



SANYO Semiconductors

DATA SHEET

LA6541D — Monolithic Linear IC For Compact Discs 4-Channel Bridge Driver

Overview

The LA6541D is a 4-channel bridge (BTL) driver for CD players.

Features

- 4-channel bridge (BTL) power amplifier.
- I_O max 700mA.
- With mute circuit (Affects all amplifier outputs, Amp 1 to Amp 8).
(When the mute voltage is low, the outputs turn off ; when the mute voltage is high, the outputs turn on).
- 5.0V regulator built-in (Uses external PNP transistor).
- Reset circuit built-in (The reset output delay time can be adjusted through an external capacitor).

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		14	V
Maximum input voltage	V_{IN}		13	V
Mute pin voltage	V_{Mute}		13	V
Allowable power dissipation	P_d max	Mounted on the specified board *	2.5	W
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Specified board : 76.2mm × 114.3mm × 1.5mm, glass epoxy board

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

Parameter	Symbol	Conditions	Ratings	Unit
Operating voltage	V_{CC}		5.6 to 13	V
Reset output source current	I_{ORH}		0 to 200	μA
Reset output sink current	I_{ORL}		0 to 2	mA

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LA6541D

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 8.0\text{V}$, $V_{REF} = 4\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
No-load current drain	I_{CC1}	When all amplifier outputs are on (Mute high)		20	40	mA
	I_{CC2}	When all amplifier outputs are off (Mute low)		15	35	mA
Output offset voltage	V_{OF1}	Amplifiers 1 to 2 (V_{O1} to V_{O2}), Amplifiers 3 to 4 (V_{O3} to V_{O4})	-50		+50	mV
	V_{OF2}	Amplifiers 5 to 6 (V_{O5} to V_{O6}), Amplifiers 7 to 8 (V_{O7} to V_{O8})	-50		+50	mV
Buffer input voltage range	V_{BIN}		1.5		$V_{CC}-1.5$	V
Input voltage range	V_{IN}		1.0		$V_{CC}-1.5$	V
Output source voltage	V_{O1}	Note 1, when $R_L = 8.0\Omega$	5.0	5.6		V
Output sink voltage	V_{O2}	Note 2, when $R_L = 8.0\Omega$		1.8	2.4	V
Closed-circuit voltage gain	VG	Between bridge amplifier		9		dB
Slew rate	SR			0.15		V/ μs
Mute on voltage	V_{Mute}	Note 3		1.2		V
Power supply (with 2SK632K connected externally)						
Output voltage	V_{OUT1}	$I_O = 200\text{mA}$	4.75	5.0	5.25	V
Line regulation	ΔV_{OLN1}	$5.6 \leq V_{IN1} \leq 12\text{V}$		20	100	mV
Load regulation	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 200\text{mA}$		50	150	mV
Reset						
High reset output voltage	V_{ORH}	$I_{ORH} = 200\mu\text{A}$, Cd pin open	4.73	4.98	5.23	V
Low reset output voltage	V_{ORL}	$I_{SRL} = 2\text{mA}$, Cd is shorted to GND		100	200	mV
Reset threshold voltage	V_{RT}	Note 4		4.3		V
Reset hysteresis voltage	V_{hys}	Note 5	40	100	200	mV
Reset output delay time	t_d	$C_d = 0.1\mu\text{F}$		10		ms

Note : 1. Source voltage to ground when an 8Ω load is connected between bridge amplifier outputs.

2. Sink voltage to ground when an 8Ω load is connected between bridge amplifier outputs.

3. When the mute signal is high, all amplifier outputs turn on, and when low, all amplifier outputs turn off. When the mute signal is low, amplifier output is undefined.

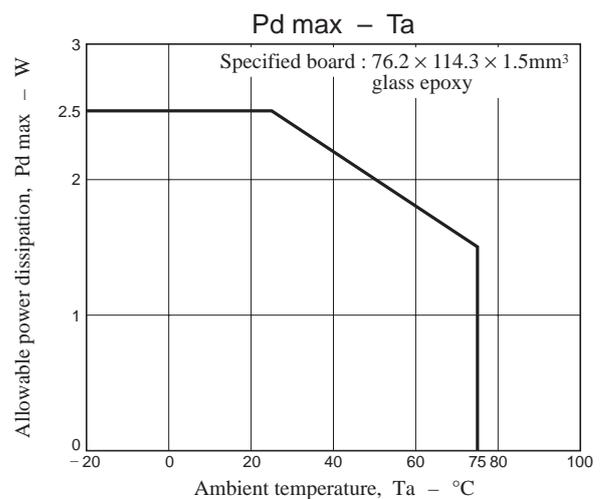
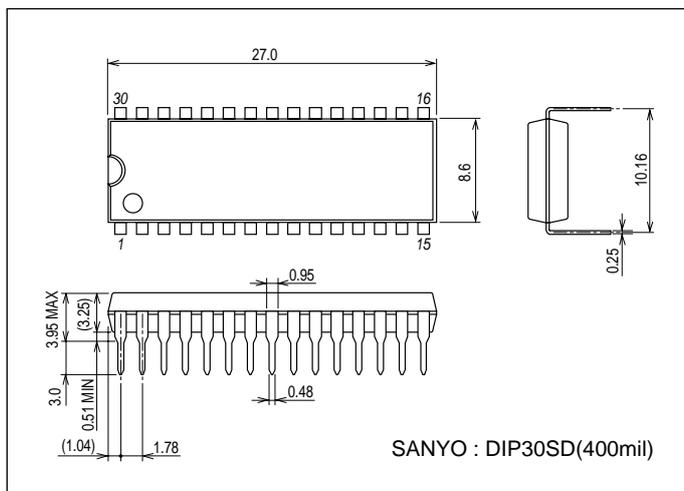
4. 5V supply voltage when the reset output goes low.

5. Potential difference from the 5V supply voltage when the reset output goes low and when it goes high.

Package Dimensions

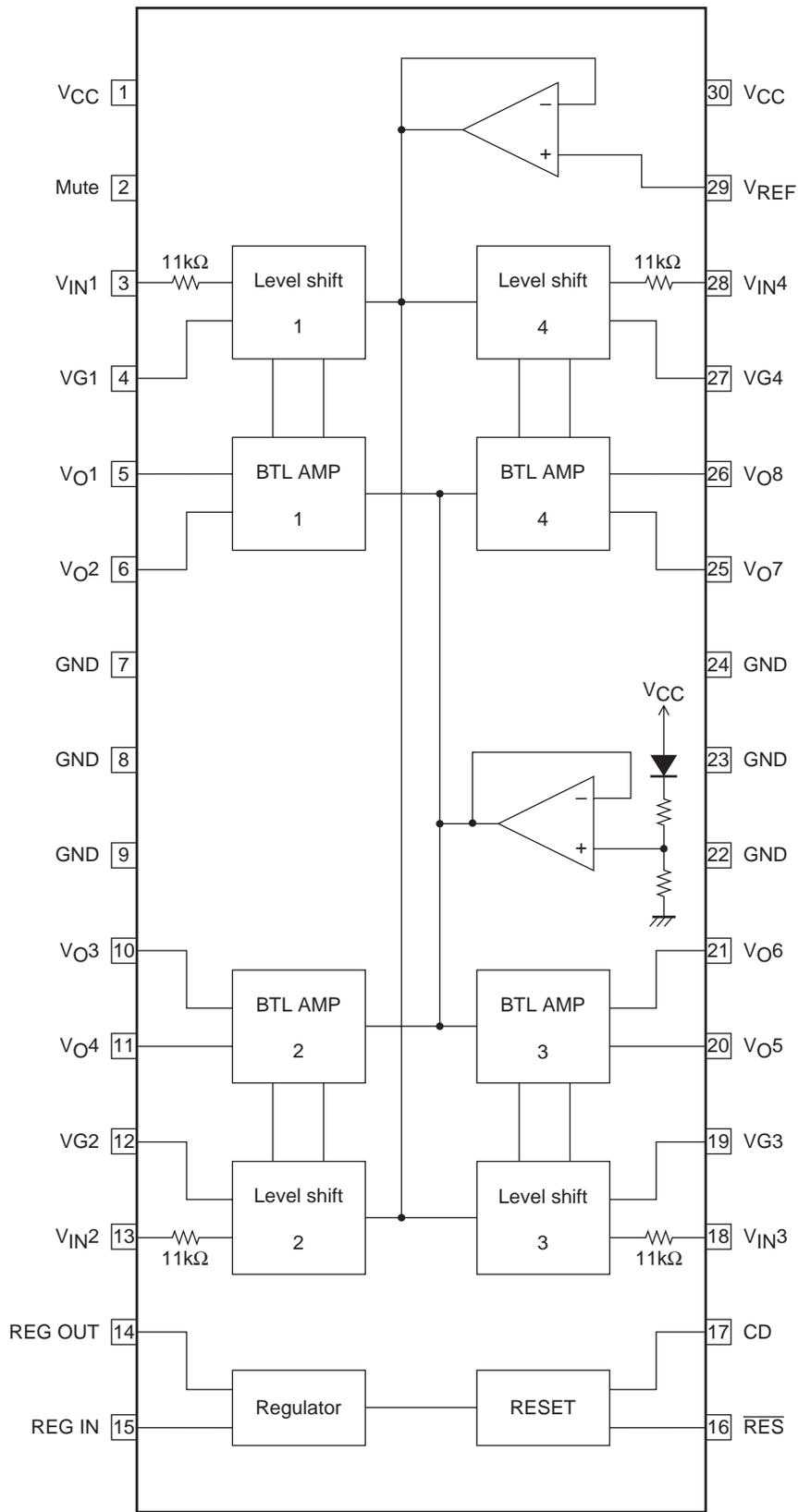
unit : mm (typ)

3196A



LA6541D

Pin Assignment and Block Diagram



Top view

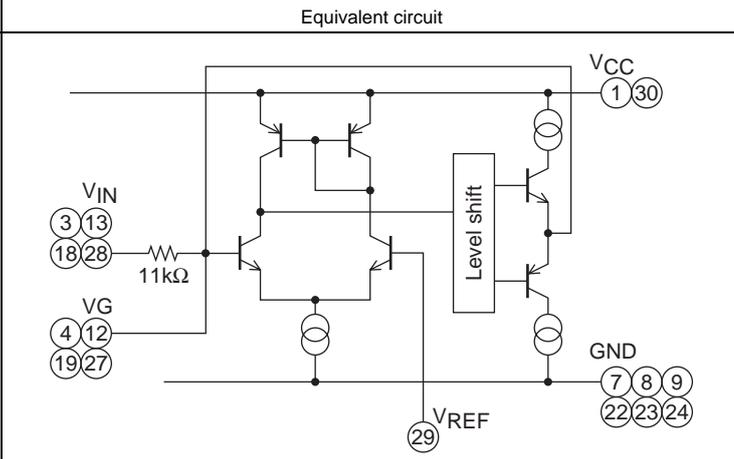
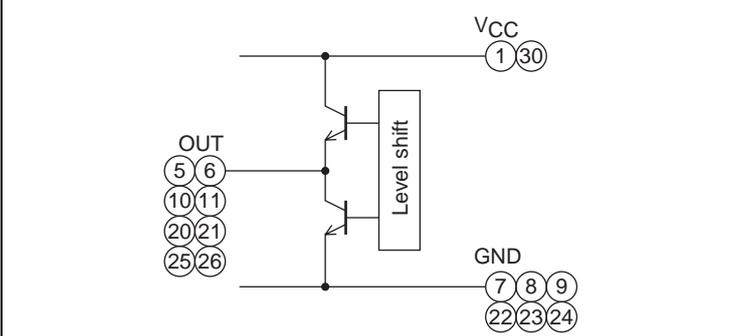
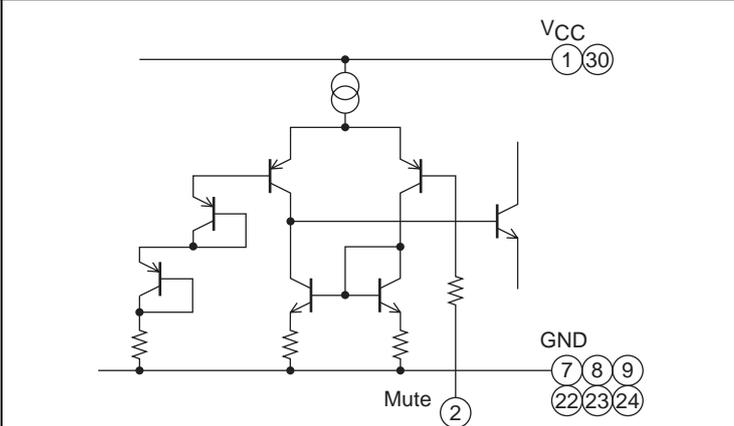
LA6541D

Pin Functions

Pin No.	Pin Name	Description
1	V _{CC}	Power supply (shorted with pin 30)
2	Mute	ON/OFF control for all BTL amplifier outputs
3	V _{IN1}	BTL amplifier 1 input
4	VG1	BTL amplifier 1 input pin (for gain control)
5	V _{O1}	BTL amplifier 1 output (non-inverting side)
6	V _{O2}	BTL amplifier 1 output (inverting side)
7	GND	GND (minimum electric potential)
8	GND	GND (minimum electric potential)
9	GND	GND (minimum electric potential)
10	V _{O3}	BTL amplifier 2 output pin (inverting side)
11	V _{O4}	BTL amplifier 2 output pin (non-inverting side)
12	VG2	BTL amplifier 2 input pin (for gain control)
13	V _{IN2}	BTL amplifier 2 input
14	REG OUT	Connection for collector of external transistor (PNP) ; 5V supply output
15	REG IN	Connection for base of external transistor (PNP)
16	$\overline{\text{RES}}$	Reset output
17	CD	Reset output delay time setting (with capacitor)
18	V _{IN3}	BTL amplifier 3 input
19	VG3	BTL amplifier 3 input (for gain control)
20	V _{O5}	BTL amplifier 3 output (non-inverting side)
21	V _{O6}	BTL amplifier 3 output (inverting side)
22	GND	GND (minimum electric potential)
23	GND	GND (minimum electric potential)
24	GND	GND (minimum electric potential)
25	V _{O7}	BTL amplifier 4 output (inverting side)
26	V _{O8}	BTL amplifier 4 outputn (non-inverting side)
27	VG4	BTL amplifier 4 input (for gain control)
28	V _{IN4}	BTL amplifier 4 input
29	V _{REF}	Reference voltage input for level shift circuit
30	V _{CC}	Power supply (shorted with pin 1)

LA6541D

Pin Description

Pin No.	Pin Name	Function	Description	Equivalent circuit
3 13 18 28 4 12 19 27	V _{IN1} V _{IN2} V _{IN3} V _{IN4} V _{G1} V _{G2} V _{G3} V _{G4}	Input	Each input pins	
5, 6 10, 11 20, 21 25, 26	V _{O1} , V _{O2} V _{O3} , V _{O4} V _{O5} , V _{O6} V _{O7} , V _{O8}	Output	Each output pins	
2	Mute	Mute	Output ON/OFF	

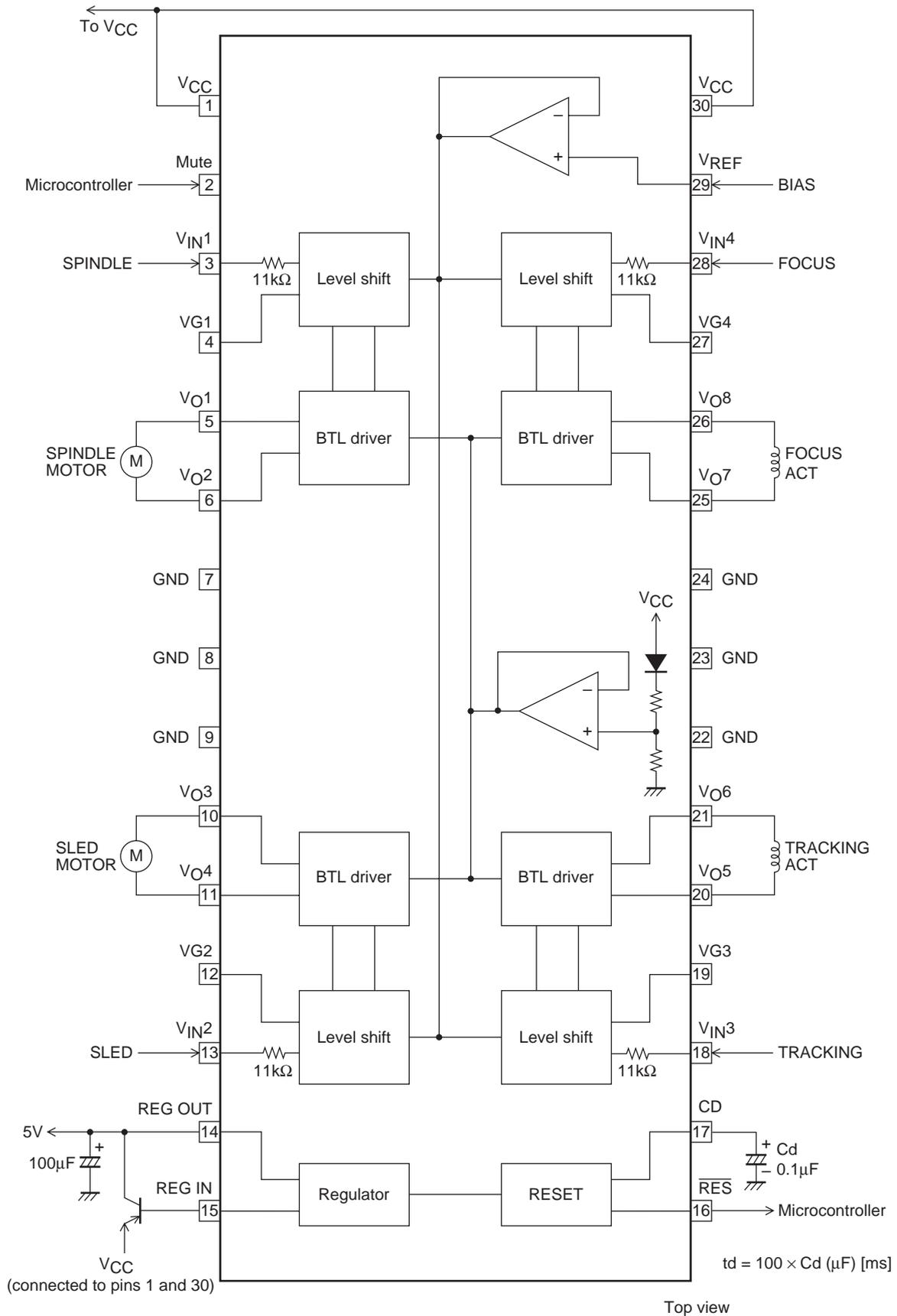
Truth Table

Input	MUTE	CH1		CH2		CH3		CH4	
		V _{O1} (Amp 1)	V _{O2} (Amp 2)	V _{O3} (Amp 3)	V _{O4} (Amp 4)	V _{O5} (Amp 5)	V _{O6} (Amp 6)	V _{O7} (Amp 7)	V _{O8} (Amp 8)
H	H	H	L	L	H	H	L	L	H
	L	-	-	-	-	-	-	-	-
L	H	L	H	H	L	L	H	H	L
	L	-	-	-	-	-	-	-	-

* The "-" symbol means "undefined."

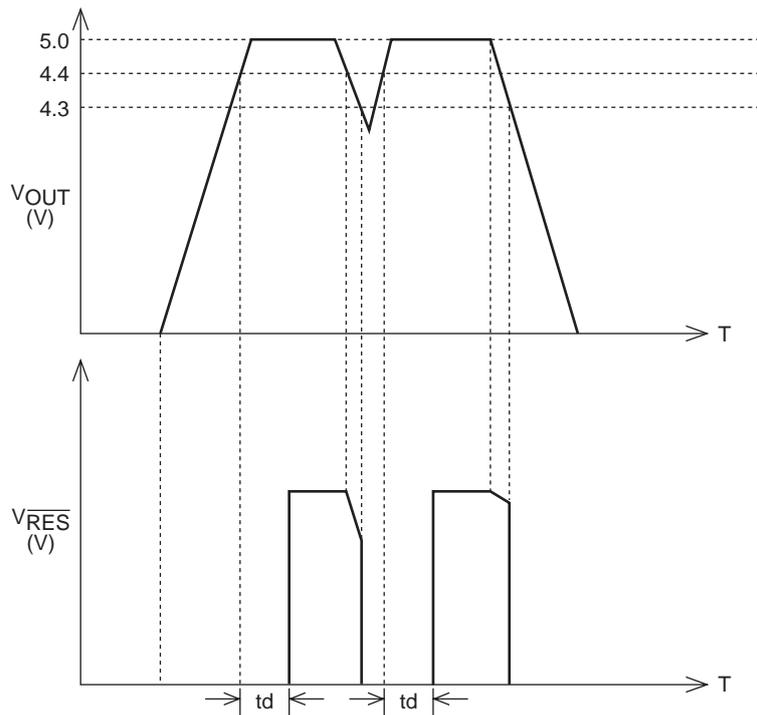
LA6541D

Sample Application Circuit



Note : Use a delay capacitor (Cd) whose capacitance does not change much according to the temperature.

Reset Operation



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