



SANYO Semiconductors

DATA SHEET

Monolithic Digital IC

LB11886NH — For VCR Decks

Capstan Motor Driver

Overview

The LB11886NH is a direct PWM drive capstan motor driver for VCR decks.

Features

- Three-phase 120° round-trip drive direct PWM drive
- Built-in high side and low side output transistor diodes
- Built-in PWM oscillator
- Current limiter function (fixed internal or with external setting)
- Forward/reverse switching function
- Two-stage FG amplifier function (with built-in gain resistor)
- Built-in overvoltage protection function
- Thermal protection function (TSD)

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC} max		6.5	V
Supply voltage 2	V_S max		30	V
Output current	I_O max		1.2	A
Allowable output voltage	V_O max		30	V
Allowable power dissipation	P_d max	Independent IC	0.77	W
		When mounted on a circuit board *1	1.81	
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

*1 Specified circuit board : 114.3 × 71.1 × 1.6mm³, glass epoxy.

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Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC}		4 to 6	V
Supply voltage 2	VS		8 to 28	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $VS = 12\text{V}$

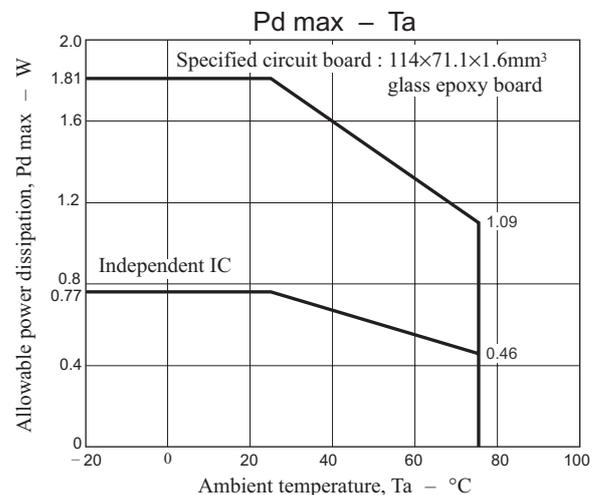
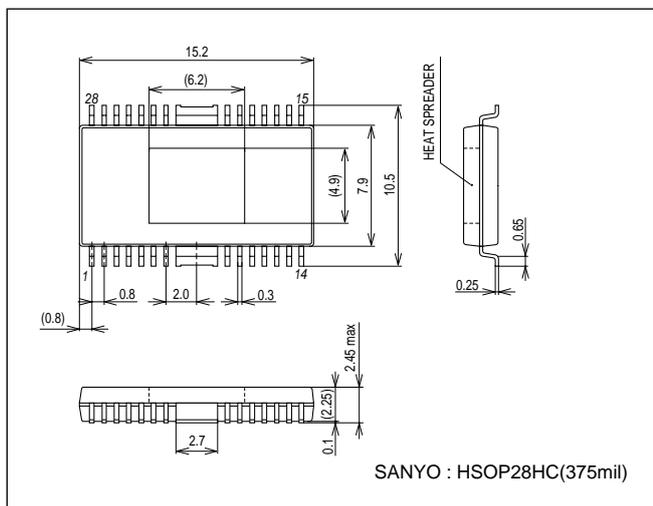
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
V_{CC} supply current	I_{CC}	$V_{CTL} = 0\text{V}$		8	16	mA
Output saturation voltage 1	VOSAT	$I_O = 0.8\text{A}$, source + sink		2.6	4.0	V
Hall sensor amplifier signal input level	Vhall	Between the Hall sensor +/- inputs	100			mVp-p
Hall sensor amplifier common-mode input voltage	Vcm		1.0		$V_{CC} - 1.7$	V
Hall sensor amplifier input bias current	Ib		-3	-1		μA
LIM pin input voltage	VLIM		0		V_{CC}	V
LIM pin input current	ILIM	VILM = 3V		0.5	2.0	μA
LIM pin offset voltage	OLIM		2.4	2.5	2.6	V
LIM gain	GLIMM	CTL = 5V	0.4	0.5	0.6	V/V
CTL pin input voltage	VCTL		0		V_{CC}	V
CTL pin input current	ICTL	VILM = 3V		0.5	2.0	μA
CTL pin offset voltage	OCTL		2.4	2.5	2.6	V
CTL gain	GCTL		0.4	0.5	0.6	V/V
F/R pin forward voltage	Vfrsh		1.5		V_{CC}	V
F/R pin reverse voltage	VRW		0		1	V
F/R pin input current	IFR	FR = 3V		100	200	μA
FG amplifier reference voltage	VFGR		2.40	2.50	2.60	V
Linear amplifier gain at DC At 36kHz	GDC		29.5	31.1	32.7	Times
	G36		20.0	25.0	30.0	Times
Hysteresis amplifier output voltage	VHO	IHO = 4mA		0.2	0.4	V
Hysteresis amplifier hysteresis	VHS	Both hysteresis directions	50	80	100	mV
Hysteresis amplifier output duty ratio	FGDT	360Hz, Fgin = 40mVp-p	49	50	51	%
PWM carrier frequency	FOSC	CPWM = 680pF	18.5	21.7	25.0	kHz
Internal current limiter	MLIM	Design guarantee *	1.2		1.5	A

* The design specification items are design guarantees and are not measured.

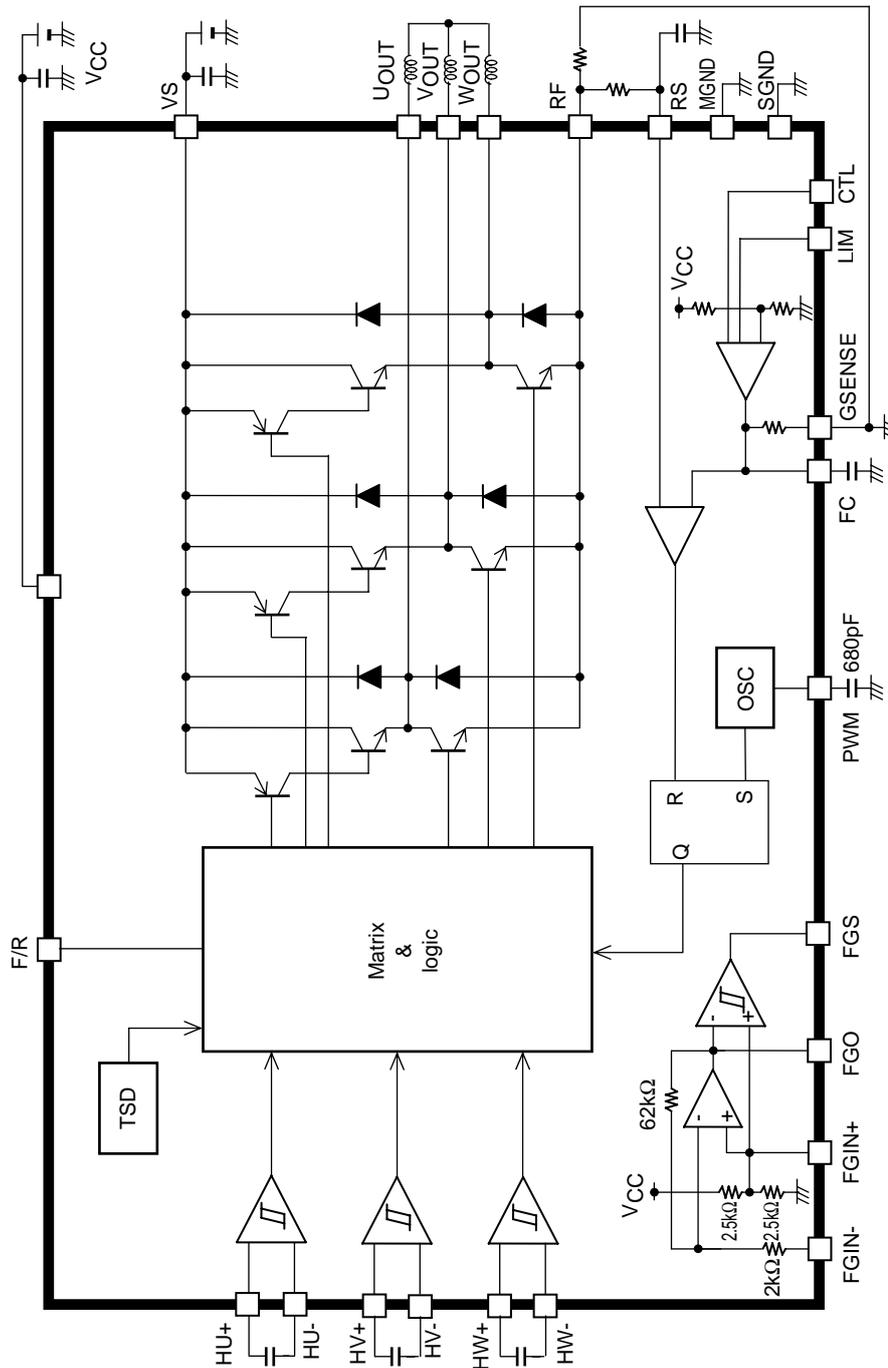
Package Dimensions

unit : mm (typ)

3234B



Block Diagram



Note that the external component values may differ depending on the motor used.

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Pin Functions

Pin No.	Pin	Pin voltage	Description	Equivalent Circuit
21	VS	8V to 28V	Motor drive power supply	
22	V _{CC}	4V to 6V	Power supply that supplies the voltage for all circuits other than the output transistors and the predriver circuit.	
12	MGND		Motor system ground	
10	GSENSE		Motor ground sense	
7	SGND		Ground for all systems other than the output system	
28	HU+	1.5V to V _{CC1} - 1.5V	U phase Hall sensor input The logical high state indicates the state where HU+ > HU-	
1	HU-		V phase Hall sensor input The logical high state indicates the state where HV+ > HV-	
2	HV+			
3	HV-			
4	HW+		W phase Hall sensor input The logical high state indicates the state where HW+ > HW-	
5	HW-			
25	FGIN-		FG amplifier inverting input	
26	FGO		FG amplifier linear output A feedback resistor is built in, and the amplification is about a factor of 31.	
27	FGS		FG Schmitt output	
18	FC		Control loop frequency characteristics correction Current control system closed loop oscillations can be prevented by connecting a capacitor between this pin and ground.	
9	RS		Current detection filter The current detected by RF is filtered by an RC circuit and input to this pin.	

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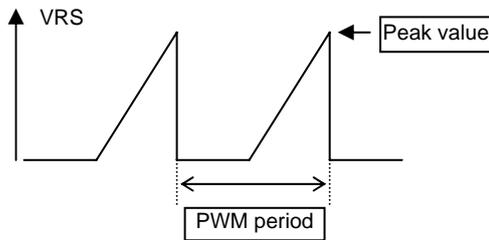
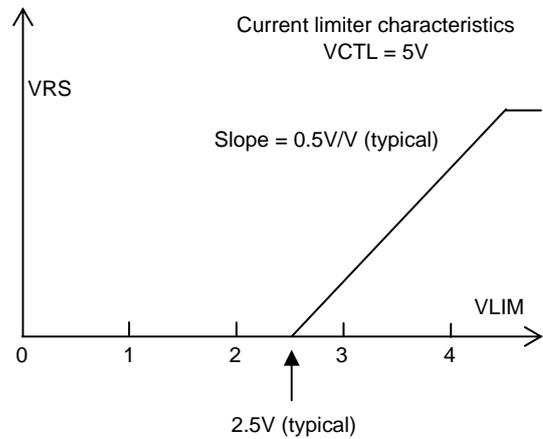
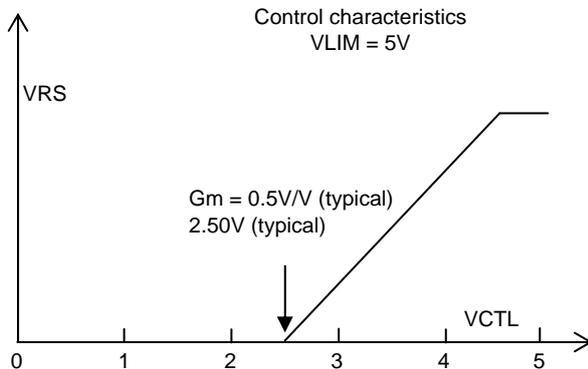
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Pin No.	Pin	Pin voltage	Description	Equivalent Circuit
23	PWM		PWM oscillator connection	
19	LIM	0V to V _{CC}	Current limiter voltage input	
20	CTL	0V to V _{CC}	Speed control voltage input	
14	W _{OUT}		W phase output	
15	V _{OUT}		V phase output	
16	U _{OUT}		U phase output	
8	RF		Power transistor ground and current feedback resistor connection	

Control Function and Current Limiter Function

Note: VRS in the control characteristics is stipulated to be a peak value measurement.



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