## Overview

The LA4485 is a 5 W ，two－channel power amplifier IC that requires a minimum of external parts，making it ideal for radio cassette players and car stereo equipment．

The LA4485 eliminates the need for bootstrap capacitors， negative feedback capacitors，and oscillation prevention CR parts，all of which were necessities for power ICs previously． All of these functions are now on chip，keeping the number of external parts to an absolute minimum．The LA4485 is part of the Power（Stylish Power）Series，and supports two modes： dual and BTL．

## Features

－ $5 \mathrm{~W} \times 2$ output power in dual mode，and 15 W in BTL mode
－Minimum external parts for the Power Series count： 4 or 5 parts in dual mode； 3 or 4 parts in BTL mode
－Protection circuits
Overvoltage protection
Thermal protection
DC output short－circuit protection（to $\mathrm{V}_{\mathrm{CC}}$ and to GND）
－Circuitry designed to handle $+\mathrm{V}_{\mathrm{CC}}$ applied to the outputs
－Pop noise reduction
－Standby switch
－Muting function

## Package Dimensions

unit ：mm

## 3107－SIP13H



## Specifications

## Maximum Ratings at $\mathbf{T a}=25^{\circ} \mathrm{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
| :--- | :---: | :--- | :---: | :---: |
| Maximum supply voltage | $\mathrm{V}_{\text {CC }}$ max | No signal | 24 | V |
| Surge supply voltage | $\mathrm{V}_{\text {CC }}$ surge $*$ | Based on the JASO standard | 50 | V |
| Peak output current | $\mathrm{I}_{\text {O }}$ peak | Per channel | 3.3 | A |
| Allowable power dissipation | Pd max | With infinite heat sink | 15 | W |
| Operating temperature | Topr |  | -30 to +80 | ${ }^{\circ} \mathrm{C}$ |
| Storage temperature | Tstg |  | -40 to +150 | ${ }^{\circ} \mathrm{C}$ |

＊：By the $\pi$ type B check point method．
Operating Conditions at $\mathbf{T a}=25^{\circ} \mathrm{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
| :--- | :---: | :--- | :---: | :---: |
| Recommended supply voltage | $\mathrm{V}_{\mathrm{CC}}$ |  | 13.2 | V |
| Supply voltage range | $\mathrm{V}_{\mathrm{CC}}$ op | Must not be over package Pd | 7.5 to 18 | V |
| Recommended load resistance range <br>  | $\mathrm{R}_{\mathrm{L}}$ | Dual | BTL | 2 to 8 |

## LA4485

Operating Characteristics at $\mathrm{Ta}=25^{\circ} \mathrm{C}, \mathrm{V}_{\mathrm{CC}}=\mathbf{1 3 . 2} \mathrm{V}, \mathrm{R}_{\mathrm{L}}=4 \Omega, \mathbf{R g}=\mathbf{6 0 0} \Omega, \mathrm{f}=1 \mathrm{kHz}$, Dual

| Parameter | Symbol | Conditions | min | typ | max | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Standby current | Ist | Pin 9 to GND, Standby switch OFF |  |  | 10 | $\mu \mathrm{A}$ |
| Quiescent supply current | ICCO | $\mathrm{Rg}=0$ | 40 | 80 | 160 | mA |
| Voltage gain | VG1 | Dual: $\mathrm{V}_{\mathrm{O}}=0 \mathrm{dBm}$ | 43 | 45 | 47 | dB |
|  | VG2 | BTL: $\mathrm{V}_{\mathrm{O}}=0 \mathrm{dBm}$ |  | 51 |  | dB |
| Output power | $\mathrm{P}_{\mathrm{O}}{ }^{*}$ | Dual: THD = 10\% | 4 | 5 |  | W |
|  | $\mathrm{P}_{\mathrm{O}} 2$ | BTL: THD $=10 \%$ | 11 | 15 |  | W |
| Total harmonic distortion | THD | $\mathrm{P}_{\mathrm{O}}=1 \mathrm{~W}$ |  | 0.15 | 0.8 | \% |
| Channel separation | CH sep | $\mathrm{V}_{\mathrm{O}}=0 \mathrm{dBm}, \mathrm{Rg}=0$ | 45 | 55 |  | dB |
| Output noise voltage | $\mathrm{V}_{\mathrm{NO}}$ | $\mathrm{Rg}=0,20 \mathrm{~Hz}$ to 20 kHz bandpass filter |  | 0.15 | 0.5 | mV |
| Ripple rejection ratio | SVRR | $\mathrm{Rg}=0,20 \mathrm{~Hz}$ to 20 kHz bandpass filter, $\mathrm{f}_{\mathrm{R}}=100 \mathrm{~Hz}, \mathrm{~V}_{\mathrm{R}}=0 \mathrm{dBm}$, decoupling capacitor connected | 40 | 50 |  | dB |

*: $\mathrm{P}_{\mathrm{O}} 1=6 \mathrm{~W}(\mathrm{typ})$ when $\mathrm{V}_{\mathrm{CC}}=14.4 \mathrm{~V}$
Voff $\pm 250 \mathrm{mV}$ for BTL-mode


Equivalent Circuit Block Diagram


## LA4485

## Recommended LA4485 External Parts Arrangement (Dual-mode)



## IC Usage Notes

## Maximum ratings

Care must be taken when operating the LA4485 close to the maximum ratings as small changes in the operating conditions can cause the maximum ratings to be exceeded, thereby breakdown will be caused.

## Printed circuit board connections

Care must be taken when designing the circuit of printed board so as not to form feedback loops, particularly with the small-signal and large-signal ground connections.

## Notes on LA4485 heatsink mounting

1. Mounting torque must be in the range 39 to $59 \mathrm{~N} \cdot \mathrm{~cm}$.
2. The spacing of the tapped holes in the heatsink must match the spacing of the holes in the IC tab.
3. Use screws with heads equivalent to truss head machine screws and binding head machine screws stipulated by JIS for the mounting screws. Furthermore, washers must be used to protect the surface of the IC tab.
4. Make sure that there is no foreign matter, such as cutting debris, between the IC tab and the heatsink. If a heat conducting compound is applied between the contact surfaces, make sure that it is spread uniformly over the entire surface.
5. Because the heatsink mounting tab and the heatsink are at the same electric potential as the chip's GND (large signal GND), care must be taken when mounting the heatsink on more than one device.
6. The heatsink must be mounted before soldering the pins to the PCB.

## Comparison of External Parts Required

| External parts | Existing device | LA4485 |
| :--- | :---: | :---: |
| Output coupling capacitors | Yes | Yes |
| Input coupling capacitors | Yes | Yes |
| Bootstrap capacitors | Yes | No |
| Feedback capacitors | Yes | No |
| Filter capacitor | Yes | Optional |
| Phase compensating capacitor | Yes | No |
| Oscillation-quenching mylar capacitors | Yes | No |
| Oscillation-quenching resistors | Yes | No |
| Others | No | Optional |
| Total (for dual-mode) | 15 to 16 parts | 4 to 6 parts |

## LA4485

Operating Pin Voltages at $\mathbf{V}_{\mathbf{C C}}=13.2 \mathrm{~V}$

| Pin No. | Name | Function | Pin voltage (Reference value) |
| :---: | :--- | :--- | :--- |
| 1 | CH1 IN | Channel 1 input. | $1.4 \mathrm{~V}\left(2 \mathrm{~V}_{\mathrm{BE}}\right)$ |
| 2 | CH2 IN | Channel 2 input. | $1.4 \mathrm{~V}\left(2 \mathrm{~V}_{\mathrm{BE}}\right)$ |
| 3 | SS GND | Small-signal ground | 0 V |
| 4 | BTL IN | BTL-mode feedback input. | 45 mV |
| 5 | BTL OUT | BTL-mode feedback output. | $3.1 \mathrm{~V}\left(\doteqdot 1 / 4 \mathrm{~V}_{\mathrm{CC}}\right)$ |
| 6 | FILTER | Filter capacitor connection. | $6.6 \mathrm{~V}\left(\doteqdot 1 / 2 \mathrm{~V}_{\mathrm{CC}}\right)$ |
| 7 | LS $\mathrm{V}_{\mathrm{CC}}$ | Large-signal supply | $13.2 \mathrm{~V}\left(\mathrm{~V}_{\mathrm{CC}}\right)$ |
| 8 | SS $\mathrm{V}_{\mathrm{CC}}$ | Small-signal supply | $13.2 \mathrm{~V}\left(\mathrm{~V}_{\mathrm{CC}}\right)$ |
| 9 | STANDBY | Standby control input. | 5 V |
| 10 | MUTE | Mute control input. | 0 V |
| 11 | CH2 OUT | Channel 2 output. | 6.3 V |
| 12 | LS GND | Large-signal ground | 0 V |
| 13 | CH1 OUT | Channel 1 output. | 6.3 V |

Note: Each pin is so arranged lest the IC should be broken even if inserted reversely.

## LA4485 Sample Application Circuit





THD - Po

f Response




THD - f


THD - VCC


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$\mathrm{Pd}-\mathrm{P}_{\mathrm{O}}$




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## LA4485


$\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}$, standby supply +5 V ,
$\mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$
Main switch ON/OFF test


Output DC trace

Speaker terminal

$\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}$, standby supply +5 V ,
$\mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$
Standby switch ON/OFF text

$\hookrightarrow$ Switching noise decreases as $\mathrm{C}_{\mathrm{IN}}=0.22 \mu \mathrm{~F}$ (Input) is increased. (ex. $2.2 \mu \mathrm{~F}$ )

$\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}$,
$\mathrm{R}_{\mathrm{L}}=4 \Omega$,
$\mathrm{Rg}=600 \Omega$,
$\mathrm{THD}=10 \%$,
$\mathrm{f}=1 \mathrm{kHz}$
Output DC waveform

## LA4485

## Dual-mode Operation Notes

- Use the input capacitor $\mathrm{C}_{\text {IN }}$ in the range of $0.22 \mu \mathrm{~F}$ to $1.0 \mu \mathrm{~F}$.

| Parameter | $\mathrm{C}_{\mathrm{IN}}=0.22 \mu \mathrm{~F}$ | $\mathrm{C}_{\mathrm{IN}}=1.0 \mu \mathrm{~F}$ |
| :--- | :---: | :---: |
| Start-up time (ts) | 0.15 s | 0.25 s |
| Attack noise when using the muting function | Somewhat noticeable | Good |

Speaker turn-ON transient noise increased significantly when $\mathrm{C}_{\text {IN }}$ is $2.2 \mu \mathrm{~F}$ or greater.

- The DC (filter) capacitor should be $100 \mu \mathrm{~F}$ or greater

| Parameter | $100 \mu \mathrm{~F}$ or less | $100 \mu \mathrm{~F}$ or more |
| :--- | :---: | :---: |
| Standby-off output capacitor <br> discharge circuit | $* 1$. Does not operate. <br> Repeated on/off: poor | $* 2$. Operates normally. <br> On/off: good |
| Ripple rejection ratio (SVRR) | Somewhat worse <br> 40 dB | Good <br> 50 dB |
| $\mathrm{V}_{\mathrm{N}}$ rise rate when main or <br> standby is turned "on" | Fast | Slow |

Note:
*1. Slow as a result of natural discharge.
*2. Approximately 0.3 seconds as a result of forced discharge.

- Use the standby supply capacitor in the range of $0.22 \mu \mathrm{~F}$ to $0.47 \mu \mathrm{~F}$.

The $\mathrm{V}_{\mathrm{N}}$ trace for standby OFF changes and speaker turn-ON transient noise is increased significantly when the capacitor is $1 \mu \mathrm{~F}$ or greater. If the standby function is not used, this capacitor must be removed and pin 9 must be pulled up to the power supply.

- The output capacitor's recommended value for $\mathrm{C}_{\mathrm{O}}$ is $1,000 \mu \mathrm{~F}$.

Smaller capacitance will worsen the roll-off frequency $f_{L}$ and $P_{O}$ in a low range.

- The recommended power supply capacitor is approximately $2,200 \mu \mathrm{~F}$, but other capacitors than $2,200 \mu \mathrm{~F}$ can be used according to the application's design.
Using a capacitor with this value, the load on the supply can be as high as $56 \Omega$ while still providing good supply stability during momentary supply glitches. Note that using a $0.15 \mu \mathrm{~F}$ capacitor can cause oscillations if the supply impedance increases. (Example: Mild oscillation results if the power supply capacitor is open.)
- STANDBY pin 9 IC internal circuit

- MUTE pin 10 IC internal circuit



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- Input pin 1/2 IC internal circuit

- Output pin 11/13 IC internal circuit

- The minimum configuration for dual-mode operation



## LA4485

- Insert capacitors of 1000 pF between each input and ground to prevent external noise.
- When the load $\left(\mathrm{R}_{\mathrm{L}}\right)$ or the supply voltage $\left(\mathrm{V}_{\mathrm{CC}}\right)$ is increased, turning the standby switch or the main switch on under strong input conditions will activate the IC's internal pseudo ASO protection circuit for the upper power transistor $\left(\mathrm{V}_{\mathrm{CE}} \times \mathrm{I}_{\mathrm{CP}}\right)$. This causes output oscillations or intermittent operation (The reference area is shown in Figure 1 below). However, strong input tests after the bias has stabilized have no problems. They also protect the upper power transistors close to the limits of ASO when all signal switches are on. Therefore, when using this IC under these conditions, the circuit design should obey the following condition:

Signal generation time > Start-up time of the power amplifier IC
or some other method of attaining the zero-volume condition should be adopted.

- An undervoltage protection circuit operates when the voltage is 7.5 V or lower.

This figure shows the pseudo ASO protection area when strong signal is input, and switch is ON: the upper power transistors have an area where $\mathrm{V}_{\mathrm{CE}} \times \mathrm{I}_{\mathrm{CP}}$ load is caused.


Strong signal input after switch-ON is OK.
In BTL-mode operation, the load is $\mathrm{R}_{\mathrm{L}} \times 2$

Figure 1
i) The operating condiations for the PHOTO-1 series in dual mode are $\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=2 \Omega, \mathrm{f}=1 \mathrm{kHz}, \mathrm{V}_{\mathrm{IN}}=50 \mathrm{mV}$ and standby switch ON.
"X-Y path observed within the normal area": checking each channel


Figure 2

## LA4485

ii) The operating conditions for the PHOTO-2 in dual mode are $\mathrm{V}_{\mathrm{CC}}=15 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=3 \Omega, \mathrm{f}=1 \mathrm{kHz}, \mathrm{V}_{\mathrm{IN}}=100 \mathrm{mV}$ and standby switch ON.
"X-Y path observed within the normal area"


Figure 3

## LA4485

LA4485, BTL Sample Application Circuit




$\mathrm{Pd}-\mathrm{P}_{\mathrm{O}}$



## LA4485


$\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}$, standby +5 V ,
$\mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$
Main switch ON/OFF test

$\mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$
Noninverting
nverting




BTL
$\mathrm{V}_{\mathrm{CC}}=13.2 \mathrm{~V}$,
$\mathrm{R}_{\mathrm{L}}=4 \Omega$,
$\operatorname{Rg}=600 \Omega$,
$\mathrm{THD}=10 \%$,
$\mathrm{f}=1 \mathrm{kHz}$
Output DC waveform

## LA4485

## BTL-mode Operation Notes

In BTL mode, channel 1 should be non-inverted and channel 2 should be inverted.

- Use the input capacitor $\mathrm{C}_{\mathrm{IN}}$ in the range $0.22 \mu \mathrm{~F}$ to $2.2 \mu \mathrm{~F}$.
- Use the standby supply capacitor in the range $0.22 \mu \mathrm{~F}$ to $1.0 \mu \mathrm{~F}$. When the capacitor is $2.2 \mu \mathrm{~F}$ or more, the $\mathrm{V}_{\mathrm{N}}$ trace for standby-off changes, and the switching noise increases significantly.
- The recommended DC (filter) capacitor is $100 \mu \mathrm{~F}$ or greater.
- The BTL-mode coupling capacitor should be $2.2 \mu \mathrm{~F}$.

When this capacitor is decreased, the output power is decreased. However, when this capacitor is increased, speaker turn-ON transient noise is increased significantly.

- In BTL mode, the ripple rejection ratio (SVRR) is approximately 40 dB .

This is because the output ripple portion of the noninverted side penetrates the BTL coupling end, so that ripple on the inverted side is large. The following method is described as one external measure:


This measure yields an SVRR of approximately 50 dB . Note that the Rx loss voltage is approximately 1 V , and the $\mathrm{P}_{\mathrm{O}}$ loss is about 1.0 to 1.5 W (to the 15 W level).

- Example of minimum parts for BTL operation


Dual-mode short-circuit test circuit

(1) Load short-circuit (to ground)
(2) Output-to-supply short-circuit
(3) Output-to-ground short-ciruit

## LA4485

- Taking BTL coupling into consideration, the output-to-supply/output-to-ground protector is two-sided in order to protect both the IC and the speaker.


## Short-circuit to GND protection



When using this method (simultaneously shorting the outputs to supply and to ground)
In BTL mode, the IC protection function works even in noninverted output $\rightarrow$ output-to-supply mode, inverted output $\rightarrow$ output-to-ground mode. (The reverse is also OK.)

## Reference Value

(a) Short-circuit test for dual-mode operation after the main and standby switches are turned ON.

Conditions: (1) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega$ and $\mathrm{P}_{\mathrm{O}}=1$ to 5 W (variable) for load short-circuit
(2) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$ (no signal) for output-to-supply short-circuit
(3) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$ (no signal) for output-to-ground short-circuit.

Z: impedance $\bigcirc$ : no device breakdown

| (1) Load short-circuit | (2) Output-to-supply short-circuit |  |  | (3) Output-to-ground short-circuit |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | One-time test |  | Repeated switching test |  | One-time test |  | Repeated switching test |  |
|  | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |

(b) Short-circuit test for dual-mode operation (opposite flow of (a)) after the main and standby switches are turned ON.

Conditions: same as (a) $\bigcirc$ : No device breakdown

| (1) Load short-circuit | (2) Output-to-supply short-circuit |  |  | (3) Output-to-ground short-circuit |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | One-time test |  | Repeated switching test |  | One-time test |  | Repeated switching test |  |
|  | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |

(Note) Shorting the outputs to ground when muting is active can result in device breakdown.

- BTL-mode short-circuit test circuit



## LA4485

## Reference Value

(a) Short-circuit test for BTL-mode operation after the main and standby switches are turned ON.

Conditions: (1) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega$ and $\mathrm{P}_{\mathrm{O}}=1$ to 15 W (variable) for load short-circuit
(2) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$ (no signal) for output-to-supply short-circuit
(3) $\mathrm{V}_{\mathrm{CC}}=10$ to $16 \mathrm{~V}, \mathrm{R}_{\mathrm{L}}=4 \Omega, \mathrm{Rg}=0$ (no signal) for output-to-ground short-circuit.

Z: impedance $\bigcirc$ : no device breakdown

| (1) Load short-circuit | (2) Output-to-supply short-circuit |  |  |  | (3) Output-to-ground short-circuit |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | One-time test |  | Repeated switching test |  | One-time test |  | Repeated switching test |  |
|  | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $Z=0$ | $\mathrm{Z}=0.5 \Omega$ | $Z=0$ | $\mathrm{Z}=0.5 \Omega$ | $Z=0$ | $\mathrm{Z}=0.5 \Omega$ |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |

(b) Short-circuit test for BTL-mode operation (opposite flow of (a)) after the main and standby switches are turned ON.

Conditions: same as (a) $\bigcirc$ : No device breakdown

| (1) Load short-circuit | (2) Output-to-supply short-circuit |  |  | (3) Output-to-ground short-circuit |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | One-time test |  | Repeated switching test |  | One-time test |  | Repeated switching test |  |
|  | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ | $\mathrm{Z}=0$ | $\mathrm{Z}=0.5 \Omega$ |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |

(Note) Shorting the outputs to ground when muting is active can result in device breakdown.

- Power supply positive surge


The power supply line positive surge breakdown margin has been increased by using the built-in overvoltage protection circuits $\left(\mathrm{V}_{\mathrm{CCX}}=28 \mathrm{~V}\right)$ to cut off all bias circuits/change the base-emitter reverse of the output stage. In other words, the breakdown margin is being raised by changing output stage groups that operate as the $\mathrm{V}_{\mathrm{CEO}}\left(\mathrm{V}_{\mathrm{CER}}\right)$ type to the $\mathrm{V}_{\mathrm{CES}}\left(\mathrm{V}_{\mathrm{CBO}}\right)$ type.

## LA4485

- Test of application of $+\mathrm{V}_{\mathrm{CC}}$ to output pins

If the power supply pin is floating under the power supply capacitor insertion conditions, and $+\mathrm{V}_{\mathrm{CC}}$ comes into contact with output lines (a) and (b) as shown in the diagram above, the IC's internal upper power transistor will generally be damaged. The LA4485 has a protective bypass circuit on chip. However, it is dangerous if the power supply capacitor is greater than $2200 \mu \mathrm{~F}$.


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