

SANYO

No. 5388

LB8112V**Loading Motor Driver with Built-in Sensor Amplifiers****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

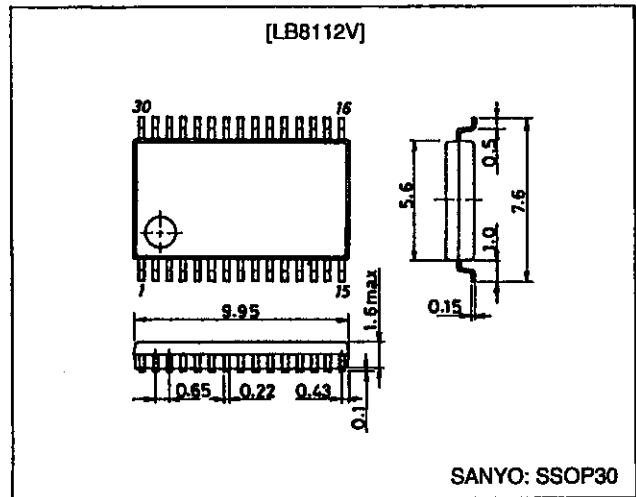
Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC1} max		7	V
	V_{CC2} max		11	V
	V_M max		V_{CC2}	V
Maximum output current	I_M max	Continuous, $P_d < 0.5$ W	600	mA
Input voltage	V_{IN}		-0.3 to $V_{CC1} + 0.3$	V
Allowable power dissipation	P_d max	Independent device, $T_J = 150^\circ\text{C}$	0.5	W
Operating temperature	T_{opr}		-20 to +80	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Package Dimensions

unit: mm

3191-SSOP30

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Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC1}		2.7 to 4.0	V
	V _{CC2}	V _{CC2} ≥ V _{CC1}	2.7 to 9	V
V _M voltage	V _M		2.2 to V _{CC2}	V

Electrical Characteristics at Ta = 25°C, V_{CC1} = 3 V, V_{CC2} = 4.75 V, V_M = 3.0 V

Parameter	Symbol	Conditions	min	typ	max	Unit
V _{CC1} current drain	I _{CC11}	Standby mode		2.3	4	mA
	I _{CC12}	Forward/reverse mode, LIMIT and EN = low		14	19	mA
	I _{CC13}	Brake mode, LIMIT and EN = low		10	14	mA
V _{CC2} current drain	I _{CC21}	Standby mode (V _{CC1} = open)		0.1	20	μA
	I _{CC22}	Standby mode (V _{CC1} = 3.0 V)		0.480	1	mA
	I _{CC23}	Forward/reverse mode		18.5	25	mA
V _M current drain		Standby mode		0.1	20	μA
[Logic Inputs (the DEC1, DEC2, LIMIT, and EN pins)]						
Input high-level voltage	V _{INH}	V _{CC1} = 2.7 to 4.0	2.0			V
High-level input current	I _{INH}	V _{IN} = 3.0 V		46	65	μA
Input low-level voltage	V _{INL}	V _{CC1} = 2.7 to 4.0			0.6	V
Low-level input current	I _{INL}	V _{IN} = 0.6 V		4.6	10	μA
[Logic Outputs (the LIMITOUT, TOPOUT, and ENDOUT pins)]						
Output high-level voltage	V _{OUTH}	V _{CC1} = 2.7 to 4.0, source current: 10 μA	V _{CC1} - 0.5			V
Output low-level voltage	V _{OUTL}	V _{CC1} = 2.7 to 4.0, sink current: 10 μA			0.4	V
[Loading Motor Driver]						
Output saturation voltage	V _{(sat)1}	I _O = 200 mA (vertical addition)		0.2	0.3	V
	V _{(sat)2}	I _O = 400 mA (vertical addition)		0.4	0.6	V
Limit current	I _{Lim}	V _{RS} = 200 mV, R _F = 1.0 Ω, R _L = 7.5 Ω	172	192	212	mA
Detection current	I _{DET}				400	mA
Limit current setting range	ΔI _{Lim}	V _{RS} = 0.1 to 0.3 V, R _F = 0.5 Ω, R _L = 4.7 Ω, V _M = 4.6 V	100		600	mA
[Reel FG Amplifier]						
Input offset voltage	V _{IO}			±1	±5	mV
Input bias current	I _B	V _{IN} = 0.3 V			250	nA
Common-mode input voltage range	V _{ICM}		1		2	V
Open-loop gain	G _{V1}	*		55		dB
Loop gain	G _{V2}		27	29	30.5	dB
Common-mode rejection ratio	C _{MR}	*	65	80		dB
Source output saturation voltage	V _{OU}	I _O = -40 μA		0.1	0.25	V
Sink output saturation voltage	V _{OD}	I _O = 40 μA		0.1	0.25	V
[LPF Buffer]						
Input offset	V _{IO}			±1	±7	mV
Input bias current	I _B	V _{IN} = 0 V			250	nA
Common-mode input voltage range	V _{ICM}		0		V _{CC2} - 1.5	V
Open loop gain	G _{V1}	*		55		dB
Common-mode rejection ratio	C _{MR}	*	65	80		dB
Output voltage range	V _{OUT1}		0		V _{CC2} - 1.5	V
Output current	Source	I _{SO}	V _O = 0 V	10		mA
		I _{SI1}	V _O = 1.0 V	1		mA
		I _{SI2}	V _O = 0.2 V	18	36	45
Bandwidth		*		1		MHz
[LPF Buffer Limiter]						
Input offset	V _{IO}			±1	±7	mV
Input bias	I _B	V _{IN} = 0.2 V			250	nA
Common-mode input voltage range	V _{ICM}		0		V _{CC1} - 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_{IN}	*	4	5	6	k Ω
Minimum input sensitivity	ΔV		± 27	± 35	± 43	mV
Thermal shutdown operating temperature	T_{TSD}	*	150	180	210	$^{\circ}C$
Thermal shutdown hysteresis	ΔT_{TSD}	*		15		$^{\circ}C$

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

Truth Tables

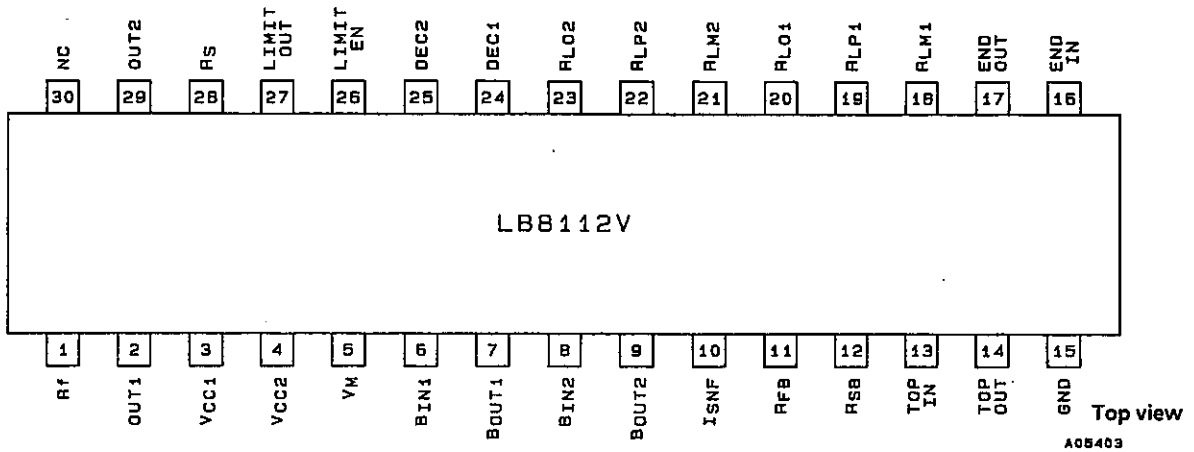
1. Loading motor truth table

Input		Output		Mode
DEC1	DEC2	OUT1	OUT2	
L	L	off	off	Standby
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	L	L	Brake

2. Loading motor current limiter detection modes

LIMIT EN	OUT output	LIMIT OUT
H	LIMIT	L
	NONLIMIT	H
L	Saturation	H

Pin Assignment



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Pin Functions

Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
1	Rf		<p>A05406</p>	<ul style="list-style-type: none"> • P-ground for the output transistor • The output current is detected by a resistor inserted between the Rf pin and ground for motor current control.
2 29	OUT1 OUT2	0 to VM	<p>A05407</p>	<ul style="list-style-type: none"> • Outputs • Connect these pins to the motor.
3	VCC1	2.7 to 4.0 V		<ul style="list-style-type: none"> • Power supply for circuit other than the loading output block and the LPF buffer • This power supply must be stabilized so that noise does not enter at this pin.
4	VCC2	2.7 to 9 V		<ul style="list-style-type: none"> • Power supply for the loading motor pre-driver and LPF buffer. • As is the case for VCC1, this power supply must be stabilized so that noise does not enter at this pin.
5	VM	2.2 to VCC2		<ul style="list-style-type: none"> • Loading motor power supply • As is the case for VCC2, this power supply must be stabilized so that noise does not enter at this pin.
6 8	BIN1 BIN2		<p>A05408</p>	<ul style="list-style-type: none"> • LPF buffer input • This pin is used to form a low-pass filter as shown in the peripheral circuit example.
7 9	BOUT1 BOUT2		<p>A05409</p>	<ul style="list-style-type: none"> • LPF buffer output • Outputs a voltage identical to that applied to the buffer IN pin.

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Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
10 11	ISNF RFB		<p>A05410</p>	<ul style="list-style-type: none"> • ISNF is the connection for the limiter oscillation prevention capacitor. • RFB is the LPF current limiter current detection pin.
12	RSB		<p>A05411</p>	<p>RSB is used to set the LPF limiter. The RSB pin voltage is determined by external circuits.</p>
13 16	TOP _{IN} END _{IN}		<p>A05412</p>	<ul style="list-style-type: none"> • Sense amplifier input block • Internal resistance: 5 kΩ • The output is inverted if a pulse in excess of ±35 mV is input to the IN pin.
15	GND			Ground that is common to P-GND and SGND.
14 17	TOP _{OUT} END _{OUT}	0 to V _{CC1}	<p>A05413</p>	The top and end sensor outputs.
18 19 21 22	RLM1 RLP1 RLM2 RLP2		<p>A05414</p>	<ul style="list-style-type: none"> • The L-FG amplifier inputs • RLM1 and RLM2 are negative inputs. • RLP1 and RLP2 are positive inputs.

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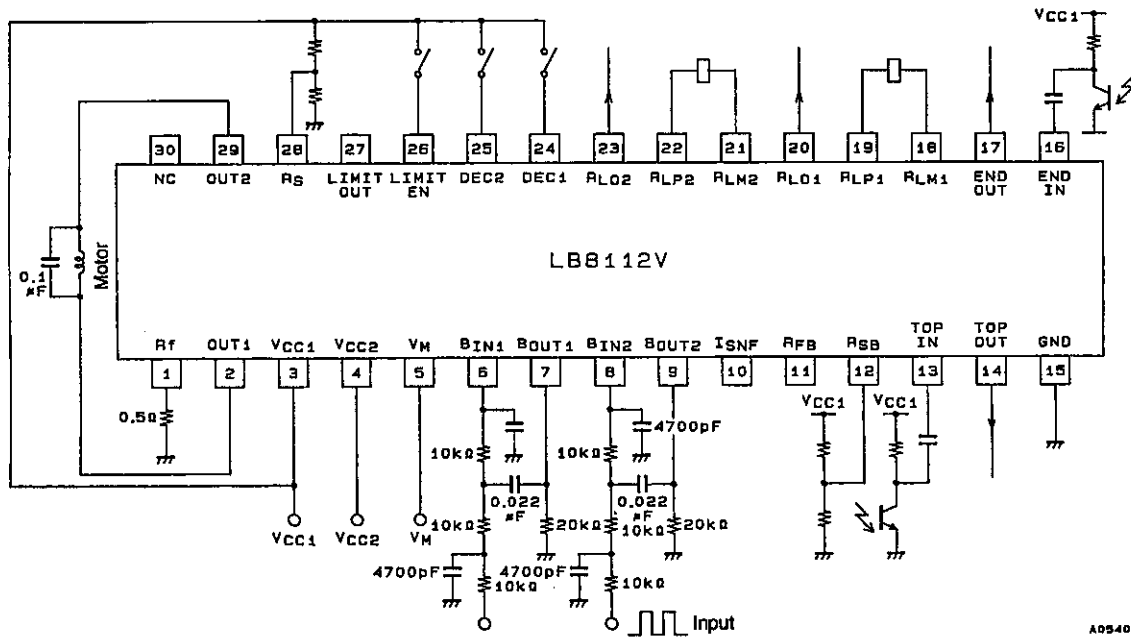
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Pin No.	Symbol	Pin voltage	Equivalent circuit	Function
20 23	RLO1 RLO2	0 to V _{CC1}	<p style="text-align: right;">A05415</p>	The R-FG amplifier outputs
24 25	DEC1 DEC2	0 to V _{CC1}	<p style="text-align: right;">A05416</p>	Loading motor inputs When V _{CC1} = 3.0 V: 2.0 V or higher is high, and 0.6 V or lower is low.
26	LIMIT EN	0 to V _{CC1}	<p style="text-align: right;">A05417</p>	Current limiter on/off control When V _{CC1} = 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	LIMIT OUT	0 to V _{CC1}	<p style="text-align: right;">A05418</p>	Current limiter detection output When V _{CC1} = 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 to V _{CC1} - 1.5 V	<p style="text-align: right;">A05419</p>	<ul style="list-style-type: none"> • Current limiter setting • Sets the limit current by setting the voltage between the Rf pin and GND.
30	NC			Unused pin (Must be left open.)

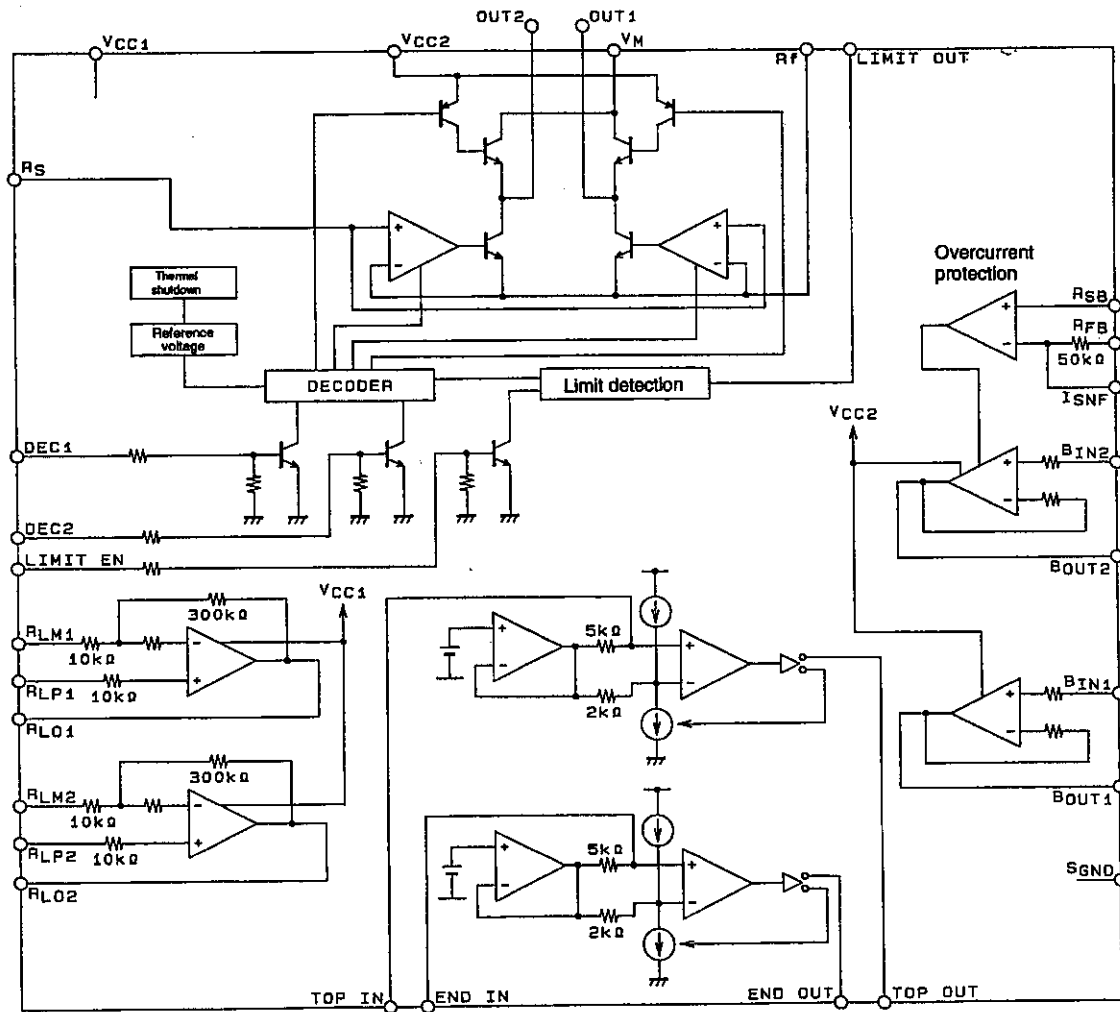
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Peripheral Circuit Example



A05404

Equivalent Circuit Block Diagram



A05405

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