



LB1943N

Monolithic Digital IC
VCR Loading Motor
Variable Output Forward/Reverse
Motor Driver

Overview

The LB1943N is a variable output forward/reverse motor driver that is optimal for driving motors such as the loading motor in VCR decks.

Functions

- Variable output forward/reverse motor driver
- Built-in thermal protection circuit
- Built-in reference voltage circuit (6.35V, typical)

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		18	V
Maximum input voltage	$V_{IN\text{ max}}$	$V_{CC} > V_{IN}$	-0.3 to +6	V
Maximum output current	$I_{OUT\text{ max}}$		± 1.6	A
Allowable power dissipation	$P_d\text{ max}$		1.2	W
Operating temperature	T_{opr}		-25 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	V_{CC1}		8.0 to 18	V
	V_{CC2}	$V_{CC1} \geq V_{CC2}$	5 to 18	V
Forward to reverse operation disallowed period	T_{off}		20 or more	μs

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

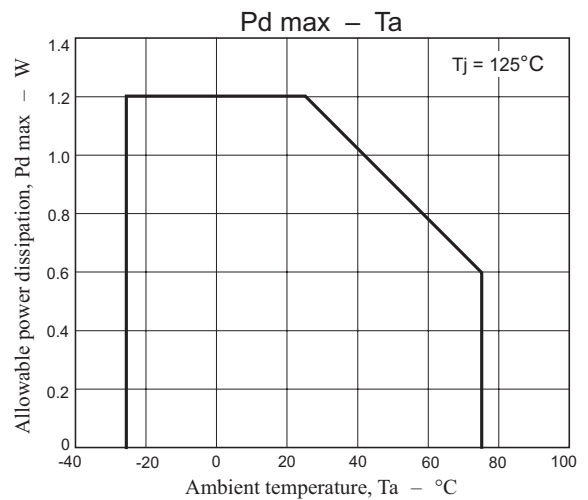
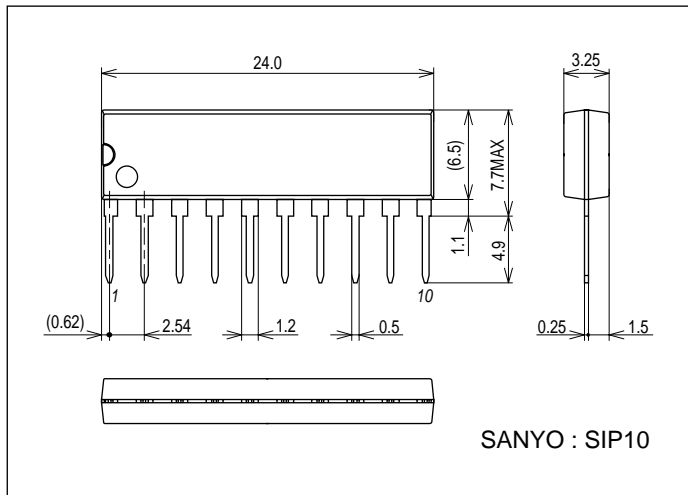
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Low-level input voltage	$V_{IN L}$		0		1.0	V
High-level input voltage	$V_{IN H}$		4.2		6.0	V
Mid-level input voltage	$V_{IN M}$		2.0		3.0	V
Input impedance	Z_{IN}			75		k Ω
Current consumption	I_{CC}			5.5	10	mA
Output voltage 1	V_{OUT1}	$R_L = 60\Omega$, $V_C = 2.5\text{V}$, $V_{IN1} = 2.5\text{V}$, $V_{IN2} = 0\text{V}$	4.4	4.95	5.4	V
Output voltage 2	V_{OUT2}	$R_L = 60\Omega$, $V_C = 2.5\text{V}$, $V_{IN1} = 2.5\text{V}$, $V_{IN2} = 5.0\text{V}$	4.4	4.95	5.4	V
Output leakage current	$I_{O L}$	$R_L = \infty$		0.01	1.0	mA
Saturation voltage (high side)	V_{sat11}	$V_{CC} = 12\text{V}$, $I_{OUT} = 300\text{mA}$		1.9	2.2	mV
	V_{sat12}	$V_{CC} = 12\text{V}$, $I_{OUT} = 500\text{mA}$		1.9	2.3	V
Saturation voltage (low side)	V_{sat21}	$V_{CC} = 12\text{V}$, $I_{OUT} = 300\text{mA}$		0.25	0.5	V
	V_{sat22}	$V_{CC} = 12\text{V}$, $I_{OUT} = 500\text{mA}$		0.4	0.65	V
Reference supply voltage	V_{ref}		6.0	6.35	6.8	V
Reference voltage load characteristics	$\Delta V_{ref}/\Delta I_{ref}$	$I_{ref} = 0\text{mA}$ to -2.0mA		0.05	0.1	V/mA
Control to output gain		V_{OUT}/V_C , $V_C = 2.5\text{V}$ $R_L = 60\Omega$	1.5	1.9	2.4	Time
Thermal shutdown temperature	T_{TSD}	Design target*	150	180		$^\circ\text{C}$

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

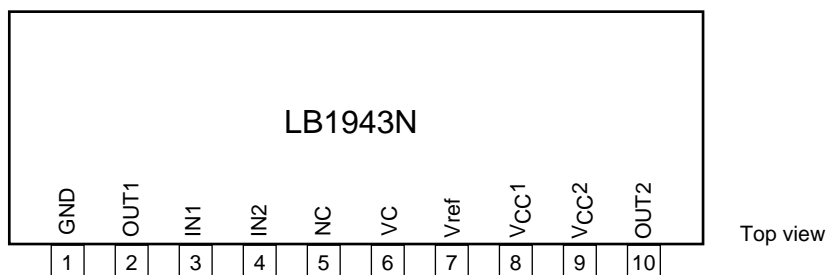
Package Dimensions

unit:mm (typ)

3043C

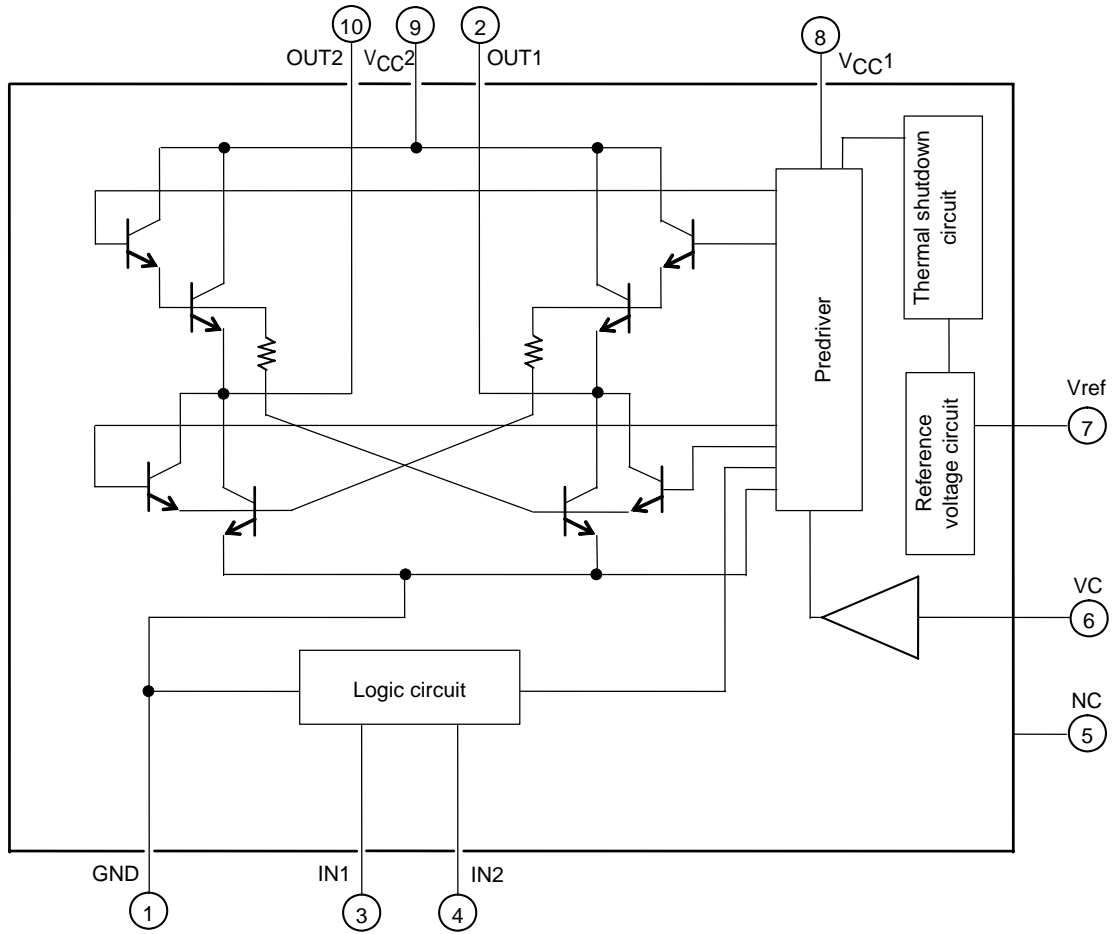


Pin Assignment



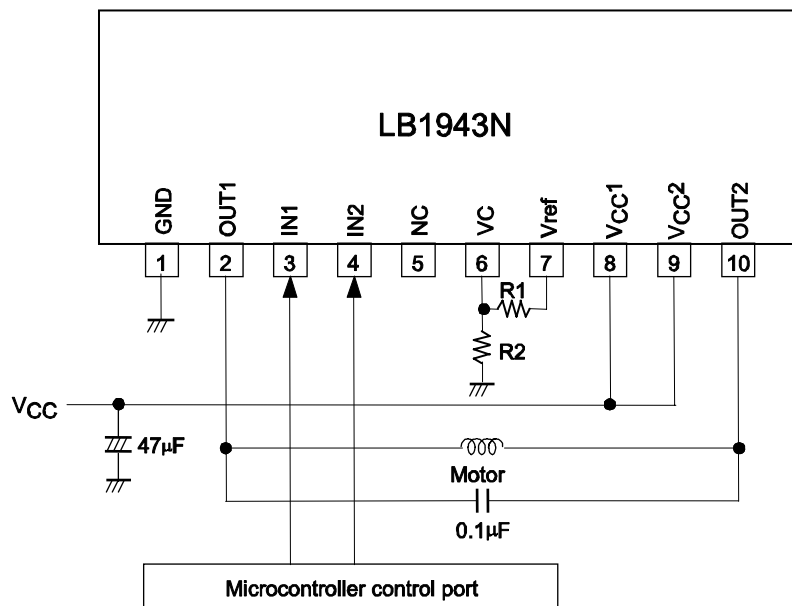
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Block Diagram



Application Circuit Example

VCC = 12V



Note: Microcontroller output ports must be CMOS outputs and must be used in the high, low, or open state.

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Truth Table

Input		Output voltage		Operation
IN1	IN2	OUT1	OUT2	
H	H	L	Full	Forward (reverse) mode
M	H	L	$VC \times 2$	Forward (reverse) mode
L	H	L	$VC \times 2$	Forward (reverse) mode
H	M	off	off	Break
M	M	off	off	Break
L	M	off	off	Break
H	L	Full	L	Reverse (forward) mode
M	L	$VC \times 2$	L	Reverse (forward) mode
L	L	$VC \times 2$	L	Reverse (forward) mode

H: high level, M: mid level, L: low level

Input levels V_H : 4.2V or higher
 V_M : 2.0V to 3.0V
 V_L : Under 1.0V

When IN1 or IN2 is open, that input will go to the 2.5V level. Operation is equivalent to that of the LB1641.

Pin Functions

Pin No.	Pin	Description	Equivalent Circuit
1	GND	<ul style="list-style-type: none"> Common ground for the power signal systems 	
3	IN1	<ul style="list-style-type: none"> Output voltage switching input When the input is open, V_M will become about 2.5V. 	
4	IN2	<ul style="list-style-type: none"> Forward/reverse/brake switching input When the input is open, V_M will become about 2.5V. 	

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Pin No.	Pin	Description	Equivalent Circuit
6	VC	<ul style="list-style-type: none"> • Output voltage setting 	
7	Vref	<ul style="list-style-type: none"> • Reference voltage output Vref = 6.4V 	
8	VCC1	<ul style="list-style-type: none"> • Signal system power supply 	
9	VCC2	<ul style="list-style-type: none"> • Power system power supply 	
2 10	OUT1 OUT2	<ul style="list-style-type: none"> • Motor coil connection 	

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