

# STK5C4U3XXJGEVB

## STK5C4U3xx Series Evaluation Board User's Manual



ON Semiconductor®

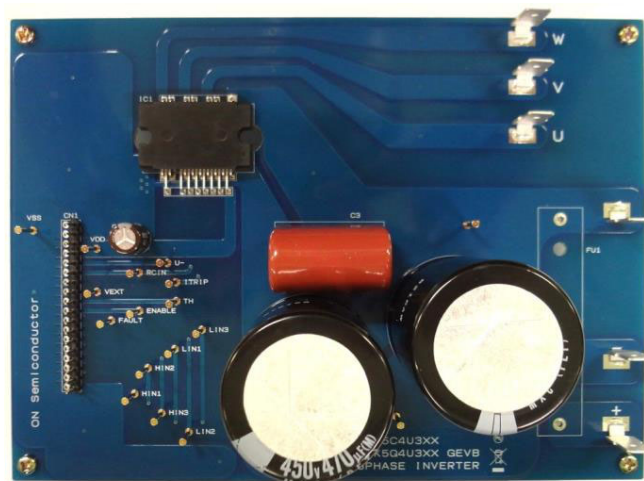
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### Introduction

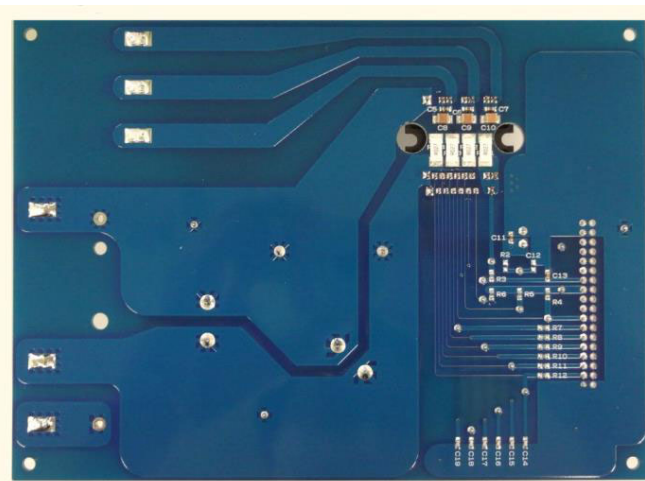
By using this board, STK5C4U3xx series (DIPS) can be evaluated.

### EVAL BOARD USER'S MANUAL

ONPN of EVAL Board	ONPN of IPM	Io
STK5C4U332JGEVB	STK5C4U332J-E	3A



Surface



Back side

Figure 1. Evaluation Board Photos

# STK5C4U3XXJGEVB

## CIRCUIT DIAGRAM

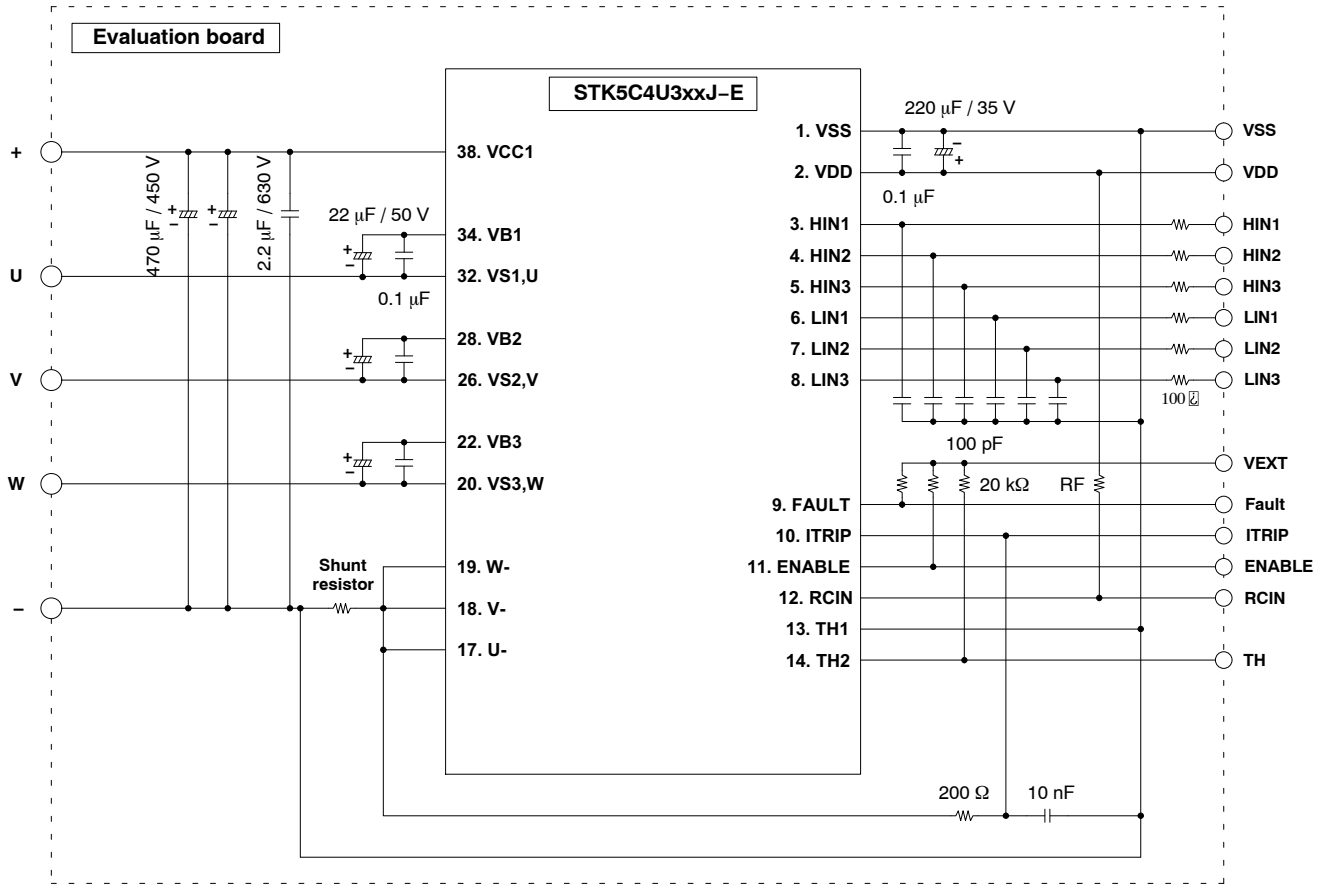
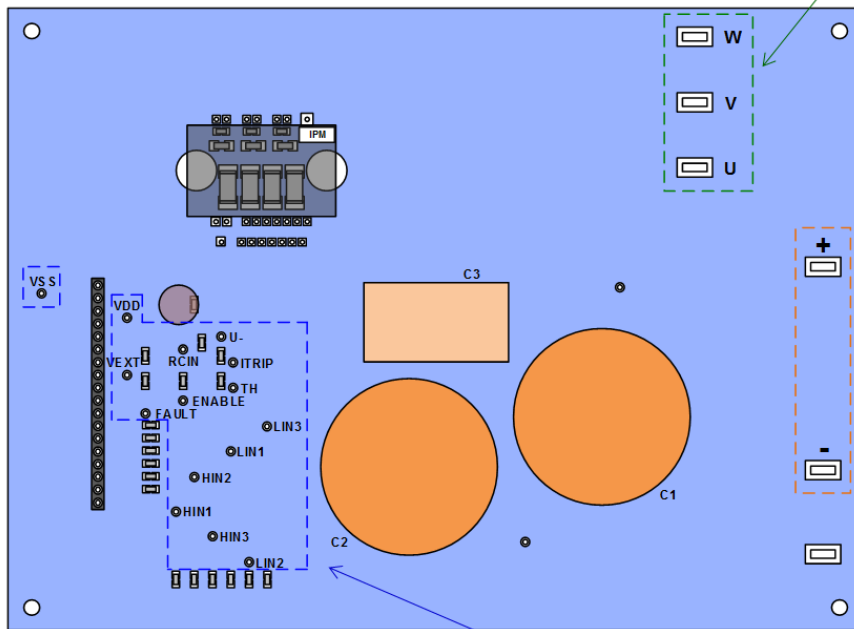


Figure 2. Circuit Diagram

# STK5C4U3XXJGEVB

## PIN DESCRIPTION

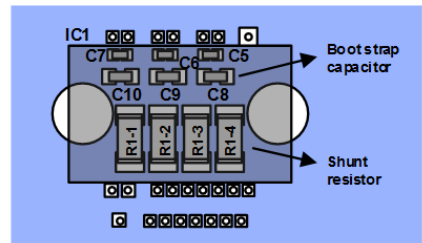
TOP view



**Green frame : U, V, W terminal**  
Please connect to the motor.

**Orange frame : +, - terminal**  
Please connect to DC power supply.

Enlarged view around IPM



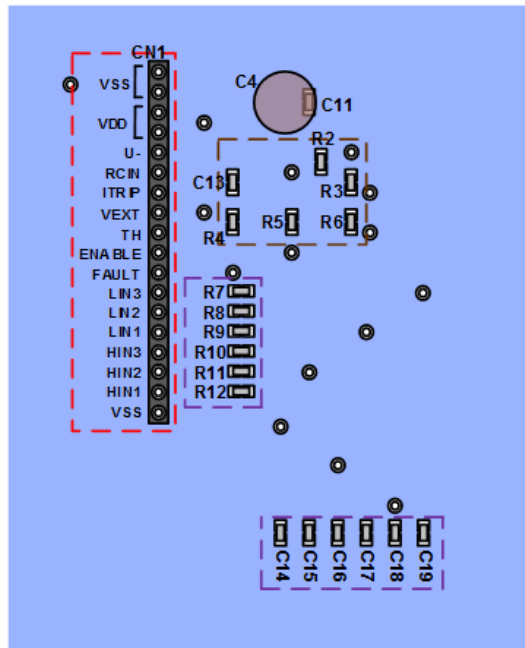
\* All chip components are arranged backside.

**Blue frame : Test pins**  
For monitoring each control signal

\* Shunt resistors are connected in series.

Figure 3. Pin Description 1

Enlarged view around test pins



**Red frame : Connector**

For the connection to the control part

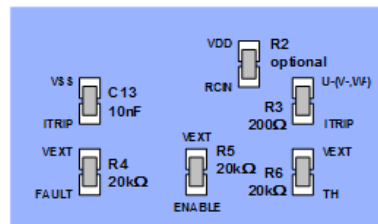
Vext terminal is connected pull-up resistor for TH, FAULT and ENABLE pins.  
Please impress arbitrary voltage to this terminal.

**Purple frame : Low pass filter for signal input pins**

Resistor R7-R12 : 100Ω  
Capacitor C14-C19 to VSS : 100pF

**Brown frame :**

R4, R5, R6 : Pull-up resistor to VEXT  
R2 : Fault clear time setting  
R3, C13 : Time constant setting for ITRIP

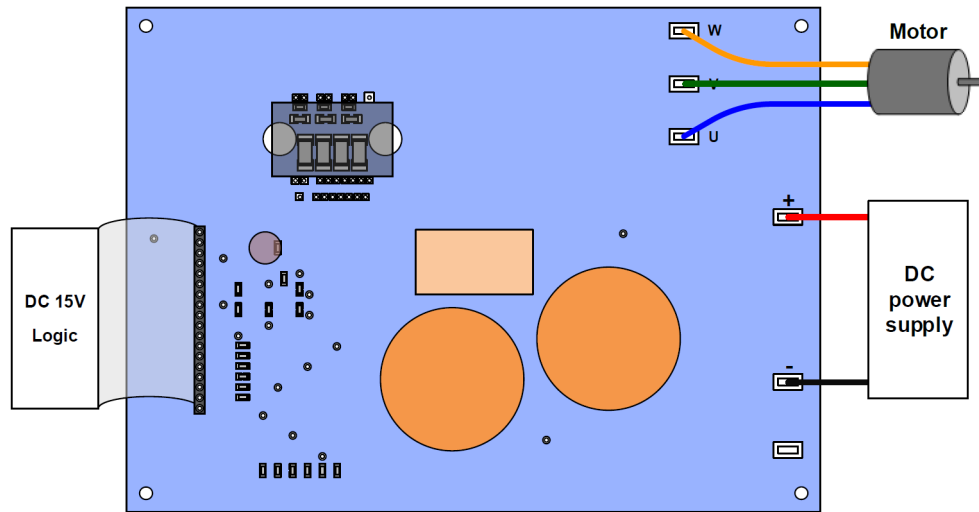


\* All chip components are arranged backside.

Figure 4. Pin Description 2

# STK5C4U3XXJGEVB

## OPERATION PROCEDURE



**Figure 5. Connection Example**

- Step 1. Please connect IPM, each power supply, logic parts, and the motor to the evaluation board, and confirm that each power supply is OFF at this time.
- Step 2. Please impress the power supply of DC 15 V.
- Step 3. Please perform a voltage setup according to specifications, and impress the power supply between the “+” and the “-” terminal.

- Step 4. By inputting signal to the logic part, IPM control is started.  
(Therefore, please set electric charge to the boot-strap capacitor of upper side to turn on lower side IGBT before running.)

NOTE: When turning off the power supply part and the logic part, please carry out in the reverse order to above steps.

# STK5C4U3XXJGEVB

## LAYOUT (TOP VIEW)

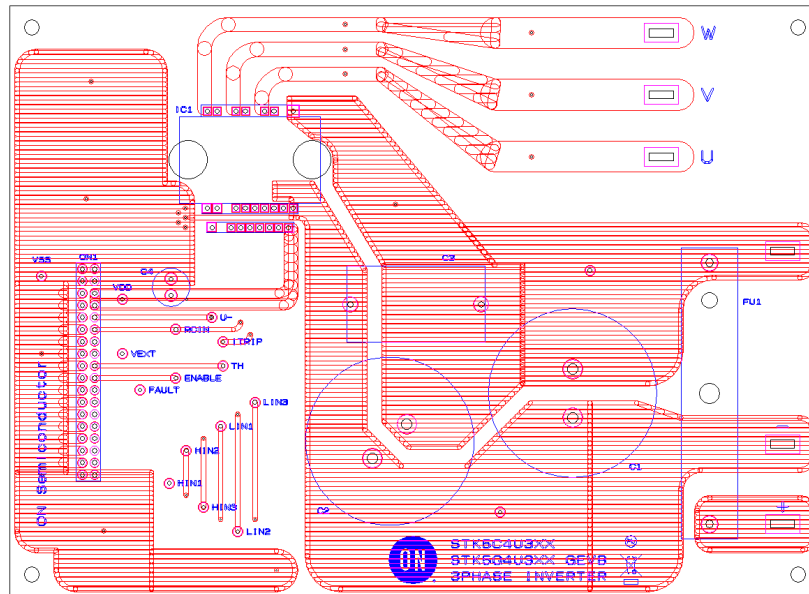


Figure 6. Layout – Surface

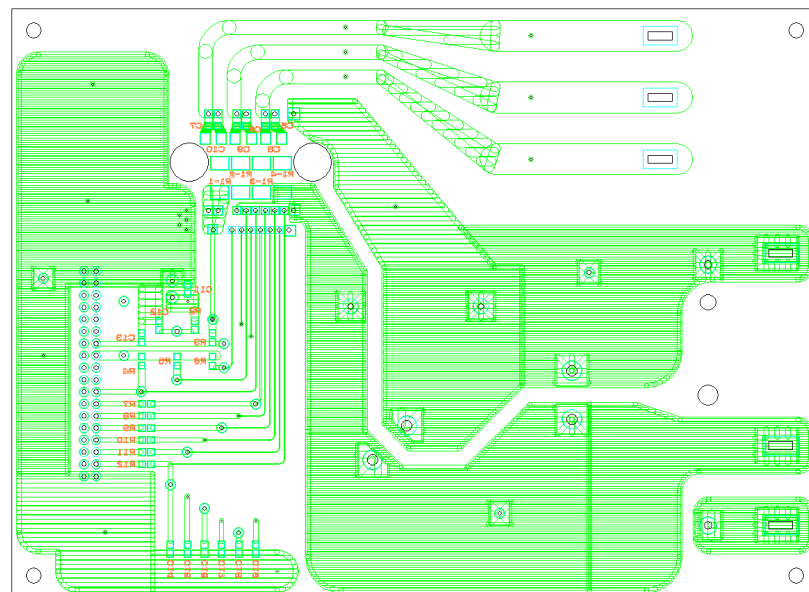


Figure 7. Layout – Back Side

Length: 124 mm

Side: 170 mm

Thickness: 1.6 mm

Rigid double-sided substrate (Material: FR-4)

Both sides resist coating

Copper foil thickness: 70  $\mu$ m

# STK5C4U3XXJGEVB

## BILL OF MATERIALS

**Table 1. BILL OF MATERIALS**

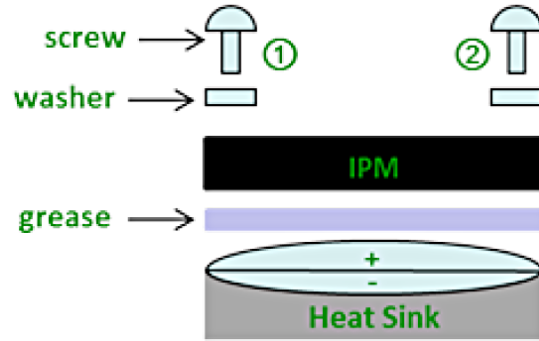
Designator	Qty	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer Part Number	Substitution Allowed
R1-1 – R1-4	4	Shunt resistor	27 mΩ / 2 W	±1%	SMD 6432	SUSUMU	KRL3264E-C-R027-F (for 332)	Yes
R2	1	Setting fault clear time / resistor	optional		SMD 1608			Yes
R3	1	Setting time constant / resistor	200 Ω / 0.1 W	±1%	SMD 1608	KOA	RK73H1JTDD2000F	Yes
R4 – R6	3	Fault, ENABLE, TH pull-up / resistor	20 kΩ / 0.1 W	±1%	SMD 1608	KOA	RK73H1JTDD2002F	Yes
R7 – R12	6	Signal input low pass filter / resistor	100 Ω / 0.1 W	±1%	SMD 1608	KOA	RK73H1JTDD1000F	Yes
C1, C2	2	Aluminum electrolytic capacitor, Plus – Minus	470 μF / 450 V	±20%	Through-hole	Rubycon	450MXC470MEFCSN35X50	Yes
C3	1	Film capacitor Plus – Minus, Snubber	2.2 μF / 630 V	±5%	Through-hole	PANASONIC	ECQE6225JT	Yes
C4	1	Aluminum electrolytic capacitor, VDD – VSS	220 μF / 35 V	±20%	Through-hole	Nippon Chemi-Con	EKM350ELL221MHB5D	Yes
C5 – C7, C11	4	VBx – VSx, VDD – VSS / capacitor	0.1 μF / 50 V	±10%	SMD 1608	MURATA	GRM188B31H104K	Yes
C8 – C10	3	VBx – VSx / capacitor	22 μF / 25 V	±20%	SMD 3225	MURATA	GRM32ER71E226ME15	Yes
C13	1	Setting time constant / capacitor	10 nF / 50 V	±10%	SMD 1608	MURATA	GRM188B11H103K	Yes
C14 – C19	6	Signal input low pass filter / capacitor	100 pF / 50 V	±5%	SMD 1608	MURATA	GRM1882C1H101J	Yes
CN1	1	Header – 18 Pin			Through-hole 2.54 pitch	HIROSE ELECTRIC	A2-18PA-2.54DSA(71)	Yes
VSS, VDD, U-, RCIN, ITRIP, VEXT, TH, ENABLE, FAULT, HIN1-3, LIN1-3, +, -	17	Test Pins			Through-hole	Mac8	ST-1-3	Yes
U, V, W, +, -	5	Faston terminal (Tab)			Through-hole			Yes
IC1	1	Inverter IPM			DIP-38	ON Semiconductor	STK5C4U3xxJ-E	No

NOTE All Components are lead free.

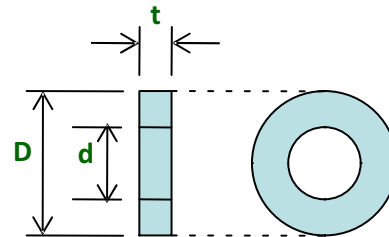
# HEAT SINK MOUNTING

**Table 2. MOUNTING CONDITION**

Item	Recommended Condition
Pitch	26.0 ± 0.1 mm (Please refer to Package Outline Diagram)
Screw	Diameter: M3 Bind machine screw, Truss machine screw, Pan machine screw
Washer	Plane washer Don't use spring washer. The size is D = 7 mm, d = 3.2 mm and t = 0.5 mm (Figure 9) JIS B 1256
Heat Sink	Material: copper or Aluminum Warpage (the surface that contacts IPM): -50 ~ 50 μm Screw holes must be countersunk. No contamination on the heat sink surface that contacts IPM.
Torque	Final tightening: 0.4 ~ 0.6 Nm Temporary tightening: 50 ~ 60% of final tightening
Grease	Silicone grease Thickness: 50 ~ 100 μm Uniformly apply silicone grease to whole back. (Figure 10)



**Figure 8. Mounting Composition**

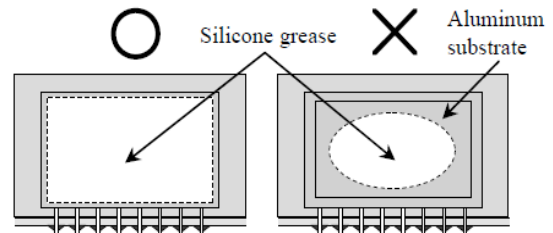


**Figure 9. Size of Washer**

## Procedure for the Heat Sink Mounting

1<sup>st</sup> step: Tighten the screws until the torque of temporary tightening while maintaining the balance of left (1) and right (2).

2<sup>nd</sup> step: Tighten them until the torque of final tightening.



**Figure 10. Grease Application**

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