



SANYO Semiconductors

# DATA SHEET

## 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	$I_{OUT\text{ max}}$		$\pm 1.6$	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	$\mu\text{s}$

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# LB1945D

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

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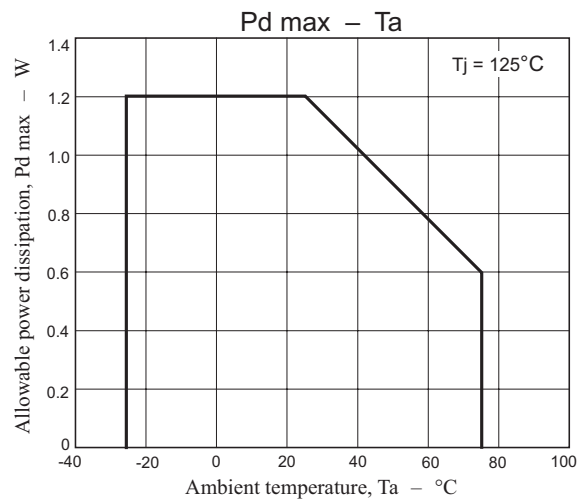
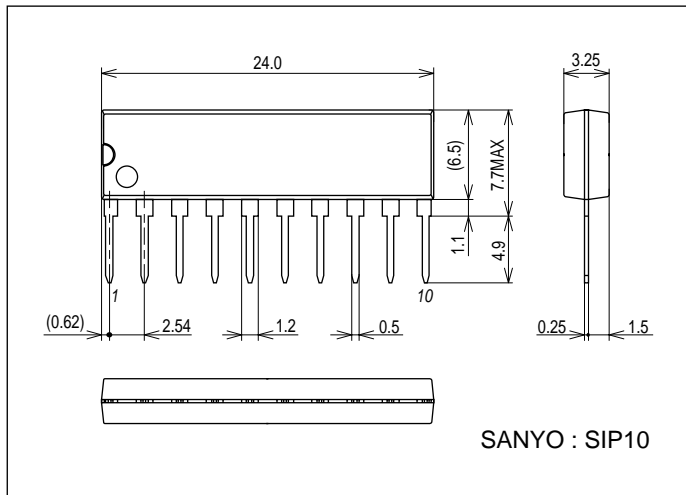
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Low-level input voltage	$V_{IN L}$		0		1.0	V
High-level input voltage	$V_{IN H}$		4.2		6.0	V
Mid-level input voltage	$V_{IN M}$		2.0		3.0	V
Input impedance	$Z_{IN}$			75		k $\Omega$
Current consumption	$I_{CC}$			5.5	10	mA
Output voltage 1	$V_{OUT1}$	$R_L = 60\Omega$ , $V_C = 2.5\text{V}$ , $V_{IN1} = 2.5\text{V}$ , $V_{IN2} = 0\text{V}$	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	$I_{OL}$	$R_L = \infty$		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 $-2.0\text{mA}$		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.

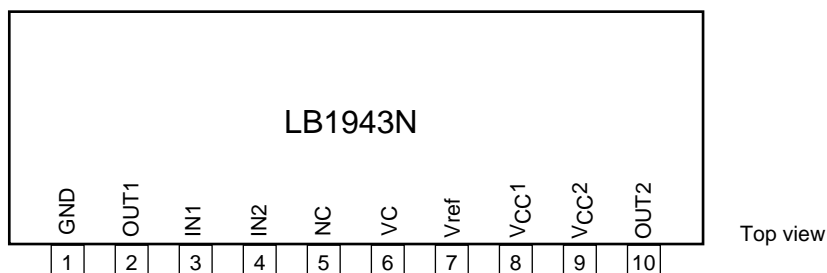
## Package Dimensions

unit:mm (typ)

3043C



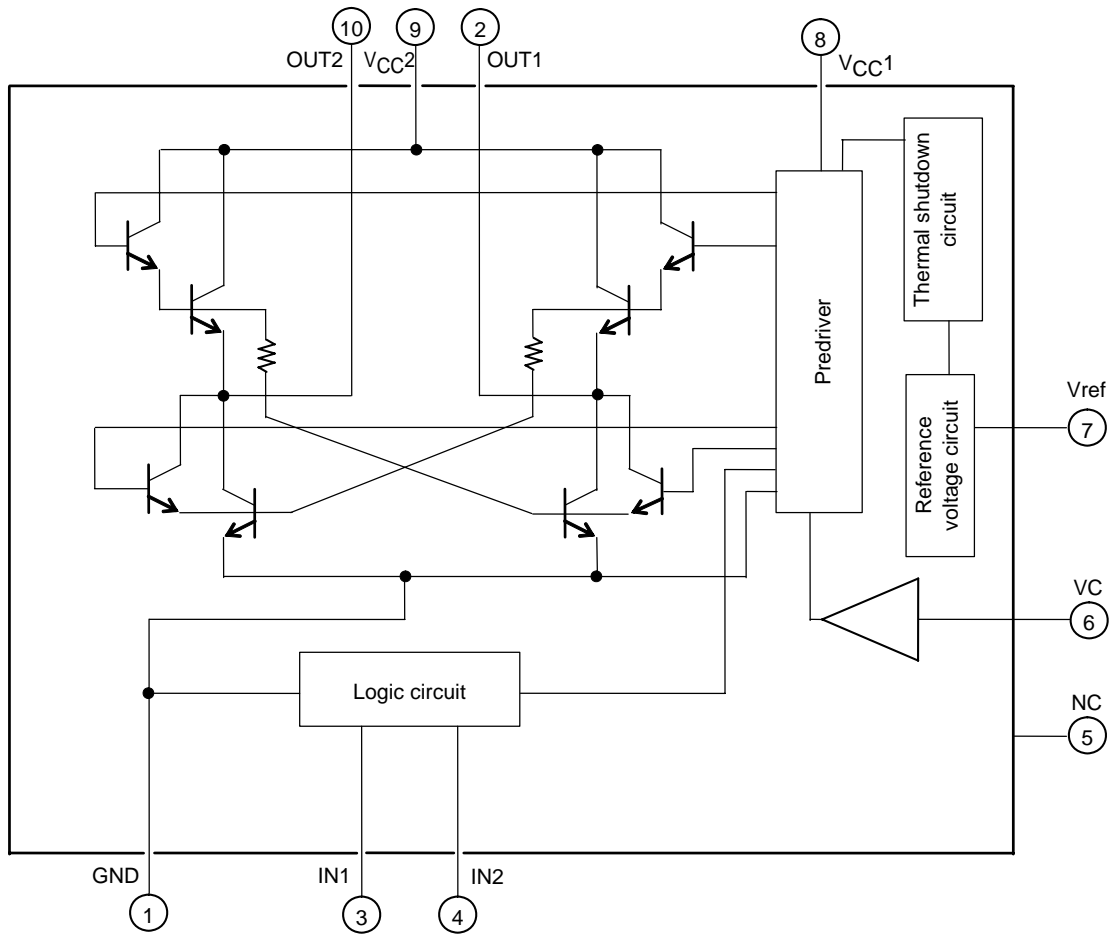
## Pin Assignment



# LB1945D

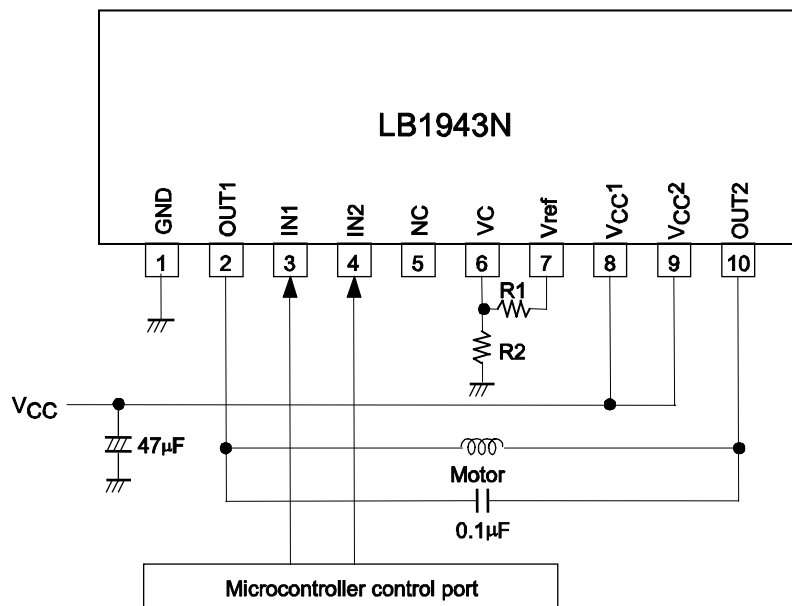
## Block Diagram

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## Application Circuit Example

VCC = 12V



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

# LB1945D

## 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  
 VH: 4.2V or higher  
 VM: 2.0V to 3.0V  
 VL: 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"> <li>Common ground for the power signal systems</li> </ul>	
3	IN1	<ul style="list-style-type: none"> <li>Output voltage switching input</li> <li>When the input is open, VM will become about 2.5V.</li> </ul>	
4	IN2	<ul style="list-style-type: none"> <li>Forward/reverse/brake switching input</li> <li>When the input is open, VM will become about 2.5V.</li> </ul>	

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Pin No.	Pin	Description	Equivalent Circuit <span style="float: right; font-size: small;">www.DataSheet4U.com</span>
6	VC	<ul style="list-style-type: none"> <li>Output voltage setting</li> </ul>	
7	Vref	<ul style="list-style-type: none"> <li>Reference voltage output</li> <li>Vref = 6.4V</li> </ul>	
8	VCC1	<ul style="list-style-type: none"> <li>Signal system power supply</li> </ul>	
9	VCC2	<ul style="list-style-type: none"> <li>Power system power supply</li> </ul>	
2 10	OUT1 OUT2	<ul style="list-style-type: none"> <li>Motor coil connection</li> </ul>	

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