

## Overview

The LB8112V integrates a driver for a video cassette deck loading motor and the associated peripheral sensor amplifiers in a single chip. The LB8112V can implement circuits with low saturation voltages and low power levels since it can directly drive power transistors from the  $V_M$  power supply.

# **Functions and Features**

- Built-in output current control and detection circuits for the loading motor
- Two reel motor FG amplifiers
- Two top-end sensors
- Two buffer amplifiers and an overcurrent protection circuit
- Thermal shutdown

# Specifications

#### Absolute Maximum Ratings at Ta = 25°C

# **Package Dimensions**

unit: mm 3191-SSOP30



Parameter	Symbol	Conditions	Ratings	Unit
	V <sub>CC</sub> 1 max		7	V
Maximum supply voltage	V <sub>CC</sub> 2 max		11	V
	V <sub>M</sub> max		V <sub>CC</sub> 2	V
Maximum output current	I <sub>M</sub> max	Continuous, Pd < 0.5 W	600	mA
Input voltage	V <sub>IN</sub>	· · · · · · · · · · · · · · · · · · ·	-0.3 to V <sub>CC</sub> 1 +0.3	v
Allowable power dissipation	Pd max	Independent device, Tj = 150°C	0.5	W
Operating temperature	Topr		-20 to +80	°C
Storage temperature	Tstg		-55 to +150	°C

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# Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply unitage	V <sub>CC</sub> 1		2.7 to 4.0	V
Subbly Aouage	V <sub>CC</sub> 2	V <sub>CC</sub> 2 ≥ V <sub>CC</sub> 1	2.7 to 9	V
V <sub>M</sub> voltage	V <sub>M</sub>		2.2 to V <sub>CC</sub> 2	v

# Electrical Characteristics at Ta = 25°C, $V_{CC}1$ = 3 V, $V_{CC}2$ = 4.75 V, $V_M$ = 3.0 V

Parameter		Symbol	Conditions	nim	tvp	max	Unit
V <sub>CC</sub> 1 current drain		lcc11	Slandby mode		2.3	4	mA
		loc12	Forward/reverse mode, LIMIT and EN = low		14	19	mA
		l <sub>cc</sub> 13	Brake mode, LIMIT and EN = low		10	14	mA
	·		Standby mode (Voc1 = open)		0.1	20	μΑ
Vcc2 current drain		10022	Standby mode (Vcc1 = 3.0 V)		0.460	1	mA
		loc23	Forward/reverse mode		18.5	25	mA
V <sub>M</sub> current drain		00	Standby mode		0.1	20	цА
Logic Inputs (the DEC1,	DEC2, LI	MIT. and EN	Dins)]	11			
Input high-level voltage	<u> </u>	VINI	$V_{cc1} = 2.7 \text{ to } 4.0$	2.0			v
High-level input current		1.61	V <sub>IN</sub> = 3.0 V		46	65	<u>µА</u>
Input low-level voltage		Vinit	Voc1 = 2.7 to 4.0		·····	0.6	
Low-level input current			V <sub>IN</sub> = 0.6 V	<u> </u>	4.6	10	цÂ
Logic Outputs (the LIMIT	OUT. TO	POUT, and E	NDOUT pins)]	·			
Output high-level voltage		Volittu	Voc1 = 2.7 to 4.0. source current: 10 uA	Vcc1-0.5			v
Output low-level voltage		Voim	$V_{cc}$ = 2.7 to 4.0. sink current; 10 $\mu$ A		······	0.4	- v
[Loading Motor Driver]		UUIL		<u>ا محمد معمد المحمد المحمد</u>		I	
		V <sub>(sal)</sub> 1	In = 200 mA (vertical addition)		0.2	0.3	V
Output saturation voltage		V(cat)2	Io = 400 mA (vertical addition)		0.4	0.6	v
Limit current		<u>limi</u>	$V_{BS} = 200 \text{ mV}, R_{E} = 1.0 \Omega, R_{I} = 7.5 \Omega$	172	192	212	mA
Detection current						400	mA
Limit current setting rang	e		$V_{BS} = 0.1$ to 0.3 V, $R_F = 0.5 \Omega$ , $R_I = 4.7 \Omega$ , $V_{AI} = 4.6 V$	100		600	mA
[Reel FG Amplifier]							
Input offset voltage		Vin			±1	±5	mA
Inout bias current		VB	V <sub>IN</sub> = 0.3 V			250	nA
Common-mode input volt	age	<u> </u>		· · · ·			
range		VICM		1		2	v
Open-loop gain		Gv1	•		55		d8
Loop gain		G <sub>V</sub> 2		27	29	30.5	dB
Common-mode rejection	ratio	C <sub>MR</sub>	*	65	80		dB
Source output saturation	voltage	Vou	I <sub>O</sub> = -40 μA		0.1	0.25	۷
Sink output saturation vo	tage	VOD	i <sub>O</sub> = 40 μA		0.1	0.25	V
[LPF Bulfer]			······································		· · · · · · · · · · · · · · · · · · ·		
Input offset		V <sub>IO</sub>			±1	±7	۳V
Input bias current		l <sub>B</sub>	V <sub>IN</sub> = 0 V			250	nA
Common-mode input volt range	age	VICM		0		V <sub>CC</sub> 2 1.5	v
Open loop gain		G <sub>V</sub> 1	•		55		dB
Common-mode rejection ratio		C <sub>MR</sub>	*	65	80		dB
Output voltage range		Vour1		0		V <sub>CC</sub> 2 - 1.5	V
	Source	Iso	V <sub>0</sub> = 0 V	10			mΑ
Output current	Cint	I <sub>SI</sub> 1	V <sub>O</sub> = 1.0 V	1			mA
	500K	I <sub>SI</sub> 2	V <sub>O</sub> = 0.2 V	18	36	45	μA
Bandwidth			•		1		MHz
[LPF Buffer Limiter]							
Input offset		VIO			±1	±7	۳V
Input bias	<u> </u>	I <sub>B</sub>	V <sub>IN</sub> = 0.2 V			250	nA
Common-mode input voltage range		V <sub>ICM</sub>		0		V <sub>CC</sub> 1 - 1.5	v

Note: \* Items marked with an asterisk are design target values and are not tested.

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Parameter	Symbol	Conditions	min	typ	max	Unit
[TOP/END sensor]						
Input resistance	R <sub>IN</sub>	•	4	5	6	kΩ
Minimum Input sensitivity	Δ٧		±27	±35	±43	mV
Thermal shutdown operating temperature	T <sub>TSD</sub>	*	150	180	210	°C
Thermal shutdown hysteresis	ΔT <sub>TSD</sub>	•		15		°C

Note: \* Items marked with an asterisk are design target values and are not tested.

## **Truth Tables**

1. Loading motor truth table

Input		Output		Mada	
DEC1	DEC2	OUT1	OUT2	IMODE	
L	L	off	off	Standby	
Н	L	н	L	Forward	
L	н	L	н	Reverse	
Н	н	L	L	Brake	

#### 2. Loading motor current limiter detection modes

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LIMIT EN	OUT output	LIMITOUT
	LIMIT	L
п	NONLIMIT	н
L	Saturation	н

## **Pin Assignment**



## **Pin Functions**

Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
1	Rf			<ul> <li>P-ground for the output transistor</li> <li>The output current is detected by a resistor inserted between the Rf pin and ground for motor current control.</li> </ul>
2 ` 29	OUT1 OUT2	0 to V <sub>M</sub>	VM 2 2 7 7 2 9 7 7 1 405407	<ul> <li>Outputs</li> <li>Connect these pins to the motor.</li> </ul>
3	V <sub>CC</sub> 1	2.7 to 4.0 V		<ul> <li>Power supply for circuit other than the loading output block and the LPF buffer</li> <li>This power supply must be stabilized so that noise does not enter at this pin.</li> </ul>
4	V <sub>CC</sub> 2	2.7 to 9 V		<ul> <li>Power supply for the loading motor pre-driver and LPF buffer.</li> <li>As is the case for V<sub>CC</sub>1, this power supply must be stabilized so that noise does not enter at this pin.</li> </ul>
5	V <sub>M</sub>	2.2 to V <sub>CC</sub> 2		<ul> <li>Loading motor power supply</li> <li>As is the case for V<sub>CC</sub>2, this power supply must be stabilized so that noise does not enter at this pin.</li> </ul>
6 8	B <sub>IN</sub> 1 B <sub>IN</sub> 2			<ul> <li>LPF buffer input</li> <li>This pin is used to form a low-pass filter as shown in a the peripheral circuit example.</li> </ul>
7 9	Bout1 Bout2			<ul> <li>LPF buffer output</li> <li>Outputs a voltage identical to that applied to the buffer IN pin.</li> </ul>

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Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
10 11	isnf Rfb		10 10 10 10 50k a 200 a W W W W AD5410	<ul> <li>ISNF is the connection for the limiter oscillation prevention capacitor.</li> <li>RBF is the LPF current limiter current detection pin.</li> </ul>
12	RSB		vcc1 v vcc1 vcc1	RSB is used to set the LPF limiter. The RSB pin voltage is determined by external circuits.
13 16	TOP <sub>IN</sub> END <sub>IN</sub>		Vсс1 5ka 2000 5ka 2000 13(15) лоб412	<ul> <li>Sense amplifier input block</li> <li>Internal resistance: 5 kΩ</li> <li>The output is inverted if a pulse in excess of ±35 mV is input to the IN pin.</li> </ul>
15	GND			Ground that is common to P-GND and SGND.
14 17	TOP <sub>OUT</sub> END <sub>OUT</sub>	0 to V <sub>CC</sub> 1	VCC1 VCC1 (14) (17) WCC1 (17) WCC1 (17) A05413	The top and end sensor outputs.
18 19 21 22	ALM1 RLP1 RLM2 RLP2		18 10k 2 10k 2	<ul> <li>The L-FG amplifier inputs</li> <li>RLM1 and RLM2 are negative inputs.</li> <li>RLP1 and RLP2 are positive inputs.</li> </ul>

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Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
20 23	RLO1 RLO2	0 to V <sub>CC</sub> 1	200 × 0 300 × 0 777 777 777 777 777 777 7777 7777 77	The R-FG amplifier outputs
24 25	DEC1 DEC2	0 to V <sub>CC</sub> 1	VCC1 10ka	Loading motor inputs When V <sub>CC</sub> 1 = 3.0 V: 2.0 V or higher is high, and 0.6 V or lower is low.
26	LIMIT EN	0 to V <sub>CC</sub> 1	VCC1 50kΩ B0kΩ 777 777 777 4054177	Current limiter on/off control When V <sub>CC</sub> 1 = 3.0 V, if this pin is: 2.0 V or higher: The current limiter will be on. 0.6 V or lower: The current limiter will be off.
· 27		0 to V <sub>CC</sub> 1	27 	Current limiter detection output When V <sub>CC</sub> 1 = 3:0 V, if this pin Is: 2.5 V or higher: The current limiter will be off. 0.4 V or lower: The current limiter will be on.
28	RS	0 ю V <sub>CC</sub> 1 1.5 V		<ul> <li>Current limiter setting</li> <li>Sets the limit current by setting the voltage between the Rf pin and GND.</li> </ul>
30	NC	· ·		Unused pin (Must be left open.)

#### **Peripheral Circuit Example**



### Equivalent Circuit Block Diagram



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