

## ***ML1469 4-channel BTL driver for CD players***

### ❖ ***Application***

- ◆ *CD player*
- ◆ *VCD player*
- ◆ *DVD player*

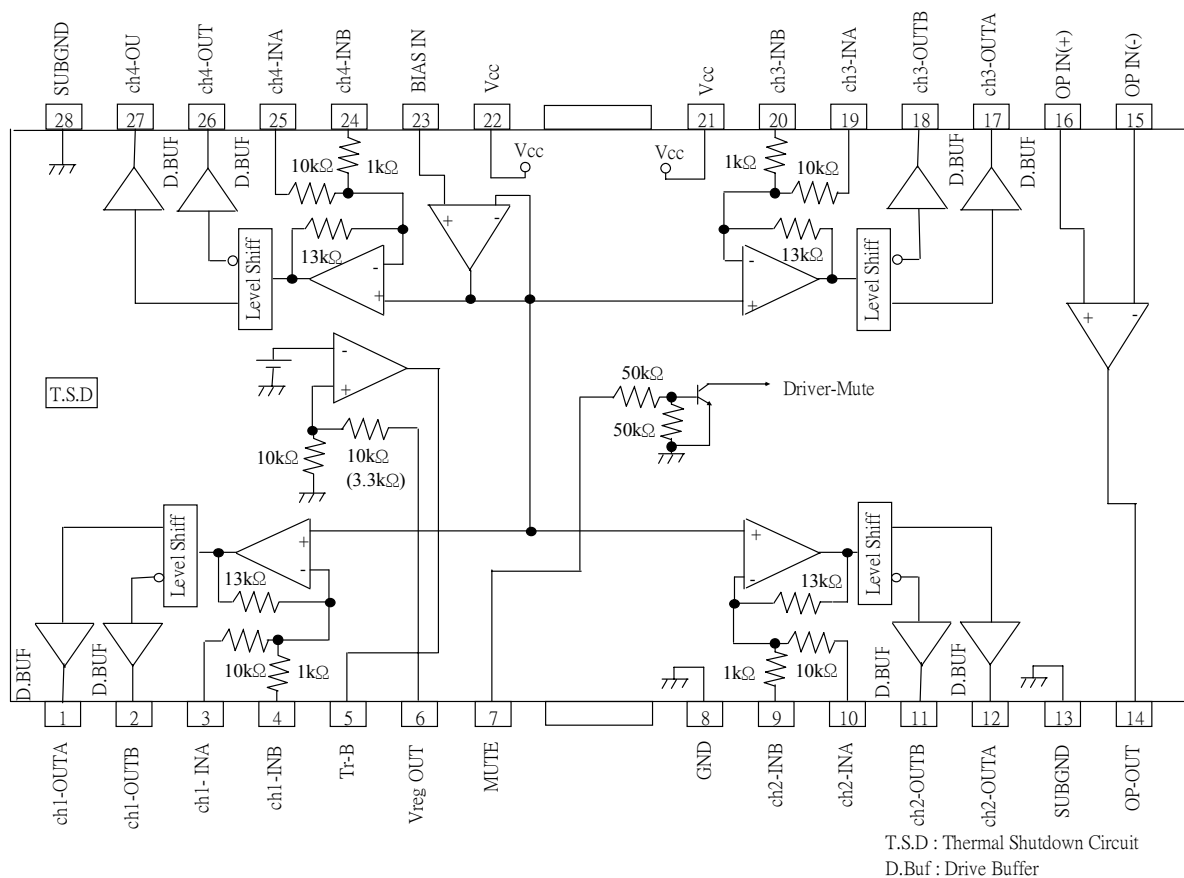
### ❖ ***Features***

- Built in 3.3V (V33) or 5.0V (V50) Voltage regulator
- Built in general purpose operational amplifier
- Built in thermal shutdown circuit
- Few external parts
- Package Available : HSOP28

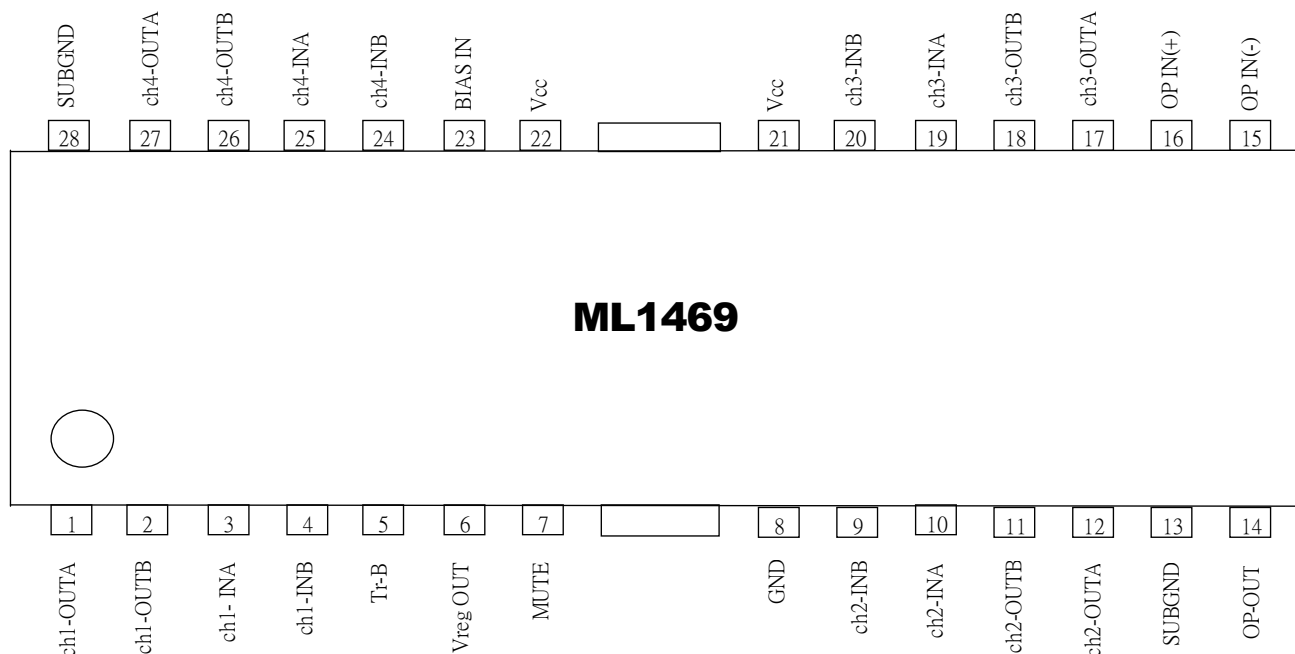
### ❖ ***General Description***

The ML1469 is a 4-channel BTL driver for CD player motors and actuators. An internal 3.3V or 5.0V voltage regulator and general purpose op-amp are provided for variety of applications.

### ❖ ***Block Diagram***



## ❖ Pin Configuration



## ❖ Pin Description

Pin	Pin Name	Function	Pin	Pin Name	Function
1	ch1-OUTA	Driver channel 1 negative output	15	OP IN (-)	Operational amplifier negative input
2	ch1-OUTB	Driver channel 1 positive output	16	OP IN (+)	Operational amplifier positive input
3	ch1-INA	Driver channel 1 input	17	ch3-OUTA	Driver channel 3 negative output
4	ch1-INB	Driver channel 1 input, gain adjustment	18	ch3-OUTB	Driver channel 3 positive output
5	Tr-B	Connect to external transistor base	19	ch3-INA	Driver channel 3 input
6	Vreg OUT	Regulated voltage output (5.0V or 3.3V)	20	ch3-INB	Driver channel 3 input, gain adjustment
7	MUTE	Driver mute control input	21	Vcc	Power supply
8	GND	Ground	22	Vcc	Power supply
9	ch2-INB	Driver channel 2 input, gain adjustment	23	BIAS IN	Bias amplifier input pin
10	ch2-INA	Driver channel 2 input	24	ch4-INB	Driver channel 4 input, gain adjustment
11	ch2-OUTB	Driver channel 2 positive output	25	ch4-INA	Driver channel 4 input
12	ch2-OUTA	Driver channel 2 negative output	26	ch4-OUTB	Driver channel 4 positive output
13	SUBGND	Substrate ground	27	ch4-OUTA	Driver channel 4 negative output
14	OP OUT	Operational amplifier output	28	SUBGND	Substrate ground

### ❖ Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Supply Voltage	VCC	13.5	V
Power Dissipation	Pd	1.7 * <sup>1</sup>	W
Storage Temperature	Tstg	-55 ~ +150	°C

Note 1 : Use base condition : 100x100mm, t=1.6mm, copper leaf 50%, glass epoxy mounting.

Derating is done at 13.6mW/°C for operation above Ta = 25 °C.

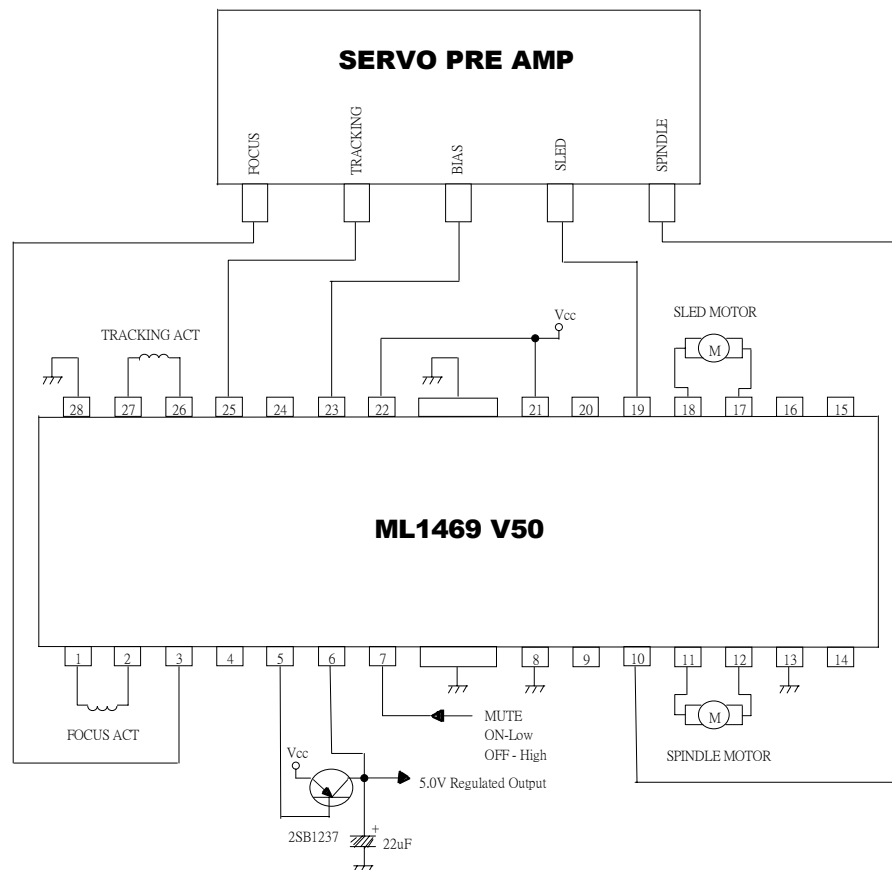
### ❖ Recommended operating conditions

Parameter	Symbol	Ratings	Units
Operating Temperature	T <sub>OPR</sub>	-25 ~ +85	°C
Operating Voltage	V <sub>OPR</sub>	5.0 ~ 12.0	V

### ❖ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Quiescent Current	I <sub>CC</sub>	No load	5.5	10.0	13.0	mA
Output Voltage Offset	V <sub>OO</sub>		-40		40	mV
Output Voltage "H"	V <sub>OHD</sub>		5.2	5.6		V
Output Voltage "L"	V <sub>OLD</sub>			1.3	1.55	V
Gain (Close Circuit)	G <sub>VC</sub>	V <sub>IN</sub> =0.1V <sub>rms</sub> , f=1kHz	7.0	8.0	9.0	V
Ripple Rejection	RR	V <sub>IN</sub> =0.1V <sub>rms</sub> , f=100Hz		60		dB
Slew Rate	SR	V <sub>OUT</sub> =3V <sub>p-p</sub> square wave, f=100kHz		2.0		V/μS
Mute-off Voltage	V <sub>MOFF</sub>		2.0			V
<b>3.3V / 5.0V Regulator</b>						
Output Voltage	V <sub>REG</sub>	I <sub>L</sub> =100mA	3.10	3.30	3.50	V
			4.75	5.00	5.25	
Load Regulation	ΔV <sub>RL</sub>	I <sub>L</sub> =0 ~ 200mA	-50	0	10	mV
Line Regulation	ΔV <sub>VCC</sub>	V <sub>CC</sub> =6 ~ 9V, I <sub>L</sub> =100mA	-10	0	35	mV
<b>Operational Amplifier</b>						
Offset Voltage	V <sub>OFOP</sub>		-2	0	2	mV
Input Bias Current	I <sub>BOP</sub>			20	300	nA
"H" Level Output Voltage	V <sub>OHOP</sub>		6.0			V
"L" Level Output Voltage	V <sub>OLOP</sub>				1.8	V
Output Drive Current (Sink)	I <sub>SINK</sub>	50 ohm, at VCC	10	50		mA
Output Drive Current (Source)	I <sub>SOURCE</sub>	50 ohm, at ground	10	30		mA
Voltage Gain (Open Circuit)	G <sub>VO</sub>	V <sub>IN</sub> =75dBV, f=1kHz		78		dB
Slew Rate	SR <sub>OP</sub>	V <sub>OUT</sub> =4VP-P square, f=100kHz		1		V/μS
Ripple Rejection	RR <sub>OP</sub>	V <sub>IN</sub> =-20dBV, f=100kHz		65		dB
Common Mode Rejection Ratio	CMRR	V <sub>IN</sub> =-20dBV, f=1kHz	70	84		dB

## ❖ Application Circuit



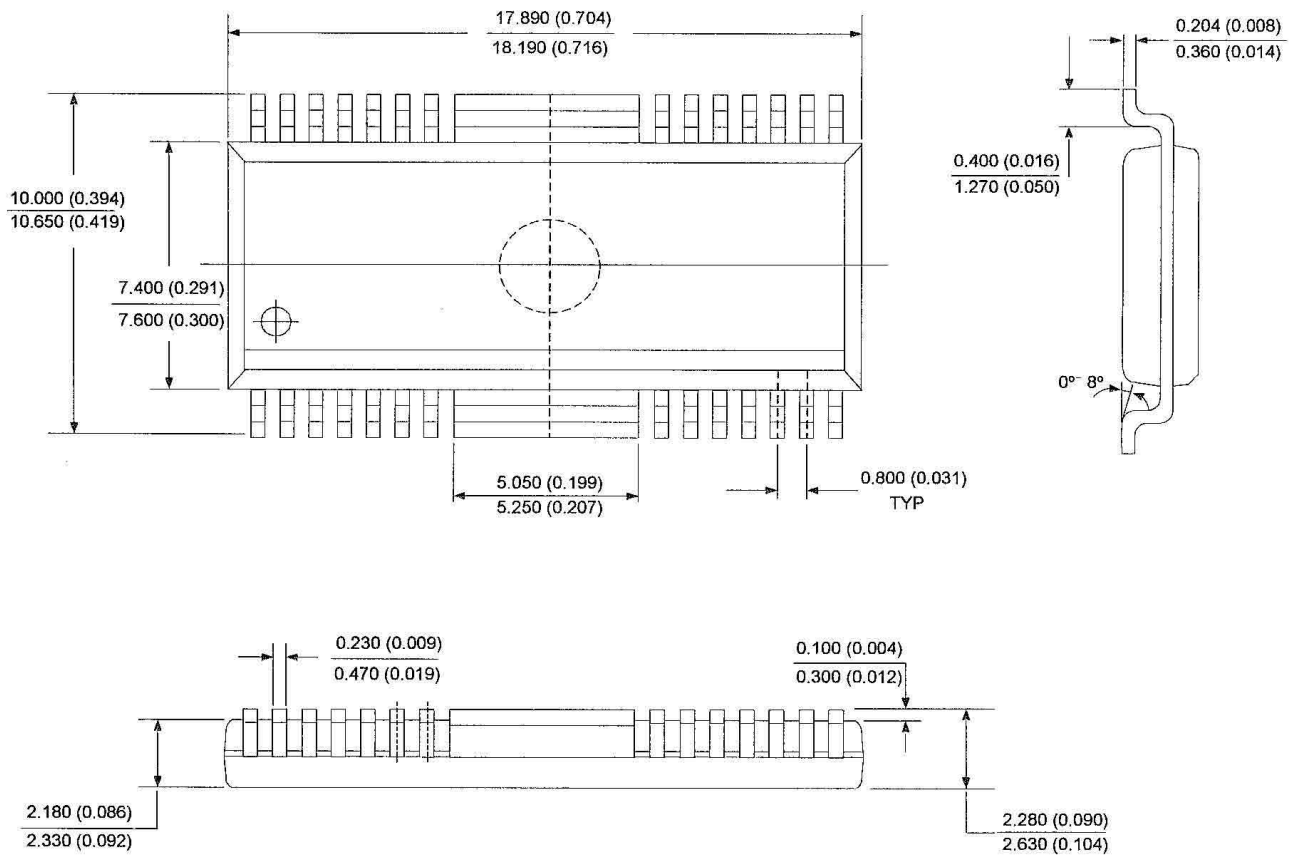
### Precautions for use

- (1) A thermal shut down circuit is built. The output current is muted, when the temperature of the chip reaches 175°C typical.
- (2) If the mute (Pin 7) voltage is open or less than 0.5V, the output current is muted. Under normal operating conditions, make sure to pull this pin above 2.0V.
- (3) If the bias pin (Pin 23) drops below 1.4V, the output current is muted. Make sure that under normal conditions, this pin is at 1.6V or above.
- (4) If the power supply voltage drops below 4.5V typical, the drivers are turned off. When the voltage exceeds 4.7V typical, the drivers return to their previous state.
- (5) The channel 4 output is muted in the event of a thermal shut down, mute on, bias pin voltage drop. Other sections are not muted. When muted, the internal bias voltage of the output pin becomes (roughly  $(V_{CC}-V_F)/2$ ).
- (6) The built-in input resistance has a positive temperature coefficient of 1500ppm/°C. When changing the gain using an external resistance, the gain will change as the temperature of the resistor changes. When using the built-in input resistance, there are virtually no gain variation due to temperature.
- (7) Make sure to connect a 0.47uF capacitor to the IC input to filter out voltage ripple.
- (8) Heat dissipation fins are attached to the GND on the inside of the package. Make sure to connect these to the external GND.
- (9) The capacitor connected between the regulator output (Pin 6) and the GND also serves to stop oscillation of the IC circuit. Consequently, make sure to use one with good temperature characteristics.

❖ *Mechanical Dimensions*

**HSOP-28**

**Unit: mm (inch)**



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