## STK5C4U3xx Series Evaluation Board User's Manual



#### **ON Semiconductor®**

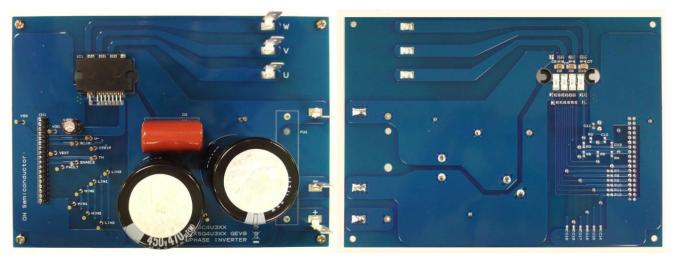
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#### Introduction

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

ONPN of EVAL Board	ONPN of IPM	lo	
STK5C4U332JGEVB	STK5C4U332J-E	ЗA	

### EVAL BOARD USER'S MANUAL



Surface

Figure 1. Evaluation Board Photos

Back side

1

#### **CIRCUIT DIAGRAM**

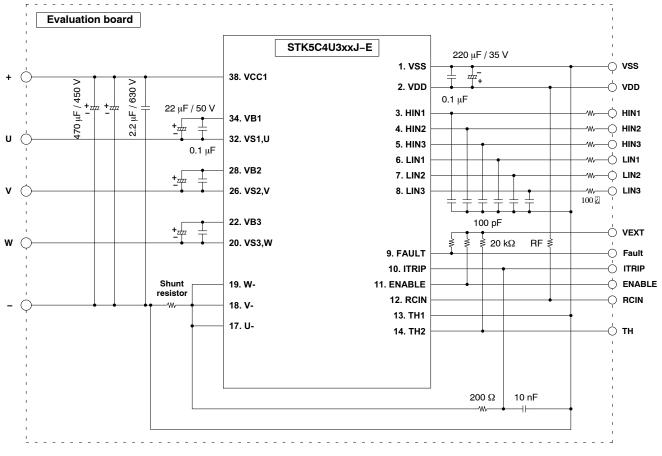
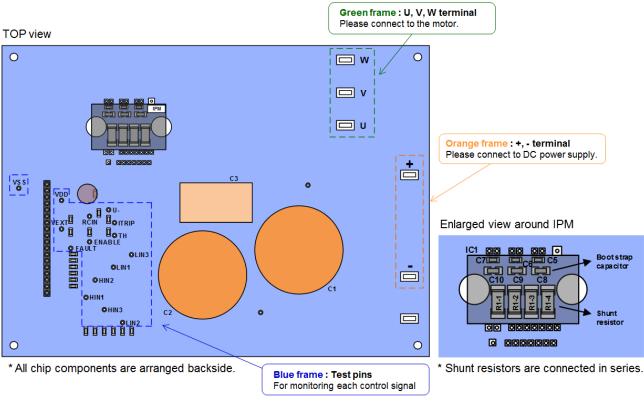
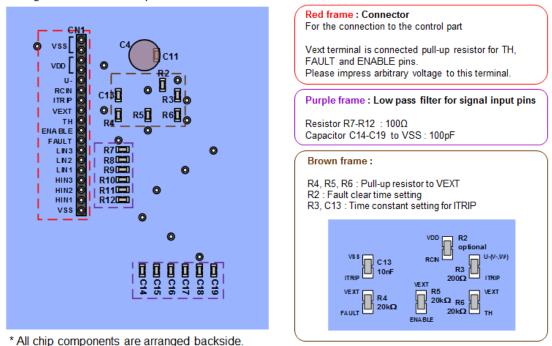


Figure 2. Circuit Diagram

#### **PIN DESCRIPTION**



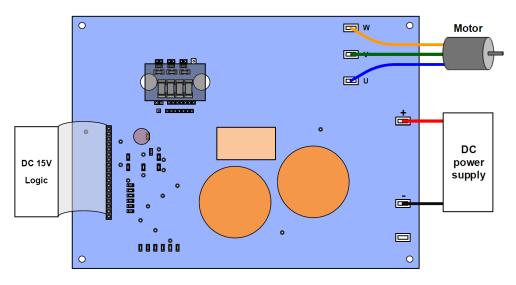




Enlarged view around test pins

Figure 4. Pin Description 2

#### **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.

### LAYOUT (TOP VIEW)

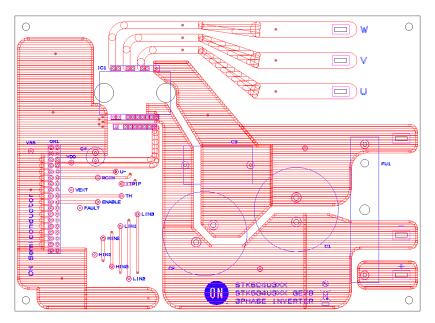


Figure 6. Layout – Surface

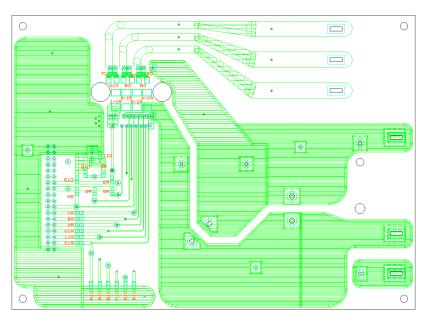


Figure 7. Layout – Back Side

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 μm

#### **BILL OF MATERIALS**

#### Table 1. BILL OF MATERIALS

Designator	Qty	Description	Value	Toler- ance	Footprint	Manufacturer	Manufacturer Part Number	Substi- tution 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	RK73H1JTTD2000F	Yes
R4 – R6	3	Fault, ENABLE, TH pull-up / resistor	20 kΩ / 0.1 W	±1%	SMD 1608	KOA	RK73H1JTTD2002F	Yes
R7 – R12	6	Signal input low pass filter / resistor	100 Ω / 0.1 W	±1%	SMD 1608	KOA	RK73H1JTTD1000F	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	EKMG350ELL221MHB5D	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

ltem	Recommended Condition				
Pitch	26.0 $\pm$ 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): $-50 \sim 50 \ \mu m$ 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: $50 \sim 100 \ \mu m$ Uniformly apply silicone grease to whole back. (Figure 10)				

#### 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.

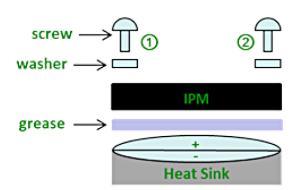


Figure 8. Mounting Composition

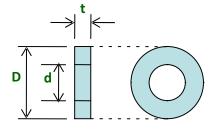


Figure 9. Size of Washer

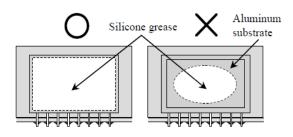


Figure 10. Grease Application

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