User's Manual for KE-KA44169A Evaluation Board

This **KE-KA44169A** evaluation board provides to verify the function of our original Auto Phase Control (APC) technology installed in KA44169A, which is the single phase motor driver for Fan and Pump.
This EVB helps to accelerate products design-in to market-in.

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Disclaimer

Regarding the specifications of this product, it is considered that you have agreed to the disclaimer described below.

1. When the application system is designed using this product, please design the system at your own risk. Please read, consider, and apply appropriate usage notes and description in this standard.

2. When designing your application system, please take into the consideration of break down and failure mode occurrence and possibility in semiconductor products. Measures on the systems such as, but not limited to, redundant design, mitigating the spread of fire, or preventing glitch, are recommended in order to prevent physical injury, fire, social damages, etc. in using the Nuvoton Technology Japan Corporation (hereinafter referred to as NTCJ) products.

3. When using this product, for each actual application systems, verify the systems and the all functionality of this product as intended in application systems and the safety including the long-term reliability at your own risk

4. Please use this product in compliance with all applicable laws, regulations and safety-related requirements that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. NTCJ shall not be held responsible for any damage incurred as a result of this product being used not in compliance with the applicable laws, regulations and safety-related requirements.

5. This product does not have any security functions using cryptographic algorithms, such as authentication, encryption, tampering detection.

6. Unless this product is indicated by NTCJ to be used in applications as meeting the requirements of a particular industry standard (e.g., ISO 9001, IATF 16949, ISO 26262, etc.), this product is neither designed nor intended for use in such environments for that applications. NTCJ shall not be held responsible for not meeting the requirements of a particular industry standard.

7. Using product that have been indicated as compliant with industry functional safety standards does not warrant that the application meets the requirements of industry functional safety standards. NTCJ shall not be held responsible for the application compliance with requirements of the particular industry functional safety standard.

8. Unless this product is indicated by NTCJ to be used in applications as meeting the requirements of a particular quality standard (e.g., AECQ-100, etc.), this product is neither designed nor intended for use in such the environments for that applications. NTCJ shall not be held responsible for not meeting the requirements of a particular quality standard.

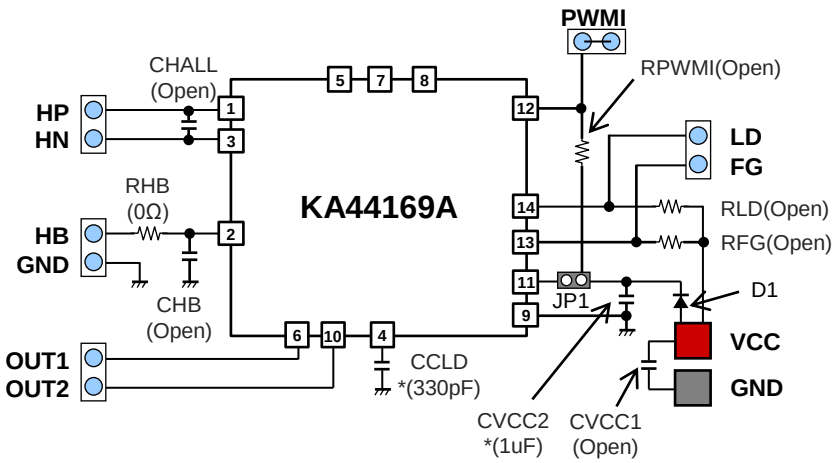
9. In case of damages, costs, losses, and/or liabilities incurred by NTCJ arising from customer's non-compliance with above from 1 to 8, customer will indemnify NTCJ against every damages, costs, losses and responsibility.

Recommended Operating Conditions

Parameter	Pin Name	Min.	Typ.	Max.	Unit	Notes
Supply voltage range	VCC	5.0	—	28	V	*1
Input voltage range	HP	0	—	1.5	V	*2
	HN	0	—	1.5	V	*2
	PWMI	0	—	28	V	*2

Notes *1: It is a value under the conditions which do not exceed the absolute maximum rating and the power dissipation.
*2: For setting range of input control voltage, refer to the IC's Datasheet.

Circuit of Evaluation Board



( ) are default values of the mounted parts.

*( ) : Operation of mass production set is not guaranteed. Perform enough evaluation and verification on the design of mass production set. If the VCC Pin voltage is raised by the regenerative current, at the time of start-up or stop operating please connect a zener diode between VCC – GND Pin.

Description for Evaluation Board

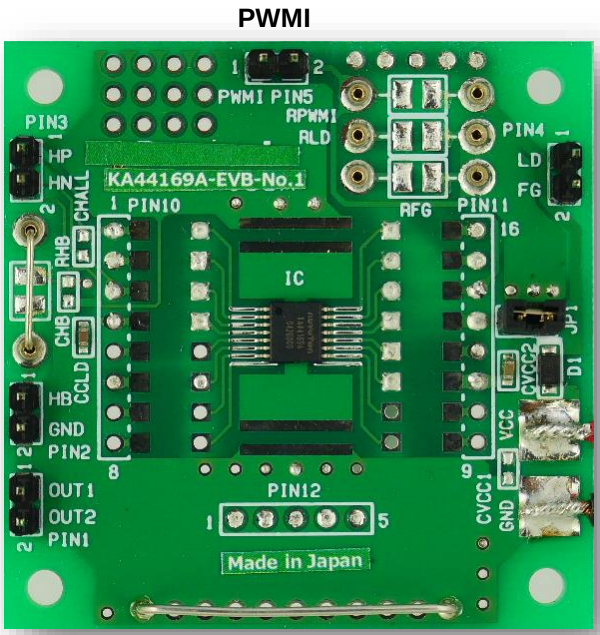
Inputs & Outputs & Jumper setting

PWMI :
External signal I/F
Input pin for torque direction. (Direct PWM system)
The range of input signal frequency is 15kHz~50kHz.
Normally, please input the 3.3V-GND level signal.
(Please adjust the input voltage level within the rating voltage.)

HP, HN :
Input pin for Hall signals
Connect to Hall effect device.
Refer to "Voltage polarity" shown below.

HB, GND :
Output pin for Hall bias
Connect to the power-Pin of Hall effect device.

OUT1, OUT2 :
Output pin for driving a motor
Connect to a motor's coil..



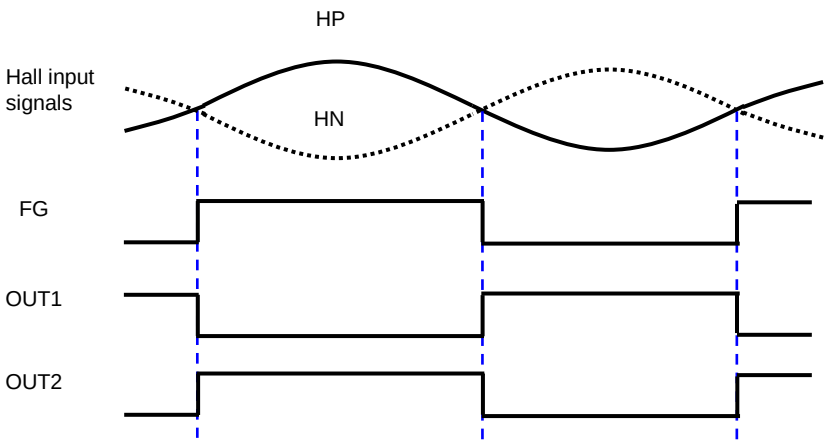
LD, FG :
External signal I/F
Output pin for FG and LD(Open).

JP1 :
Jumper for VCC short.
Normally, please be used in short JP1.

VCC, GND :
External power supply pin
Supply the recommended operating power voltage(5.0V~28V).

Voltage polarity (exclude delay)

The voltage polarity of FG and OUT1/OUT2 to Hall input signals are as shown below.
Please note the voltage polarity when connecting to a motor.



Description for Evaluation Board

Resistance & Capacitor settings

RPWMI :
Pull-up resistor for PWM signal
The default setting is “open”.
If you want to drive PWMI by open-drain, please set a resistor.

RLD :
Pull-up resistor for LD
The default setting is “open”.
If you want to pull LD-pin up to VCC, please set a resistor.
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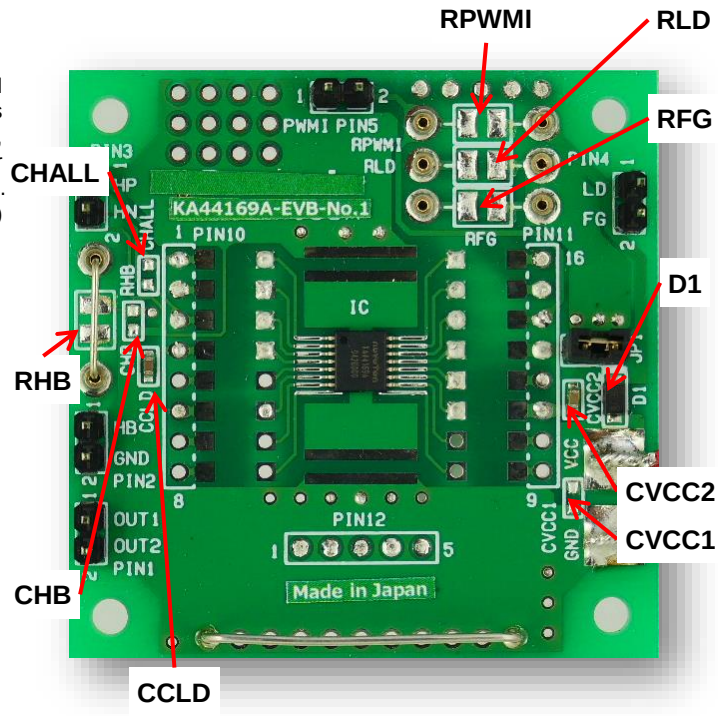
CHALL :
Bypass capacitor for Hall signals
If necessary, please mount a capacitor for protection against noise.
(Open~1000pF)



RFG :
Pull-up resistor for FG
The default setting is “open”.
If you want to pull FG-pin up to VCC, please set a resistor.

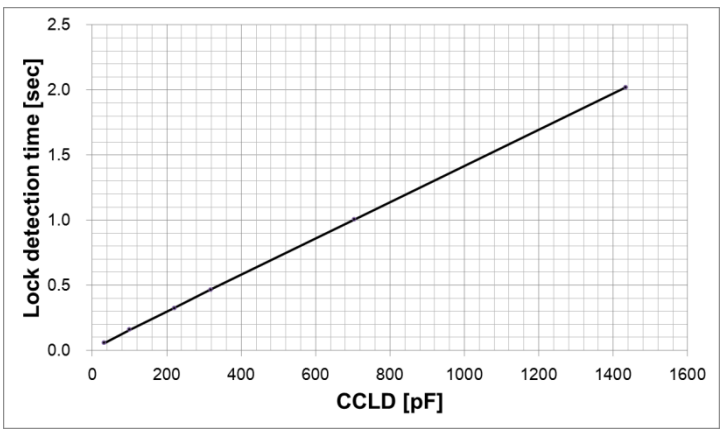
RHB :
Resistor for Hall bias
Default = “short”.
If you need “current limit” and “bias-adjustment” of Hall effect device, please set a resistor.

D1 :
Reverse connection protection diode
If necessary, please mount the reverse connection protection diode.

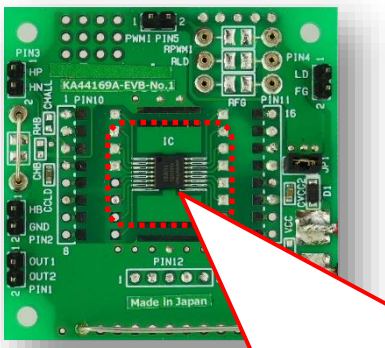
CHB :
Bypass capacitor for Hall bias
If necessary, please mount a capacitor for protection against noise.
(Open~0.1μF)

CVCC1,2 :
Bypass capacitor for power supply
If necessary, please mount a capacitor for protection against noise.
(Open~10μF)

CCLD :
Capacitor for setting “Lock detection time”
The default setting is 330pF. (Lock detection time: 0.48sec(Typ), Lock release time: 0.48sec x 10 = 4.8sec)
If you want to change settings, please set CCLD by seeing the graph below.

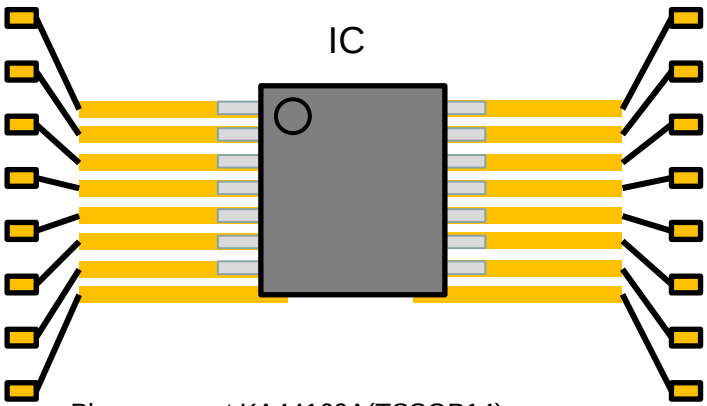


Notes about Mounting KA44169A



Please refer to the following figure for the position to mount IC.

KA44169A (TSSOP14)



Please mount KA44169A(TSSOP14)
at the position shown above.
put pin1 of IC on the first land from the upper left.

Revision History

Date	Revision	Description	Page.
2023.11.1	1.00	1. initially issued.	

Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.