

## Single-phase DC Brushless Motor Driver IC

### FEATURES

- Supply Voltage  $V_{DD}=2.0$  to  $5.5V$
- Low Quiescent Current  $I_{DD}=1.0mA$  typ.
- Output Voltage  $V_{OH}=4.8V$  typ. ( $I_o=+350mA$ )  
 $V_{OL}=0.2V$  typ. ( $I_o=-350mA$ )
- Input Offset Voltage  $V_{IO}=\pm 10mV$  max.
- Closed-loop Gain  $A_v=49.8dB$  typ.
- Direct PWM Input
- Lock Protection Function (Auto Recovery)
- FG Output
- Start up Assist Function
- Quick Start Function
- Thermal Shutdown Function
- Operating Temperature  $T_{opr}=-40$  to  $105^\circ C$
- Package Outline MSOP8-Thin (TVSP8)\*

\*MEET JEDEC MO-187-DA/THIN TYPE

### GENERAL DESCRIPTION

The NJU7367B is a single-phase motor driver IC for small DC brushless motor.

It features Lock Protection, FG Output, Start up Assist, Quick Start and Thermal Shutdown function.

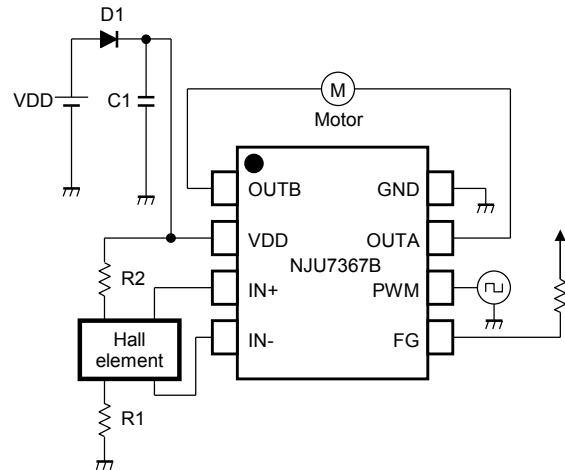
The motor rotational speed is controlled by PWM input signal.

High closed-loop gain and wide operating temperature range make NJU7367B suitable for a small fan motor in high temperature application such as car accessory.

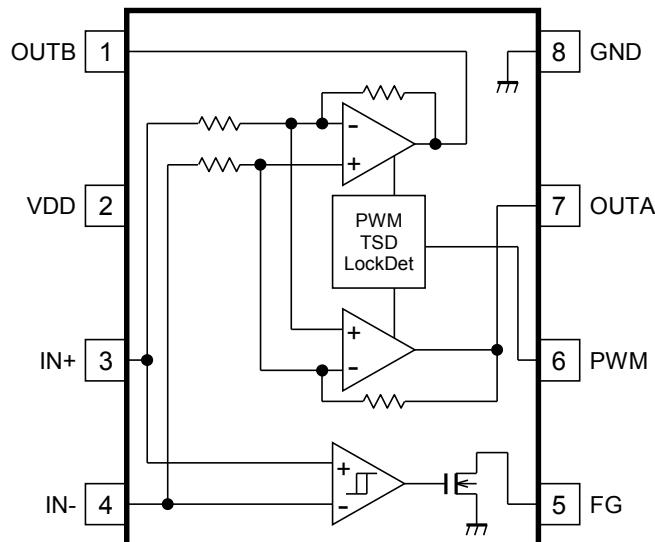
### APPLICATION

Small 5V-FAN Motor

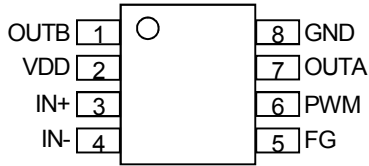
### TYPICAL APPLICATION



### BLOCK DIAGRAM

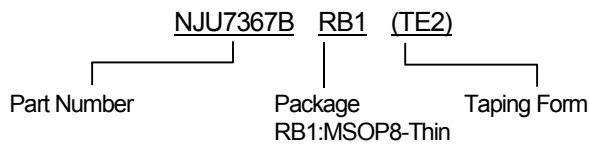


## ■PIN CONFIGURATION



PIN NO.	SYMBOL	I/O	DESCRIPTION
1	OUTB	O	Output Pin B
2	VDD	-	Power Supply Pin
3	IN+	I	Input Pin +
4	IN-	I	Input Pin -
5	FG	O	FG Output Pin
6	PWM	I	PWM Input Pin
7	OUTA	O	Output Pin A
8	GND	-	Ground Pin

## ■PRODUCT NAME INFORMATION



## ■ORDERING INFORMATION

PRODUCT NAME	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ(pcs)
NJU7367BRB1(TE2)	MSOP8-Thin	yes	yes	Sn2Bi	7367B	18	2,000

**■ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATINGS	UNIT	NOTE
Supply Voltage	$V_{DD}$	+7.0	V	VDD Pin
Input Voltage	$V_{ID}$	-0.3 to $V_{DD}$	V	IN+, IN- Pin
PWM Input Voltage	$V_{PWM}$	-0.3 to +7.0	V	PWM Pin
Output Current (Peak)	$I_{OPEAK}$	1000	mA	OUTA, OUTB Pin
FG Output Current	$I_{FG}$	10	mA	FG Pin
FG Output Voltage	$V_{FG}$	+7.0	V	FG Pin
Power Dissipation( $T_a=25^{\circ}C$ ) MSOP8-Thin	$P_D$	400 <sup>(1)</sup>	mW	
		510 <sup>(2)</sup>		
Junction Temperature Range	$T_j$	-40 to +150	$^{\circ}C$	
Operating Temperature Range	$T_{opr}$	-40 to +105	$^{\circ}C$	
Storage Temperature Range	$T_{stg}$	-50 to +150	$^{\circ}C$	

(1): Device itself

(2): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 2Layers FR-4)

**■RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{DD}$	2.0 to 5.5	V

**■ELECTRICAL CHARACTERISTICS**

(Unless otherwise noted,  $V_{DD}=5V$ ,  $T_a=25^{\circ}C$ )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
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**GENERAL**

Quiescent Current	$I_{DD}$	IN+=3.9V, IN-=0.4V	-	1.0	1.5	mA
Thermal Shutdown Operating Temperature	$T_{TSD}$		-	170	-	$^{\circ}C$
Thermal Shutdown Hysteresis	$T_{HYS}$		-	20	-	$^{\circ}C$

**HALL AMP BLOCK**

Input Offset Voltage	$V_{IO}$		-10	-	10	mV
Common Mode Input Voltage Range	$V_{ICM}$		0.4	-	3.9	V
Closed-loop Gain	$A_V$		-	49.8	-	dB

**OUTPUT BLOCK**

Output Voltage	$V_{OH}$	$I_O=+350mA$	4.7	4.8	-	V
	$V_{OL}$	$I_O=-350mA$	-	0.2	0.3	V
FG L Output Voltage	$V_{FG}$	$I_{FG}=5mA$	-	-	0.2	V
FG Leak Current	$I_{FG-LEAK}$	$V_{FG}=5V$	-	-	1.0	$\mu A$

## ■ ELECTRICAL CHARACTERISTICS

(Unless otherwise noted,  $V_{DD}=5V$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>PWM INPUT BLOCK</b>						
PWM Input Frequency	$f_{PWM}$		2	-	50	kHz
Pullup Resistance	$R_{PWM}$		-	200	-	k $\Omega$
H Level Input Voltage 1	$V_{IHP1}$		2.4	-	5	V
L Level Input Voltage 1	$V_{ILP1}$		0	-	1.4	V
H Level Input Voltage 2	$V_{IHP2}$	$V_{DD}=2V$	1.1	-	2	V
L Level Input Voltage 2	$V_{ILP2}$	$V_{DD}=2V$	0	-	0.5	V

## LOCK PROTECTION BLOCK

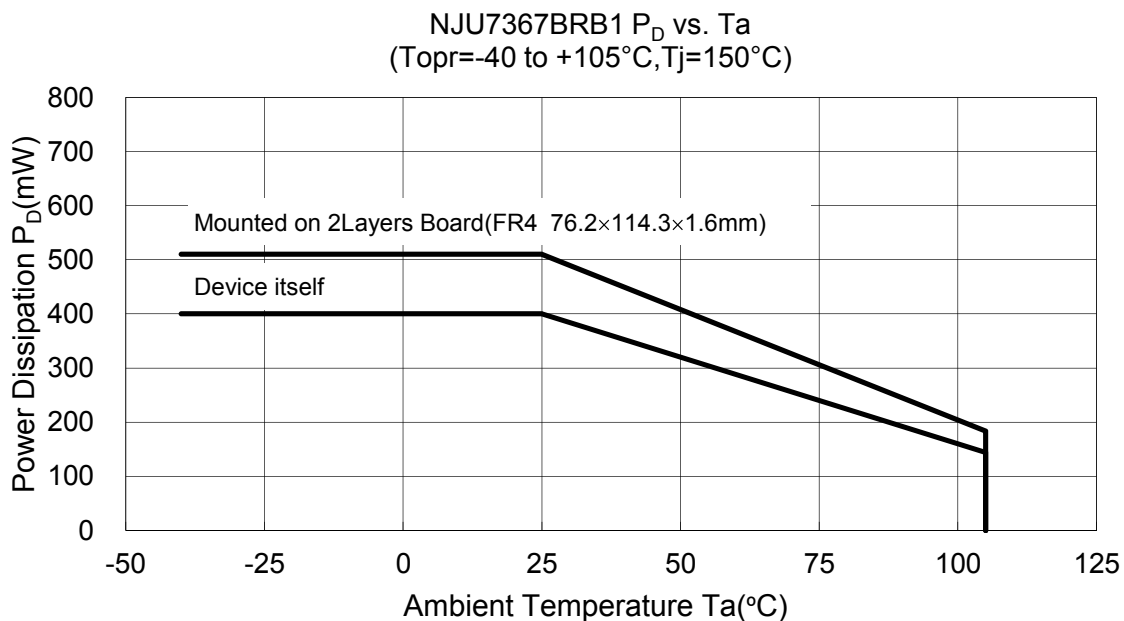
Lock Protection ON Time	$t_{ON}$		-	0.5	-	s
Lock Protection OFF Time	$t_{OFF}$		-	5.0	-	s
Lock Protection Ratio	$t_{RATIO}$		-	1:10	-	-

## ■ THERMAL CHARACTERISTICS

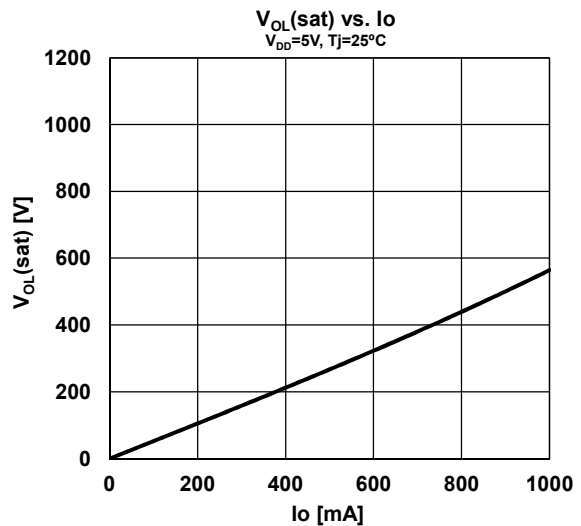
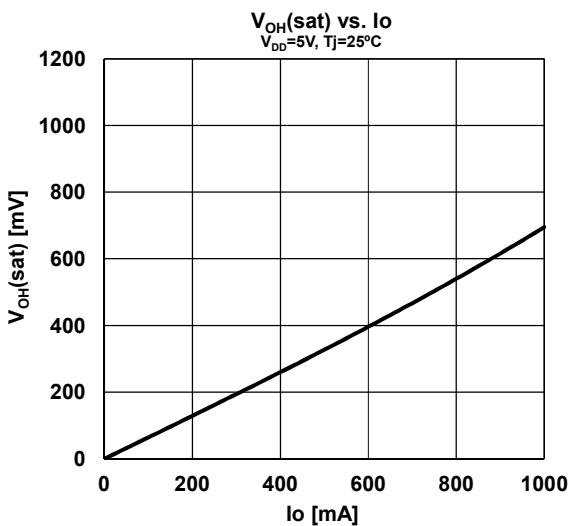
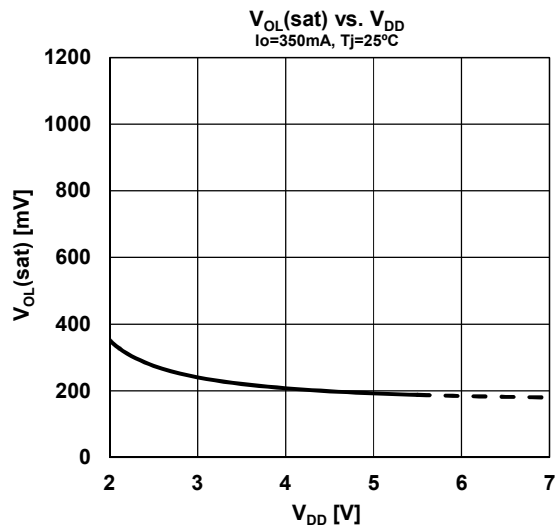
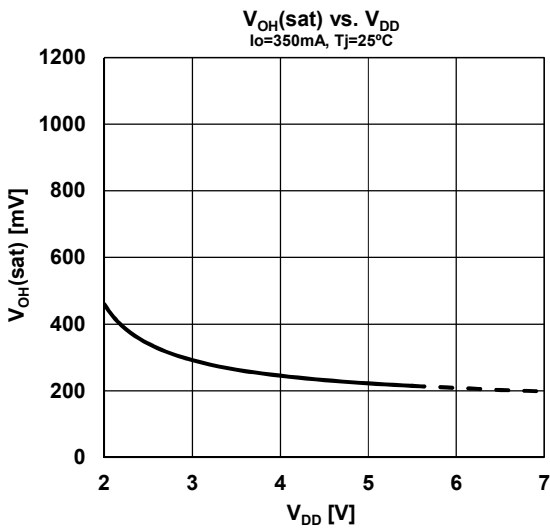
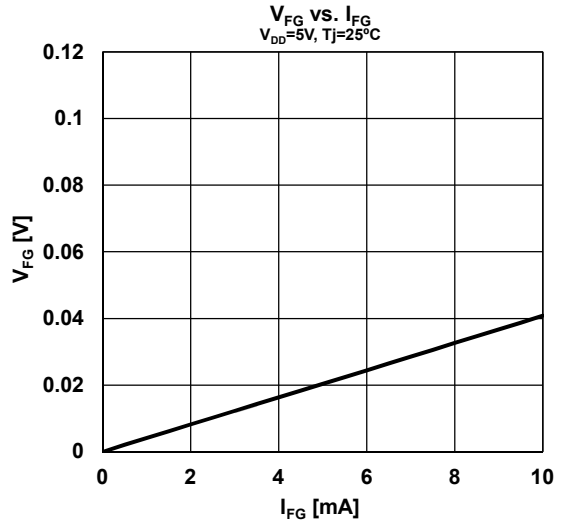
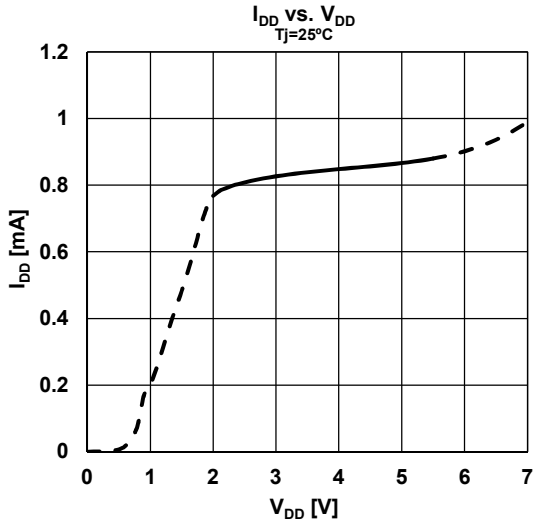
PARAMETER	SYMBOL	VALUE	UNIT
Junction-to-ambient thermal resistance	$\theta_{ja}$	244 <sup>(3)</sup>	$^\circ C/W$
Junction-to-Top of package characterization parameter	$\psi_{jt}$	51 <sup>(3)</sup>	$^\circ C/W$

(3): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 2Layers FR-4)

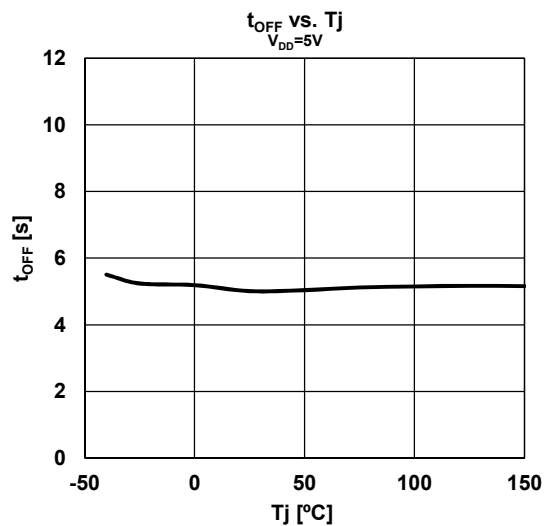
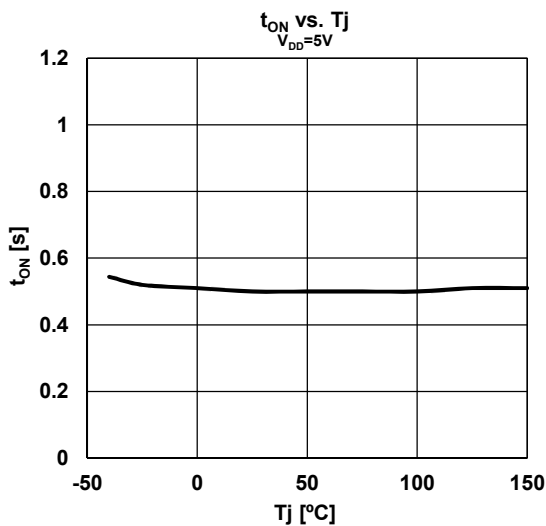
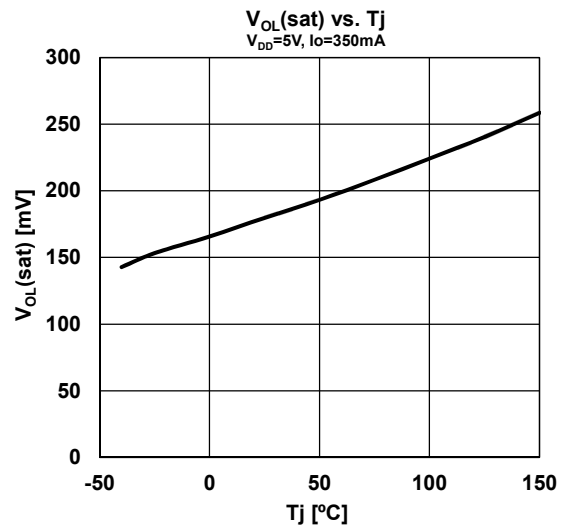
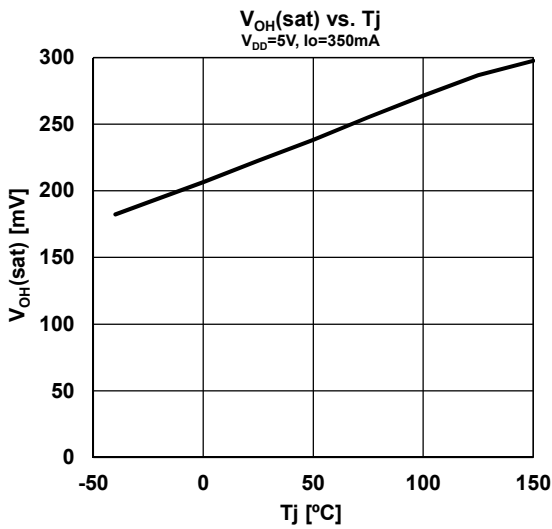
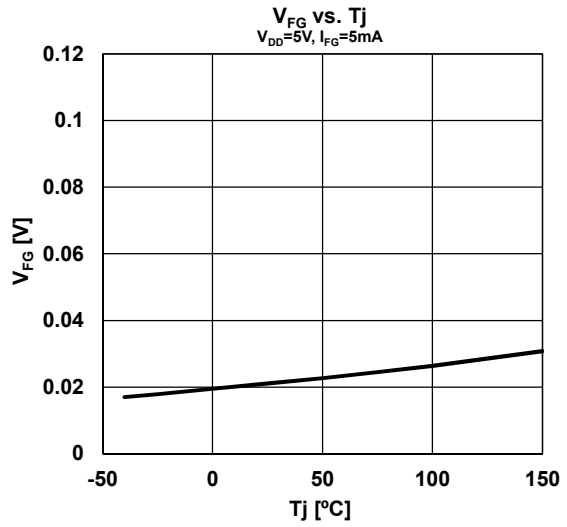
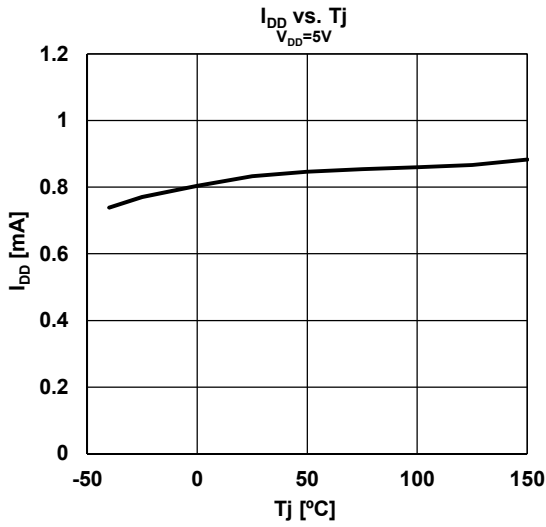
## ■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS



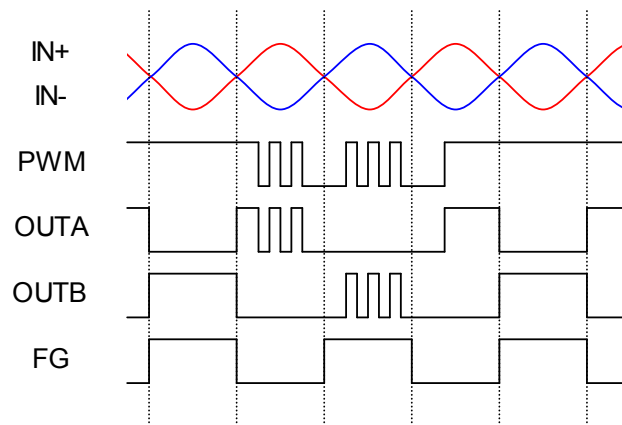
## ■APPLICATION NOTE / GLOSSARY

### ●Truth Table

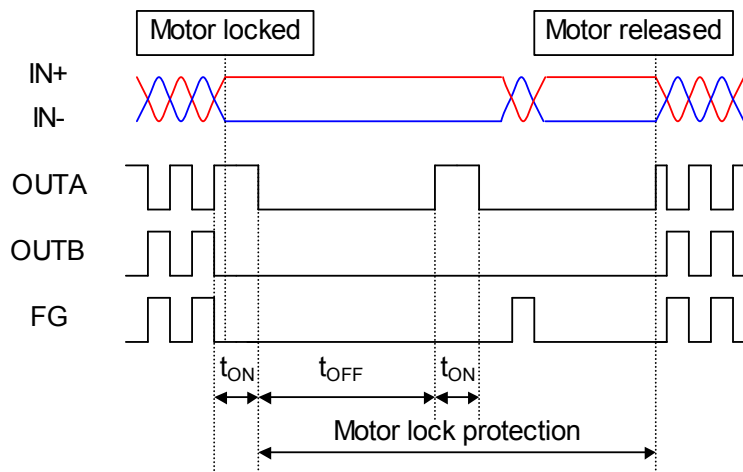
IN+	IN -	PWM	TSD/LD	OUTA	OUTB	FG
H	L	H	OFF	H	L	L
L	H			L	H	Hi-Z
H	L	L		L	L	L
L	H			L	L	Hi-Z
H	L	-	ON	L	L	L
L	H					Hi-Z

### ●Timing Chart

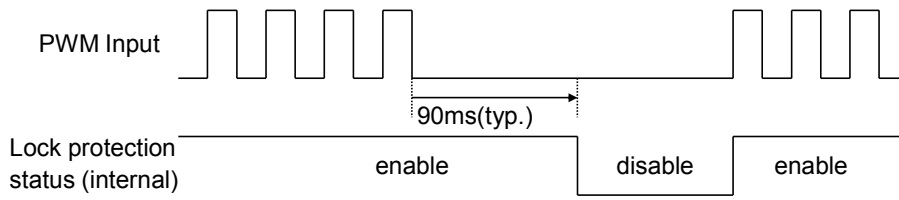
< PWM Input >



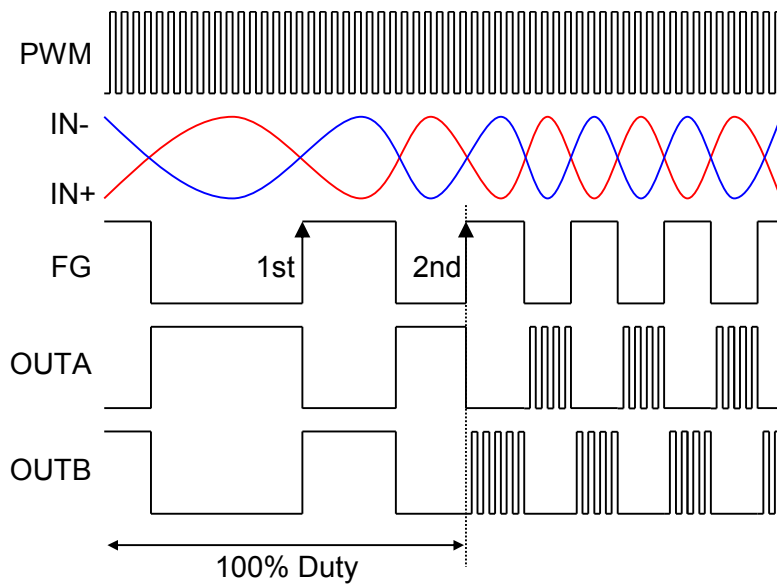
< Lock Protection Function >



### < Quick Start Function >



### < Start up Assist Function >

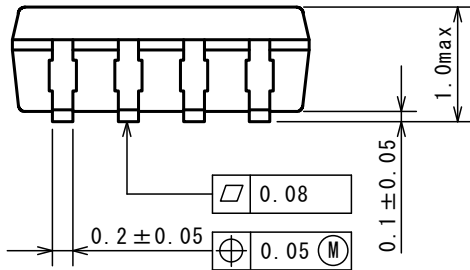
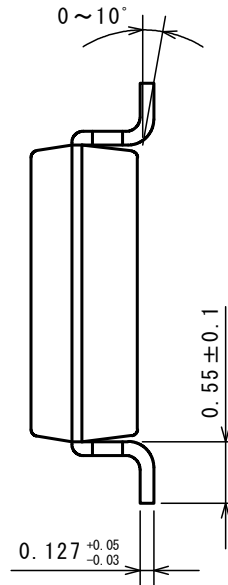
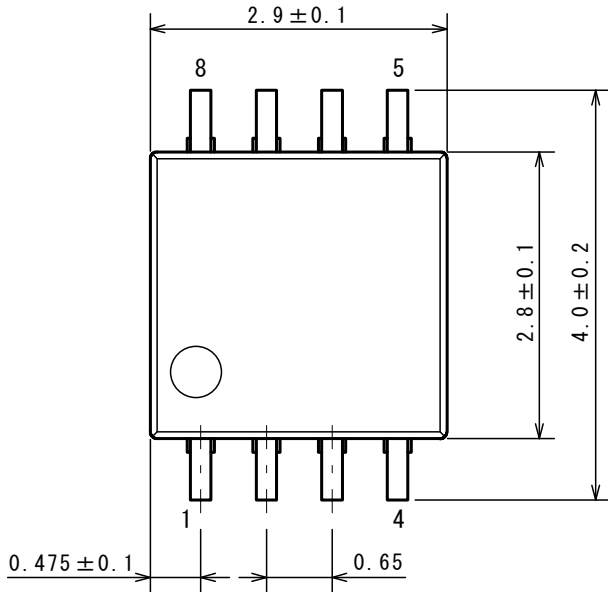




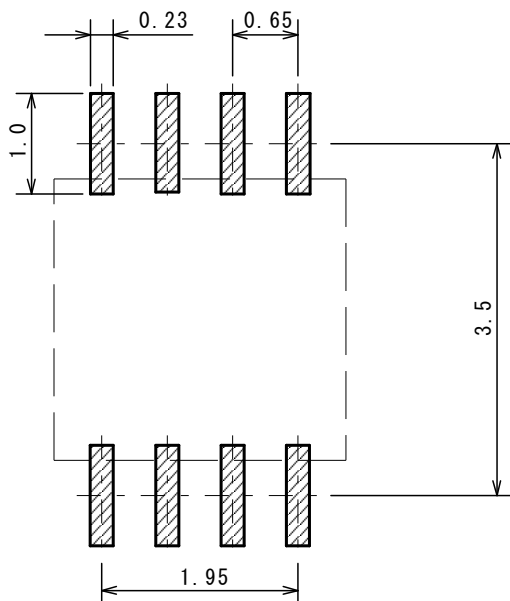
## MSOP8 JEDEC MO-187-DA/THIN TYPE

Unit: mm

### PACKAGE DIMENSIONS



### EXAMPLE OF SOLDER PADS DIMENSIONS

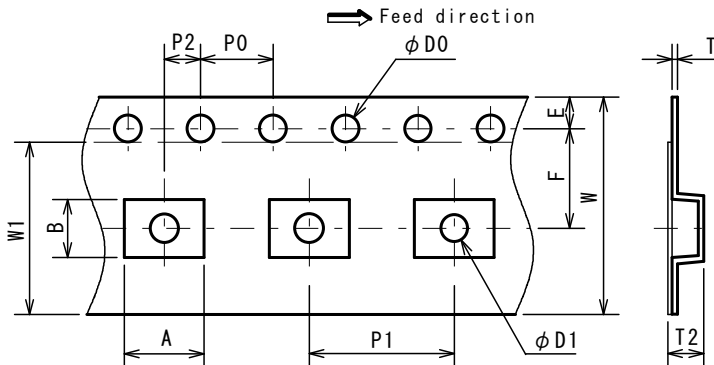


## MSOP8 MEET JEDEC MO-187-DA/THIN TYPE

Unit: mm

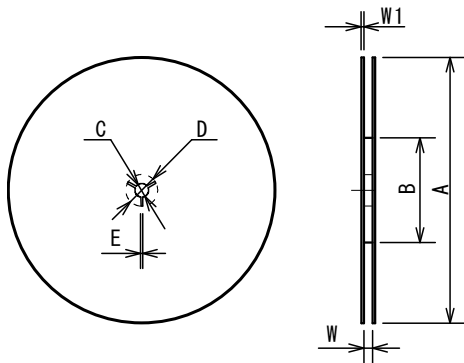
### PACKING SPEC

#### TAPING DIMENSIONS



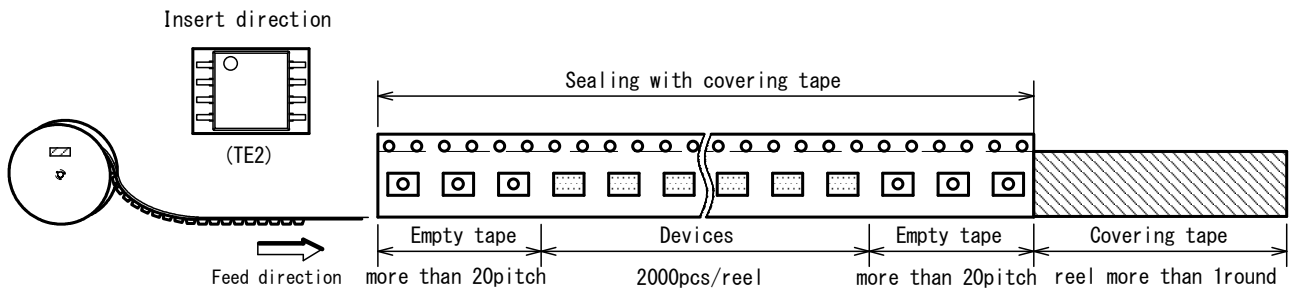
SYMBOL	DIMENSION	REMARKS
A	4.4	BOTTOM DIMENSION
B	3.2	BOTTOM DIMENSION
D0	1.5 <sup>+0.1</sup> <sub>0</sub>	
D1	1.5 <sup>+0.1</sup> <sub>0</sub>	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.30±0.05	
T2	1.75 (MAX.)	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

#### REEL DIMENSIONS

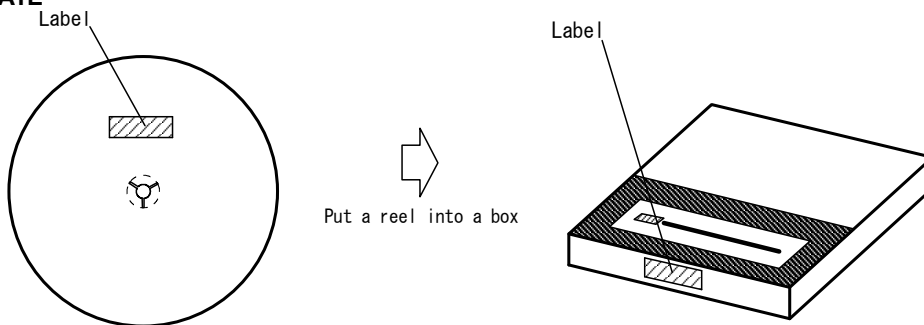


SYMBOL	DIMENSION
A	φ 254±2
B	φ 100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2.0±0.2

#### TAPING STATE



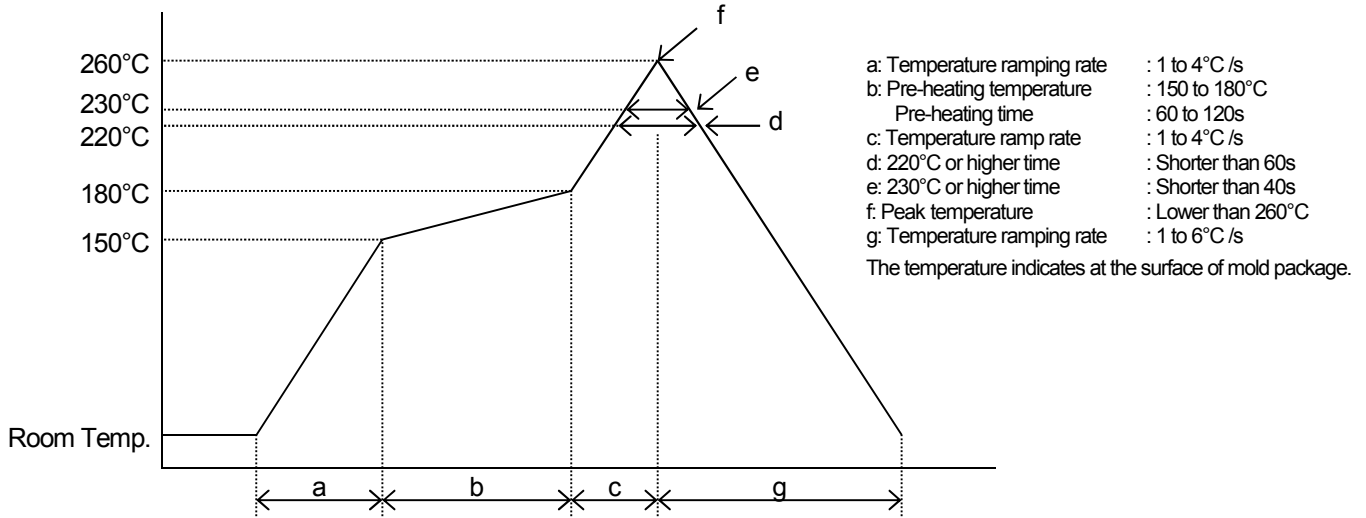
#### PACKING STATE



## ■RECOMMENDED MOUNTING METHOD

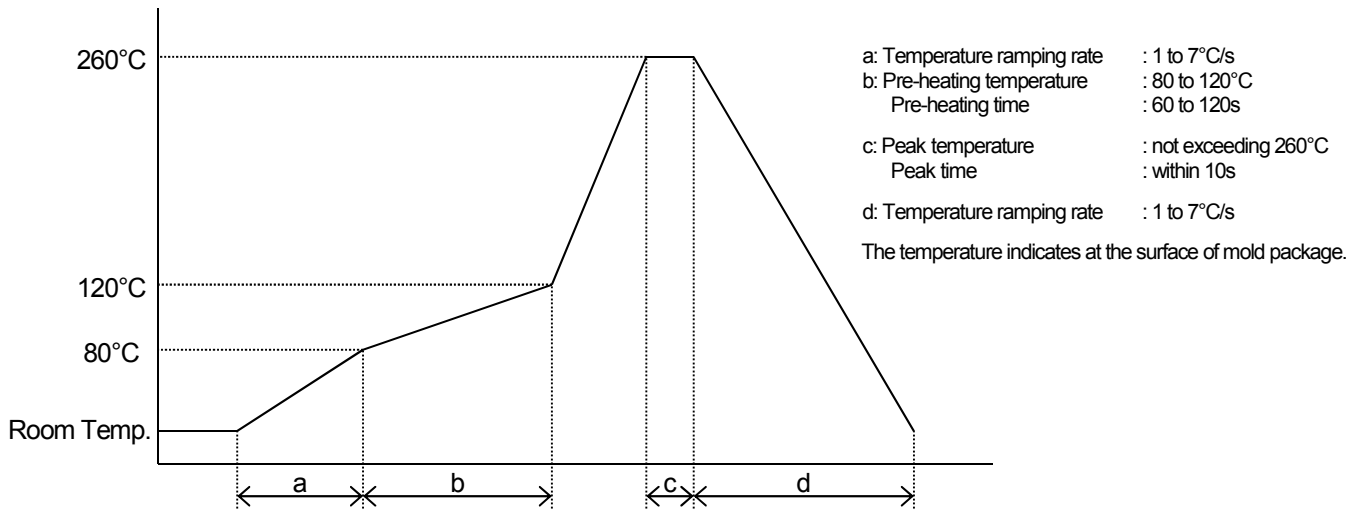
### •INFRARED REFLOW SOLDERING METHOD

\*reflow soldering procedure



### •INFRARED FLOW SOLDERING METHOD

\*flow soldering procedure



**■REVISION HISTORY**

Date	Revision	Changes
28.Nov.2016	Ver.1.0	New Release
07.Jun.2017	Ver.1.1	Corrected of PRODUCT NAME INFORMATION, ORDERING INFORMATION, THERMAL CHARACTERISTICS, PACKAGE DIMENSIONS, EXAMPLE OF SOLDER PADS DIMENSIONS and PACKING SPEC.

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