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.

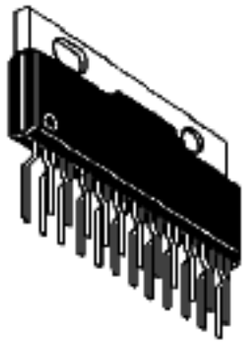
Functions

- 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



ECN3061SPV

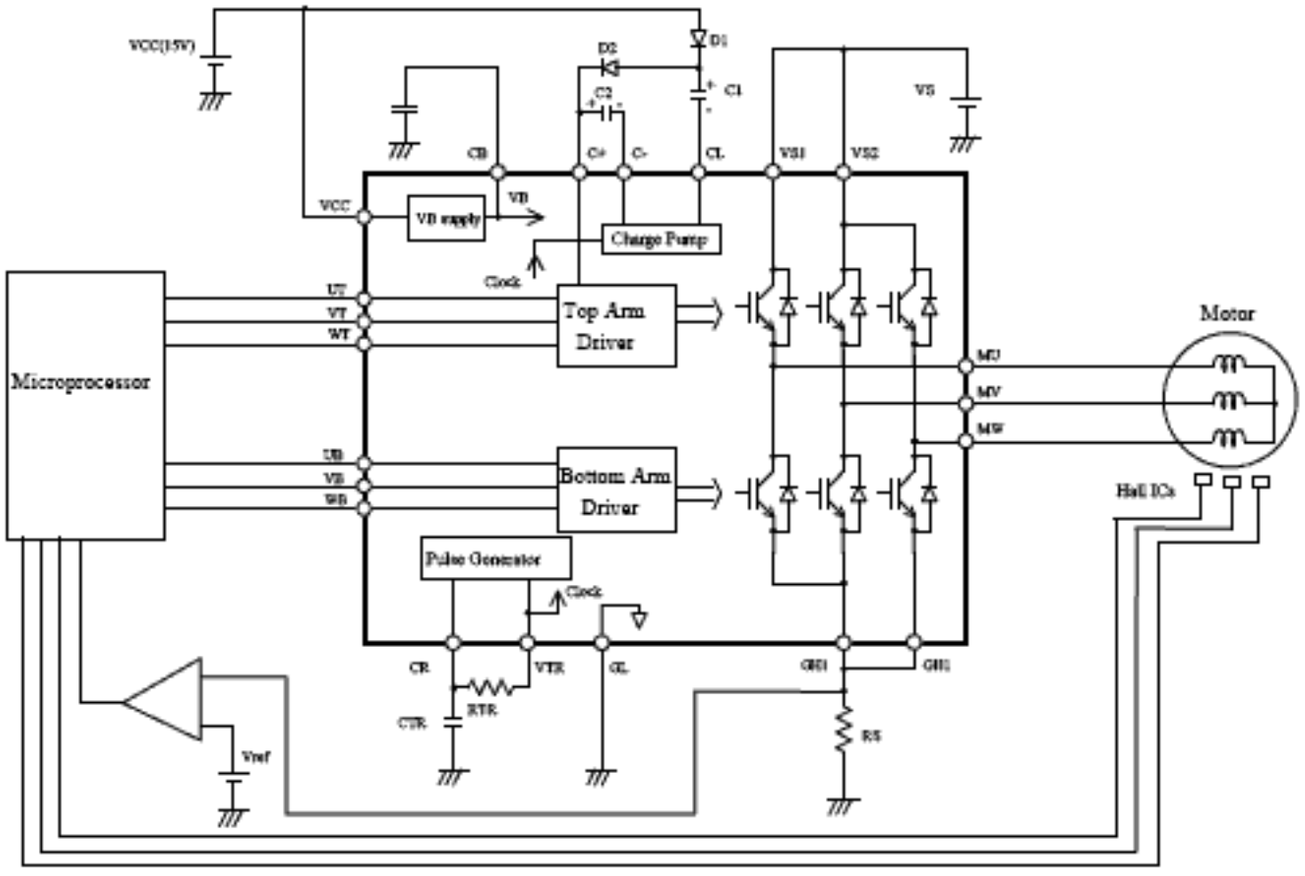


Fig.1 Block Diagram

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)

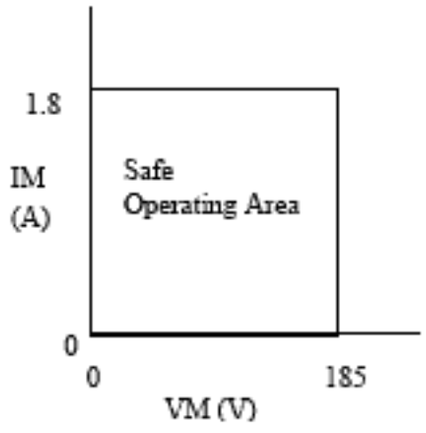
No.	Items	Symbols	Terminal	Ratings	Unit	Condition
1	Output Device Breakdown Voltage	VSM	VS1,VS2 MU,MV,MW	250	V	
2	Supply Voltage	VCC	VCC	18	V	
3	Input Voltage	VIN	UT,VT,WT, UB,VB,WB	-0.5 ~ VB+0.5	V	
4	Output Current	IMDC	MU,MV,MW	1.0	A	
5	Peak Output Current	IMP	MU,MV,MW	1.8	A	Note 1
6	Output Current 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
Rj-c = 4 °C/W
Rj-a = 40°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).



4. Electorical 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,
2		ICC	VCC	-	10	20	mA	WB=0
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	
6	Delay Time	TdONB	MU,MV,MW	-	0.5	3.0	μs	I=0.7A
7	Turn Off	TdOFFT	MU,MV,MW	-	1.0	3.0	μs	Resistance load
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

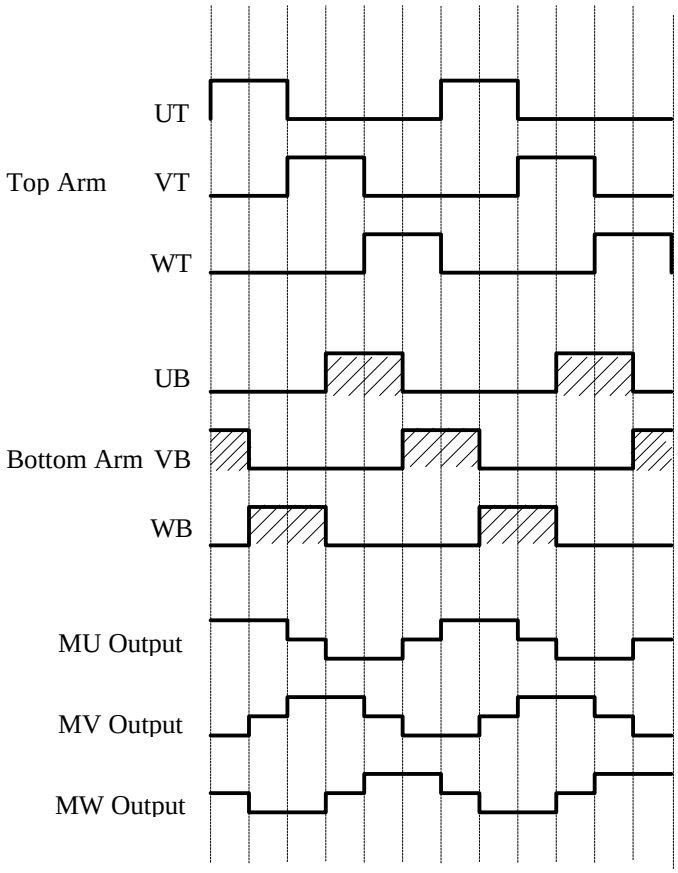
Note 1. A pull down resistance is typically 200 kΩ.

5. Function

5.1 Truth Table

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

5.2 Timing Chart

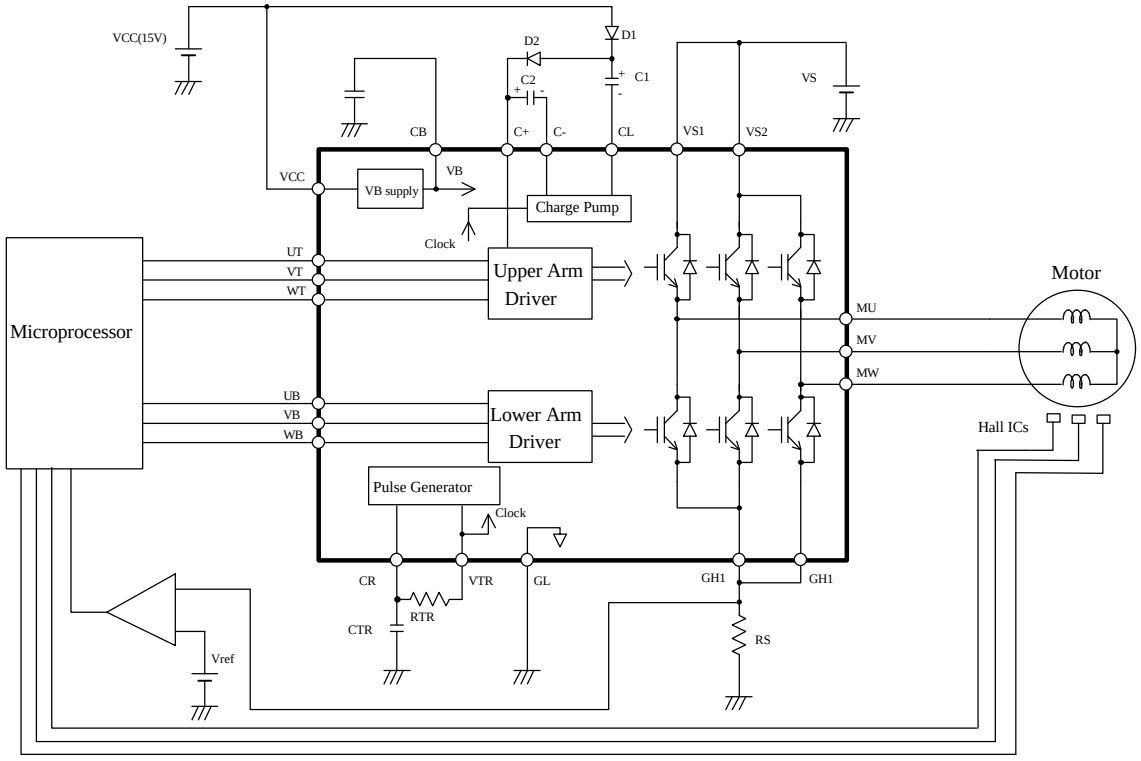


6. Standard Application

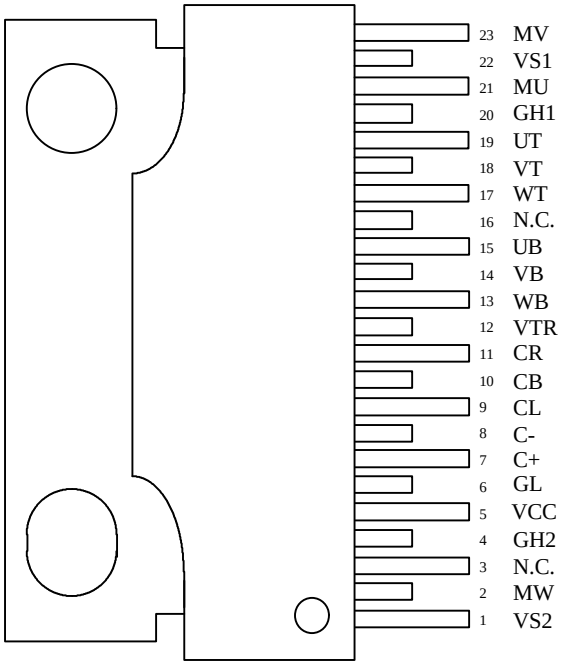
No.	Component	Recommended Value	Usage	Remark
1	C0	More than 0.22μF	for smoothing VB (VB; internal power supply)	The stress voltage is 8V.
2	C1,C2	1.0μF ± 20%	for a charge pump	The stress voltage is VCC.
3	D1,D2	Hitachi DFG1C4(glass mold) Hitachi DFM1F4(resin mold) or considerable parts	for a charge pump	400V/1A t_{rr}≤100ns
4	CTR	1800 pF ± 5%	for an internal clock	Note 1.
5	RTR	22 kΩ ± 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_{clock} = -1 / (2C*R*Ln(1-3.5/5.5)) ; Ln is natural logarithm.
= 0.494 / (C*R) (Hz)



7. Terminal



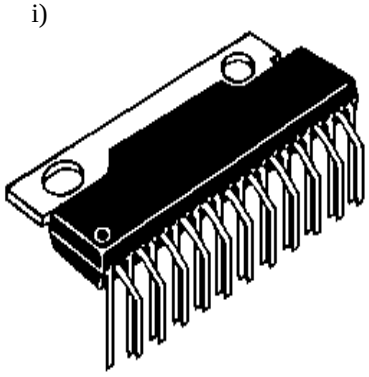
(Marking Side)

* N.C. ; No Connection

Fig.2 Pin Connection

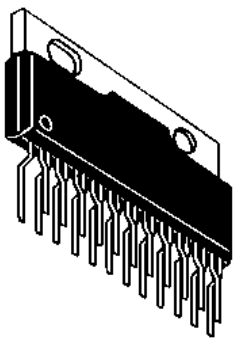
8. Package appearance

i)



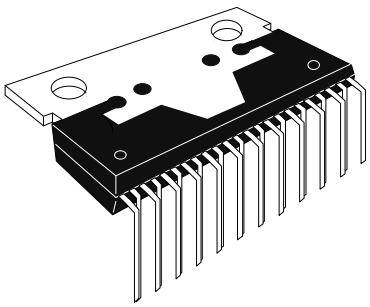
ECN3061SP

ii)



ECN3061SPV

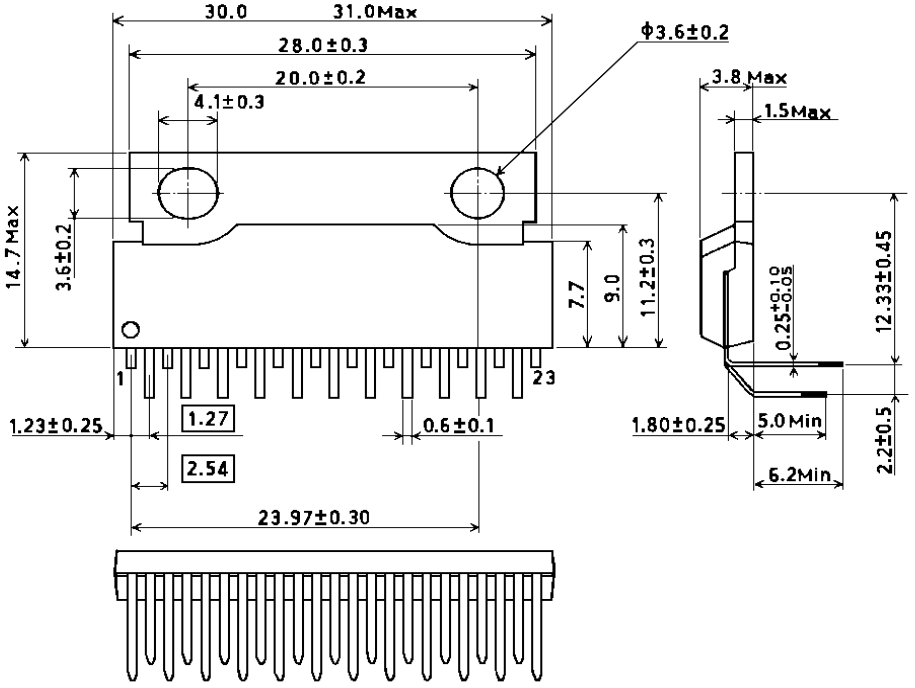
iii)



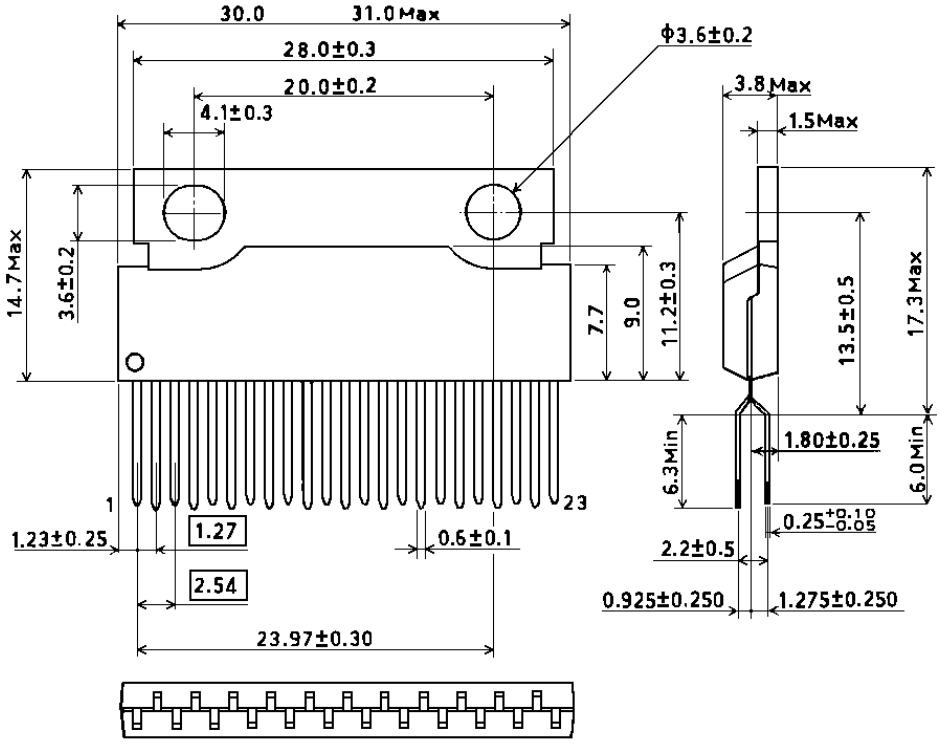
ECN3061SPR

9. Package dimensions

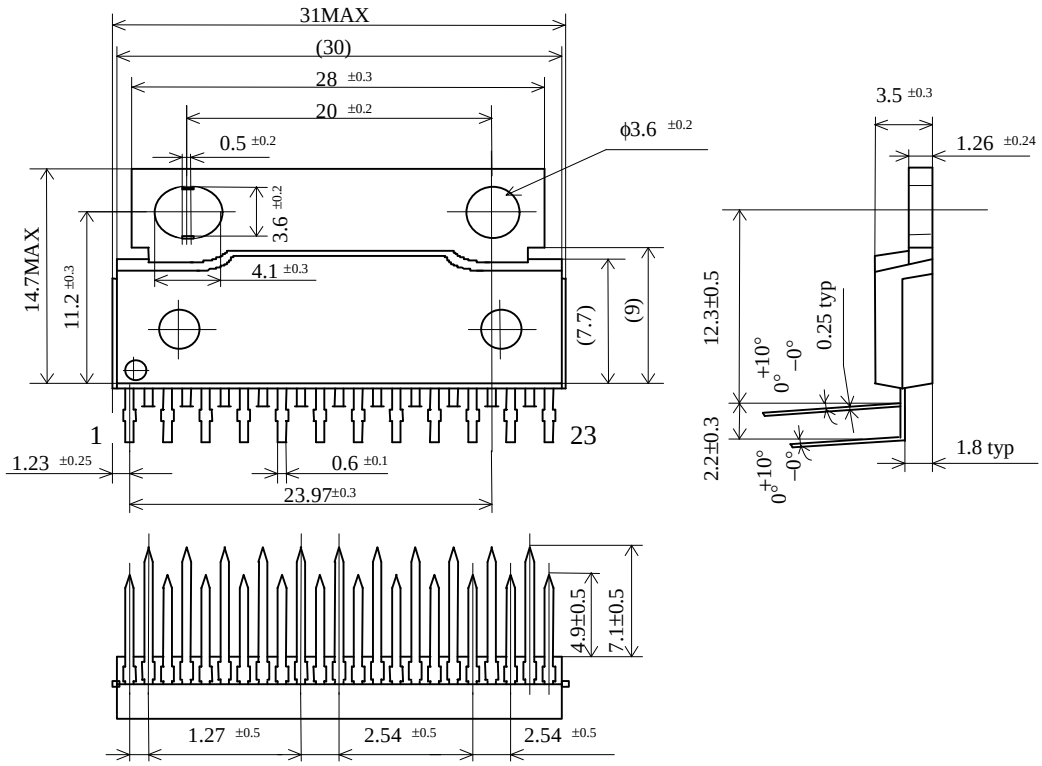
i)ECN3061SP



ii)ECN3061SPV



iii)ECN3061SPR



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