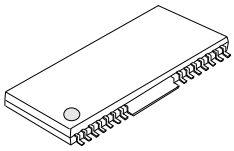
4-CHANNEL BTL DRIVER FOR CD PLAYERS

DESCRIPTION

The SA6392 is a monolithic integrated circuit, and suitable for 4-CH motor driver, It has an internal primary filter, and can be directly connected to the servo PWM output of all drivers other than the spindle driver.



HSOP-28-375-0.8

FEATURES

* 4-channel BTL driver on a HSOP 28-pin power package, allowing for application miniaturization.
* PWM input is filtered by the internal primary filter, eliminating the need for attached resistors and capacitors, thereby helping reduce the number of components.

  Resistor and capacitor time constants can also be changed with attached components.
* Built in thermal shutdown circuit
* Built in mute function

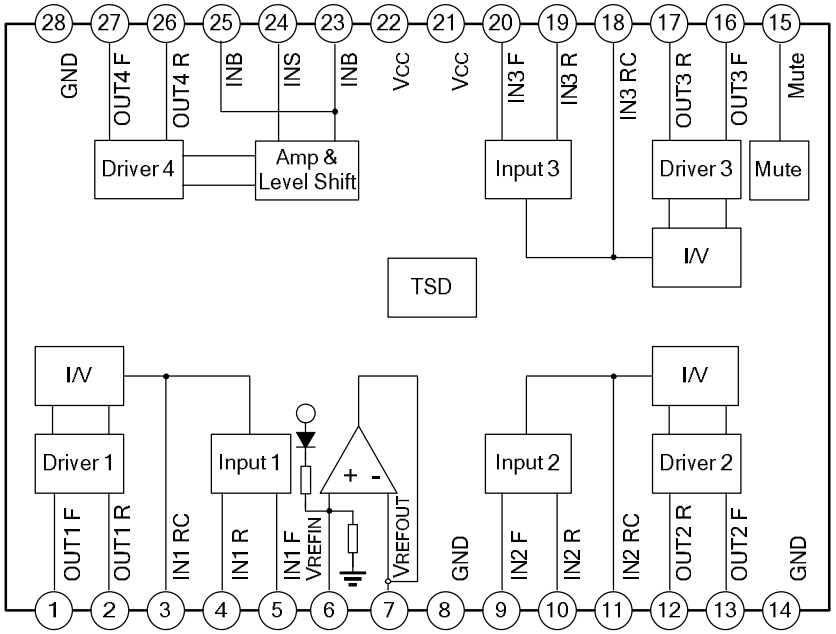
ORDERING INFORMATION

Part No.	Package
SA6392	HSOP-28-375-0.8

APPLICATION

CD players, CD-ROM drives

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING (T_{amb}=25°C)

Characteristic	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	18	V
Power Dissipation	P_D	1.7*	W
Operating Temperature	T_{opr}	-30~+85	°C
Storage Temperature	T_{stg}	-55~+150	°C

*: Reduced by 13.6mW for each increase in Tamb of 1°C over 25°C. When mounted on a 50 x 50 x 1.0 mm phenol paper PCB.

RECOMMENDED OPERATING CONDITIONS (T_{amb}=25°C)

Characteristics	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	6~16*	V

* Set the power supply voltage according to power dissipation.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, T_{amb}=25°C, V_{CC}=8V, f=1KHz, R_L=8Ω)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Quiescent Current	I_Q	No load	8	13	18	mA
Bias Pin Voltage	V_{BIAS}		3.4	3.70	4.00	V
Bias Pin Voltage Variance	ΔV_{BIAS}	1mA source, sink	-30	--	30	mV
Mute-off Voltage	V_{MON}		2.0	--	--	V
Mute-on Voltage	V_{MOFF}		--	--	0.5	V
Drivers Other than Spindle						
Input High Level Voltage	V_{IH}		2.4	--	--	V
Input Low Level Voltage	V_{IL}		--	--	0.5	V
Input High Level Current	I_{IH}	V_{IN}=5V	170	310	450	μA
Input Low Level Current	I_{IL}	V_{IN}=0V	-10	--	0	μA
Output Voltage, Offset	V_{OO}	(same for spindle)	-30	--	30	mV
Output High Level Voltage	V_{OHD}	F_{IN}=5V, R_{IN}=0V	5.2	5.6	--	V
Output Low Level Voltage	V_{OLD}	F_{IN}=0V, R_{IN}=5V	--	1.3	1.6	V
Constant Current	I_{CONST}		14	22	30	μA
Internal Integral Capacitance	C		--	24	--	pF
Current Pulse Rise Time 1	Δt_r	At startup	--	0.08	1	μs
Current Pulse Fall Time 2	Δt_f	At shutdown	--	0.55	1	μs
Current Pulse Time Differential	Δt_{r-f}		-160	--	160	μs
Drive Linearity	L_{IN}	V_{IN}=V_{REF}±0.5, 1, 1.5V *	90	100	110	%
Ripple Rejection	R_R	V_{IN}=100mVrms, 100Hz	--	70	--	dB

(To be continued)

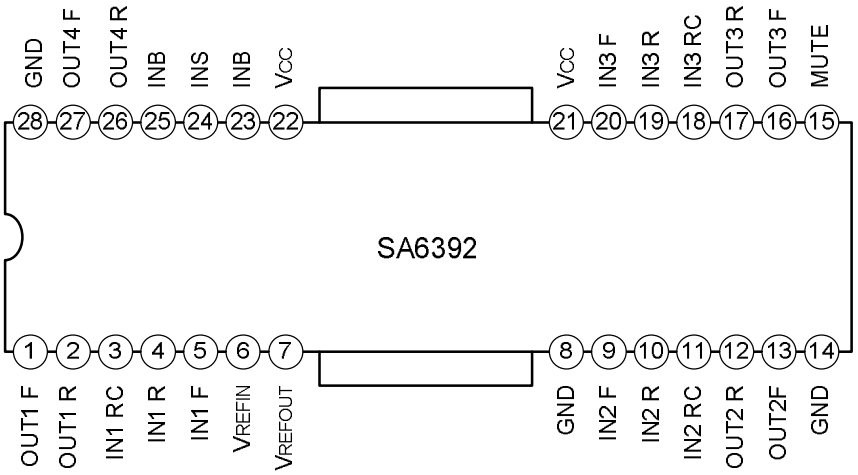
(Continued)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Spindle Driver						
Input Bias Current	I_B		--	10	300	nA
Synchronous Input Voltage	V_{ICM}		1.6	--	6.4	V
Output Voltage High	V_{OHD}		5.2	5.6	--	V
Output Voltage Low	V_{OLD}		--	1.3	1.55	V
Voltage Gain	GVC		8.0	10.5	13.0	dB
Slew Rate	SR		--	2	--	V/μs
Ripple Rejection	R_{RS}	V_{IN}=100Vrms, 100Hz	--	70	--	dB

Not designed for radiation resistance.

* If V_O=V_{O1} when V_{IN}=V_{REF}±0.5V, V_O=V_{O2} when V_{IN}=V_{REF}±1.0V, and V_O=V3 when V_{IN}=V_{REF}±1.5V, then L_{IN}=(V_{O3}-V_{O2})/(V_{O2} • V_{O1}) x100%

PIN CONFIGURATION



PIN DESCRIPTION

Pin no	Symbol	Description
1	OUT1F	Driver channel 1 forward output
2	OUT1R	Driver channel 1 reverse output
3	IN1RC	Connect to attached resistor/capacitor (1)
4	IN1R	Driver channel 1 reverse input
5	IN1F	Driver channel 1 forward input
6	VREF IN	Internal reference amplifier input
7	VREF OUT	Internal reference amplifier output
8	GND	Ground for internal reference and internal power circuit
9	IN2F	Driver channel 2 forward input

(To be continued)

(Continued)

Pin no	Symbol	Description
10	IN2R	Driver channel 2 reverse input
11	IN2RC	Connect to attached resistor/capacitor (2)
12	OUT2R	Driver channel 2 reverse output
13	OUT2F	Driver channel 2 forward output
14	GND	Ground
15	MUTE	Driver mute control input
16	OUT3F	Driver channel 3 forward output
17	OUT3R	Driver channel 3 reverse output
18	IN3RC	Connect to attached resistor/capacitor (3)
19	IN3R	Driver channel 3 reverse input
20	IN3F	Driver channel 3 forward input
21	VCC	Power supply
22	VCC	Power supply
23	INB	Driver channel 4 bias input*
24	INS	Driver channel 4 input
25	INB	Driver channel 4 bias input*
26	OUT4R	Driver channel 4 reverse output
27	OUT4F	Driver channel 4 forward output
28	GND	Ground

* Pin 23 and pin 25 shorted internally.

FUNCTION DESCRIPTION

CIRCUIT OPERATION

(1) Fig. 2 shows the inputs from the digital servo IC for CH1-CH3 drivers (all drivers except the spindle).

SW1 is on when the forward input signal (HIGH level, over 2.4V) is present. SW2 is on when the reverse input signal is present (Fig. 1)

The constant current (I1) at this time enters the RC and generates an integral waveform based on the duty of the input waveform. The BTL is output from BUF1 and BUF2 (Fig. 3).

Fig.1

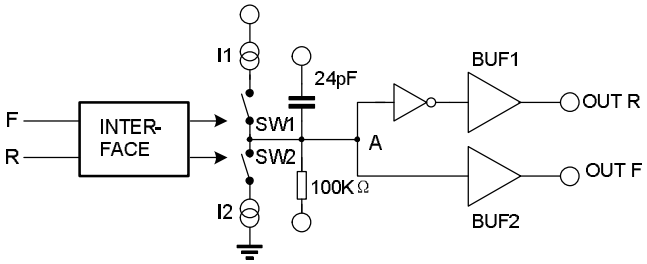
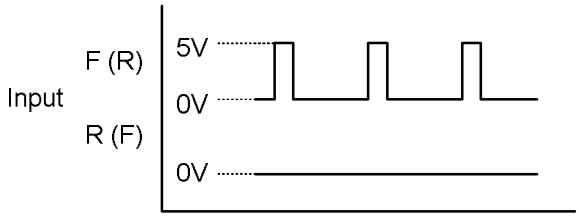


Fig.2



To maintain the HIGH level with forward (or reverse) in-put, the DC voltage generated at point A is:

$$I1 \times R \approx 2.5V \text{ (reverse: - 2.5V)}$$

This is the voltage generated relative VREF. The setting is such that a voltage differential of 5V is generated between output pins. The time constant is:

$$RxC = 2.4\mu \text{ sec}$$

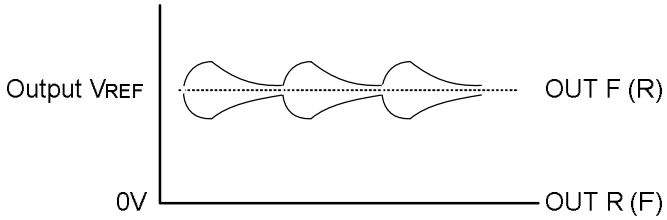
This can be increased by inserting a capacitor between point A (pins 3, 11 and 18) and VREF. The constant current (Iconst) given in the electrical characteristics refers to I1 and I2 in Fig. 2.

F	R	SW1	SW2
L	L	OFF	OFF
L	H	OFF	ON
H	L	ON	OFF
H	H	OFF	OFF

H…2.4V Max.

L…0.5V Min.

Fig.3



(2) CH4 driver (spindle driver)

Pins 23 and 25 are shorted inside the IC. Bias amplitudes are the primary type of inputs assumed. The level shift circuit converts the pre-stage amplifier output (centered on the bias level and impressed on pins 23 and 25) to positive and negative amplitudes centered on VREF. The level shift circuit's output is BTL-output from the buffer amplifier.

Because of the high input impedance, the IC is designed to accommodate a filter comprising attached resistors and capacitors.

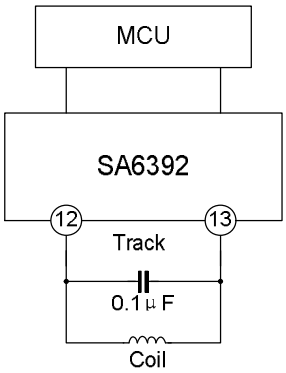
OPERATION NOTES

(1) The SA6392 has an internal thermal shutdown circuit. Output current is muted when the chip temperature exceeds 180°C (typically).

(2) The output current can also be muted by lowering the mute pin (pin 15) voltage below 0.5V.

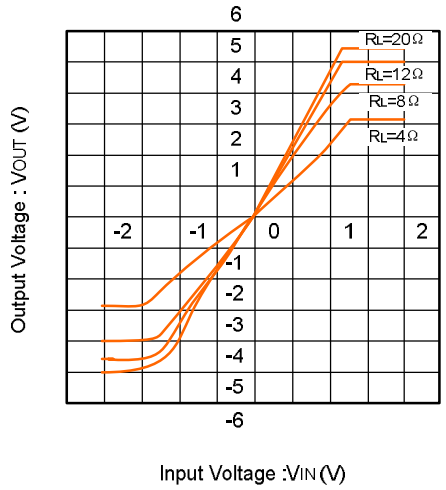
(3) All four driver output channels are muted during thermal shutdown, muting and a drop in bias pin voltage. No other components are muted.

(4) If CH2 is the motor tracking channel, it should be connect a capacitor (0.1μF) between pin12 and pin 13. It suit to more laser tape equipments.



ELECTRICAL CHARACTERISTICS CURVES AND TEST CIRCUIT

Fig.4 Spindle driver (CH4) I/O characteristics (load variation)



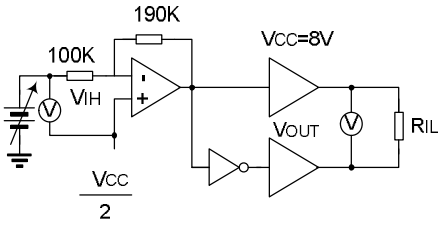
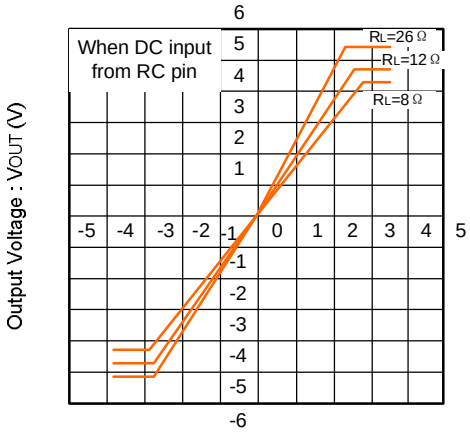


Fig.5 I/O characteristics of driver stages CH1-CH3



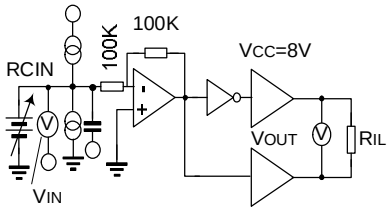


Fig.6 I/O characteristics with pulse input (drivers CH1-CH3)

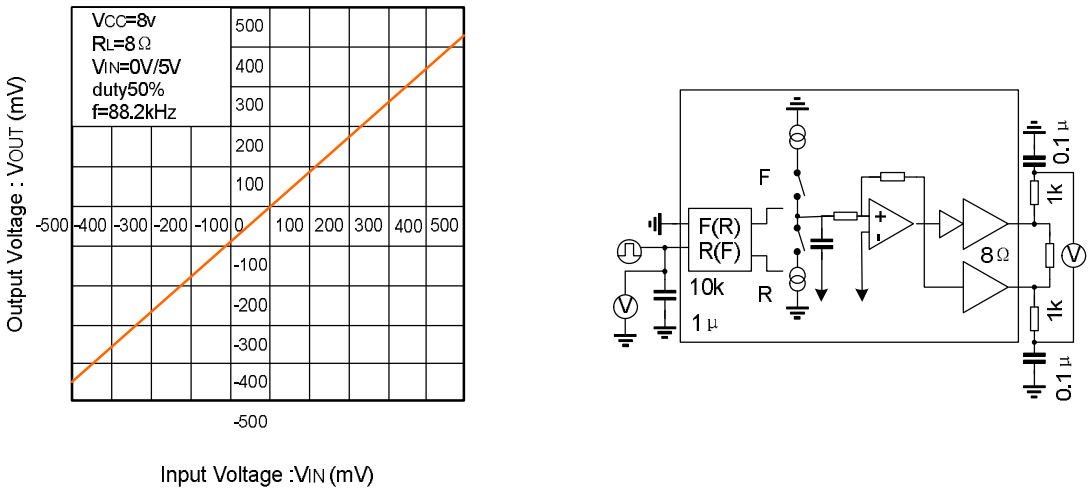
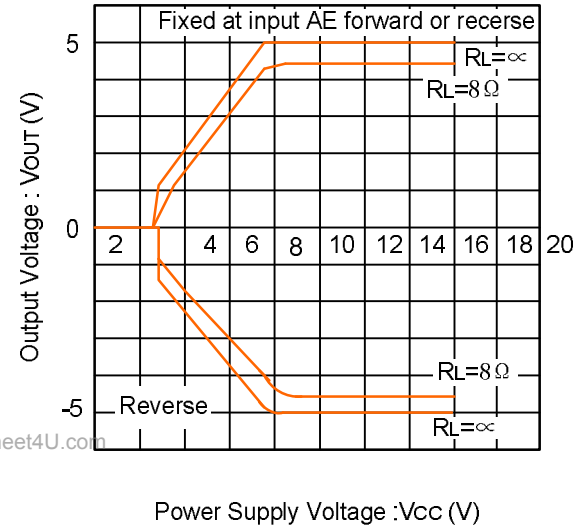
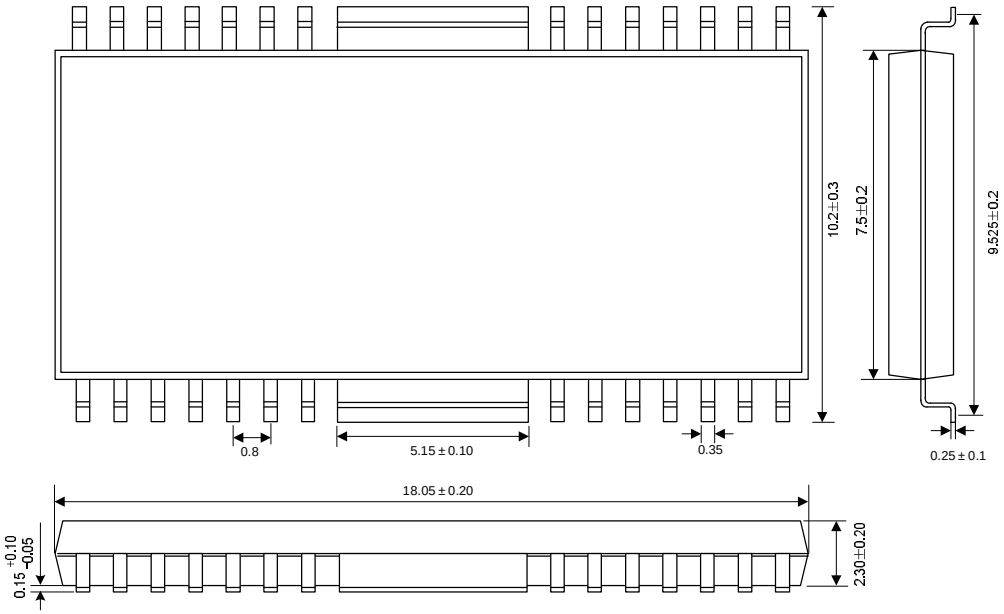


Fig.7 Driver CH1-CH3 power supply voltage vs. output voltage



PACKAGE OUTLINE

HSOP-28-375-0.8 UNIT: mm



ATTACHMENT

Revision History

Data	REV	Description	Page
2003.03.21	1.0	Original	
2003.04.16	2.0	“SA5692” change to “SA6392”.	
2003.11.13	2.1	Modify the “Operation notes”	5
2004.02.12	2.2	Modify the “Operation notes”	5