

**SANYO Semiconductors****DATA SHEET**

# 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 $20\text{kHz}$		0.45	0.9	mVrms
BTL output noise voltage	VNB	$R_g=0\Omega$ , $f=20$ to $20\text{kHz}$ , BTL mode		0.6	1.2	mVrms
Channel separation	SCH	$V_{IN}=-40\text{dBm}$ , $1\text{kHz}$ -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

**Pin Description**

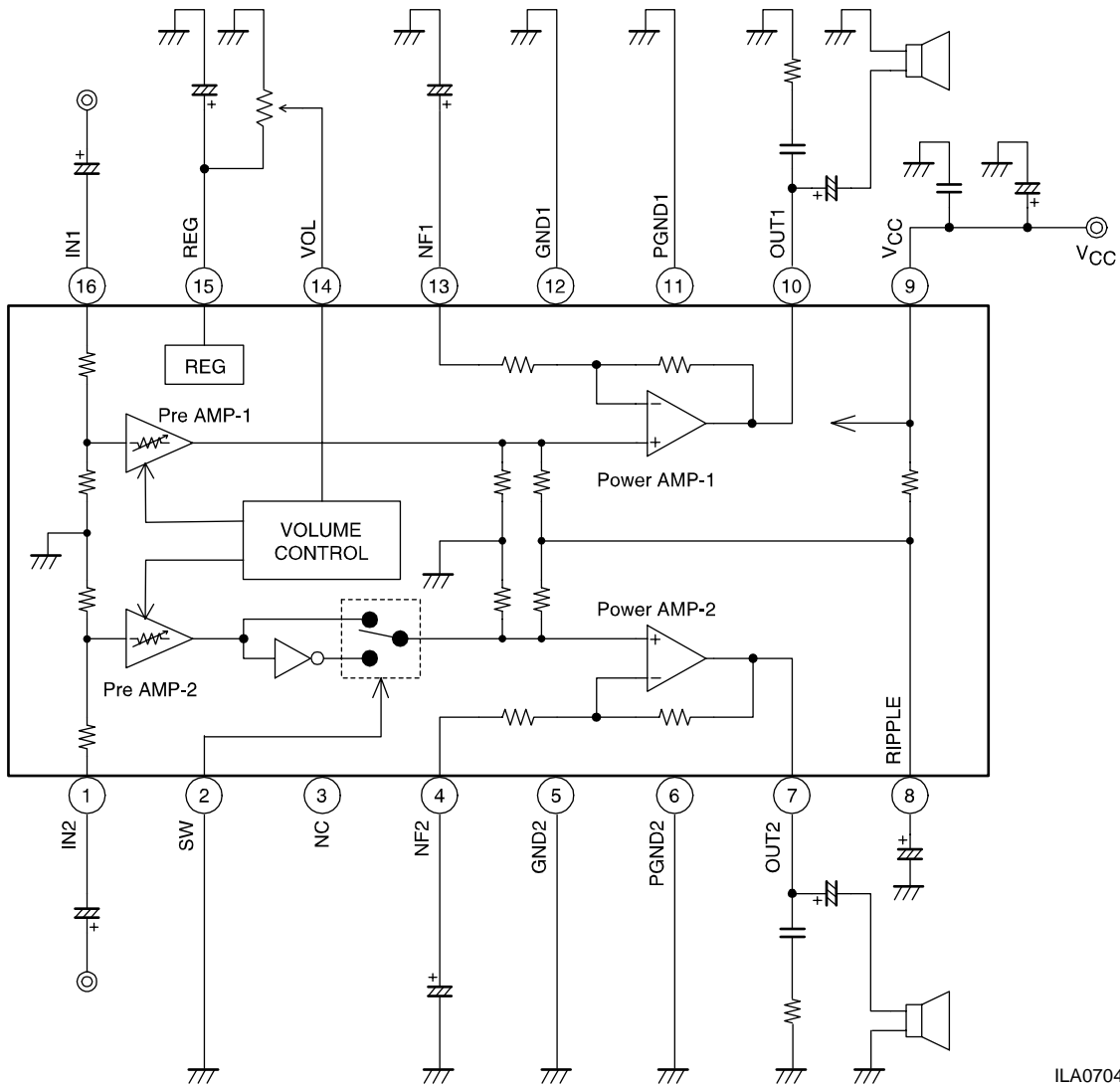
Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V <sub>CC</sub> =3V	V <sub>CC</sub> =4.5V	
1 16	IN2 IN1	<p>IL07036</p>	0	0	Input pins
2	SW	<p>ILA07037</p>	1.23	1.23	MONO/BTL Selector pin
3	NC				
4 13	NF2 NF1	<p>ILA07038</p>	1.45	2.2	Power amplifier NF pins (Connect a NF capacitor 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>ILA07039</p>	1.45	2.2	Power amplifier output pins

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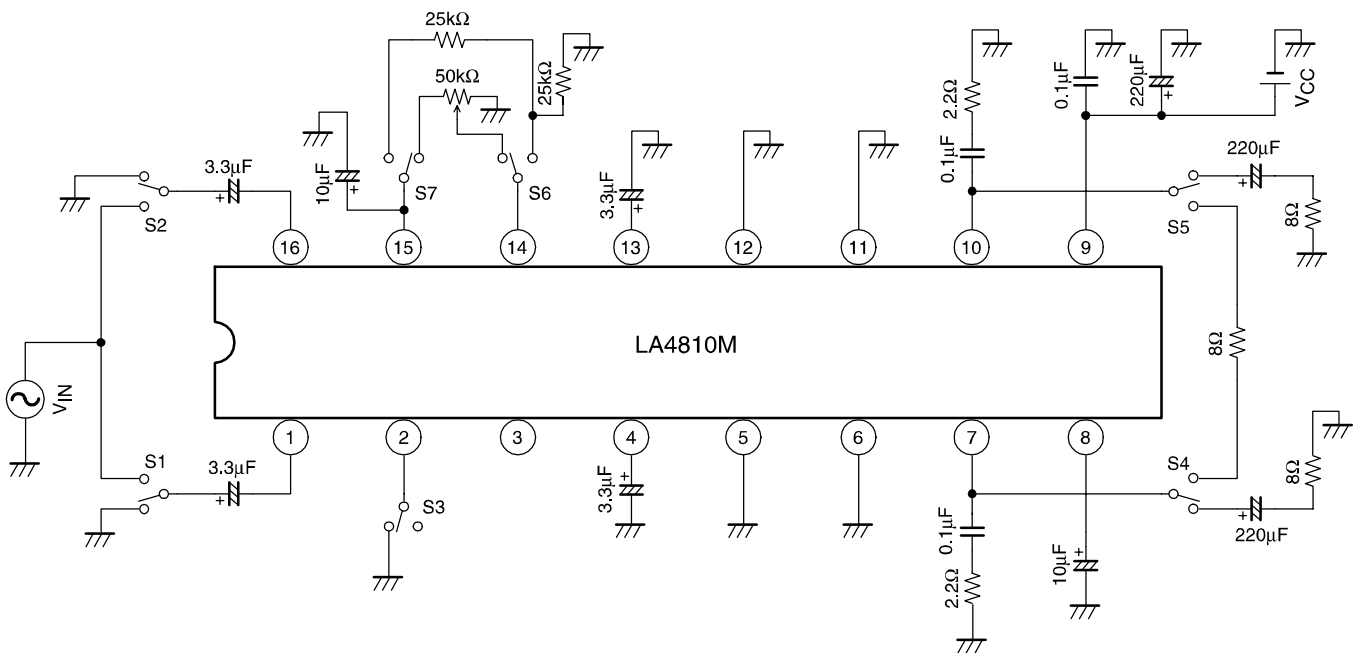
Pin No.	Pin Symbol	Equivalent Circuit Diagram	Pin Voltage		Description
			V <sub>CC</sub> =3V	V <sub>CC</sub> =4.5V	
8	RIPPLE		2.71	4.07	Ripple filter pin (Connect a filter capacitor.)
9	V <sub>CC</sub>		3	4.5	Power pin
14	V <sub>OL</sub>		0 to 1.23 (Apply)	0 to 1.23 (Apply)	Volume control pin
15	REG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

**Block Diagram**



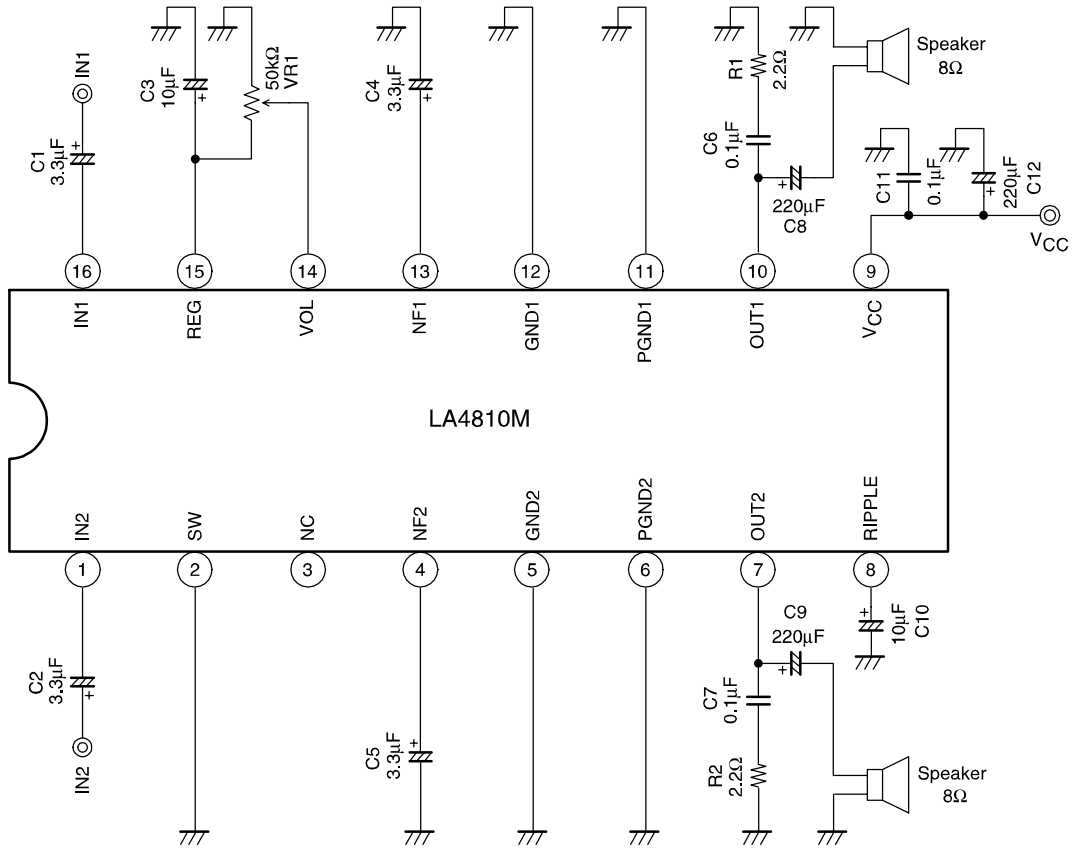
ILA07043

**Test Circuit Diagram**



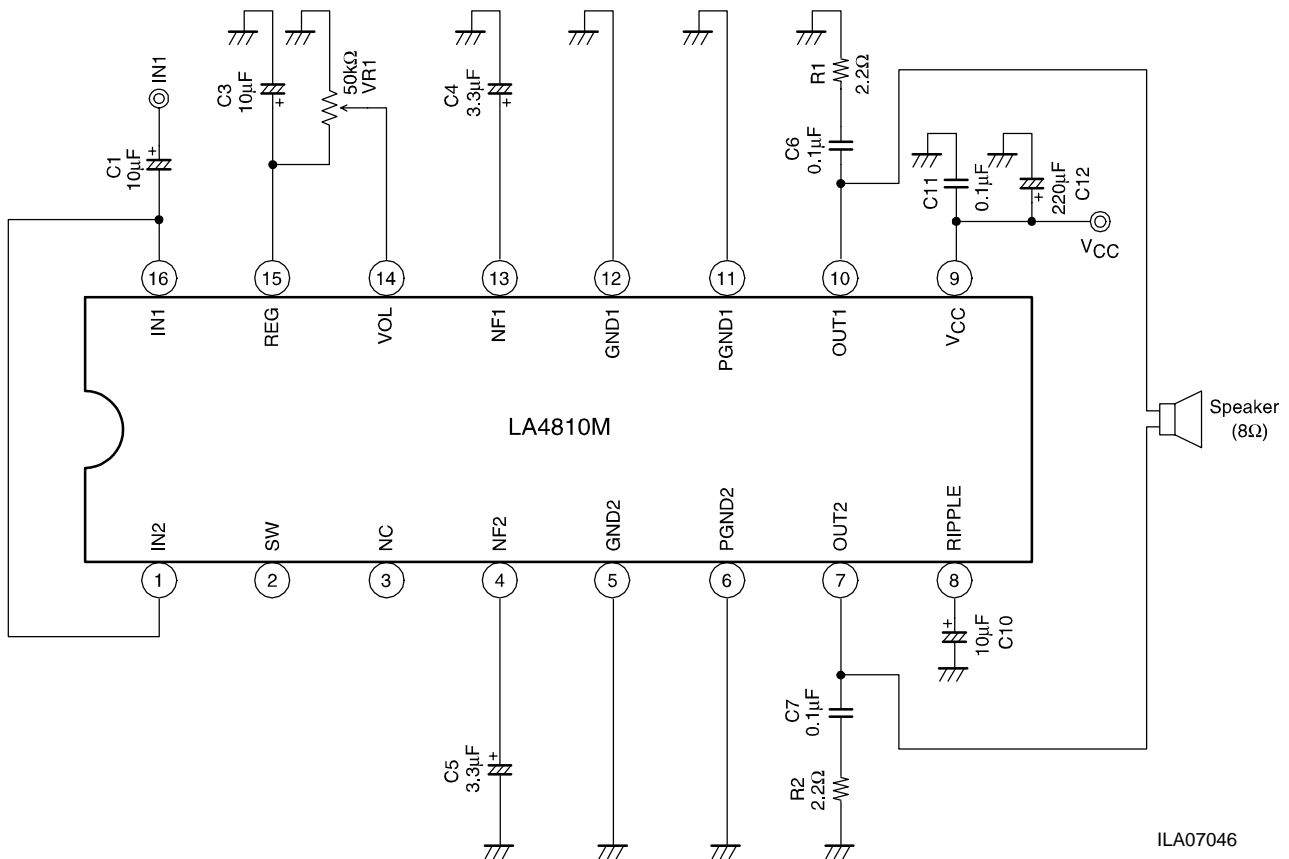
ILA07044

**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 $\Omega$  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  $\mu$ F or greater

R1, R2: 1.5 to 4.7  $\Omega$

### 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

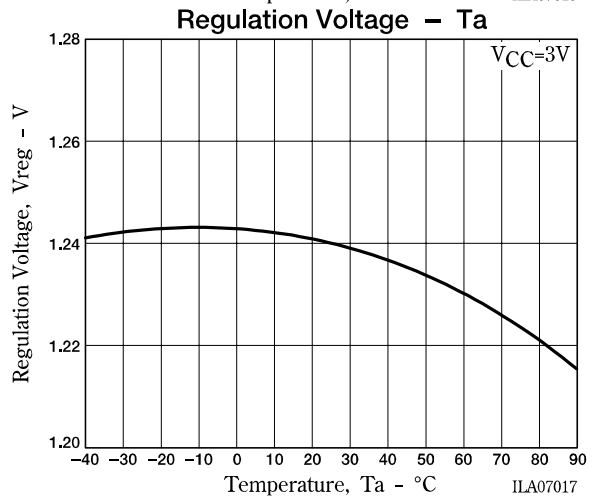
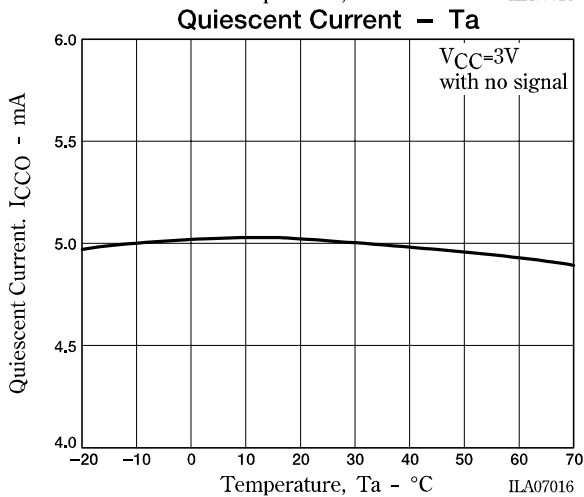
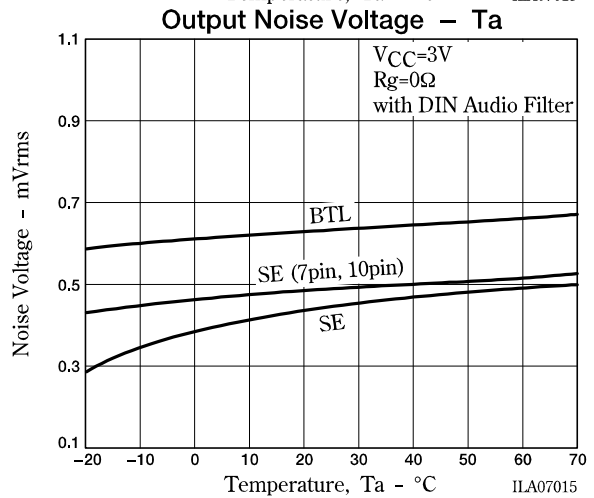
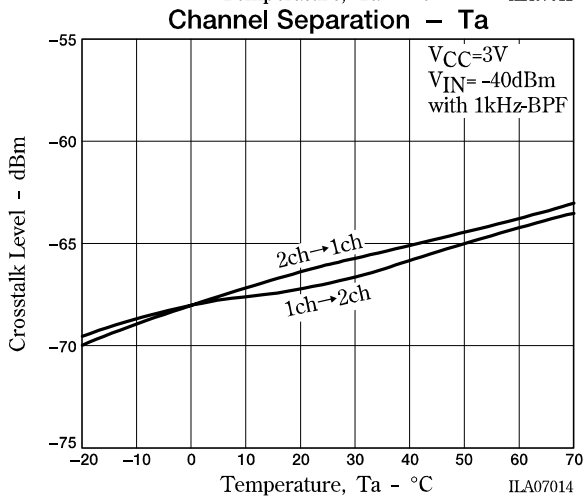
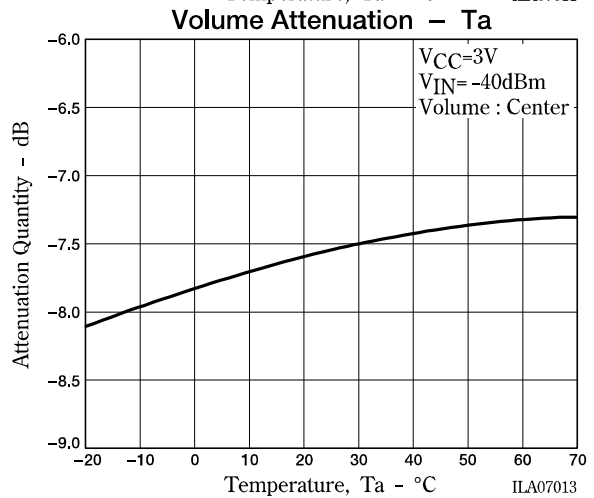
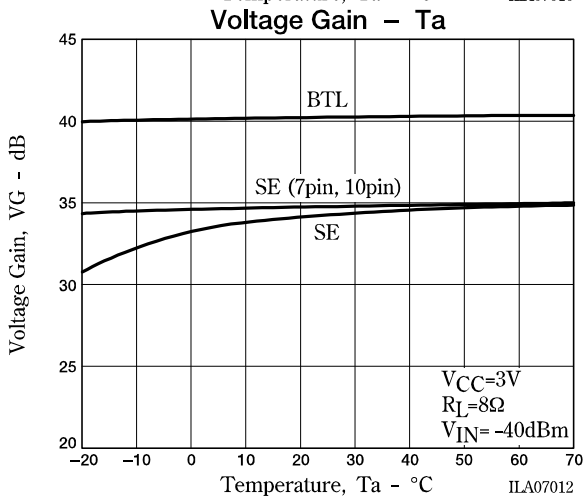
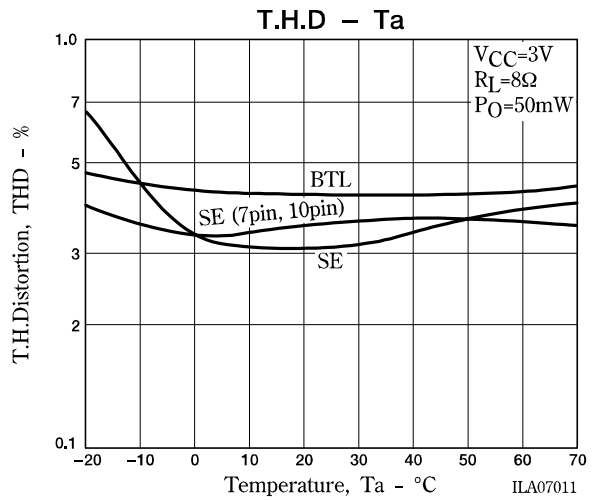
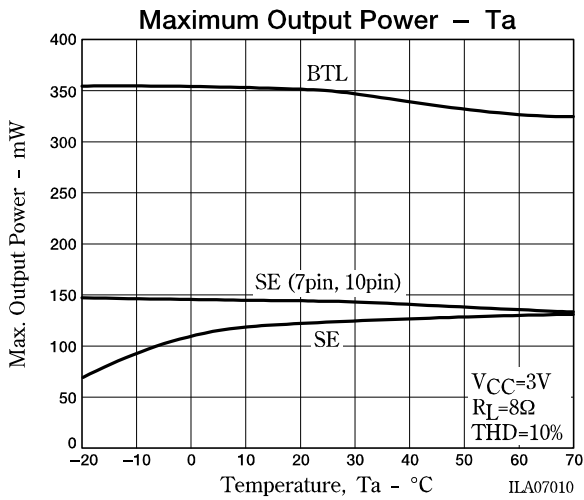
Turning on the IC with some of its pins short-circuited may cause characteristic deterioration of or fatal damage to the IC. After installing the IC on a board and before turning on power, make sure that its pins are not short-circuited by solder or other foreign materials.

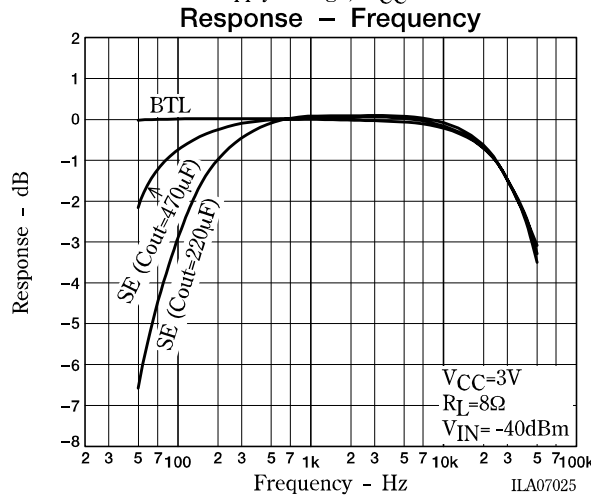
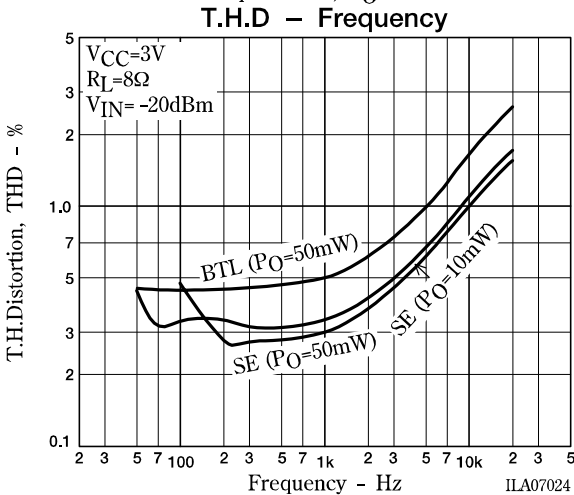
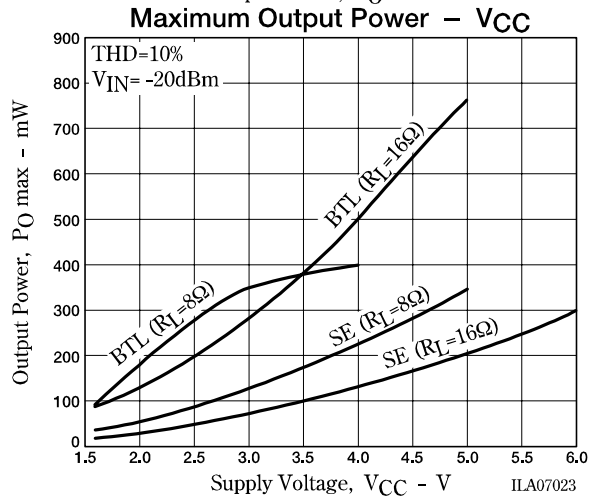
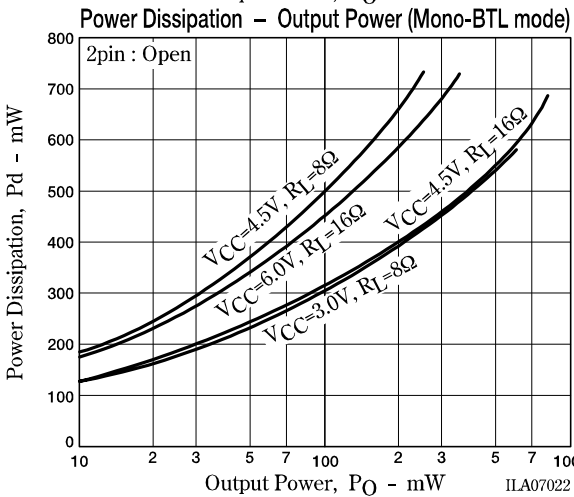
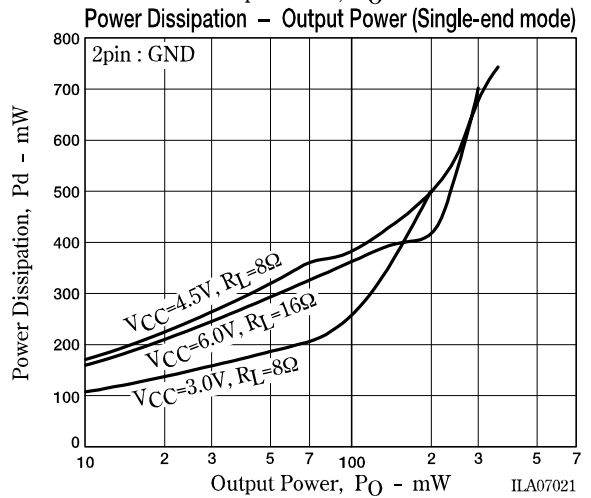
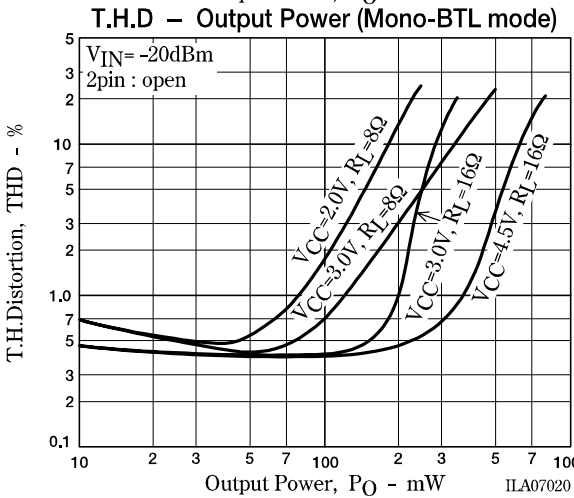
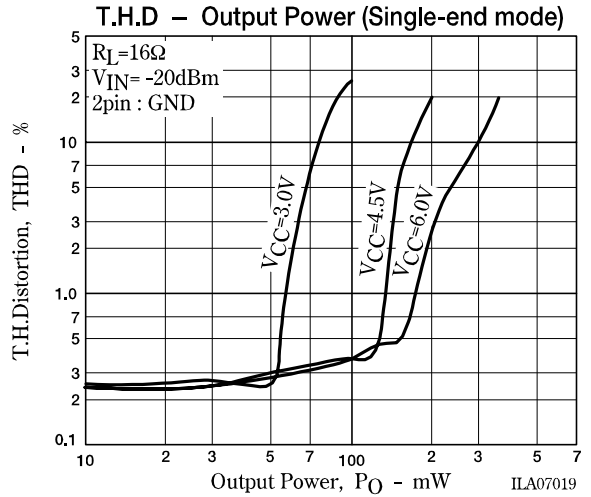
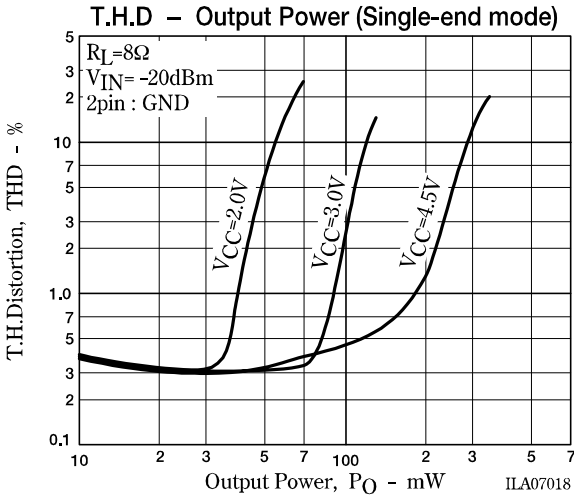
### 7. Short-circuit of the load

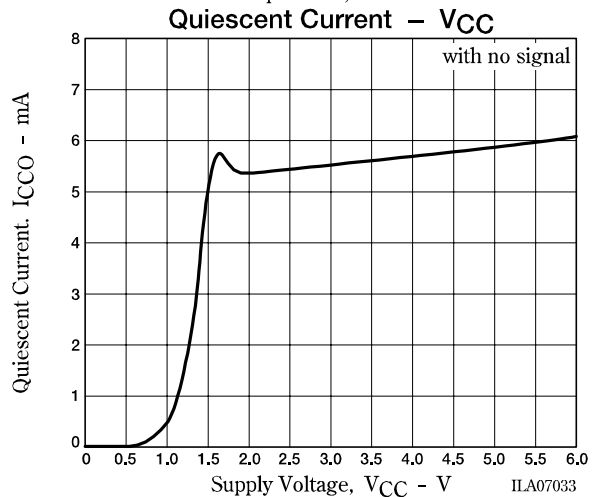
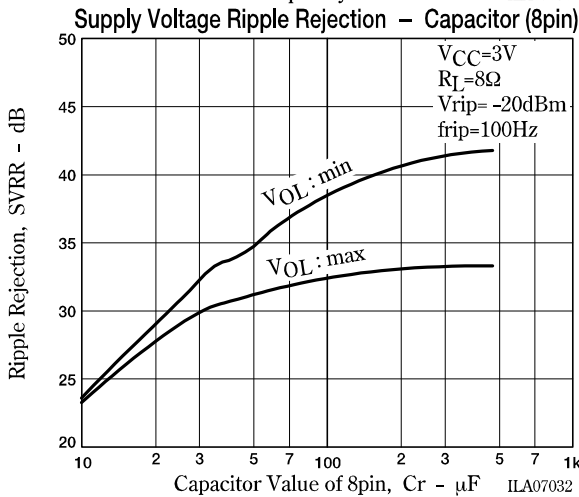
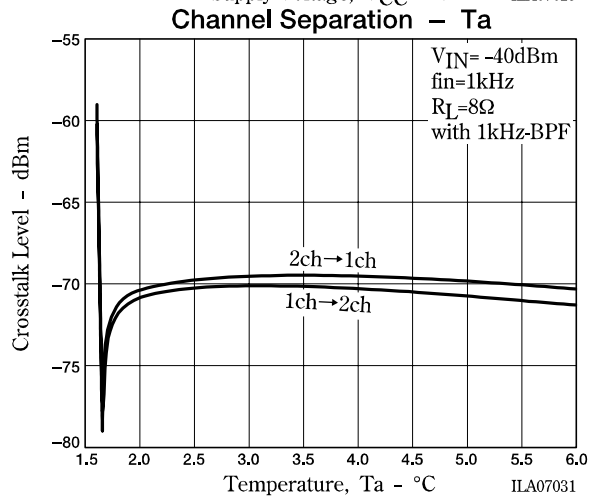
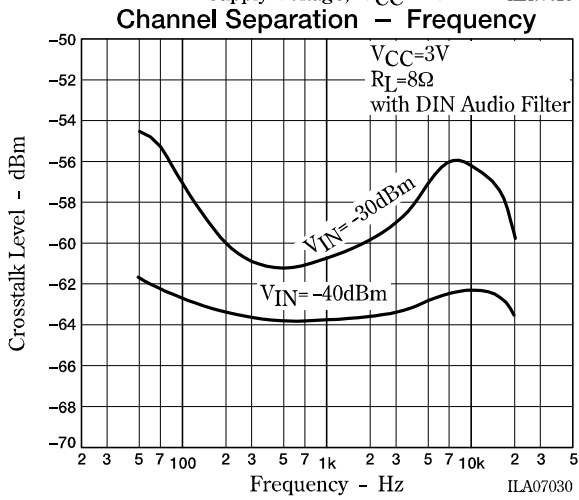
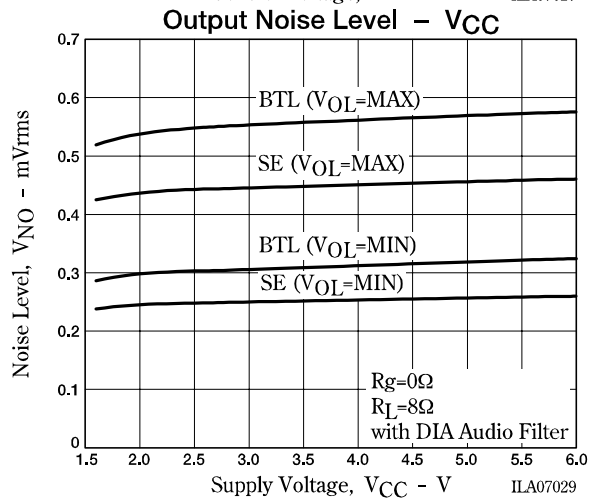
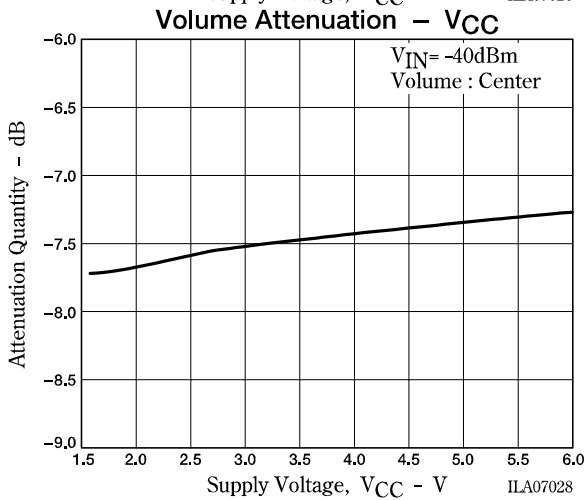
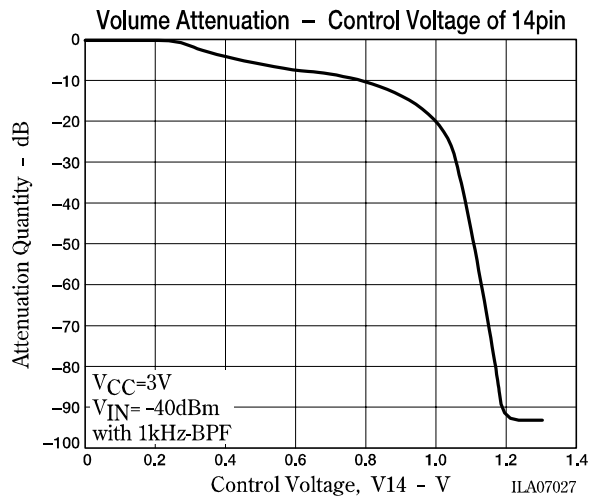
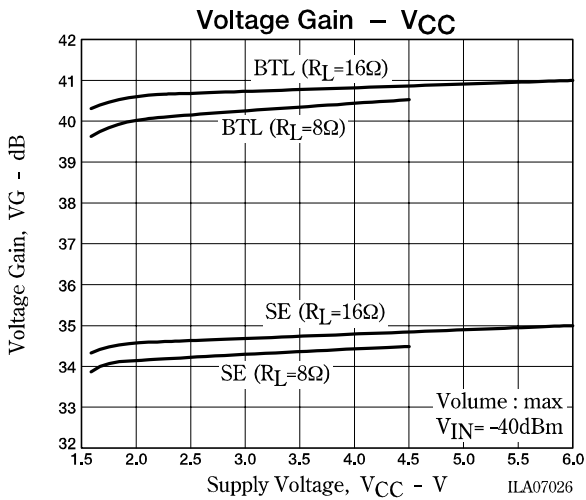
Keeping the IC with its load short-circuited for an extended period of time may cause characteristic deterioration of or fatal damage to the IC. Never short-circuit the load of the IC.

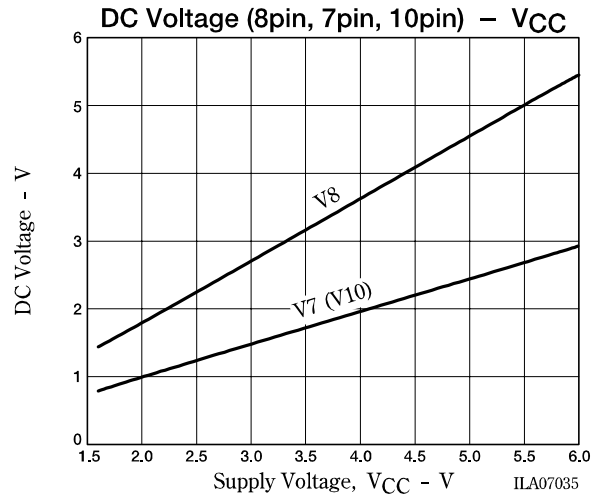
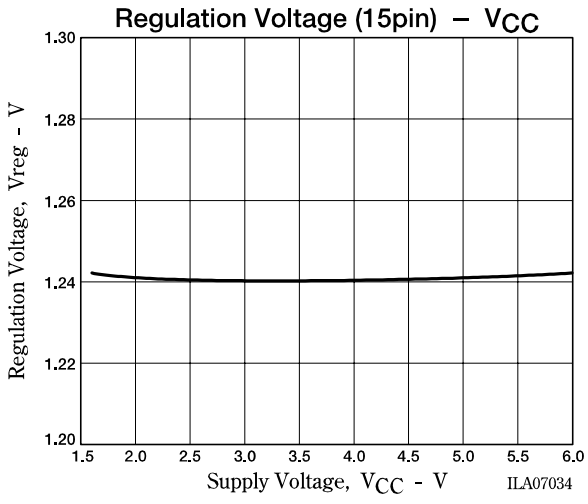
### 8. Maximum ratings

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.



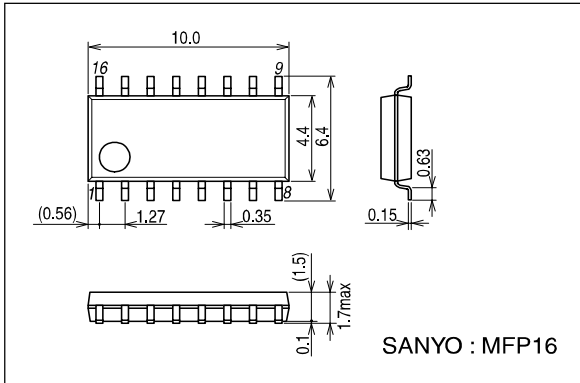






## Package Dimensions

unit : mm  
3035B



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