

STK5Q4U3XXJGEVB

STK5Q4U3xx Series Evaluation Board User's Manual



ON Semiconductor®

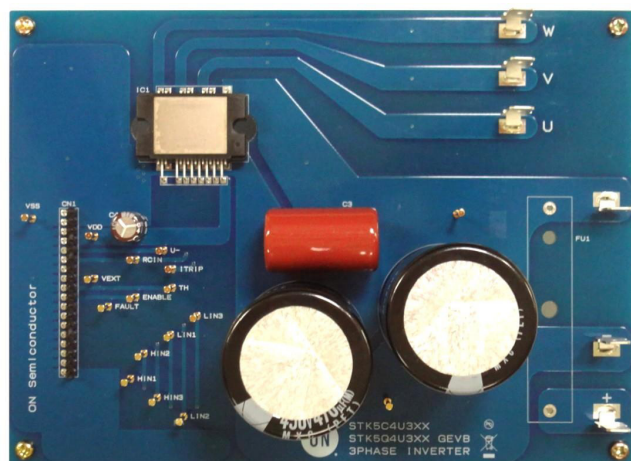
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Introduction

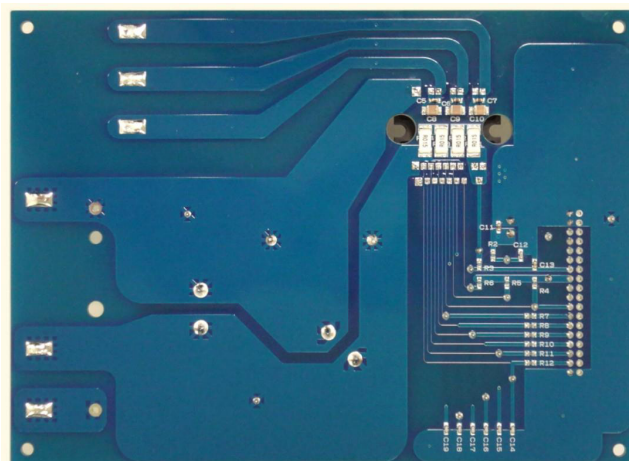
By using this board, STK5Q4U3xx series (DIPS3) can be evaluated.

EVAL BOARD USER'S MANUAL

ONPN of EVAL Board	ONPN of IPM	I _O
STK5Q4U352JGEVB	STK5Q4U352J-E	8 A
STK5Q4U362JGEVB	STK5Q4U362J-E	10 A



Surface



Back Side

Figure 1. Evaluation Board Photos

STK5Q4U3XXJGEVB

CIRCUIT DIAGRAM

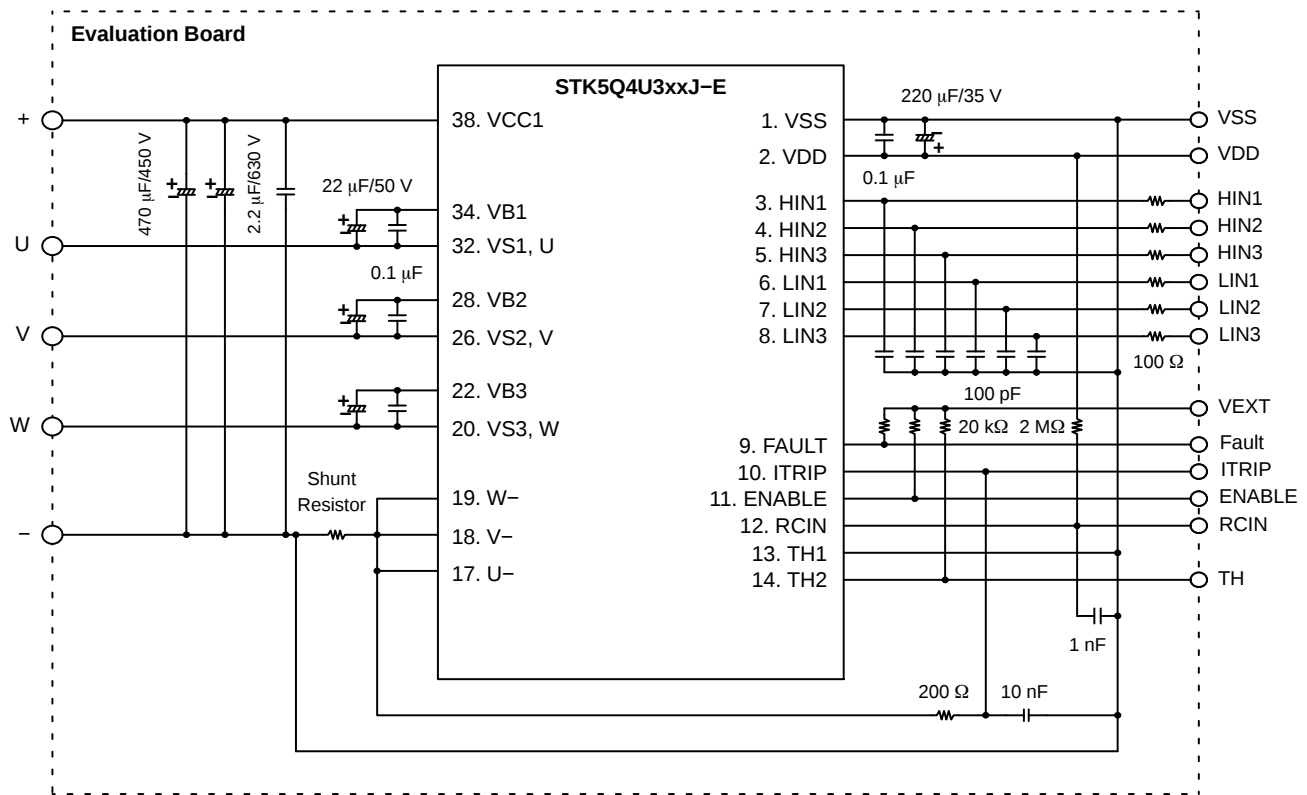


Figure 2. Circuit Diagram

STK5Q4U3XXJGEVB

PIN DESCRIPTION

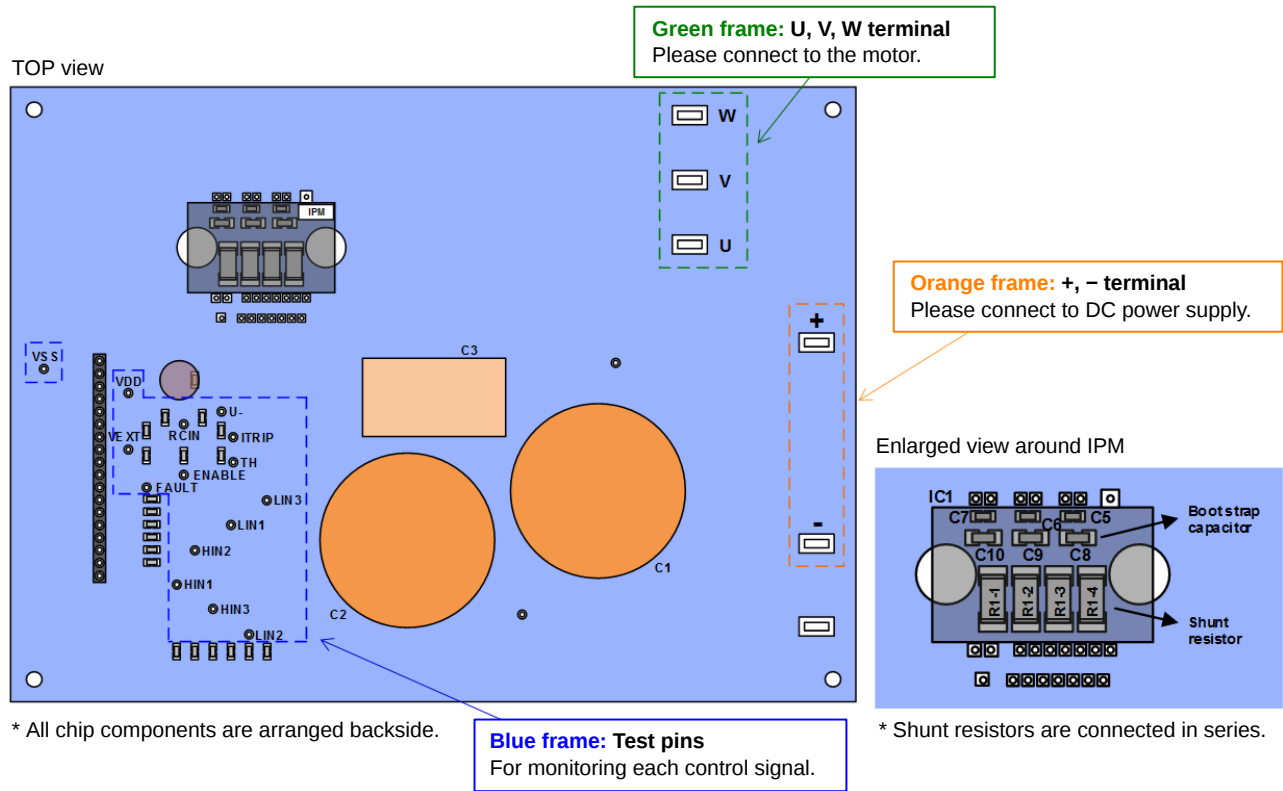
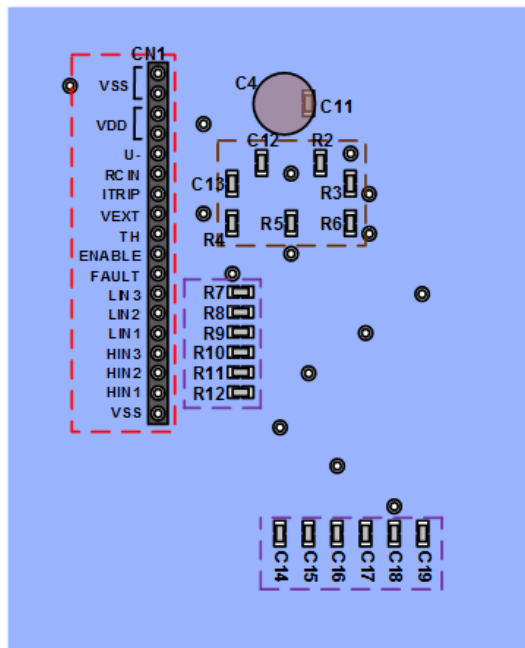


Figure 3. Pin Description – 1

Enlarged view around test pins



* All chip components are arranged backside.

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: 100 Ω
Capacitor C14–C19 to VSS: 100 pF

Brown frame:

R4, R5, R6: Pull-up resistor to VEXT
R2, C12: Fault clear time setting
R3, C13: Time constant setting for ITRIP

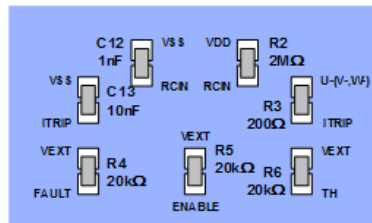


Figure 4. Pin Description – 2

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OPERATION PROCEDURE

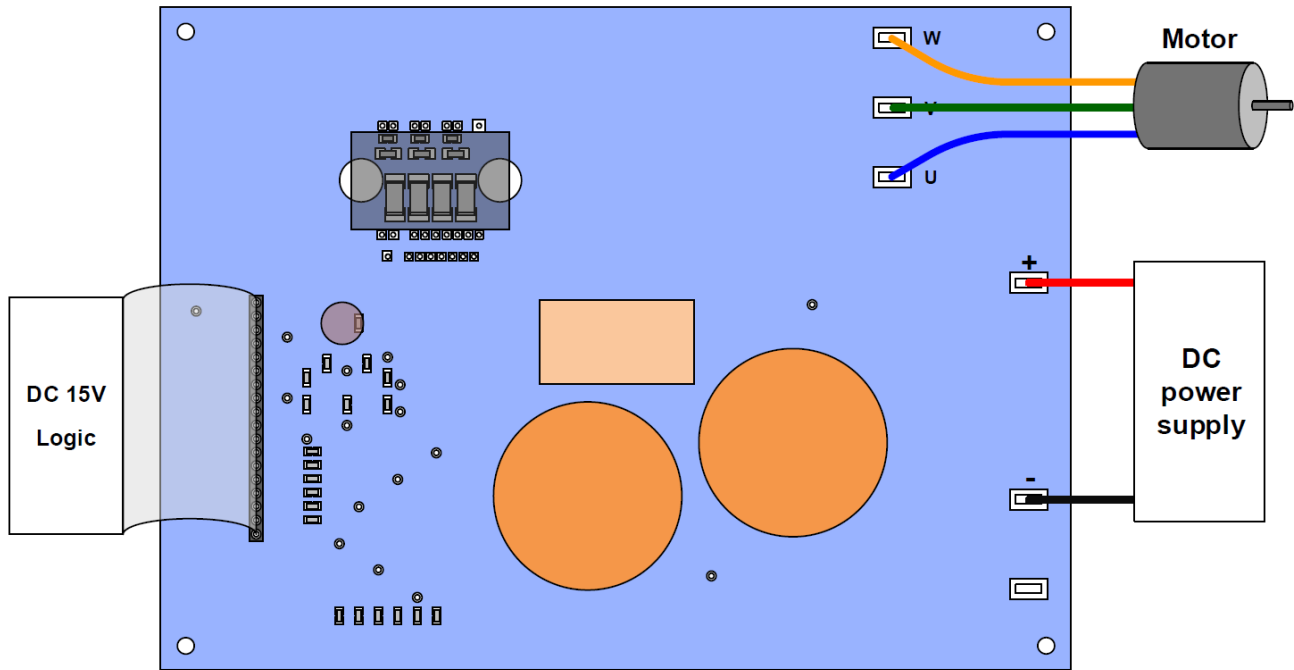


Figure 5. Connection Example

- Step1:** 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.
- Step2:** Please impress the power supply of DC15V.
- Step3:** Please perform a voltage setup according to specifications, and impress the power supply between the "+" and the "-" terminal.
- Step4:** 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.

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LAYOUT (Top View)

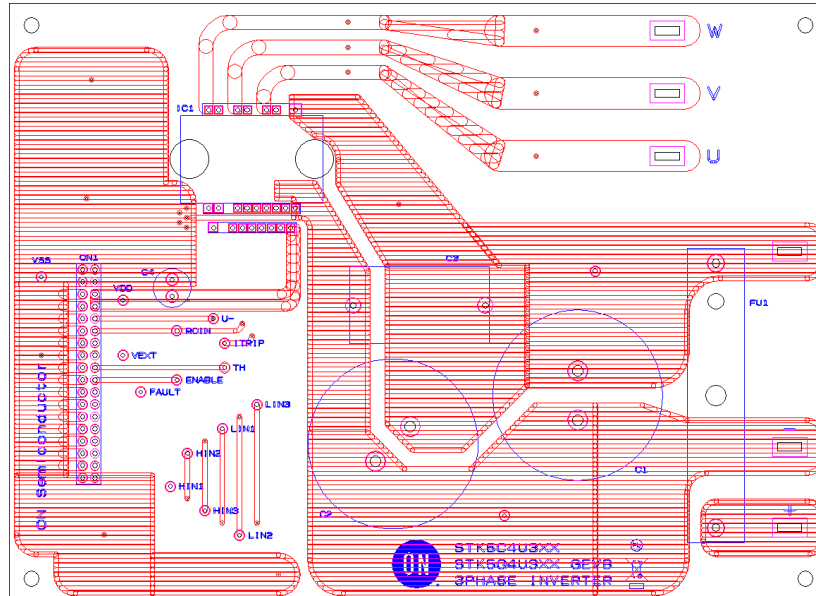


Figure 6. Surface

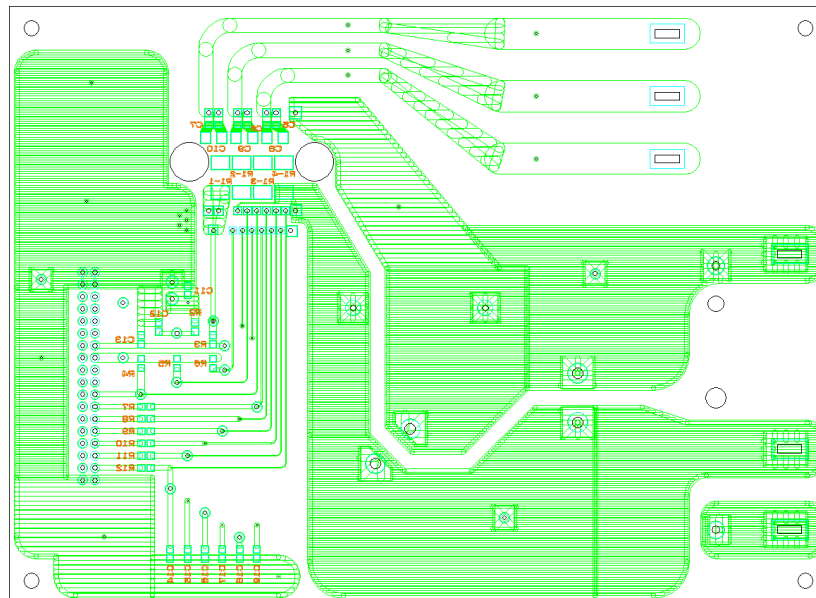


Figure 7. Back Side

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 μ m

HEAT SINK MOUNTING

Table 1. 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 (See 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 (see Figure 10)

Procedure for the Heat Sink Mounting

Step 1: Tighten the screws until the torque of temporary tightening while maintaining the balance of left((1)) and right((2)).

Step 2: Tighten them until the torque of final tightening.

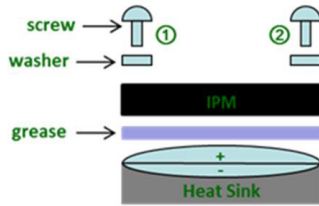


Figure 8. Mounting Composition

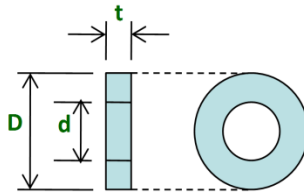


Figure 9. Size of Washer

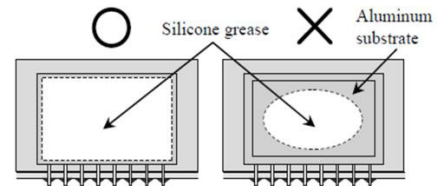


Figure 10. Grease Application

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BILL OF MATERIALS

Table 2. BILL OF MATERIALS

Designator	Qty.	Description	Value	Tolerance	Footprint	Manufacturer	Part Number	Substitution Allowed
R1-1 – R1-4	4	Shunt Resistor	10 mΩ/2 W	±1%	SMD6432	SUSUMU	KRL3264E-C-R010-F (for 352)	Yes
			8 mΩ/2 W	±1%			KRL3264E-C-R008-F (for 362)	
R2	1	Setting Fault Clear Time/Resistor	2 MΩ/0.1 W	±1%	SMD1608	KOA	RK73H1JT2D2004F	Yes
R3	1	Setting Time Constant/Resistor	200 Ω/0.1 W	±1%	SMD1608	KOA	RK73H1JT2D2000F	Yes
R4 – R6	3	Fault, ENABLE, TH Pull-Up/Resistor	20 kΩ/0.1 W	±1%	SMD1608	KOA	RK73H1JT2D2002F	Yes
R7 – R12	6	Signal Input Low Pass Filter/Resistor	100 Ω/0.1 W	±1%	SMD1608	KOA	RK73H1JT2D1000F	Yes
C1, C2	2	Aluminum Electrolytic Capacitor, Plus – Minus	470 μF/450 V	±20%	Through-Hole	Rubycon	450MXC470MEFCN35X50	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	EKMG350ELL221MHB5D	Yes
C5 – C7, C11	4	VBx – VSx, VDD – VSS/ Capacitor	0.1 μF/50 V	±10%	SMD1608	MURATA	GRM188B31H104K	Yes
C8- C10	3	VBx – VSx/ Capacitor	22 μF/25 V	±20%	SMD3225	MURATA	GRM32ER71E226ME15	Yes
C12	1	Setting Fault Clear Time/Capacitor	1 nF/50 V	±5%	SMD1608	MURATA	GRM1882C1H102J	Yes
C13	1	Setting Time Constant/ Capacitor	10 nF/50 V	±10%	SMD1608	MURATA	GRM188B11H103K	Yes
C14 – C19	6	Signal Input Low Pass Filter/ Capacitor	100 pF/50 V	±5%	SMD1608	MURATA	GRM1882C1H101J	Yes
CN1	1	Header – 18 Pin			Through-Hole 2.52 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 for 3-Phase Motor Drive			DIP-38	ON Semiconductor	STK5Q4U3xxJ-E	No

*All Components are Pb-Free.

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