



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LB1935T LB1935CL

Monolithic Digital IC Stepping Motor Driver IC

Overview

LB1935T/LB1935CL is IC with forward/reverse motor drive 2-channel in which low saturation voltage and low voltage operation possible. Its small sized package is optimal for 2 phase excitation drive of 2 phase bipolar stepping motors for various portable devices such as digital still cameras.

Features

- Low saturation voltage, $V_{O(sat)} = 0.3V$ typ at $I_O = 150mA$
- Built-in shoot-through current protection circuit
- No standby current consumption (or zero)
- Built-in thermal shutdown circuit
- MSOP10 small-sized package (3.0mm×4.9mm×1.1mm typ) [LB1935T]
- ECSP2828-10 ultraminiature leadless package (2.8mm×2.8mm×0.8mm typ) [LB1935CL]

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum power source voltage	V_{CC} max		-0.3 to +8.0	V
Applied output voltage	V_{OUT} max	OUT1, OUT2, OUT3, OUT4 pin	$V_{CC} + V_{SF}$	V
Applied input voltage	V_{IN} max	ENA, IN1, IN2 pin	-0.3 to +8.0	V
GND Pin outflow current	I GND	Per channel	400	mA
Allowable power dissipation	Pd max	With substrate* [LB1935T]	400	mW
	Pd max	With substrate* [LB1935CL]	450	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

* Specified substrate : 20.0mm×10.0mm×0.8mm, paper phenol

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

Parameter	Symbol	Conditions	Ratings	Unit
Source voltage	V_{CC}		2.2 to 7.5	V
Input high level voltage	V_{IH}	ENA, IN1, IN2 pin	1.8 to 7.5	V
Input low level voltage	V_{IL}	ENA, IN1, IN2 pin	-0.3 to +0.7	V

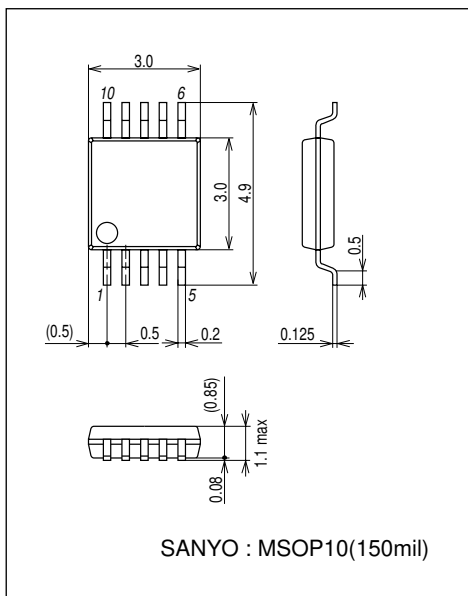
Electric Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power source current	I_{CC0}	ENA = 0V, $V_{IN} = 3\text{V}$ or 0V		0.1	1	μA
	I_{CC1}	ENA = 3V, $V_{IN} = 3\text{V}$ or 0V		13	19	mA
Output saturation voltage	V_{OUT1}	ENA = 3V, $V_{IN} = 3\text{V}$ or 0V, $I_{OUT} = 100\text{mA}$		0.2	0.3	V
	V_{OUT2}	ENA = 3V, $V_{IN} = 3\text{V}$ or 0V, $I_{OUT} = 200\text{mA}$ * [LB1935T only]		0.4	0.6	V
Input current	I_{IN}	$V_{IN} = 3\text{V}$		40	60	μA
	I_{ENA}	VENA = 3V		40	60	μA
Spark killer diode						
Reverse current	$I_S(\text{leak})$				1	μA
Forward voltage	VSF	$I_{OUT} = 200\text{mA}$ * [LB1935T only]			1.7	V

Note : *For LB1935CL, it is a design assured value.

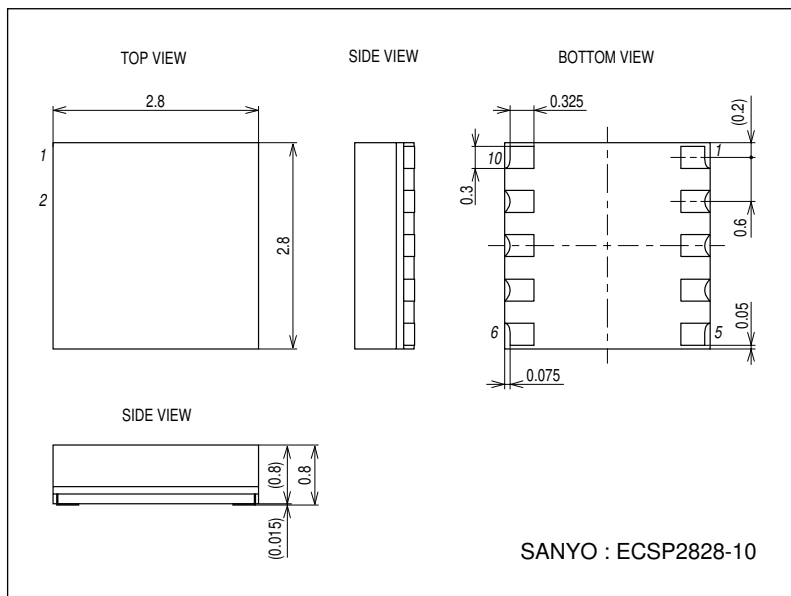
Package Dimensions

unit : mm (typ)
3297 [LB1935T]



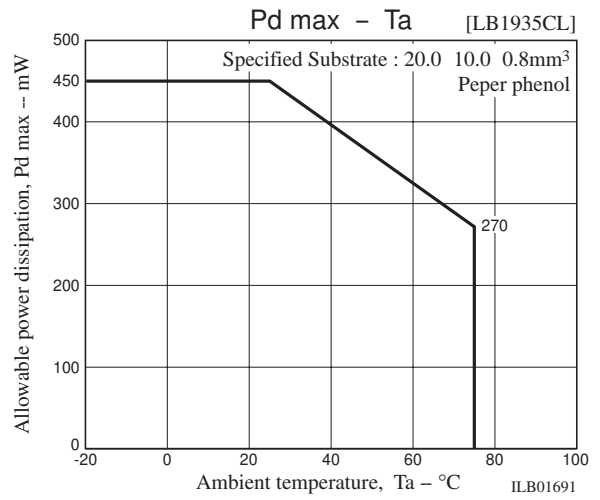
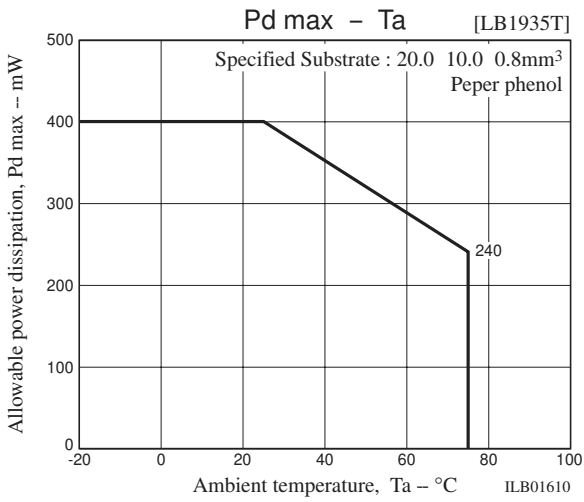
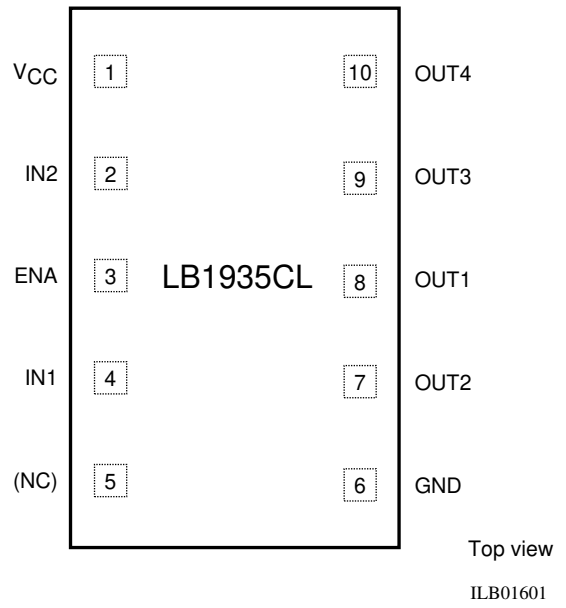
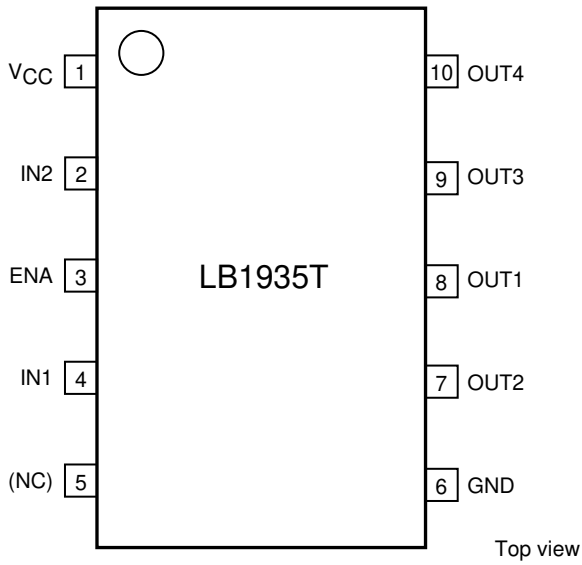
Package Dimensions

unit : mm (typ)
3301A [LB1935CL]



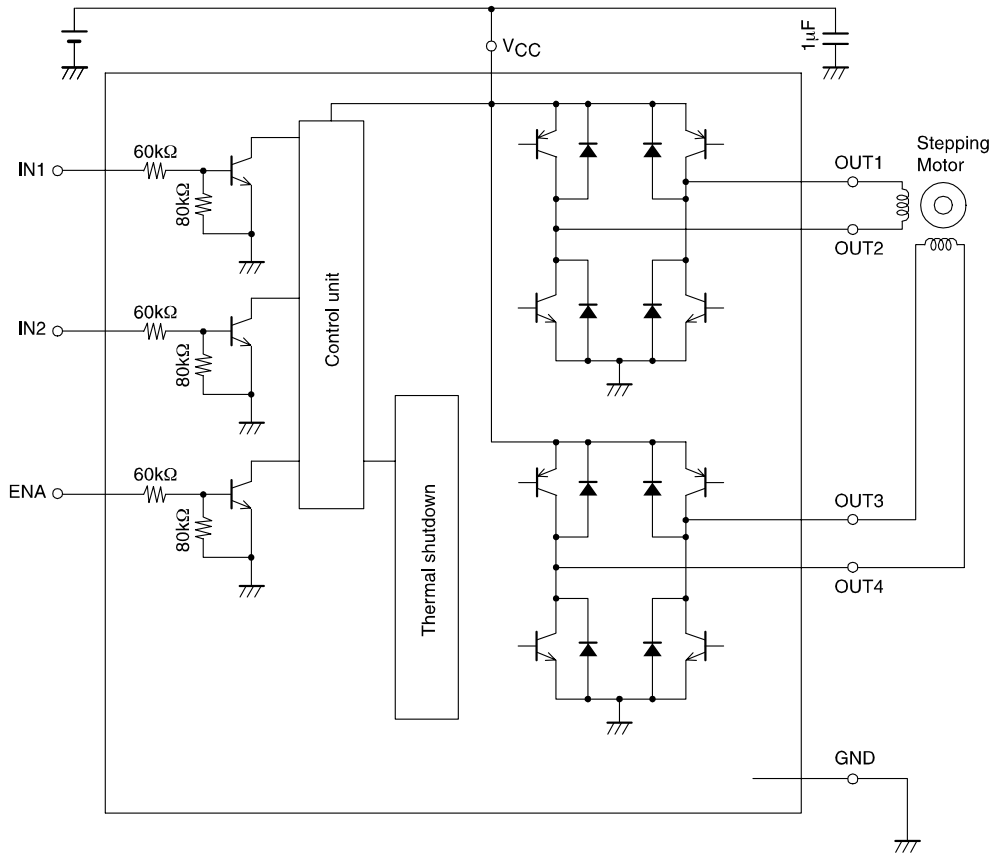
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Pin Assignments



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Block Diagram



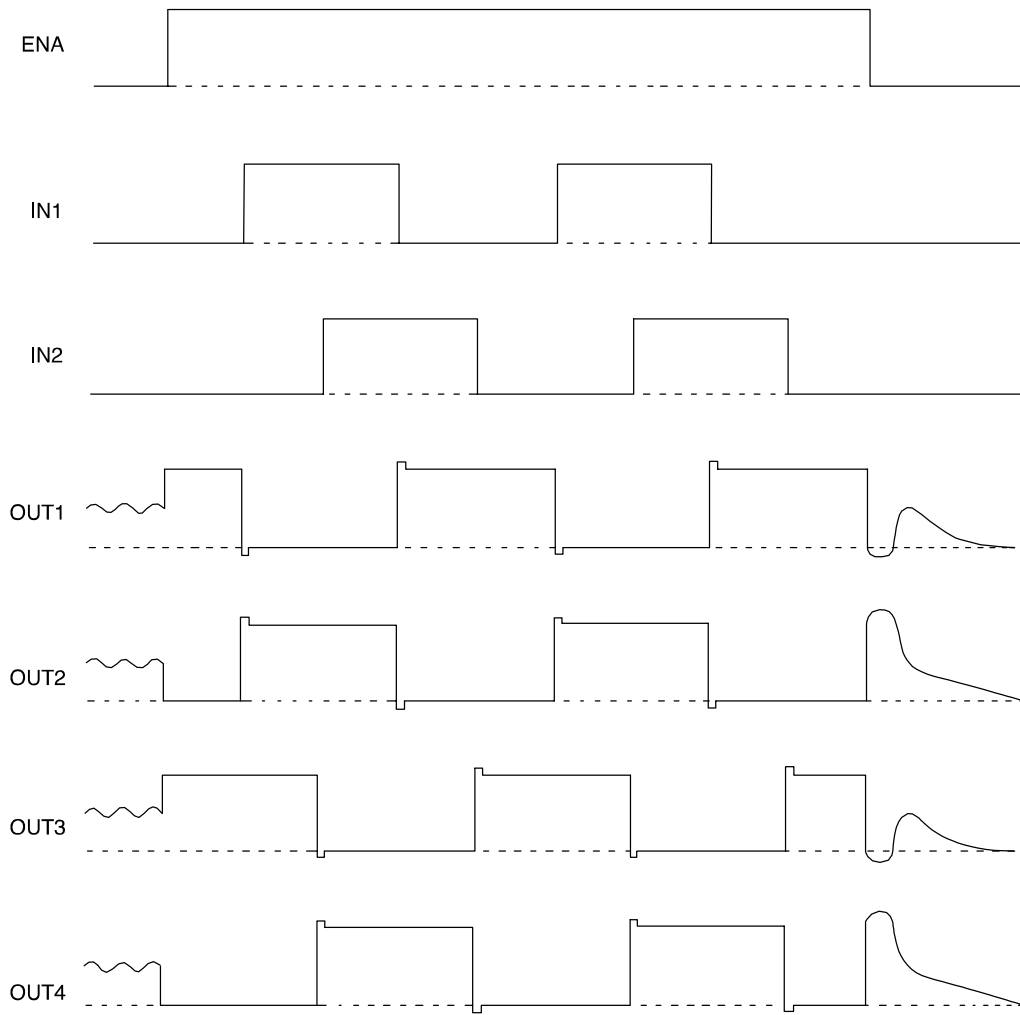
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Truth Table

Input			Output				Remarks
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4	
L	-	-	OFF	OFF	OFF	OFF	Stdby
H	L	L	H	L	H	L	2-phase excitation
	L	H	H	L	L	H	
	H	H	L	H	L	H	
	H	L	L	H	H	L	

Timing Chart

Timing chart below shows the 2 phase excitation stepping motor.



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