

ECN3061

ECN3061 is a one-chip three-phase bridge inverter IC which has 6 IGBTs in the circuit. Especially, it is very suitable for controlling the speed of three-phase DC brushless motors which are applied to AC100~110V power supplies.

Functions

- A Charge pump circuit is integrated.
- Free wheeling diodes are integrated.

Features

- It can be controlled by PWM with 6 inputs from an external microprocessor.
- 6 logic inputs are compatible with 5V CMOS and LSTTL outputs.
- 6 IGBTs can be operated in 20kHz chopping frequency.

Package

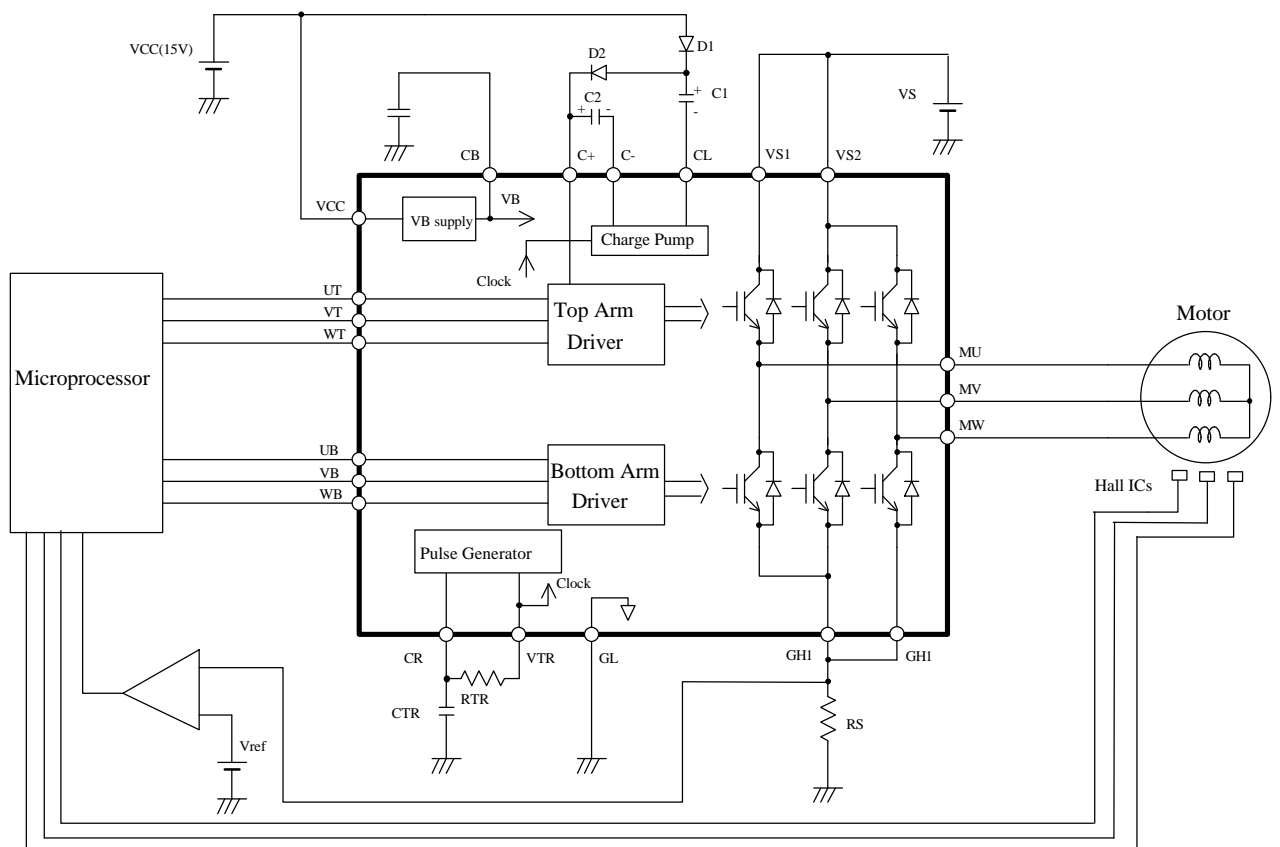
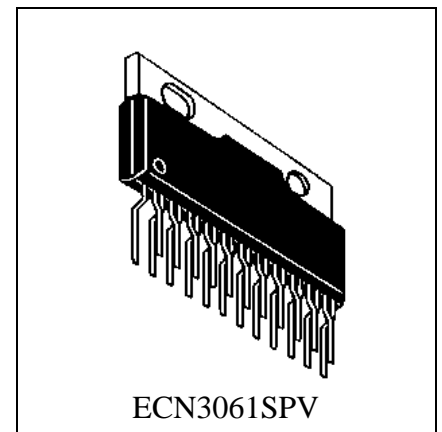


Fig.1 Block Diagram

HITACHI

www.DataSheet.in

ECN3061

1. General

- (1) Type i)ECN3061SP
 ii)ECN3061SPV
 iii)ECN3061SPR
- (2) Application 3-phase DC brushless motor
- (3) Structure Monolithic IC
- (4) Package SP-23T

2. Maximum Allowable Ratings (Ta=25°C)

No.	Items	Symbols	Terminal	Ratings	Unit	Condition
1	Output Device Breakdown Voltage	VSM	VS1,VS2 MU,MV,MW	250	V	
2	Supply Voltage	VCC	VCC	18	V	
3	Input Voltage	VIN	UT,VT,WT, UB,VB,WB	-0.5 ~ VB+0.5	V	
4	Output Current	IMDC	MU,MV,MW	1.0	A	
5	Peak Output Current	IMP	MU,MV,MW	1.8	A	Note 1
6	Output Current in Start Up and Accelerating	IOM	MU,MV,MW	1.8	A	Note 1
7	Operating Junction Temperature	Tjop		-20 ~ +125	°C	Note 2
8	Storage Temperature	Tstg		-40 ~ +150	°C	

Note1. Please note that the duty for a period exceeding 1A has to be less than 5% of total current flowing period.

Note2. Thermal resistance

$$R_{j-c} = 4 \text{ } ^\circ\text{C/W}$$

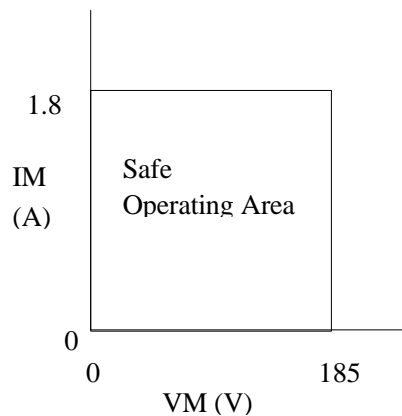
$$R_{j-a} = 40^\circ\text{C/W}$$

3. Recommended Operating Conditions

No.	Items	Symbols	Terminal	MIN	TYP	MAX	Unit	Condition
1	Supply Voltage	VS	VS1,2	90	141	185	V	
2		VCC	VCC	13.5	15	16.5	V	

Note 1. Recommended Safe Operating Area(SOA)

This IC should be used within the SOA as shown below, where IM and VM are the current and the voltage at the terminals connected to motor coils when the phase is changed (turned off).



ECN3061

4. Electrical Characteristics (Ta=25°C)

Unless otherwise specified, VCC=15V, VS=141V,
Suffix T; Top arm B; Bottom arm

No.	Items	Symbols	Terminal	MIN	TYP	MAX	Unit	Condition
1	Standby Current	IS	VS1,2	-	4.0	10	mA	UT,VT,WT,UB,VB, WB=0
2		ICC	VCC	-	10	20	mA	
3	Output device FVD	VFT	MU,MV,MW	-	2.0	3	V	I=0.7A
4		VFB	MU,MV,MW	-	2.0	3	V	
5	Turn On	TdONT	MU,MV,MW	-	0.5	3.0	μs	I=0.7A Resistance load
6	Delay Time	TdONB	MU,MV,MW	-	0.5	3.0	μs	
7	Turn Off	TdOFFT	MU,MV,MW	-	1.0	3.0	μs	
8	Delay Time	TdOFFB	MU,MV,MW	-	0.8	3.0	μs	
9	Diode FVD	VFDT	MU,MV,MW	-	2.0	2.5	V	I=0.7A
10		VFDB	MU,MV,MW	-	2.2	2.7	V	
11	Input Voltage	VIH	UT,VT,WT,	3.5	-	-	V	
12		VIL	UB,VB,WB	-	-	1.5	V	
13	Input Current	IIL	UT,VT,WT, UB,VB,WB	-	-	100	μA	Input=5V Note 1 Pull down Resistance
14	VB supply voltage	VB	CB	6.8	7.5	8.2	V	
15	VB supply current	IB	CB	25	-	-	mA	δV _{LOAD} =0.1V

Note 1. A pull down resistance is typically 200 kΩ.

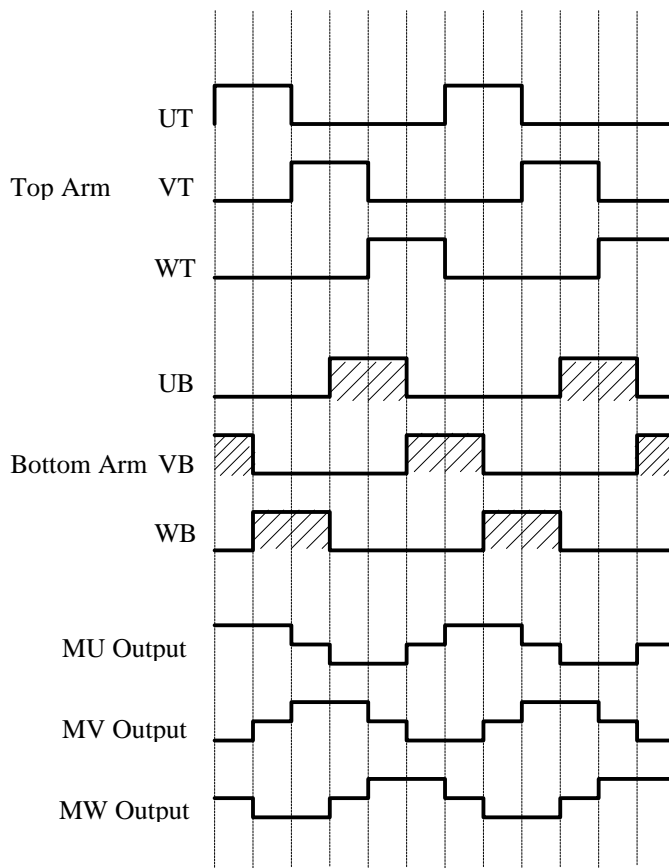
ECN3061

5. Function

5.1 Truth Table

Terminal	Input	Output
UT,VT,WT,	L	OFF
UB,VB,WB	H	ON

5.2 Timing Chart



ECN3061

6. Standard Application

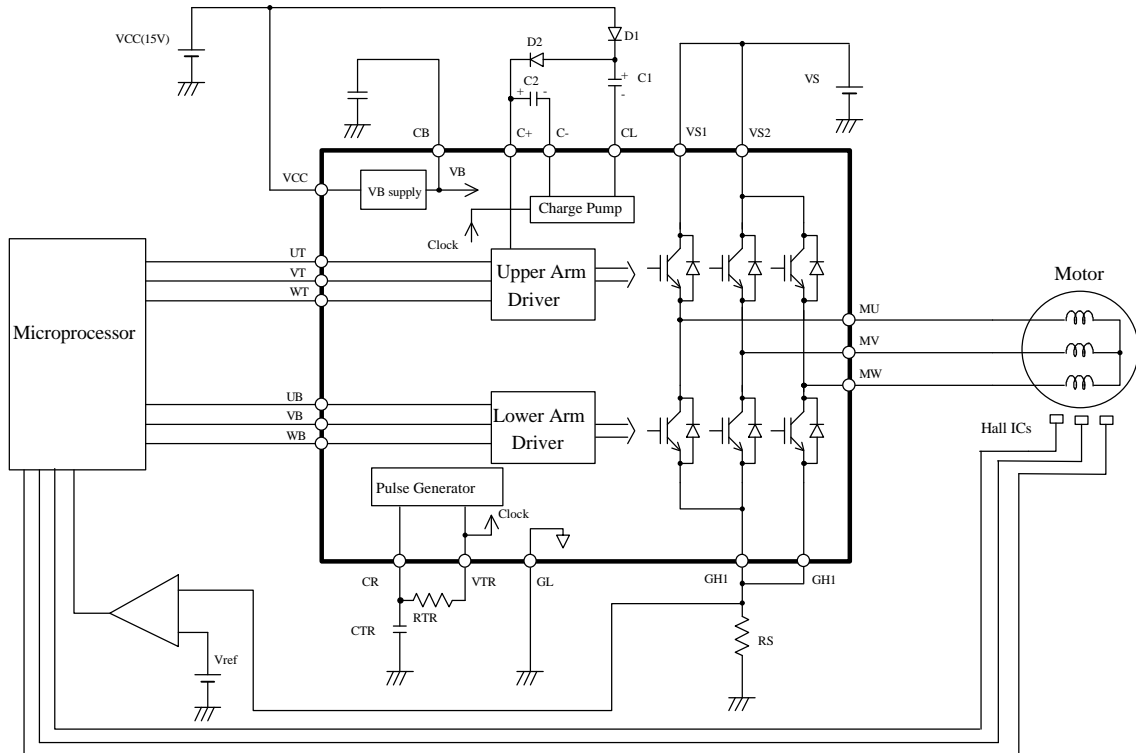
No.	Component	Recommended Value	Usage	Remark
1	C0	More than 0.22 μ F	for smoothing VB (VB; internal power supply)	The stress voltage is 8V.
2	C1,C2	1.0 μ F \pm 20%	for a charge pump	The stress voltage is VCC.
3	D1,D2	Hitachi DFG1C4(glass mold) Hitachi DFM1F4(resin mold) or considerable parts	for a charge pump	400V/1A $t_{rr} \leq 100$ ns
4	CTR	1800 pF \pm 5%	for an internal clock	Note 1.
5	RTR	22 k Ω \pm 5%	for an internal clock	Note 1.

Note 1. The internal clock frequency is approximately determined by next equation.

At recommended value of CR, the error factor of IC is about 10%.

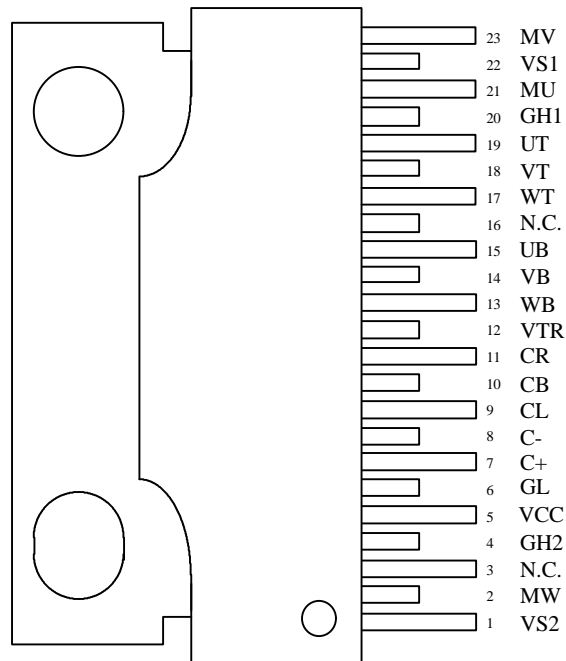
$$f_{\text{clock}} = -1 / (2C * R * \ln(1 - 3.5/5.5)) \quad ; \quad \ln \text{ is natural logarithm.}$$

$$= 0.494 / (C * R) \quad (\text{Hz})$$



ECN3061

7. Terminal



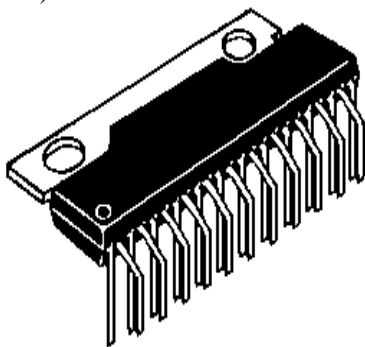
(Marking Side)

* N.C. ; No Connection

Fig.2 Pin Connection

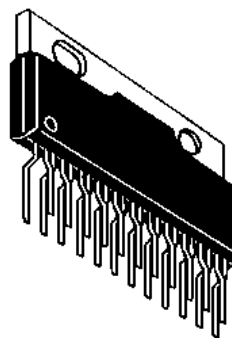
8. Package appearance

i)



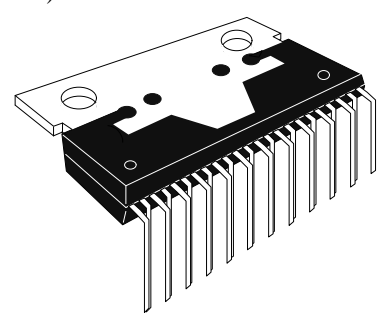
ECN3061SP

ii)



ECN3061SPV

iii)

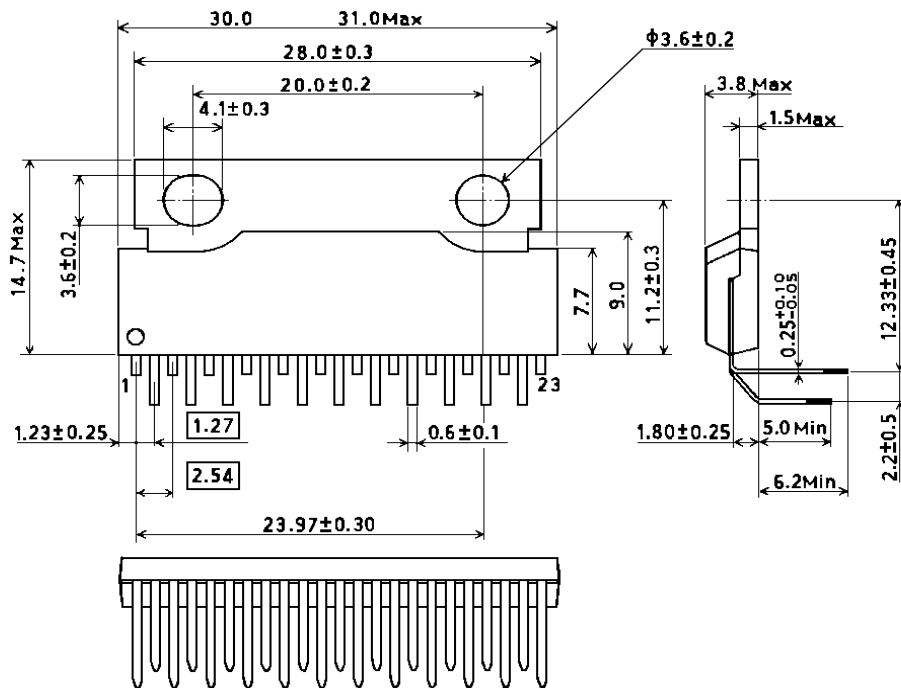


ECN3061SPR

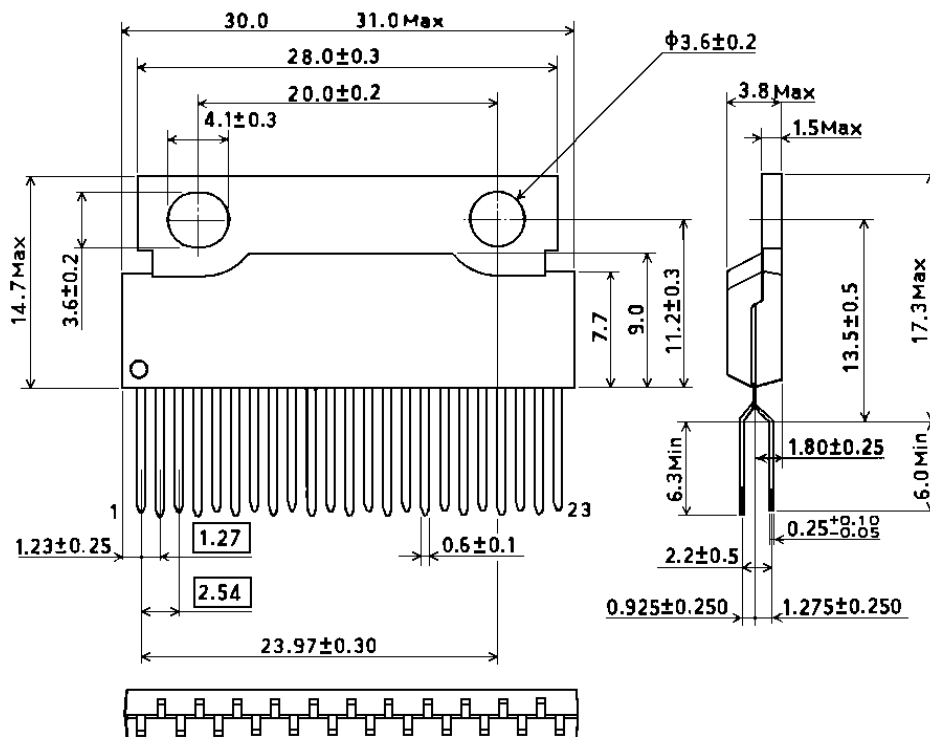
ECN3061

9. Package dimensions

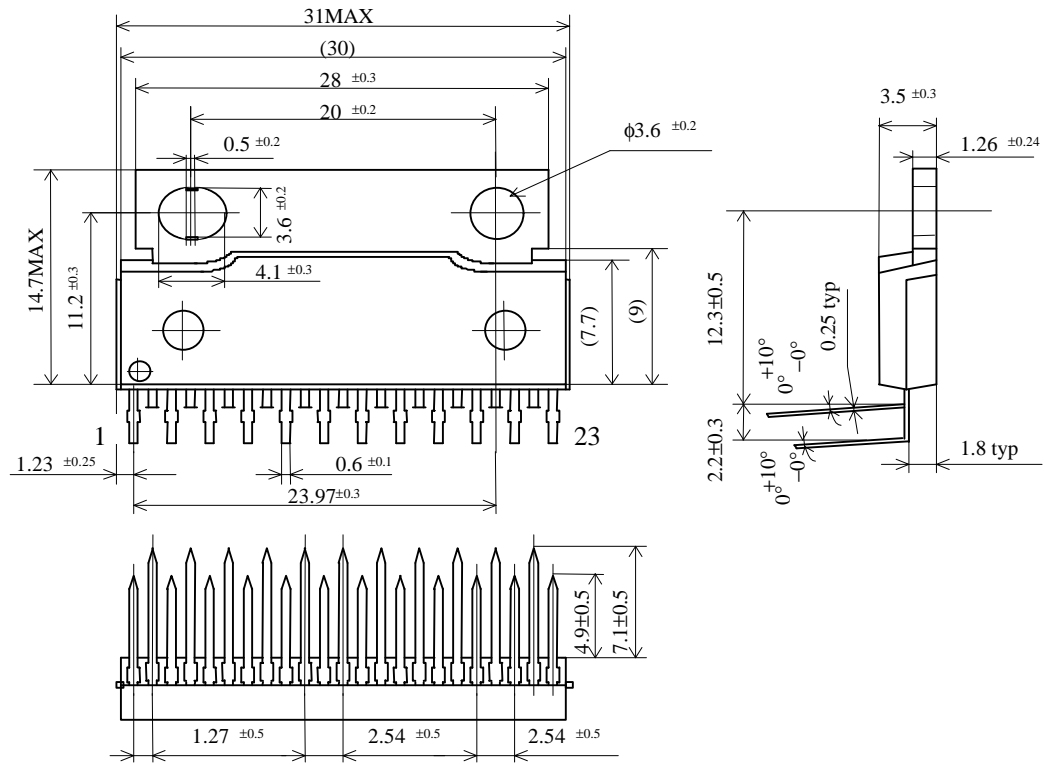
i) ECN3061SP



ii) ECN3061SPV



iii)ECN3061SPR



HITACHI POWER SEMICONDUCTORS

Notices

- 1.The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact Hitachi sales department for the latest version of this data sheets.
- 2.Please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
- 3.In cases where extremely high reliability is required(such as use in nuclear power control, aerospace and aviation, traffic equipment, life-support-related medical equipment, fuel control equipment and various kinds of safety equipment), safety should be ensured by using semiconductor devices that feature assured safety or by means of users' fail-safe precautions or other arrangement. Or consult Hitachi's sales department staff.
- 4.In no event shall Hitachi be liable for any damages that may result from an accident or any other cause during operation of the user's units according to this data sheets. Hitachi assumes no responsibility for any intellectual property claims or any other problems that may result from applications of information, products or circuits described in this data sheets.
- 5.In no event shall Hitachi be liable for any failure in a semiconductor device or any secondary damage resulting from use at a value exceeding the absolute maximum rating.
- 6.No license is granted by this data sheets under any patents or other rights of any third party or Hitachi, Ltd.
- 7.This data sheets may not be reproduced or duplicated, in any form, in whole or in part , without the expressed written permission of Hitachi, Ltd.
- 8.The products (technologies) described in this data sheets are not to be provided to any party whose purpose in their application will hinder maintenance of international peace and safety not are they to be applied to that purpose by their direct purchasers or any third party. When exporting these products (technologies), the necessary procedures are to be taken in accordance with related laws and regulations.

-
- For inquiries relating to the products, please contact nearest overseas representatives which is located "Inquiry" portion on the top page of a home page.
-

Hitachi power semiconductor home page address <http://www.hitachi.co.jp/pse>