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# LB1935FA

Monolithic Digital IC

## Stepping Motor Driver IC

### Overview

LB1935FA 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,  $V_O(\text{sat}) = 0.3\text{V}$  typ at  $I_O = 150\text{mA}$
- Built-in shoot-through current protection circuit
- No standby current consumption (or zero)
- Built-in thermal shutdown circuit
- Micro10 small-sized package

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum power source voltage	$V_{CC\text{ max}}$		-0.3 to +8.0	V
Applied output voltage	$V_{OUT\text{ max}}$	OUT1, OUT2, OUT3, OUT4 pin	$V_{CC} + V_{SF}$	V
Applied input voltage	$V_{IN\text{ max}}$	ENA, IN1, IN2 pin	-0.3 to +8.0	V
GND Pin outflow current	$I_{GND}$	Per channel	400	mA
Allowable power dissipation	$P_d\text{ max}$	With substrate*	400	mW
Operating temperature	$T_{opr}$		-20 to +75	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ\text{C}$

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

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

# LB1935FA

## 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

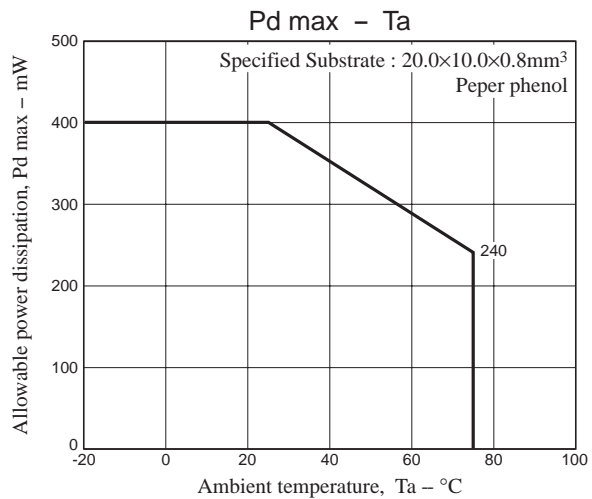
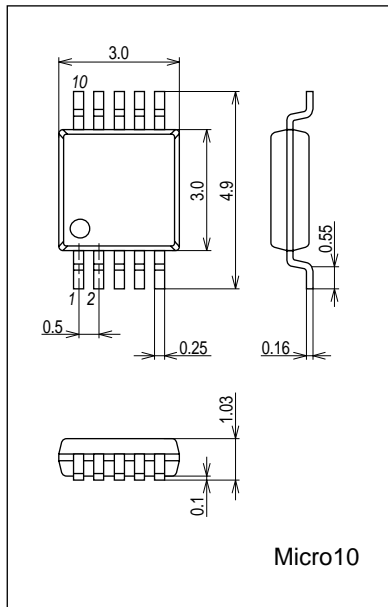
## Electric Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3.3\text{V}$

Parameter Sy	mbol	Conditions	Ratings			Unit
			min ty	p	max	
Power source current	$I_{CC0}$	ENA = 0V, $V_{IN} = 3\text{V}$ or 0V	0.1		1	$\mu\text{A}$
	$I_{CC1}$	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, $I_{OUT} = 200\text{mA}$	0.4		0.6	V
Input current	$I_{IN}$	$V_{IN} = 3\text{V}$	40		60	$\mu\text{A}$
	$I_{ENA}$	VENA = 3V	40		60	$\mu\text{A}$
Spark killer diode						
Reverse current	$I_S(\text{leak})$				1	$\mu\text{A}$
Forward voltage	$V_{SF}$	$I_{OUT} = 200\text{mA}$			1.7	V

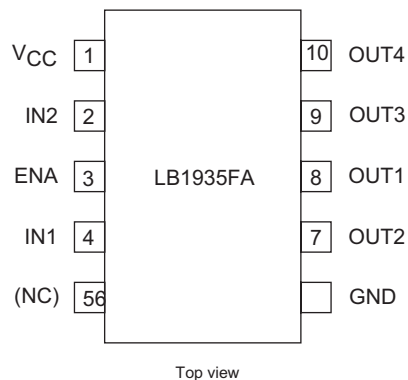
## Package Dimensions

unit : mm (typ)

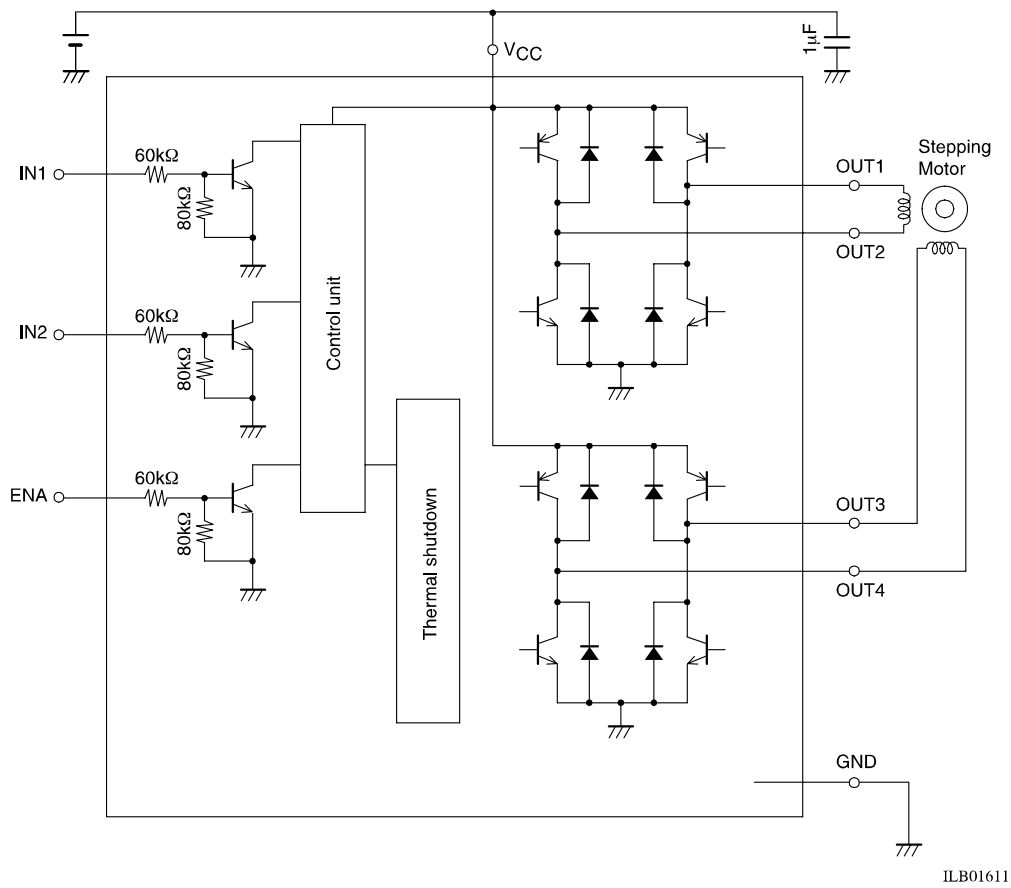
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## Pin Assignments



Block Diagram



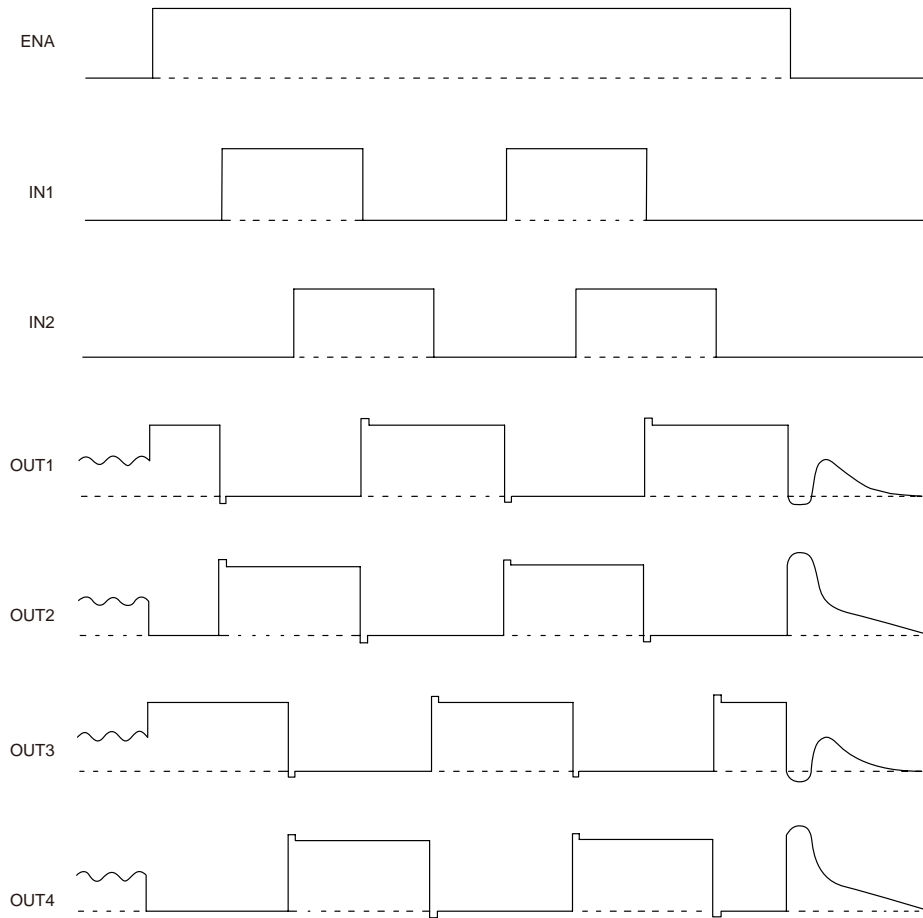
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Truth Table

Input Output			t				Remarks
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4	
L	-	-	OFF	OFF	OFF	OFF	Standby
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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