



SANYO Semiconductors DATA SHEET

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	$V_{CC}+VSF$	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 Consumption	P_d max	With substrate* [LB1935T]	400	mW
	P_d max	With substrate* [LB1935CL]	450	
Operating Temperature	T_{opr}		-20 to +75	$^\circ C$
Storage Temperature	T_{stg}		-40 to +150	$^\circ C$

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

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

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

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

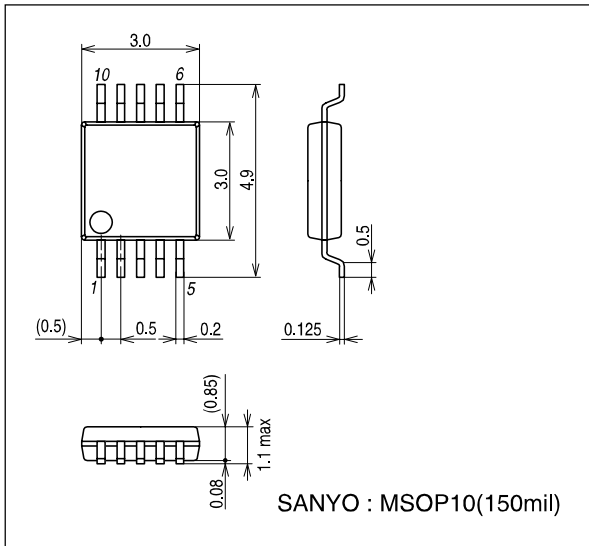
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power Source Current	I_{CC0}	$EN_A = 0\text{V}$, $V_{IN} = 3\text{V}$ or 0V		0.1	1	μA
	I_{CC1}	$EN_A = 3\text{V}$, $V_{IN} = 3\text{V}$ or 0V		13	19	mA
Output Saturation Voltage	V_{OUT1}	$EN_A = 3\text{V}$, $V_{IN} = 3\text{V}$ or 0V , $I_{OUT} = 100\text{mA}$		0.2	0.3	V
	V_{OUT2}^*	$EN_A = 3\text{V}$, $V_{IN} = 3\text{V}$ 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}	$V_{ENA} = 3\text{V}$		40	60	μA
Spark killer diode						
Reverse Current	$I_S(\text{leak})$				1	μA
Forward Voltage	V_{SF}^*	$I_{OUT} = 200\text{mA}$ [LB1935T only]			1.7	V

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

Package Dimensions

unit : mm

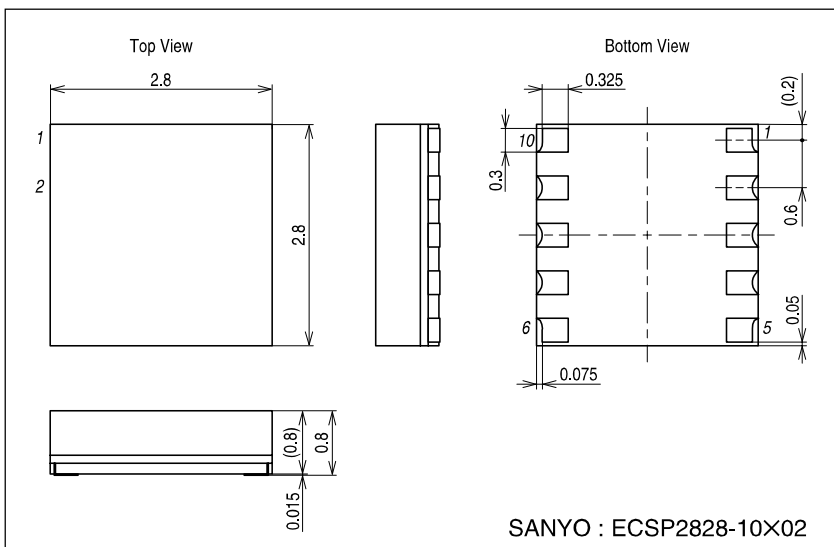
3297 [LB1935T]



Package Dimensions

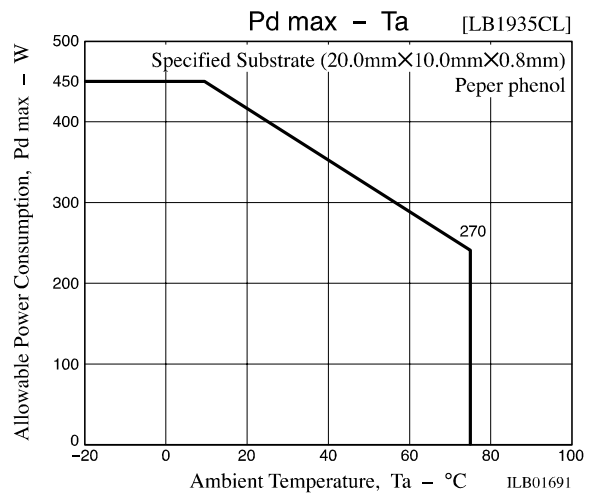
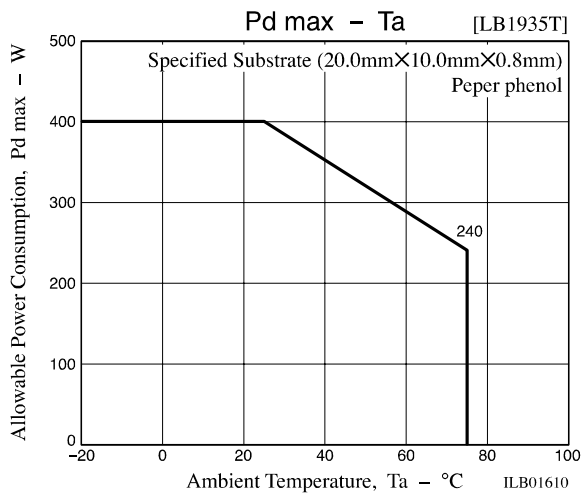
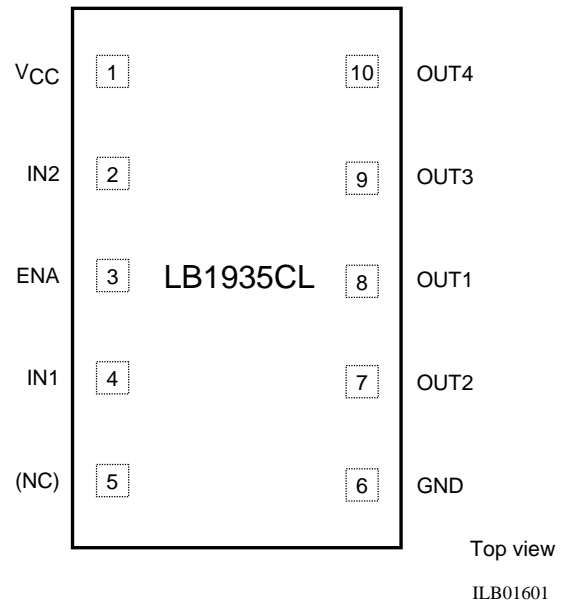
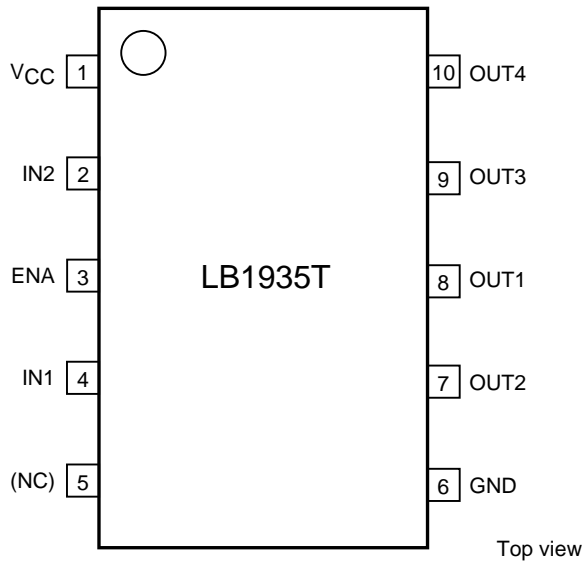
unit : mm

3301 [LB1935CL]



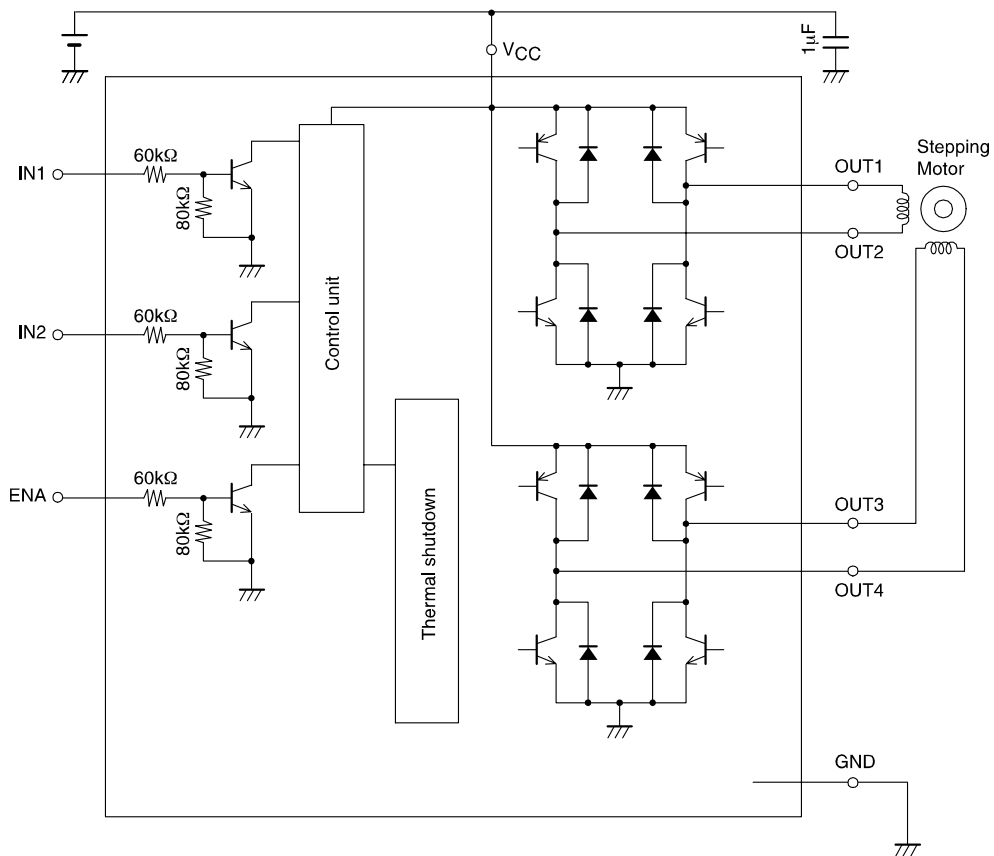
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Pin Assignments



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Block Diagram



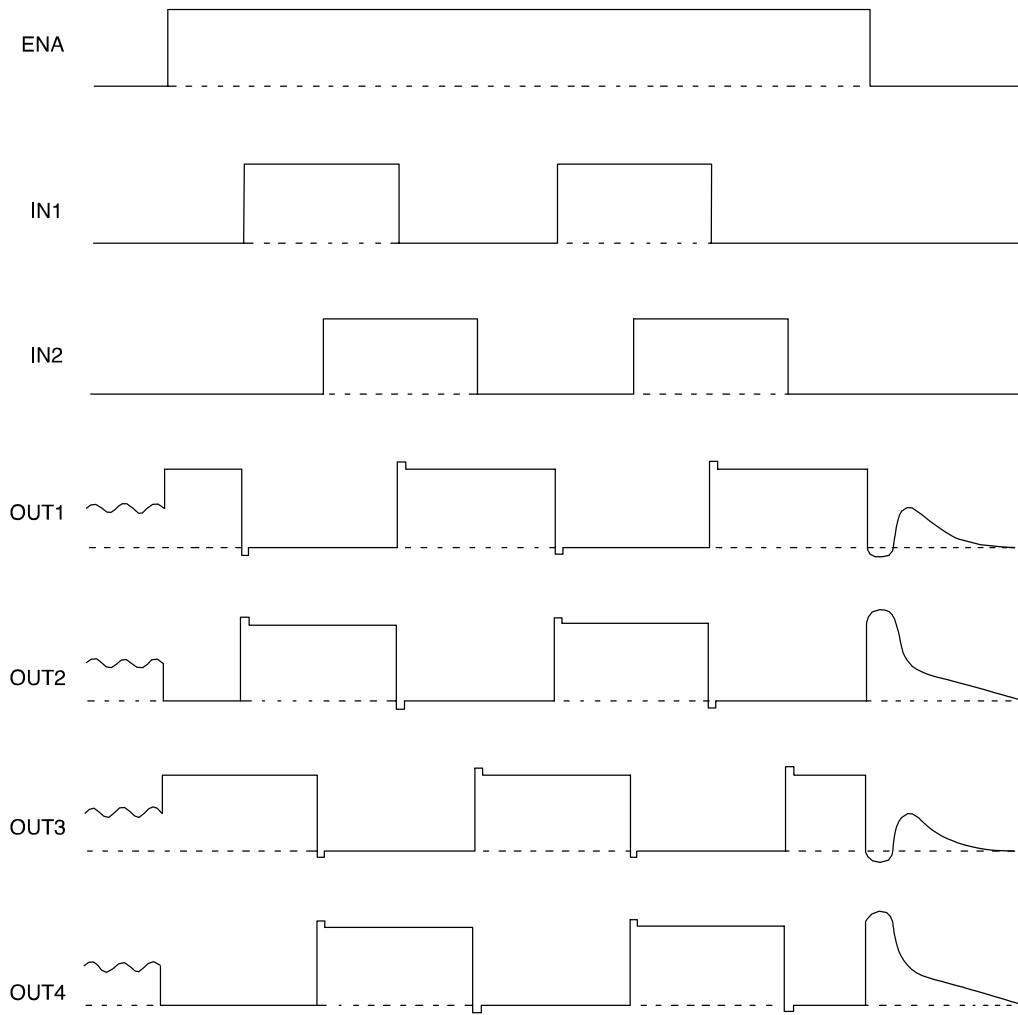
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Truth Table

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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