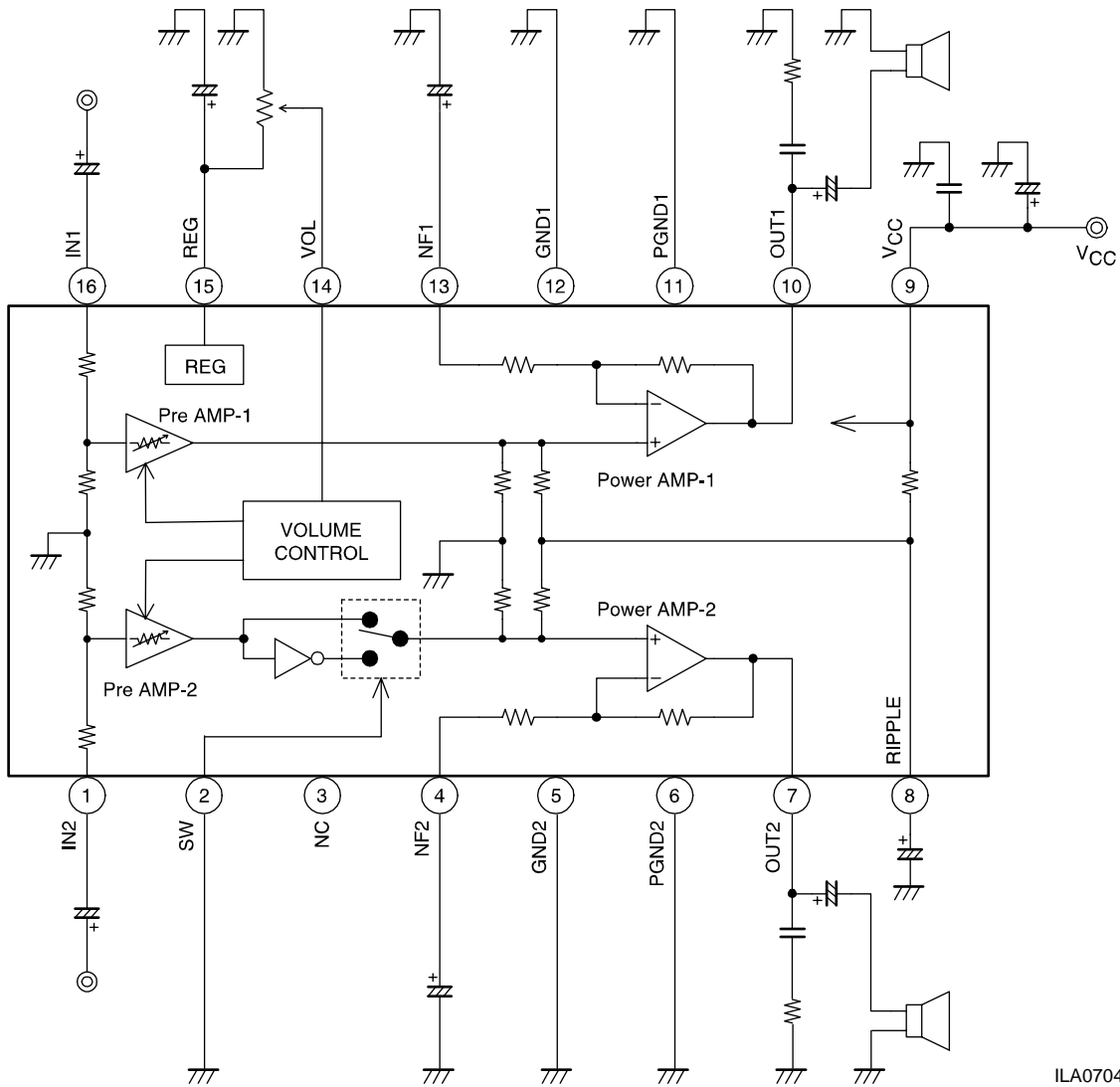
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Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V _{CC} =3V	V _{CC} =4.5V	
8	RIPPLE	<p style="text-align: right;">ILA07040</p>	2.71	4.07	Ripple filter pin (Connect a filter capacitor.)
9	V _{CC}		3	4.5	Power pin
14	V _{OL}	<p style="text-align: right;">ILA07041</p>	0 to 1.23 (Apply)	0 to 1.23 (Apply)	Volume control pin
15	REG	<p style="text-align: right;">ILA07042</p>	1.23	1.23	Internal regulator pin (Connect a stabilization capacitor.)

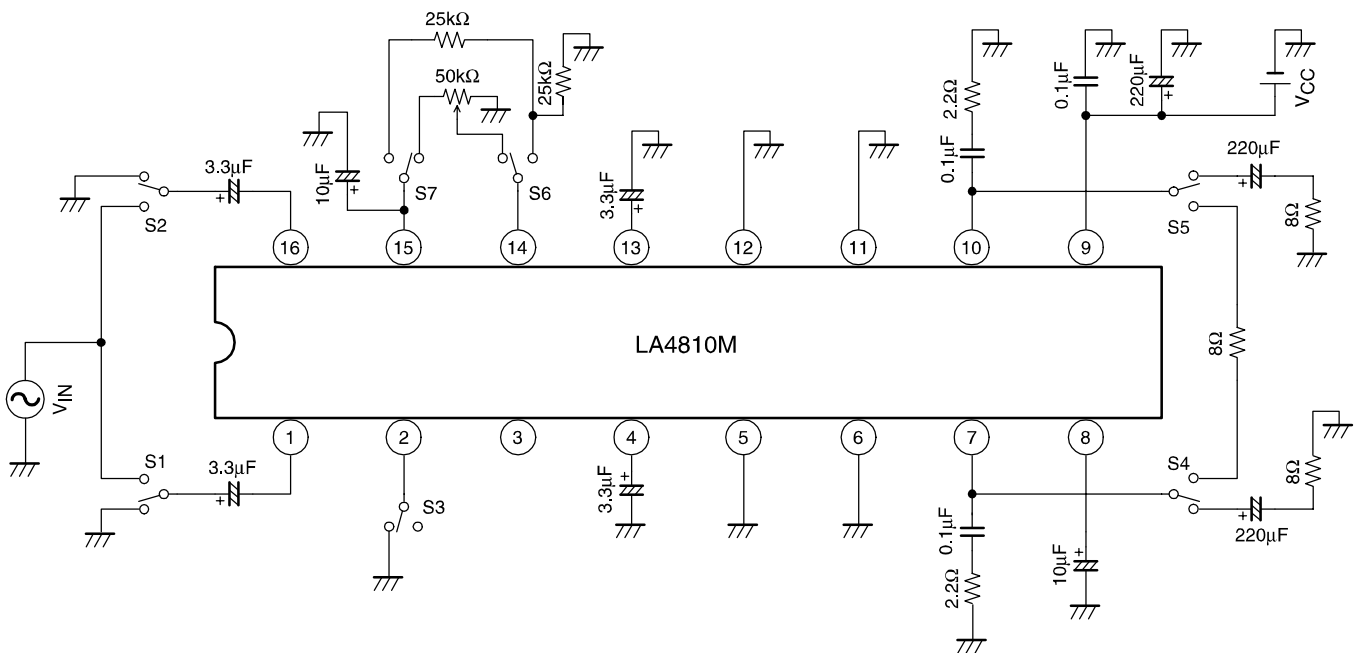
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Block Diagram



ILA07043

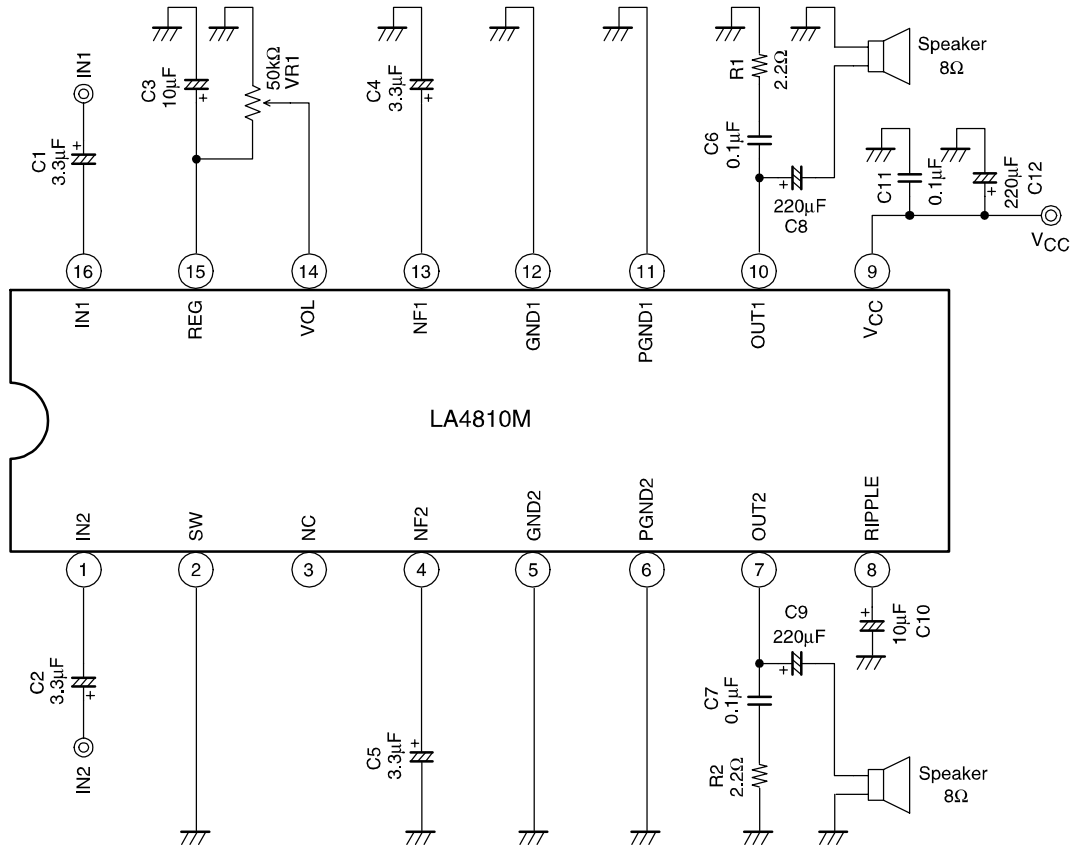
Test Circuit Diagram



ILA07044

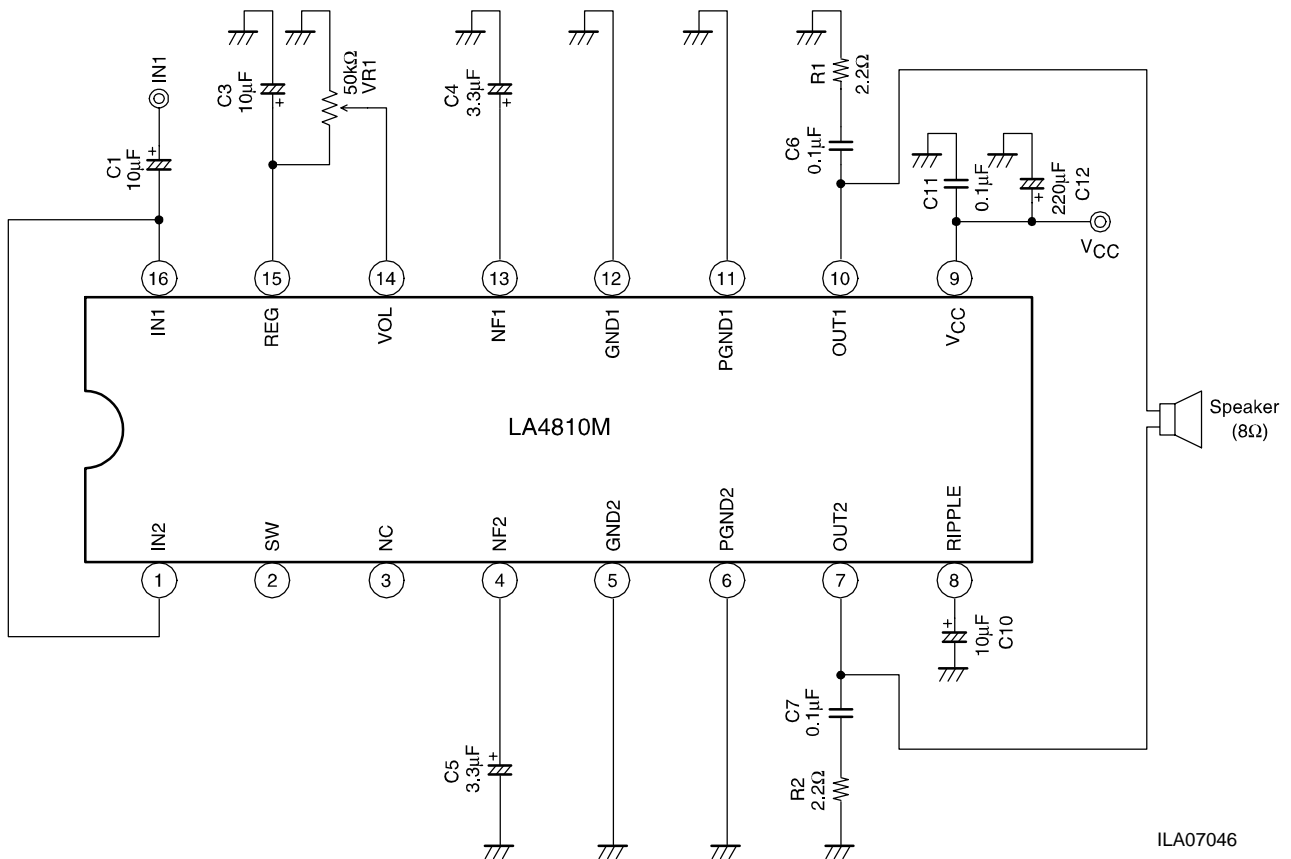
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Application Circuit Example (Stereo Mode)



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 k Ω or greater.

Maximum gain \rightarrow V14=0V (GND)

Minimum gain \rightarrow 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 \rightarrow Connect to GND (or 0.3V or below).

BTL mode Pin 2 \rightarrow 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 μ F 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

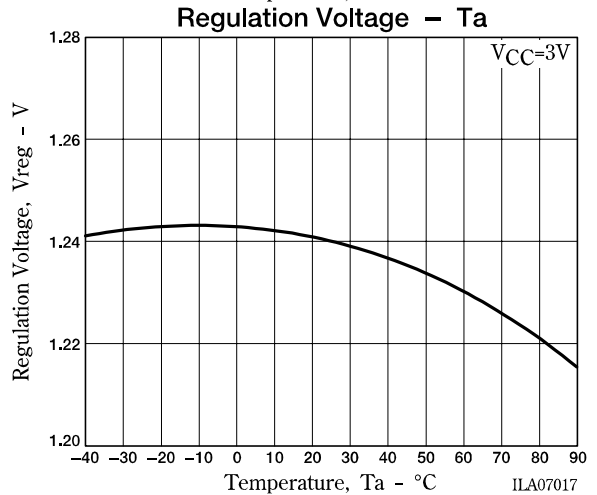
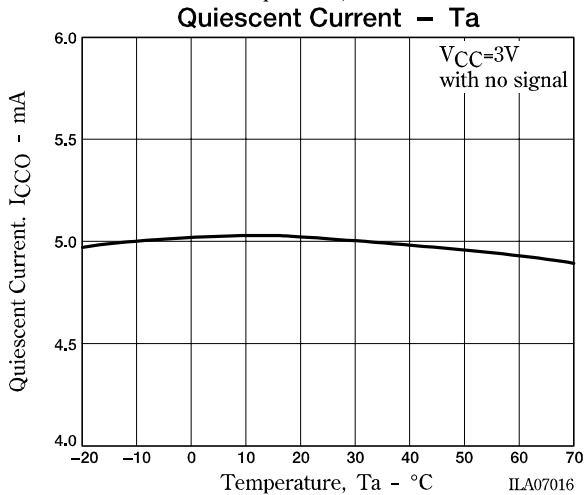
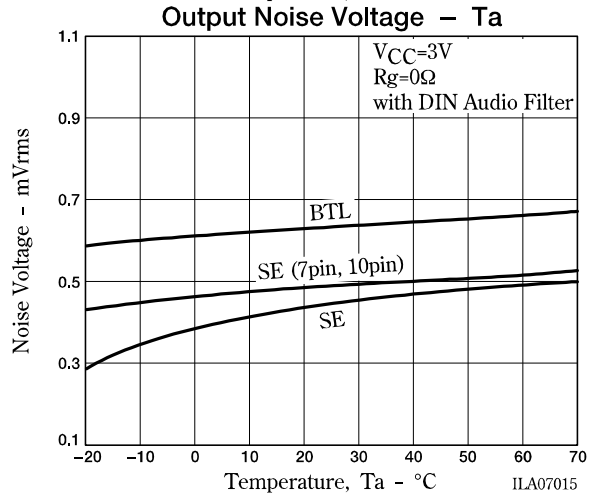
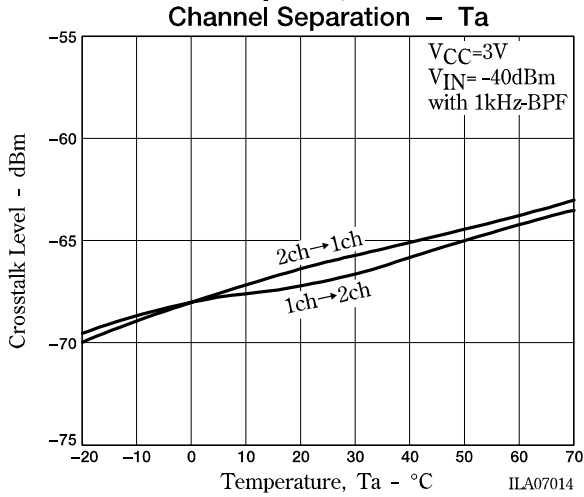
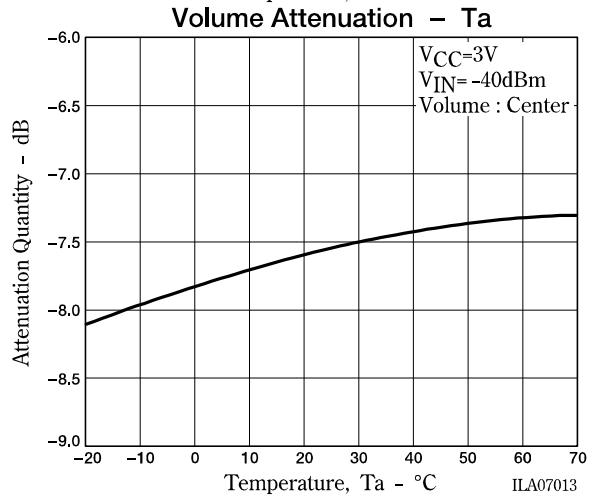
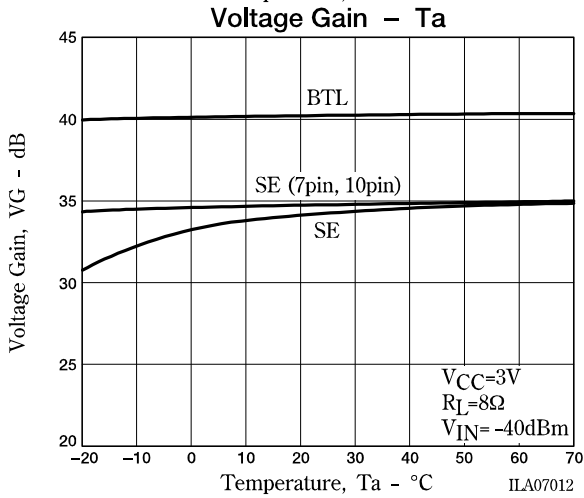
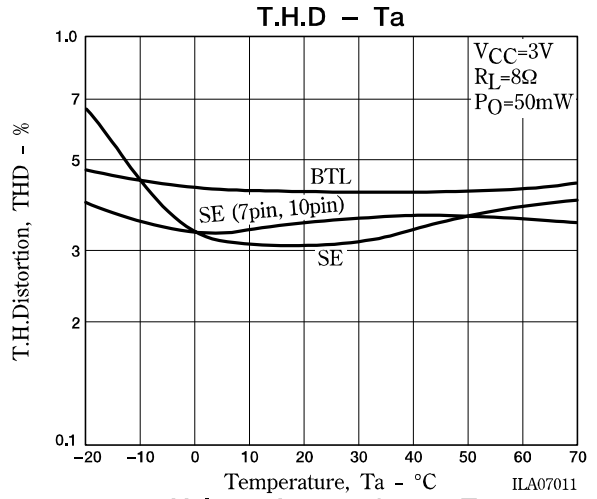
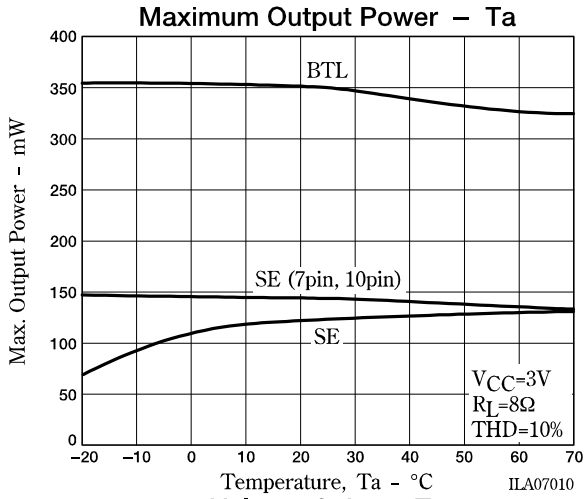
Turning on the IC with some of its pins short-circuited may cause characteristic deterioration of or fatal damage to the IC. After installing the IC on a board and before turning on power, make sure that its pins are not short-circuited by solder or other foreign materials.

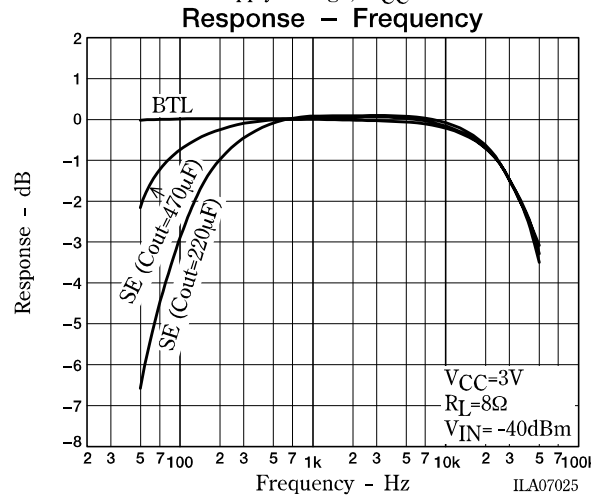
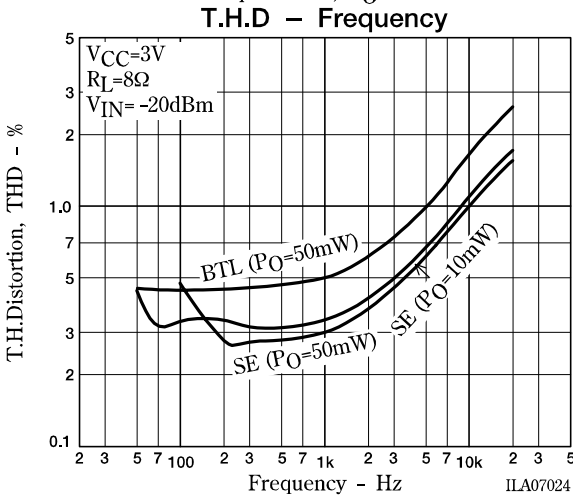
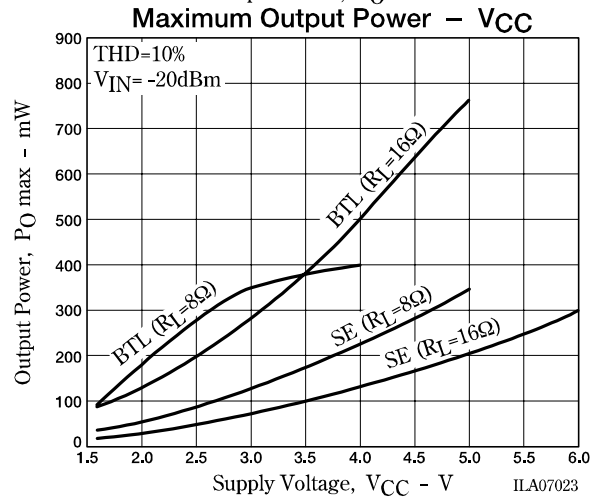
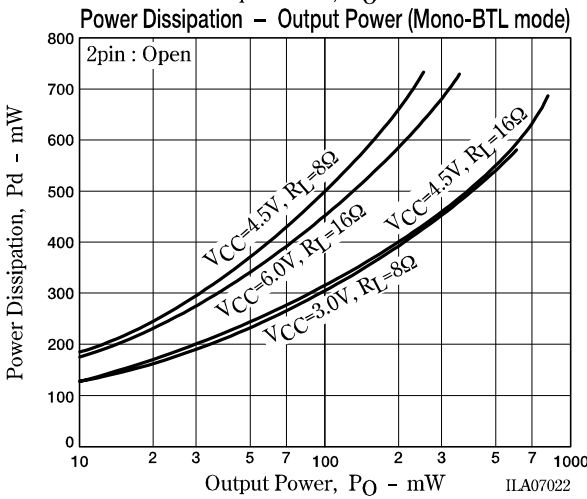
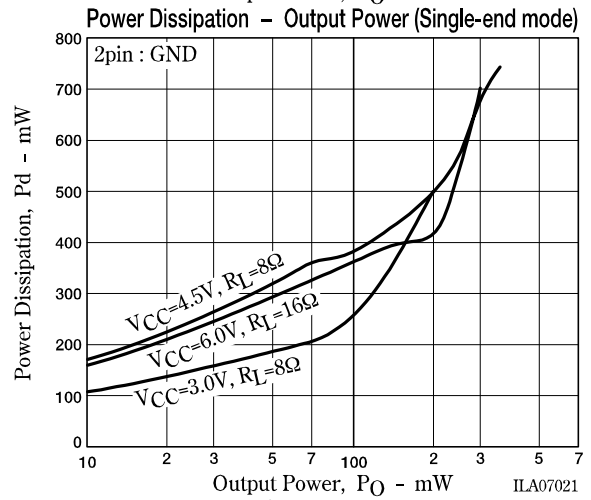
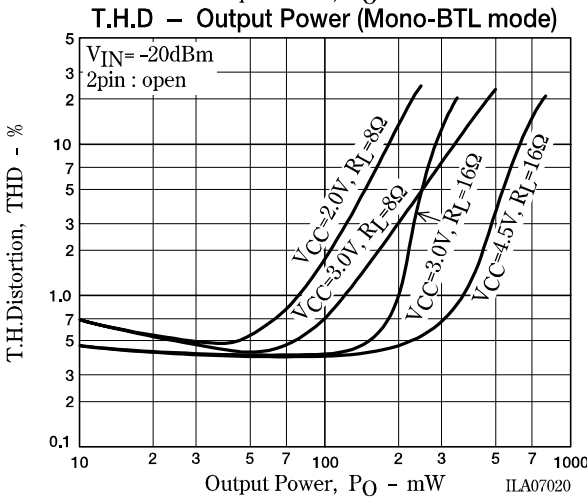
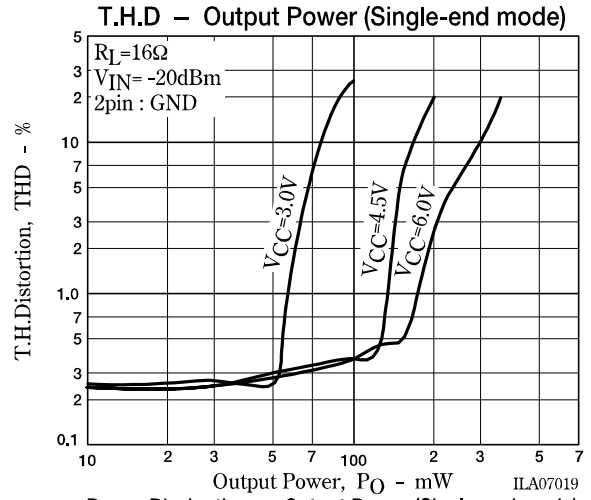
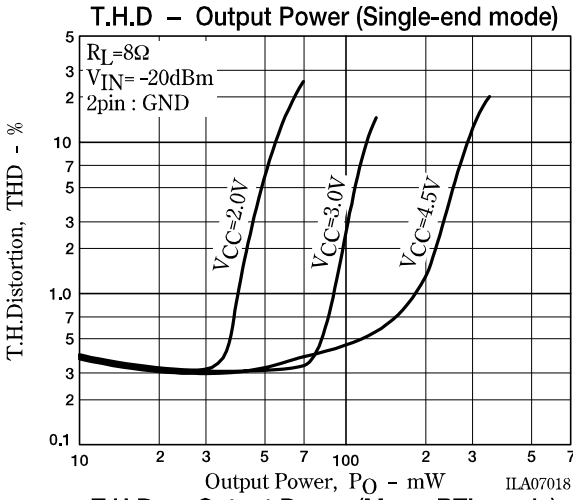
7. Short-circuit of the load

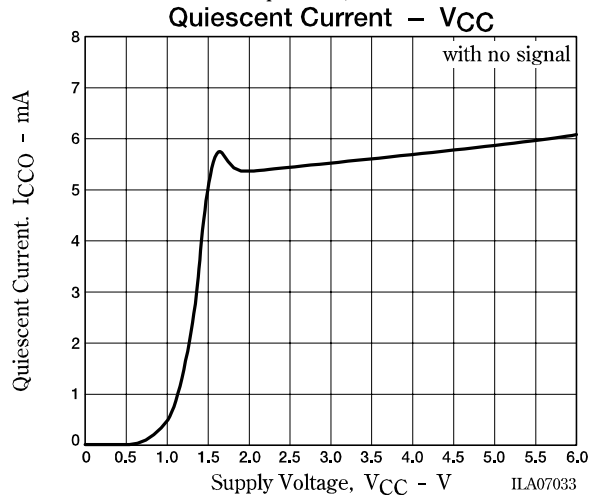
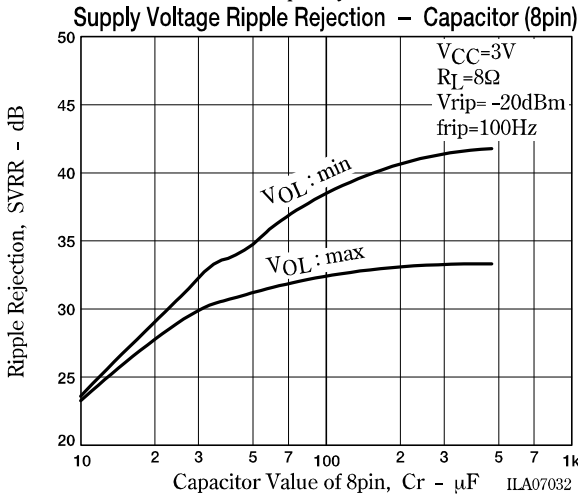
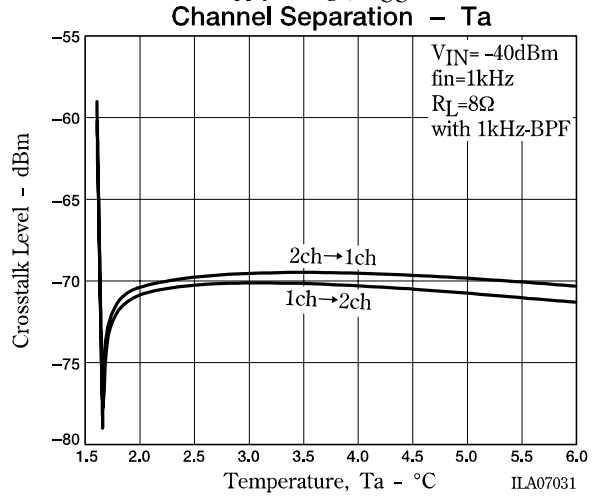
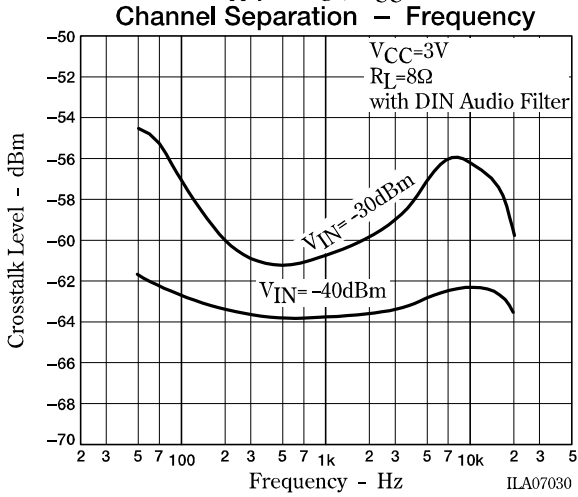
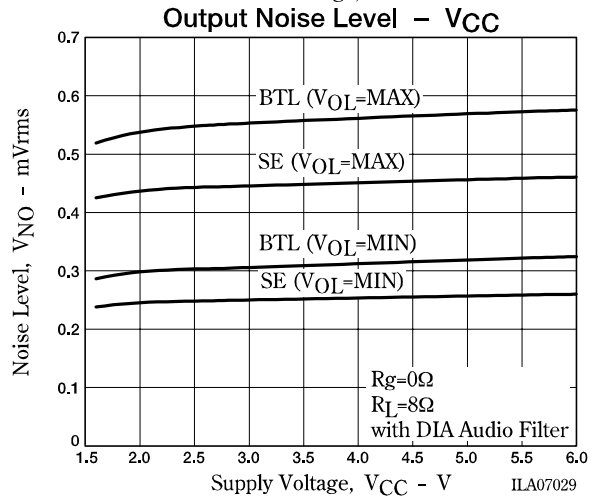
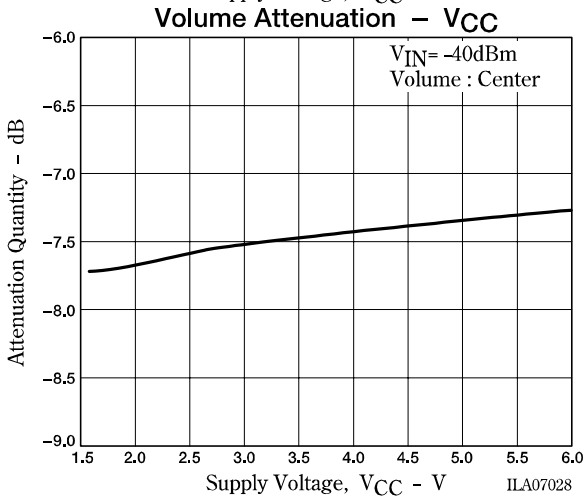
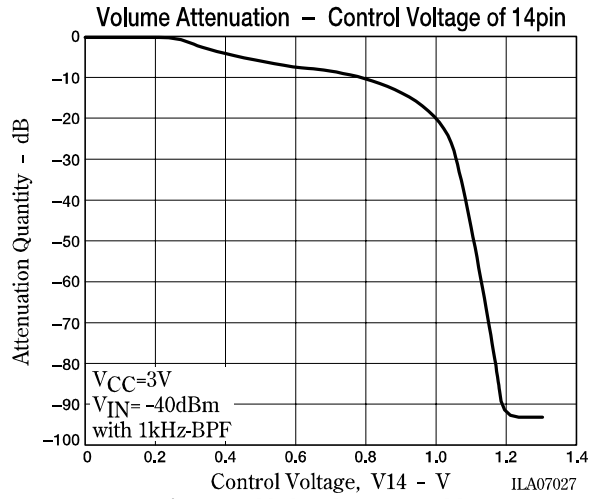
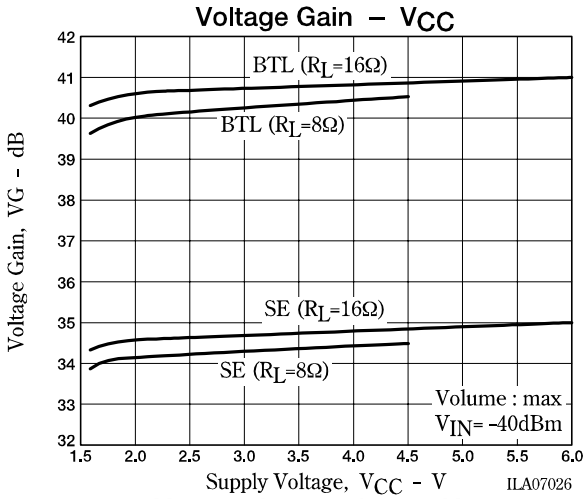
Keeping the IC with its load short-circuited for an extended period of time may cause characteristic deterioration of or fatal damage to the IC. Never short-circuit the load of the IC.

8. Maximum ratings

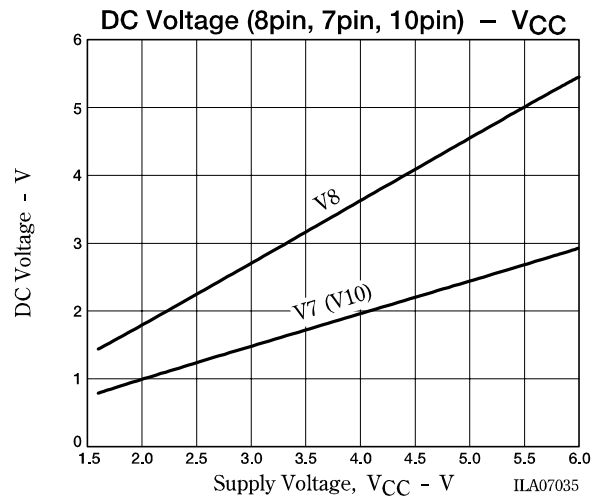
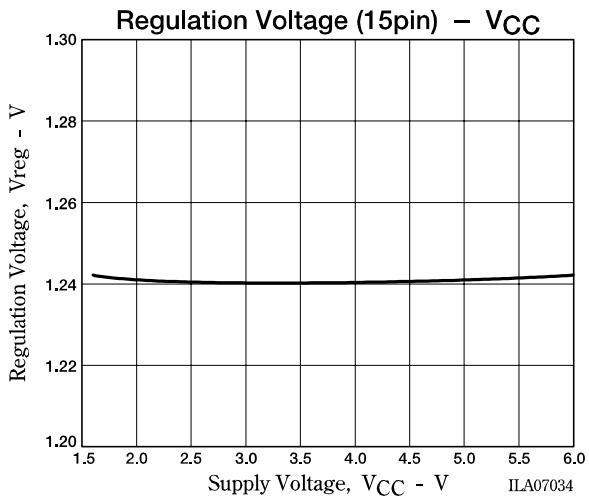
It is likely that the maximum ratings of the IC may be exceeded on a slight change in operating conditions if the IC is used at or near its ratings. Since such a condition may lead to a fatal failure accident, allow for adequate margins for fluctuations in supply voltage and to make sure that the IC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





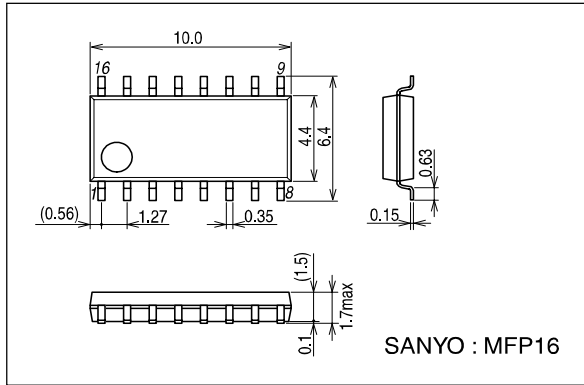


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Package Dimensions

unit : mm
3035B



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