Ordering number : ENA0741

SANYO Semiconductors

DATA SHEET

LA42105 — Monolithic Linear IC Audio Output for TV application BTL 5W × 1ch Power Amplifier

Overview

The LA42105 is a 5W 1-channel power amplifier IC and optimal for use as the audio output power amplifier in TV application

Functions

- 5W × 1 channels (V_{CC} = 9.5V, R_L = 8Ω, THD = 10%)
- Built-in standby function.
- Built-in mute function.
- Built-in various protection circuit (short to power/short to ground/load shorting/thermal).

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	No signal	16	V
Allowable power dissipation	Pd max	Infinitely large heat sink	30	W
Maximum output current	I_O peak		1.0	A
Maximum junction temperature	Tj max		150	°C
Thermal resistance	θjc		2.5	°C/W
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9.5	V
Recommended load resistance	R_L		8	Ω
Allowable operating supply voltage range	V_{CC} op	Under conditions such that maximum ratings are not exceeded	7 to 14	V

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Electrical Characteristics at Ta = 25°C, V_{CC} = 9.5V, R_L = 8Ω, f = 1kHz, Rg = 600Ω

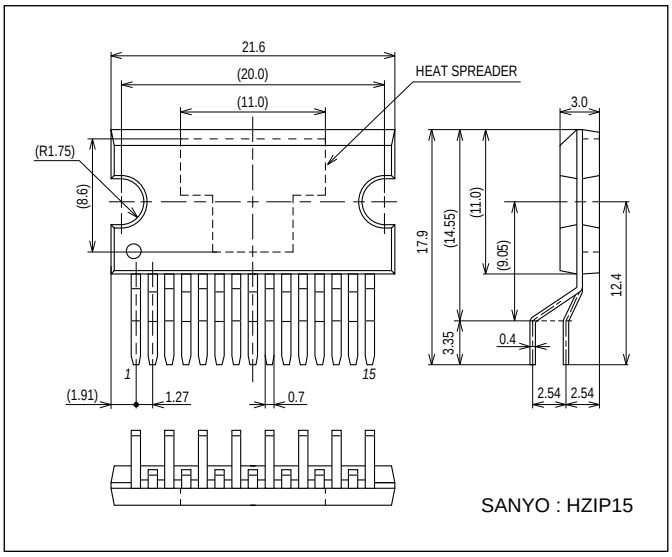
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	Ist	Amplifier OFF		0	10	μA
Quiescent current	I_{CCO}	Rg = 0, R_L = OPEN	25	50	100	mA
Output power	P_O	THD = 10%	4	5		W
Total harmonic distortion	THD	P_O = 1W		0.06	0.2	%
Voltage gain	VG	V_O = 0dBm	30	32	34	dB
Output noise voltage	V_{NO}	Rg = 0, BPF = 20Hz to 20kHz		0.2	0.4	mVrms
Ripple rejection ratio	SVRR	Rg = 0, fR = 100Hz, V_{CC}R = 0dBm	40	50		dB
Mute attenuation value	ATT	V_O = 1Vrms, BPF = 20Hz to 20kHz	80	90		dB
Mute control voltage (pin 7)	Vmute	Mute ON *1	1.5		3.0	V
		Mute OFF	0		0.5	V
Standby control voltage (pin 6)	Vst	Amplifier ON *1	2.5		V_{CC}	V
		Amplifier OFF	0		0.5	V
Input resistance	Ri		21	30	39	kΩ

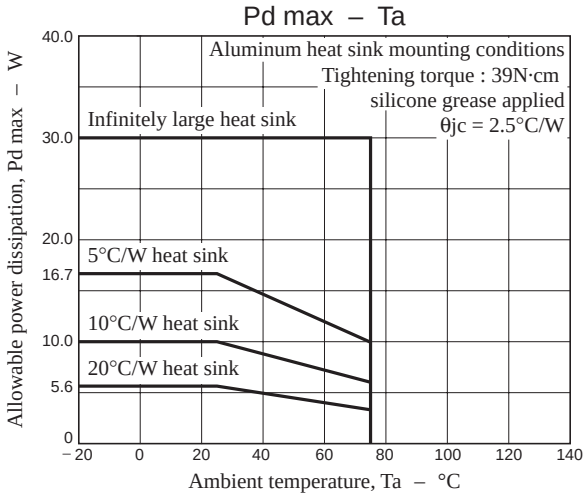
*1 : Note that the standby pin (pin 6) and MUTE pin (pin 7) incorporate the anti-electrostatic diode allowing the current to flow through the diode when the potential of V_{CC} (pin 9) decreases below that of pin 6 or 7.

Package Dimensions

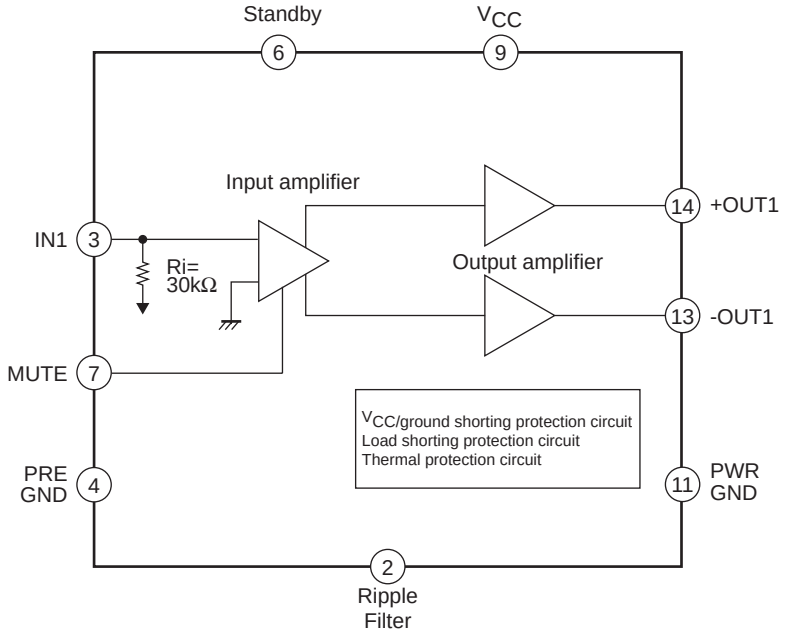
unit : mm (typ)

3336

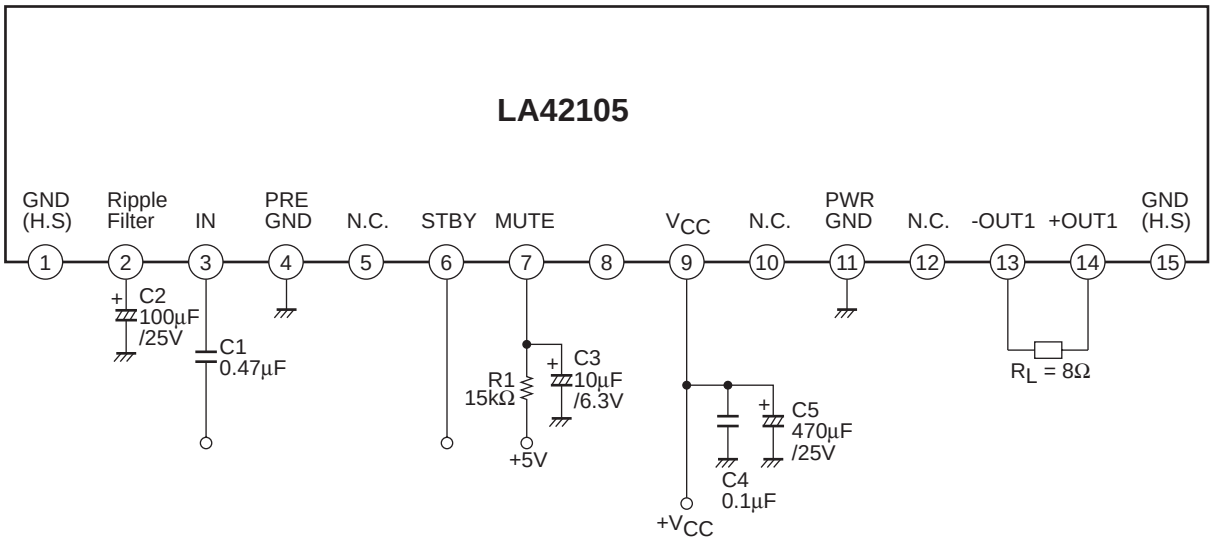




Block Diagram



Test Circuit



* Pin 8 : This pin must be left open.
* Pins 1 and 15 are connected to the heat sink. They must be connected to power and ground.

Pin Voltage

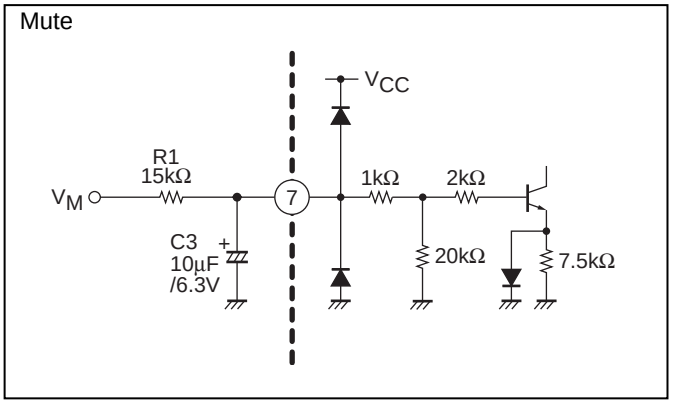
Conditions : V_{CC} = 9.5V, STBY = 5V

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pin	GND (H.S)	Ripple Filter	IN	Pre GND	N.C.	STBY	Mute	N.C.	V_{CC}	N.C.	Power GND	N.C.	-OUT1	+OUT1	GND (H.S)
Pin voltage (V)	0	9.2	0.7	0	-	5	0	-	9.5	-	0	-	4.8	4.8	0

External Components

C1 : Input coupling capacitors. A value of 0.47µF is recommended.
The input pin potential is 0.7V.
C2 : Capacitor which sets the starting time of the ripple filter and amplifier. A value of 100µF is recommended.
C3, R1 : Capacitor and resistor for muting function. C3 is necessary even when the mute function is not used.
C4 : This capacitor increases the oscillator margin. We recommend a value of 0.1µF.
C5 : Power supply capacitor.

1. Muting function (pin 7)
The muting function is turned on when the pin 7 voltage is 1.5V (minimum) or higher.
The V_M applied voltage is set so that the pin 7 voltage will be 1.5V or higher.
The muting time constant is determined by an C3, R1 circuit, and the component values must be determined by a careful analysis, since they are related to impulse noise that occurs when the muting function is turned on or off. Also note that since C3 affects the occurrence of impulse noise when the amplifier is turned on or off, it will be required if the muting function is not used.

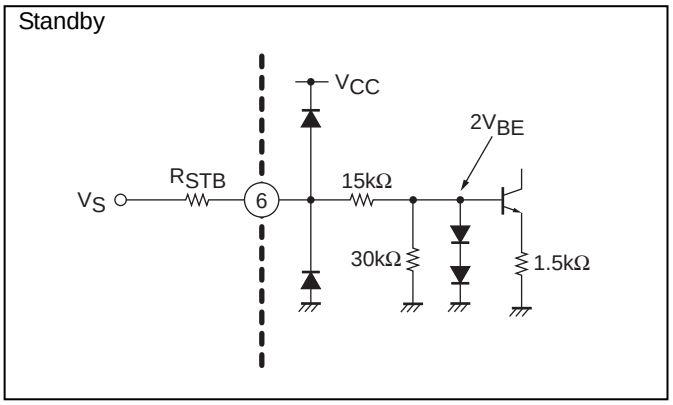


2. Standby function (pin 6)
The amplifier is turned on by applying a level of 2.5V (minimum) or higher to pin 6.

Pin 6 control voltage

Pin 6 voltage	Amplifier	Standby
0 to 0.5	Off	On
2.5 to V_{CC}	On	Off

The limit resistor R_{STB} may be inserted if the V_{STB} applied voltage is comparatively high and there is a need to suppress the pin 6 sink current.



Usage Notes

1. This IC includes three short circuit protection circuits : shorting to power (shorts between an output and the power supply), shorting to ground (shorts between an output and ground), and load shorting protection circuits.
   These protection circuits operate while the corresponding abnormal condition continues, and recover automatically when the abnormal condition is resolved.
   There are, however, cases where, due to IC usage conditions, one of these protection circuits may lock and continue operating after the problem has been resolved. If this occurs, the protection circuit state can be reset by either switching the IC to standby mode or by temporarily cutting power from the IC.

2. This IC includes a thermal protection circuit that operates if the junction temperature (Tj) rises to 160°C or higher. This circuit gradually reduces the output level.

3. If this IC is operated in the vicinity of any of its maximum ratings, even slight changes in operating conditions could result in a maximum rating being exceeded. Since this could lead to the destruction of the IC, end product designs must include adequate margins in the supply voltage and other parameters so that the IC is always used within ranges such that the maximum ratings are never exceeded.