



LA6544M

Four-Channel Bridge (BTL) Driver for CD-ROM

Overview

The LA6544M is a 4-channel bridge (BTL) driver developed for use in CD-ROM systems.

Functions

- Bridge connected (BTL) four-channel power amplifier
- V_{CE} (residual voltage) minimized (channels 1 to 3) by using two power supplies.
- I_{Omax} : 1.0 A
- Muting circuit provided (output on/off control)

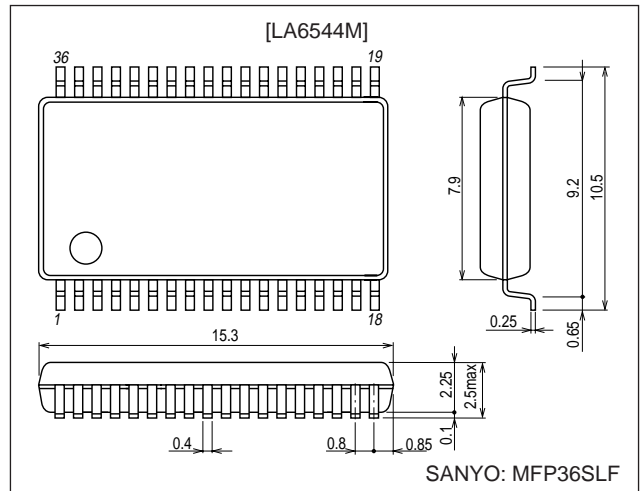
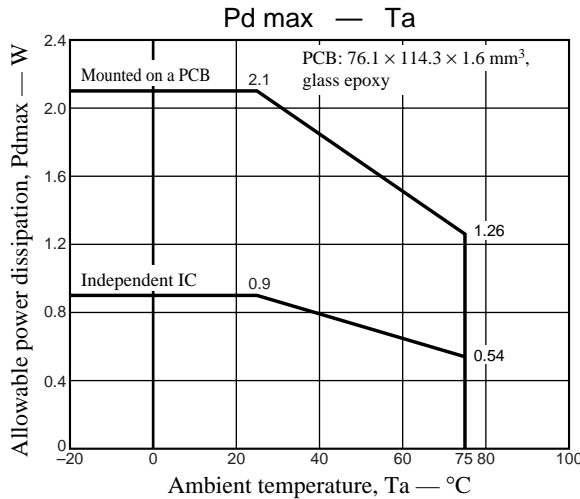
(MUTE pin: low for output off, high for output on.
MUTE1: controls channel 1, MUTE2: controls channels 2, 3, and 4.)

- Thermal protection (shutdown) circuit
- Separated output stage power supply (VS1: channels 1, 2, and 3, VS2: channel 4)

Package Dimensions

unit: mm

3129-MFP36SLF



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	$V_{CC\ max}$	$V_{CC} \geq V_{S1, 2}$	14	V
Maximum supply voltage 2	$V_S\ max$	$V_{S1, 2}, V_{CC} \geq V_{S1, 2}$	14	V
Input voltage	$V_{IN\ max}$	Each of the input pins V_{IN1} to V_{IN4}	13	V
MUTE pin voltage	$V_{MUTE\ max}$		13	V
Allowable power dissipation	$P_{d\ max}$	Independent IC	0.9	W
		Mounted on the specified PCB (76.1 x 114.3 x 1.6 mm ³ , glass epoxy)	2.1	W
Operating temperature	T_{opr}		-20 to +75	°C
Storage temperature	T_{stg}		-55 to +150	°C

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LA6544M

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

Parameter	Symbol	Conditions	Ratings	Unit
Operating supply voltage	V_{CC}	$V_{CC} \geq V_{S1, 2}$	4 to 13	V
	$V_{S1, 2}$	V_{S1} and V_{S2} are the output stage power supply. $V_{CC} \geq V_{S1}$ and V_{S2}	4 to 13	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = V_{S2} = 12\text{ V}$, $V_{S1} = 5\text{ V}$, $V_{REF} = 2.5\text{ V}$

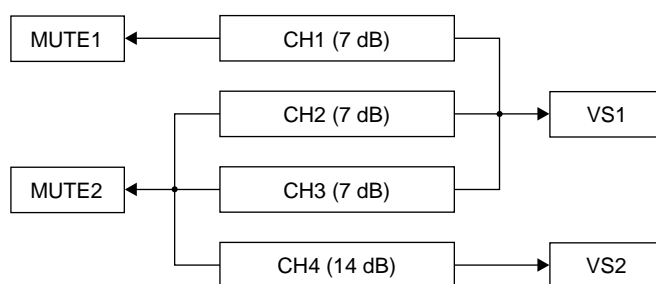
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
V_{CC} no load current drain 1	I_{CC-ON}	Output on (MUTE1 and MUTE2: high), V_{CC}		10	25	mA
V_{CC} no load current drain 2	I_{CC-OFF}	Output off (MUTE1 and MUTE2: low), V_{CC}			4	mA
V_{S1} no load current drain 1	I_{S1-ON}	Output on (MUTE1 and MUTE2: high), V_{S1}		20	35	mA
V_{S1} no load current drain 2	I_{S2-OFF}	Output off (MUTE1 and MUTE2: low), V_{S1}			4	mA
V_{S2} no load current drain 1	I_{S2-ON}	Output on (MUTE1 and MUTE2: high), V_{S2}		5	10	mA
V_{S2} no load current drain 2	I_{S2-OFF}	Output off (MUTE1 and MUTE2: low), V_{S2}			4	mA
Output offset voltage	V_{OF1} to 4	Potential difference between the + and – outputs for each channel	-50		+50	mV
Input voltage range 1	V_{IN1}	Input voltage range for channels 1, 2, and 3	0		V_{S1}	V
Input voltage range 2	V_{IN2}	Input voltage range for channel 4	0		V_{S2}	V
Output voltage 1	VO1	$I_O = 700\text{ mA}$, the difference between the outputs for channels 1, 2, and 3	4	4.5		V
Output voltage 2	VO2	$I_O = 700\text{ mA}$, the difference between the outputs for channel 4	10.5	11		V
Closed circuit voltage gain	VG1	The BTL amplifier voltage gain for channels 1, 2, and 3		7		dB
	VG2	The BTL amplifier voltage gain for channel 4		14		dB
Slew rate	SR	*1		0.5		V/ μs
Muting on voltage	V_{MUTE}	MUTE1 and MUTE2. The voltage at which the output turns on. *2		1.5	2	V

Notes: 1. Design guarantee value.

2. The MUTE1, and MUTE2 pins turn the output on when high and off when low. When the output is off, the outputs will be in the high-impedance state.

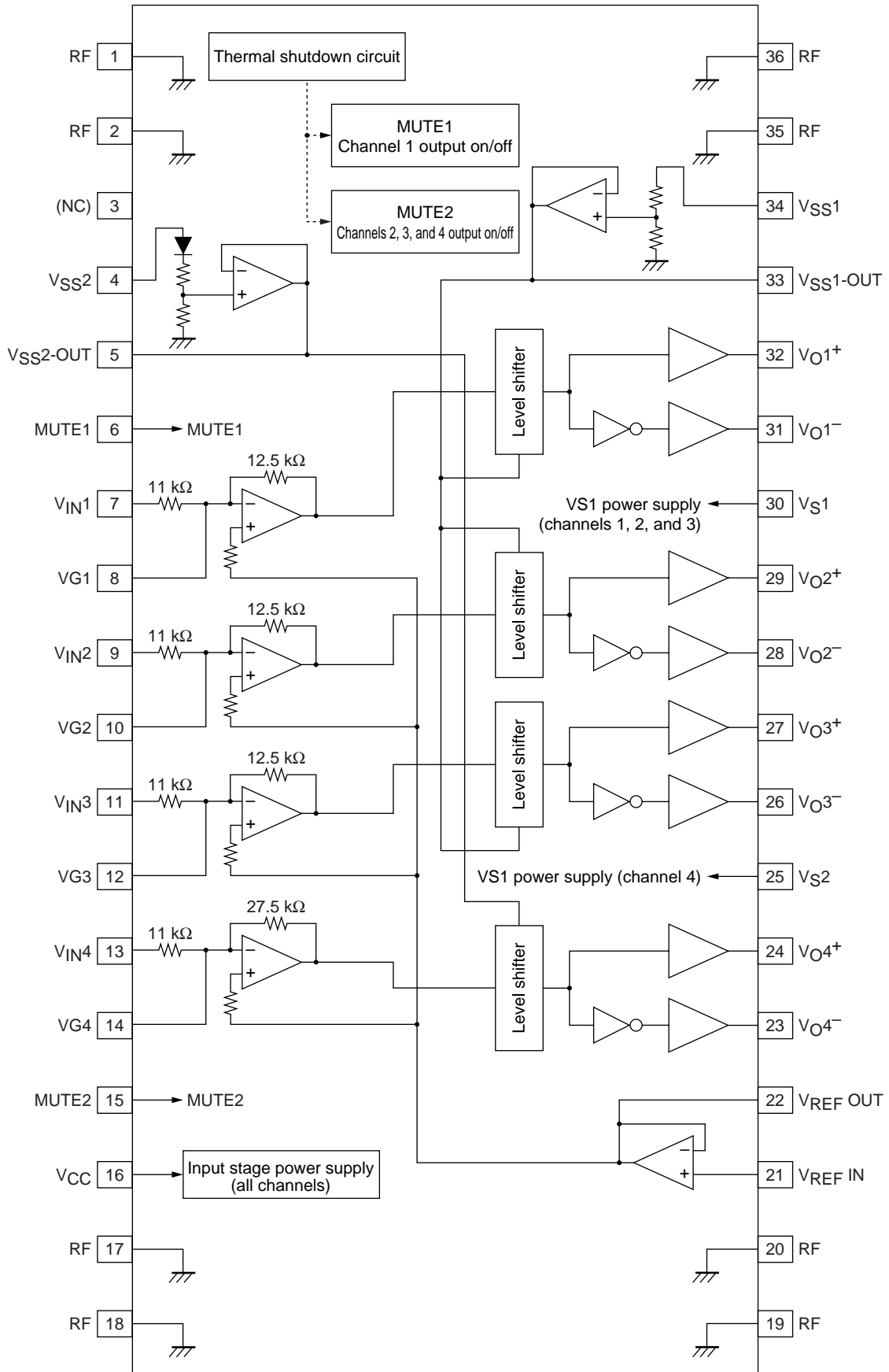
The figure below shows the relationship between the channels and the MUTE pins and between the channels and the power supplies.

System Figure



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Block Diagram and Pin Assignment



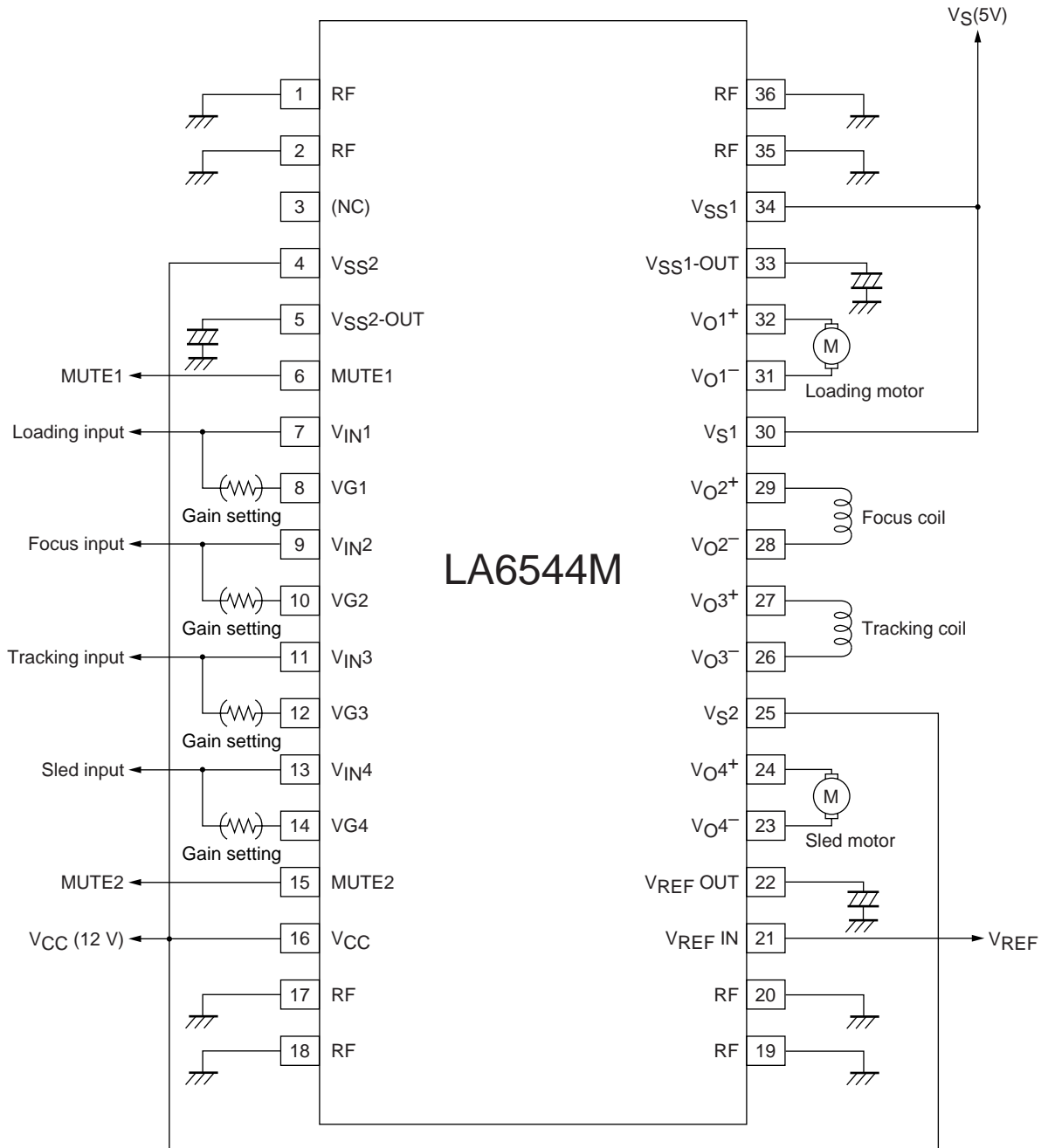
LA6544M

Pin Functions

Pin No.	Pin	Function
1	RF	Substrate (lowest potential)
2	RF	Substrate (lowest potential)
3	(NC)	Unused.
4	V _{SS2}	Connect to V _{S2} .
5	V _{SS2} -OUT	Output stage reference voltage output ((V _{S2} -V _{BE})/2, typical)
6	MUTE1	Channel 1 output on/off control
7	V _{IN1}	Channel 1 input
8	VG1	Channel 1 input (gain adjustment)
9	V _{IN2}	Channel 2 input
10	VG2	Channel 2 input (gain adjustment)
11	V _{IN3}	Channel 3 input
12	VG3	Channel 3 input (gain adjustment)
13	V _{IN4}	Channel 4 input
14	VG4	Channel 4 input (adjustment)
15	MUTE2	Channels 2, 3, and 4 on/off control
16	V _{CC}	Power supply
17	RF	Substrate (lowest potential)
18	RF	Substrate (lowest potential)
19	RF	Substrate (lowest potential)
20	RF	Substrate (lowest potential)
21	V _{REF} IN	Reference voltage input (V _{REF1} buffer amplifier input)
22	V _{REF} OUT	Reference voltage output (V _{REF1} buffer amplifier output)
23	V _{O4-}	Channel 4 inverted output
24	V _{O4+}	Channel 4 noninverted output
25	V _{S2}	Channel 4 output stage power supply
26	V _{O3-}	Channel 3 inverted output
27	V _{O3+}	Channel 3 noninverted output
28	V _{O2-}	Channel 2 inverted output
29	V _{O2+}	Channel 2 noninverted output
30	V _{S1}	Channels 1, 2, and 3 output stage power supply
31	V _{O1-}	Channel 1 inverted output
32	V _{O1+}	Channel 1 noninverted output
33	V _{SS1} -OUT	Output stage reference voltage (Outputs V _{SS2} : typical) (V _{REF2} buffer amplifier output)
34	V _{SS1}	Connect to V _{S1} . (V _{SS1} - OUT is generated by a resistor divider.)
35	RF	Substrate (lowest potential)
36	RF	Substrate (lowest potential)

LA6544M

Sample Application Circuit



A12683

LA6544M

Pin Description

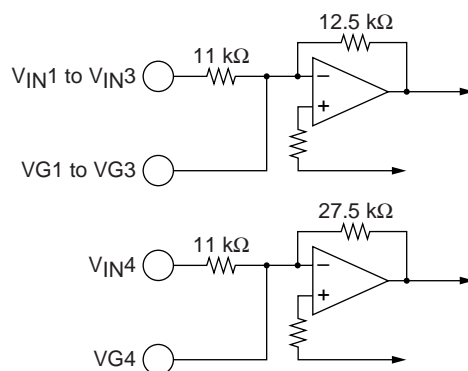
Pin No.	Pin	Symbol	Function	Equivalent circuit
7 8 9 10 11 12 13 14	V_{IN}^* VG^* (Input)	V_{IN1} $VG1$ V_{IN2} $VG2$ V_{IN3} $VG3$ V_{IN4} $VG4$	Inputs for each channel	<p>A12684</p>
32 31 29 28 27 26 24 23	V_O^* (Output)	V_{O1+} V_{O1-} V_{O2+} V_{O2-} V_{O3+} V_{O3-} V_{O4+} V_{O4-}	Outputs for each channel	<p>A12685</p>
6 15	MUTE	MUTE1 MUTE2	Output on/off control	<p>A12686</p>

Gain Setting (Functions of the Input and Gain Adjustment Pins)

The figures present overviews of the V_{IN} and VG pin circuits. (These are the same as the block diagrams.)

1. Consider resistors (11 k Ω , typical) to be inserted between the V_{IN} and VG pins. This should be seen as being the same as the operational amplifier noninverting input (V_{IN}^+).
2. If the VG pins are not used, and only the V_{IN} pins are used, the BTL gain (across the V_{O}^+ and V_{O}^- outputs) will be 7 dB for channels 1, 2, and 3 (amplifier units: 1 dB + BTL: 6 dB) and 14 dB for channel 4 (amplifier units: 8 dB + BTL: 6 dB).

If the V_{IN} pins are not used and 11 k Ω external resistors are attached to the VG pins, input to the opposite ends of those resistors will result in equivalent circuit operation. However, the V_{IN} pins should be used and the gain set to minimize the I/O gain temperature characteristics.



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Offset Voltage

This IC includes built-in level shifting circuits. For input to which V_{REF} is applied as a reference, the output is referenced to the voltage $V_{SS1}/2$ (V) for channels 1, 2, and 3, and the output is referenced to the voltage $(V_{SS2} - V_{BE}(0.7))/2$ (V) for channel 4.

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