



LA6542M

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

Overview

The LA6542M is a 4-channel bridge (BTL) driver developed for CD-ROM applications.

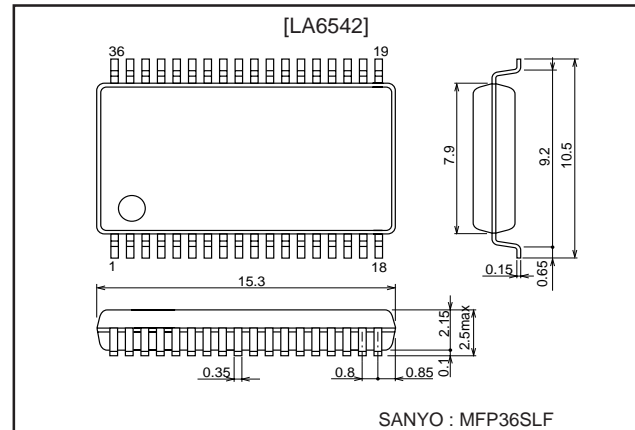
Functions

- 4-channel power amplifier with bridge circuit (BTL)
- I_{Omax} : 1A
- Integrated muting circuit
(MUTE: Output OFF at Low, output ON at High.
MUTE1 is for channels 1 and 2, and MUTE2 for channels 3 and 4.)
- Slew rate 0.5 V/ μ s
- Integrated thermal shutdown circuit

Package Dimensions

unit: mm

3204-MFP36SLF



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	V_{CCmax}		14	V
Maximum supply voltage 2	V_{Smax}	$V_{S1}, 2$	14	V
Maximum input voltage	V_{INmax}	Input pins V_{IN1} to 4	13	V
Mute pin voltage	$V_{MUTEmax}$		13	V
Allowable power dissipation	P_{dmax}	IC only	0.9	W
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operation voltage 1	V_{CC}		4 to 13	V
Recommended operation voltage 2-1	V_{S1}		4 to 13	V
Recommended operation voltage 2-2	V_{S2}		4 to 13	V

* $V_{CC} \geq V_{S1}, 2$

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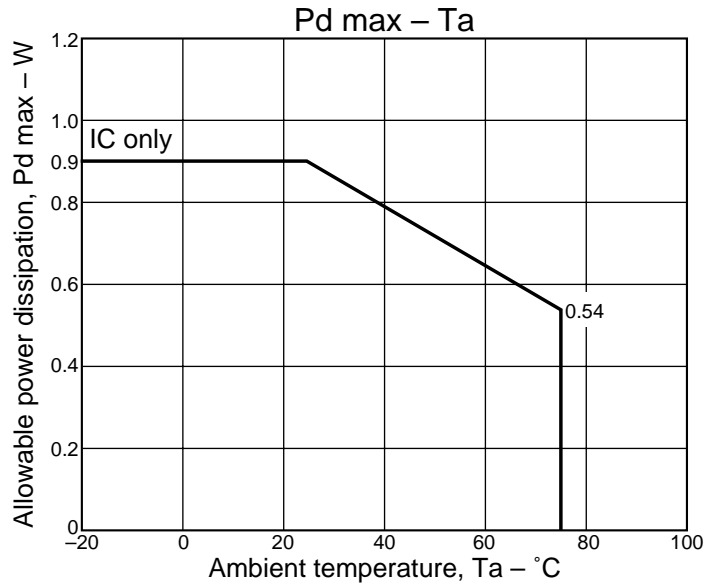
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Electrical Characteristics at $V_{CC} = 12V$, $V_S = 5V$, $T_a = 25^\circ C$

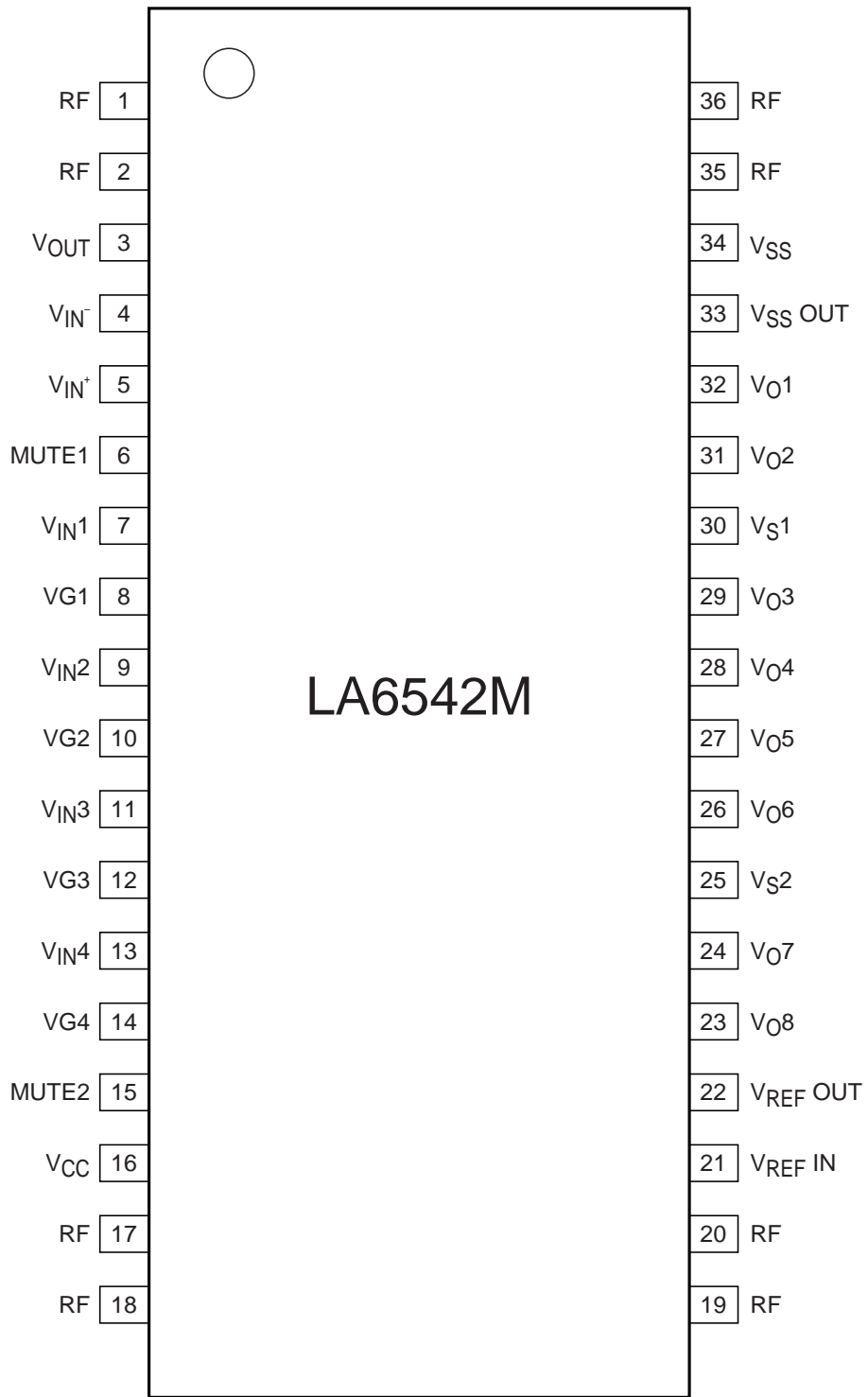
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
V_{CC} no-load current drain	I_{CC1}	All outputs ON (MUTE1, MUTE2: High)	5	10	20	mA
	I_{CC2}	All outputs OFF (MUTE1, MUTE2: Low)		5	10	mA
V_S1 no-load current drain	I_{S1-1}	CH1, 2 ON (MUTE1, MUTE2: High)		10	30	mA
	I_{S1-2}	CH1, 2 OFF (MUTE1, MUTE2: Low)			4	mA
V_S2 no-load current drain	I_{S2-1}	CH3, 4 ON (MUTE1, MUTE2: High)		10	30	mA
	I_{S2-2}	CH3, 4 OFF (MUTE1, MUTE2: Low)			4	mA
Output offset voltage	V_{OF1} to 4	Potential difference between plus and minus outputs for CH1 to CH4	-50		50	mV
Input voltage range	V_{IN}	Input voltage range for V_{IN1} to V_{IN4}	0.5		5	V
Output voltage (source) (sink)	V_{source}	Plus and minus outputs at high level	4.4	4.7		V
		$I_O = 700$ mA				
	V_{sink}	Plus and minus outputs at low level		0.3	0.6	V
		$I_O = 700$ mA				
Closed circuit voltage gain	VG	Voltage gain between BTL amplifiers		6		dB
Slew rate	SR	(Note 1)		0.5		V/ μ s
Mute ON voltage	V_{MUTE}	MUTE1, MUTE2 voltage when output is ON (Note 2)		1.5	2	V
Mute ON current	I_{MUTE}	MUTE1, MUTE2 current when output is ON (Note 2)		6	10	μ A

Note 1: Guaranteed design value

Note 2: MUTE works on all channels. At High, amplifier output is ON and at Low amplifier output is OFF (output impedance becomes HI).



Pin Assignment



Top view

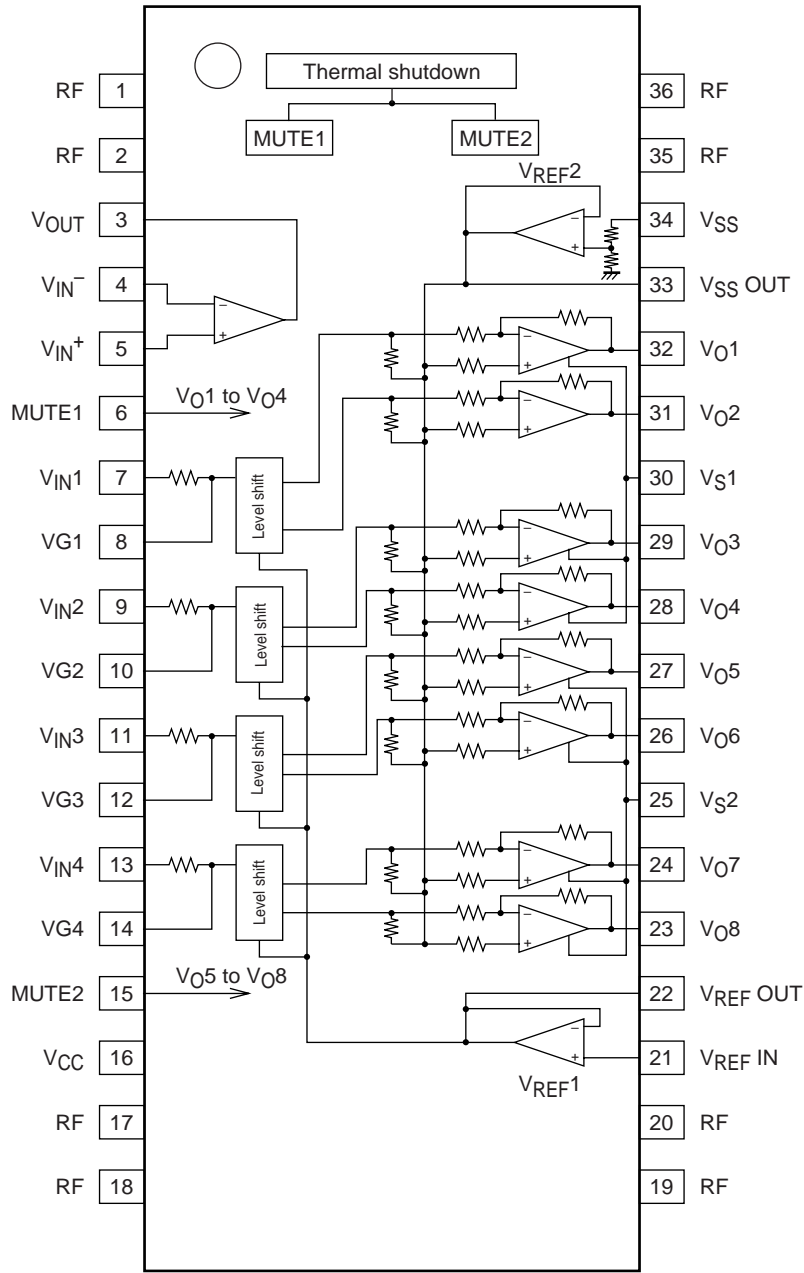
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Pin Function

Pin number	Pin name	Equivalent circuit	Pin function
1, 2 17, 18 19, 20 35, 36	RF		Substrate (minimum potential)
7, 9 11, 13	V_{IN1}, V_{IN2} V_{IN3}, V_{IN4}		Input pins for CH1 and CH2
8, 10	V_{G1}, V_{G2}		Input pins for CH1 and CH2 (for gain adjustment)
12, 14	V_{G3}, V_{G4}		Input pins for CH3 and CH4 (for gain adjustment)
16	V_{CC}		Power supply
22	V_{REFOUT}		Level shift circuit reference voltage (V_{REF1} buffer amplifier output*)
3	V_{OUT}		OP amp output
4	V_{IN^-}		OP amp inverted input
5	V_{IN^+}		OP amp non-inverted input
6 15	MUTE1 MUTE2		CH1, CH2 output ON/OFF CH3, CH4 output ON/OFF
21	V_{REFIN}		Level shift circuit reference voltage input (V_{REF} buffer amplifier input*)
23 24 26 27 28 29 31 32	V_{O8} V_{O7} V_{O6} V_{O5} V_{O4} V_{O3} V_{O2} V_{O1}		CH4 inverted output (AMP8 output) CH4 non-inverted output (AMP7 output) CH3 inverted output (AMP6 output) CH3 non-inverted output (AMP5 output) CH2 inverted output (AMP4 output) CH2 non-inverted output (AMP3 output) CH1 inverted output (AMP2 output) CH1 non-inverted output (AMP1 output)
25	V_{S2}		CH3 (AMP5, AMP6), CH4 (AMP7, AMP8) output stage power supply
30	V_{S1}		CH1 (AMP1, AMP2), CH2 (AMP3, AMP4) output stage power supply
33	V_{SS-OUT}		Output stage reference voltage ($V_{SS1/2}$: typ) (V_{REF2} buffer amplifier output*)
34	V_{SS}		Connect to V_{S1}, V_{S2} (resistance split) to generate V_{SSOUT}

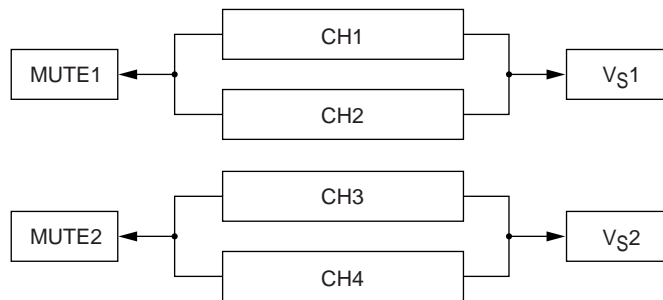
*See block diagram on next page.

Block Diagram



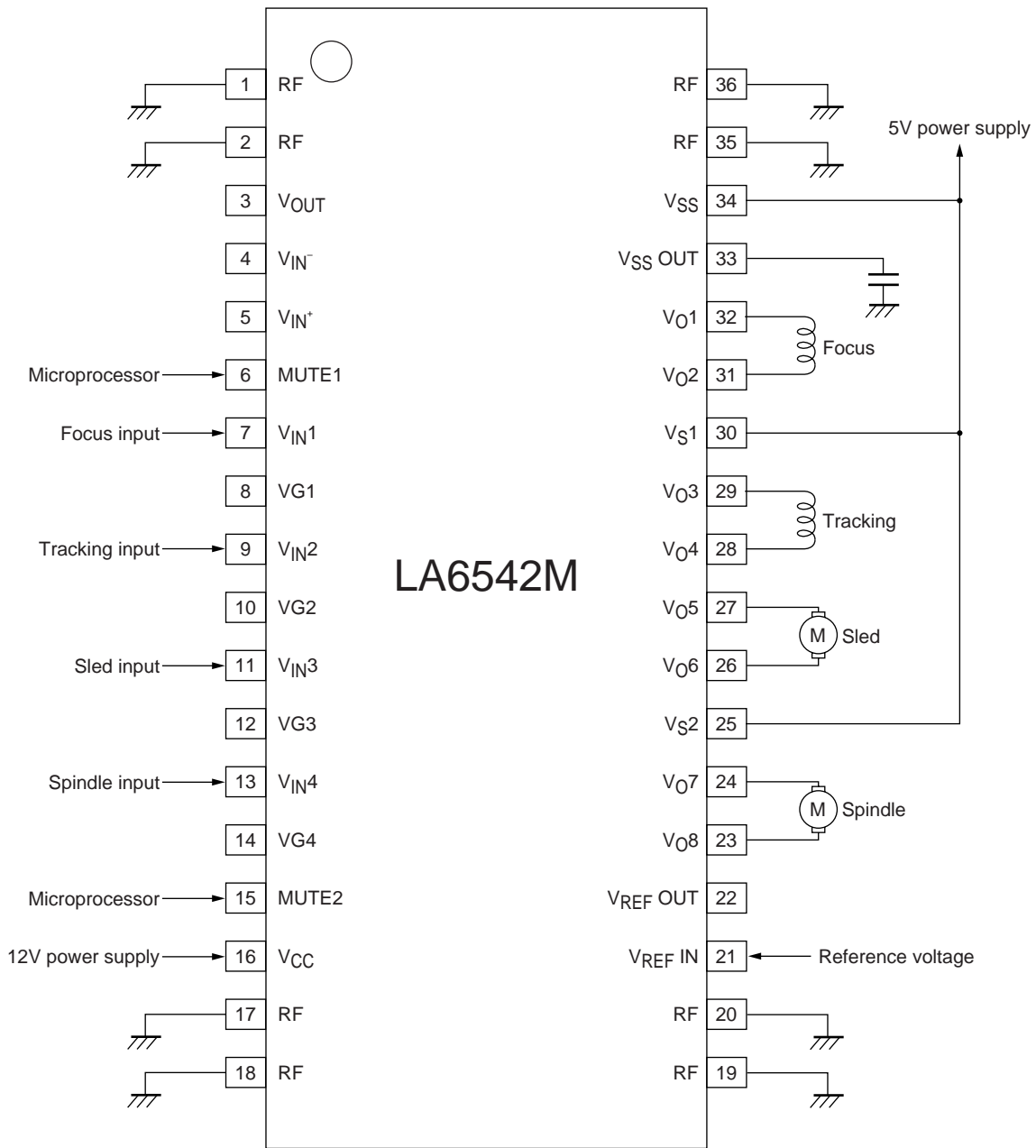
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System Diagram (relationship between power supply and MUTE)



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Sample Application Circuit



A11141

Gain Setting (input pins and adjustment pins)

A simplified diagram of V_{IN} and V_G is shown below.

- 1) Consider an 11 k Ω (typ.) resistor inserted between V_{IN} and V_G .
- 2) When not the pin V_G but the pin V_{IN} is used alone, the BTL gain (between V_{O^+} and V_{O^-}) is set to 6 dB (0 dB for AMP only). This also applies for the case when V_{IN} is not used and an 11 k Ω external resistor is connected to V_G for input.
- 3) Gain is set by the input impedance as seen from point A.

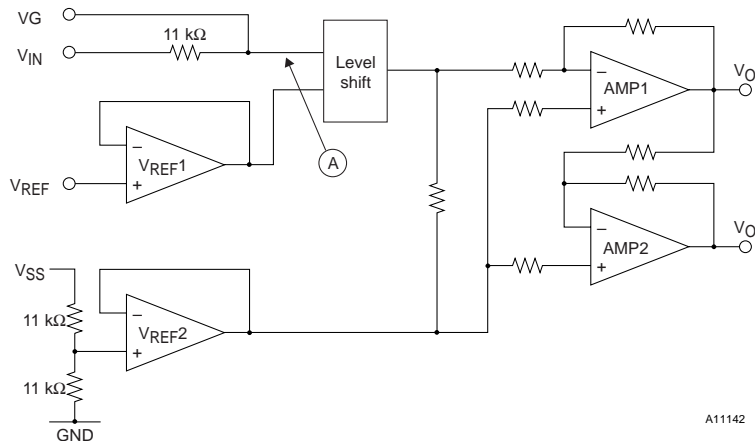
When V_G only is used and the external resistor is R , the BTL gain (between V_{O^+} and V_{O^-}) is

$$20 \log (11 \text{ k}\Omega/R) + 6 \text{ dB}.$$

When an 11 k Ω resistor is inserted between V_{IN} and V_G , and input is via V_{IN} , the combined resistance R_z as seen from point A is

$$R_z = 5.5 \text{ k}\Omega. \text{ Gain is}$$

$$20 \log (11 \text{ k}\Omega / 5.5 \text{ k}\Omega) + 6 \text{ dB} = 12 \text{ dB}.$$



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Offset Voltage

This IC incorporates a level shifter circuit. The input references the V_{REF} to be applied, and references the voltage $(V_{SS} - V_{BE} (0.7))/2V$ to be output.

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