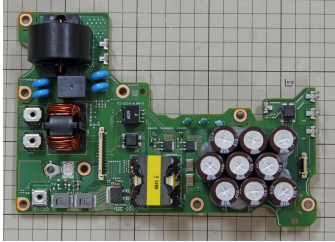
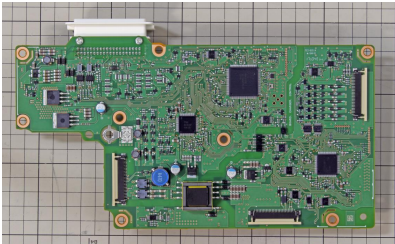
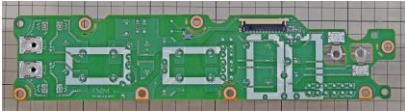
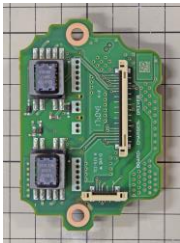


▪Circuit Boards

	Top view	Dimensions	Area	No. of layer	Board thickness	Weight
Power Supply Board		(W) 204.4mm (L) 137.7mm	281.5cm²	4	(t) 1.7mm	512.6g
Control Board		(W) 245.3mm (L) 131.4mm	322.3cm²	4	(t) 1.6mm	167.0g
Filter Board		(W) 276.9mm (L) 62.0mm	171.7cm²	4	(t) 1.7mm	319.0g
Driver Board		(W) 79.9mm (L) 53.8mm	43.0cm²	4	(t) 1.6mm	23.6g

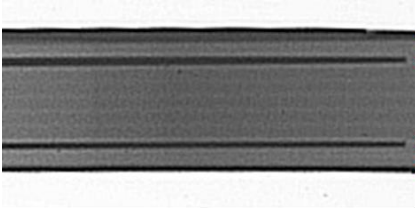
✖ Detailed dimensions are available in the paid version of the report

2. Circuit boards and modules

Power
Supply
Board

4-layer through-hole.
Layers are structured as follows :
The board is screwed with the case at 9 portions
The screwed portions are not through-holed.

	Layer structure	Thickness	L/S [mm]	Min. through-hole dia.[mm]	Layout
Solder resist	Resin				-
L1	Copper-plated layer				
	Copper foil				
Insulation layer between L1-L2	Resin + 2 sheets of glass cloth				-
L2	Copper foil				
Insulation layer bet. L2-L3	Resin + 5 sheets of glass cloth				-
L3	Copper foil				
Insulation layer bet. L3-L4	Resin + 2 sheets of glass cloth				-
L4	Copper foil				
	Copper-plated layer				
Solder resist	Resin				-
Overall thickness of substrate	SR(on L1 circuit) to SR(on L4 circuit)				-
Thick. of through-hole plating	Copper-plated layer				-
Inner dia. of through-hole plating	-				-

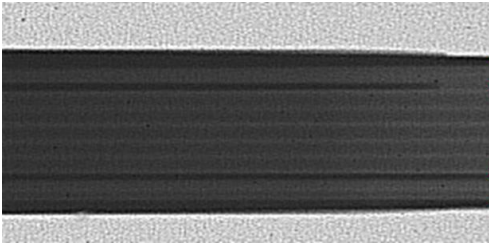


Board X-ray (Side View)

Control
Board

4-layer through-hole.
Layers are structured as follows :
The board is screwed with the case at 9 portions
The screwed portions are not through-holed.

	Layer structure	Thickness	L/S [mm]	Min. through-hole dia.[mm]	Layout
Silk-screen	Resin				-
Solder resist	Resin				-
L1	Copper-plated layer				
	Copper foil				
Insulation layer between L1-L2	Resin + 2 sheets of glass cloth				-
L2	Copper foil				
Insulation layer bet. L2-L3	Resin + 5 sheets of glass cloth				-
L3	Copper foil				
Insulation layer bet. L3-L4	Resin + 2 sheets of glass cloth				-
L4	Copper foil				
	Copper-plated layer				
Solder resist	Resin				-
Overall thickness of substrate	SR(on L1 circuit) to SR(on L4 circuit)				-
Thick. of through-hole plating	Copper-plated layer				-
Inner dia. of through-hole plating	-				-



Board X-ray (Side View)

3. Circuit

The circuit consists of the following blocks :

•Input Filter

AC source (100V / 200V) for battery charging is applied.

•Input Voltage Monitor

The circuit to monitor the voltage of AC source from external.

2 types of input voltage, one upstream of power relay (4019)•(ACIC2,ACIH2) and the other downstream (ACIC3,ACIH3), are transferred to "Charge MCU Block" through the filter consists of the operational amplifiers (2505,2510) each.

•PFC Voltage Monitor

•PFC Control

The circuit to control "PFC Driver" in conjunction with the current sensor output (4035) from "Input Filter", monitoring the output of the current sensor (4035) remains between the current values specified by "Charge MCU Block" utilizing the operational amplifiers (2500_3,2500_4).

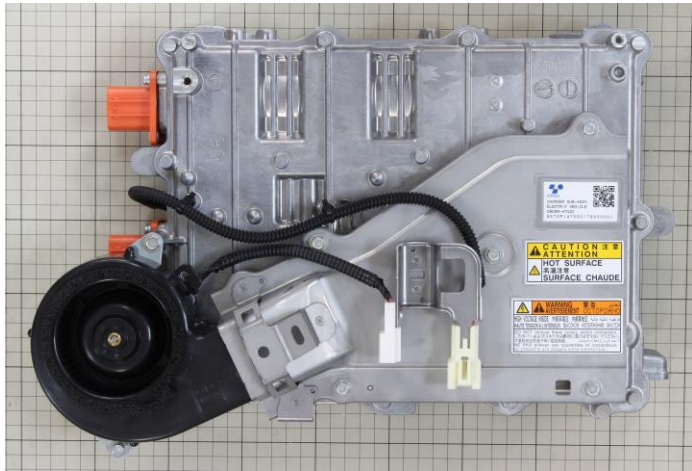
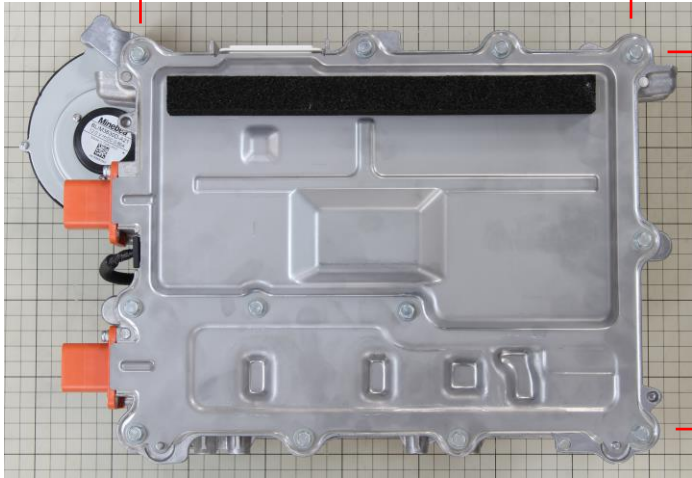
The result of the monitoring is input to "Charge MCU Block" and enables to stop "PFC Driver" via. the logic IC (2606_1,2606_2).

Overview

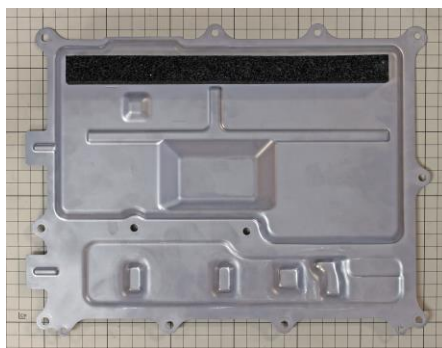
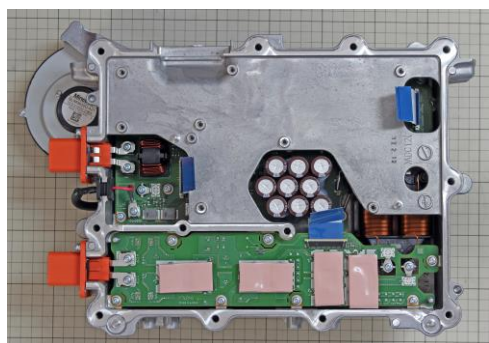
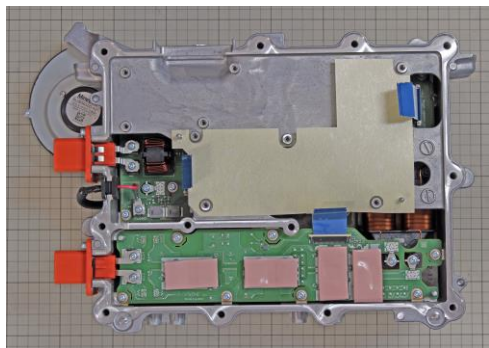
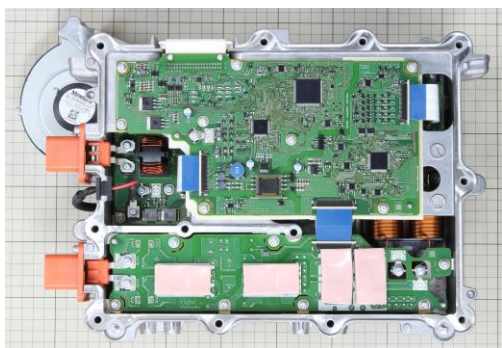
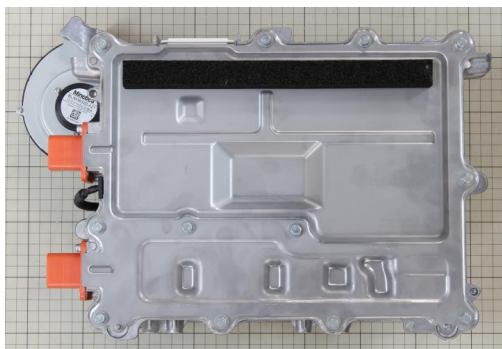


300.3 mm

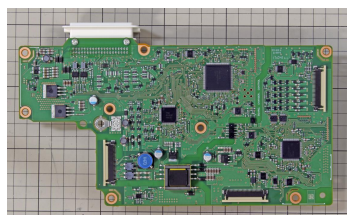
80.2 mm



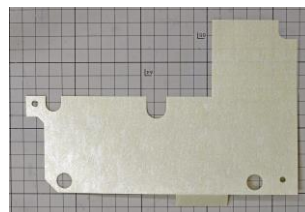
Overall weight: kg



Top side cover

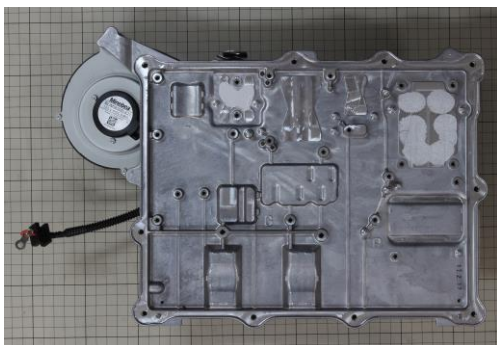
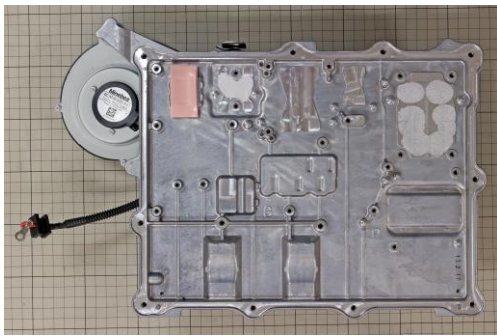
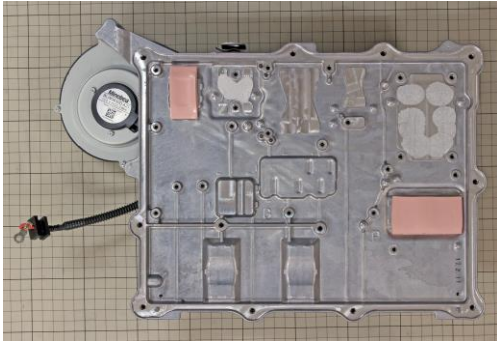
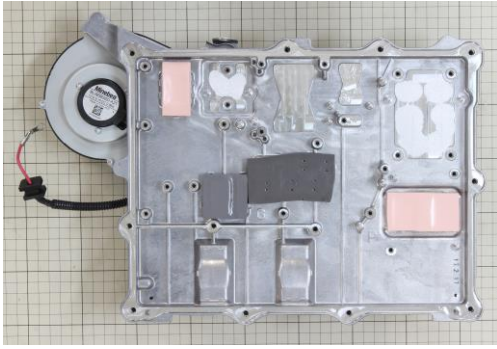


Control circuit board



Insulation sheet

Fig. 1-1 Dismantling 1



**Insulation & heat
radiation rubber 1**



**Insulation & heat
radiation rubber 2**

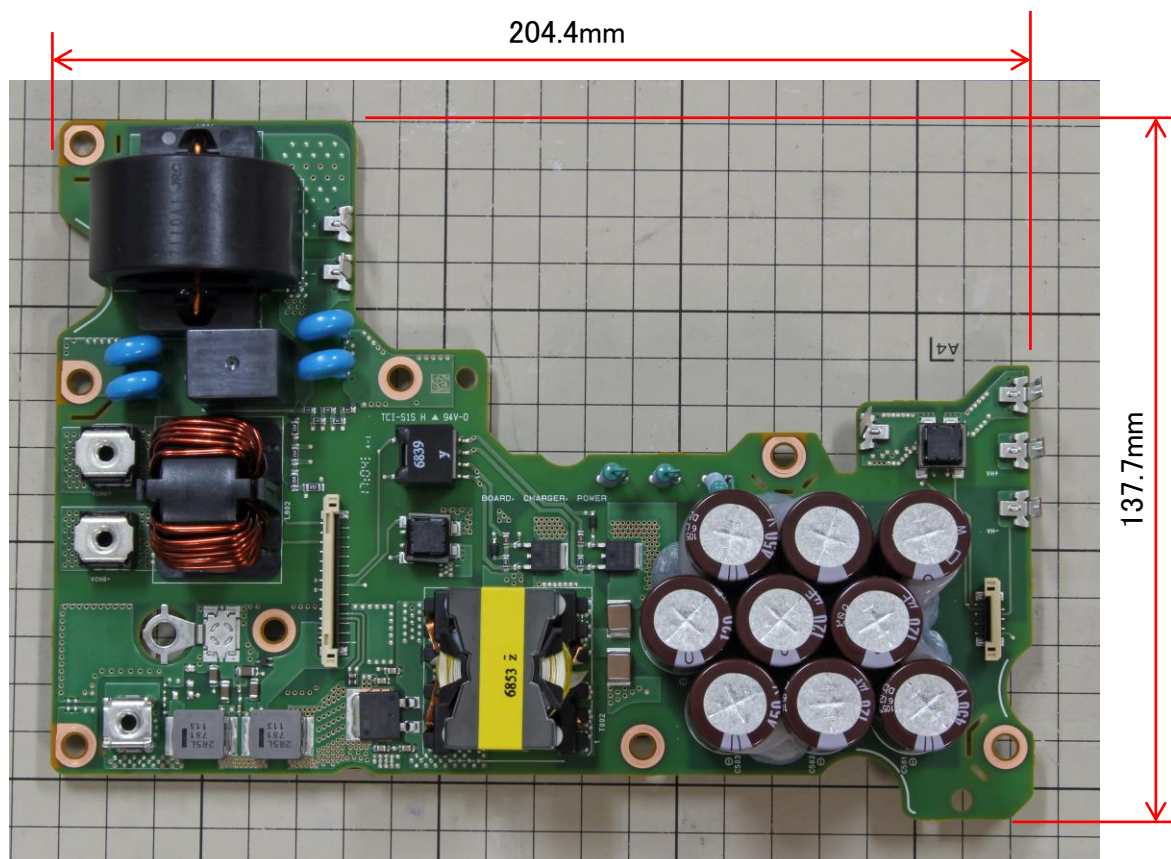


Heat radiation rubber 8

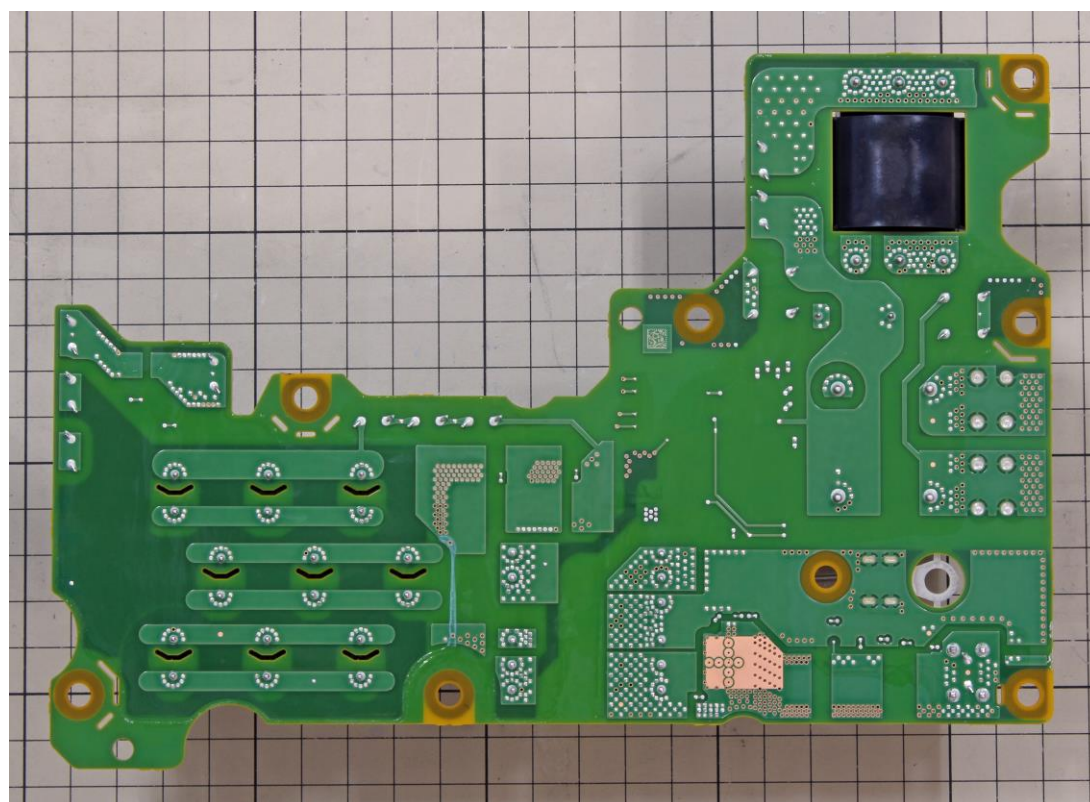


Heat radiation rubber 9

Fig. 1-2 Dismantling 2



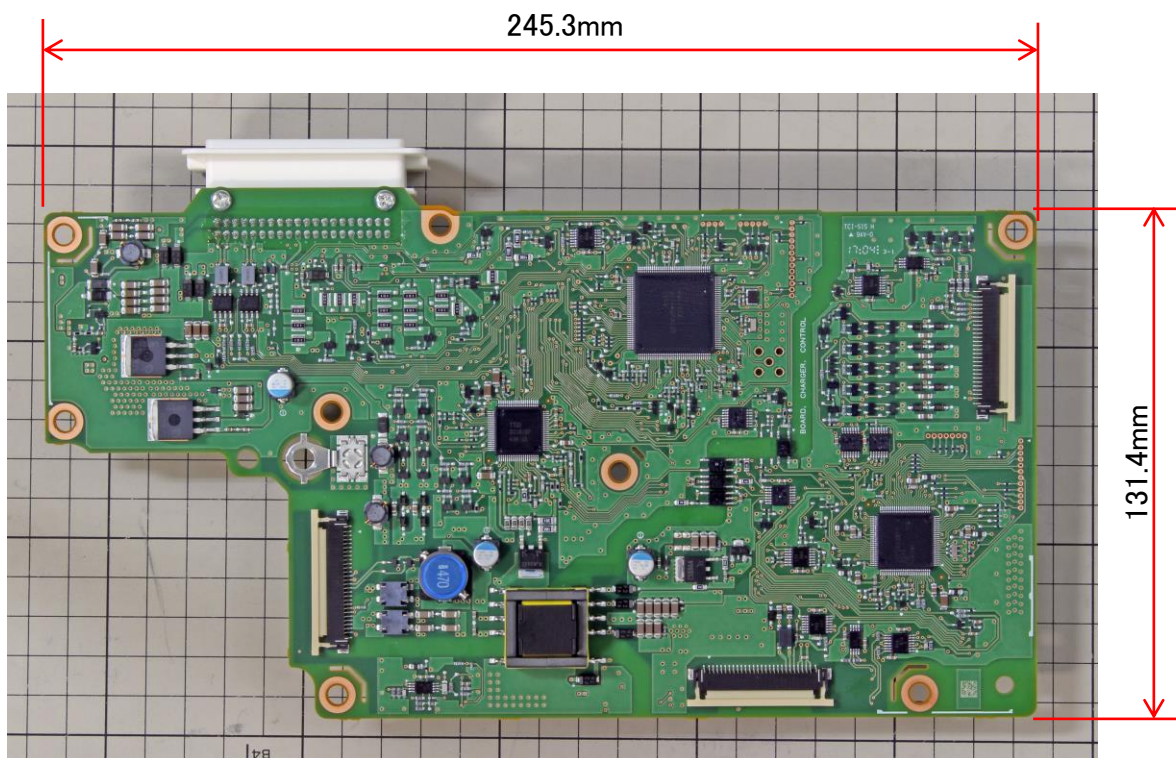
Top View



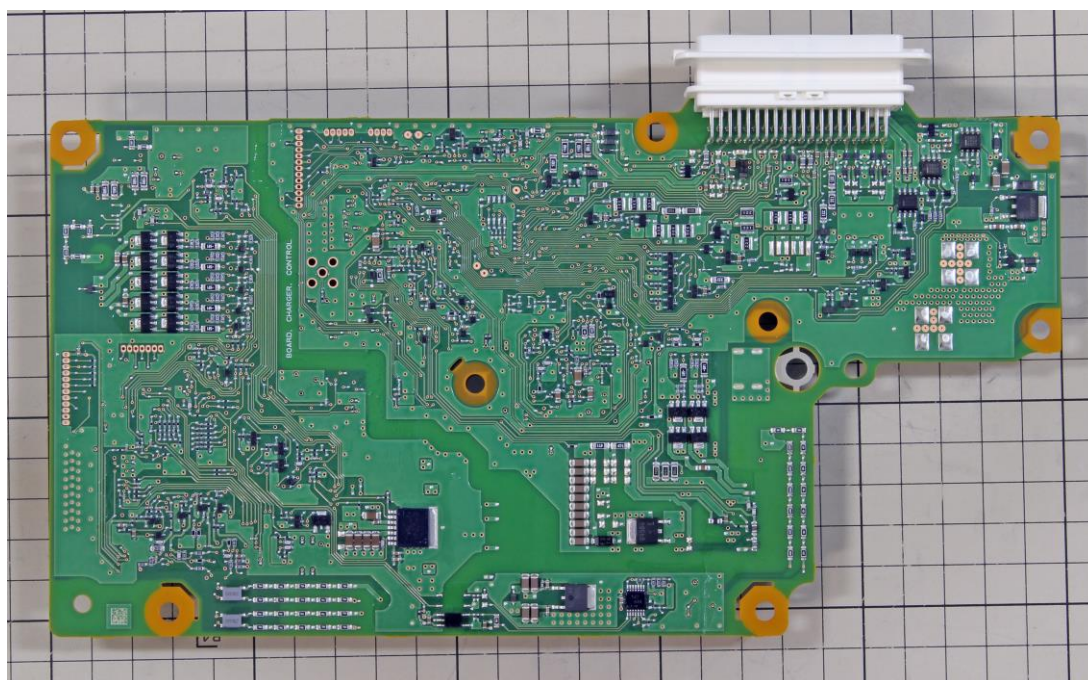
Bottom View

Weight: 512.6g

Fig. 2-1 Power Source Board appearance



Top View




Bottom View

Weight: 167.0g

Fig. 2-2 Control Board appearance


Elements

0013,0018




1 2

0021




2 1

0024



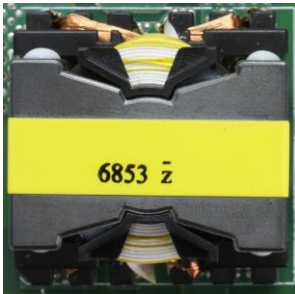
1 3

0032,0038

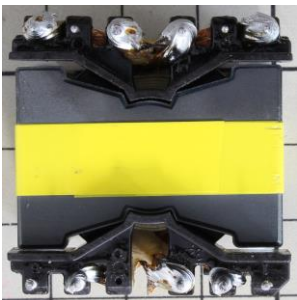


K A

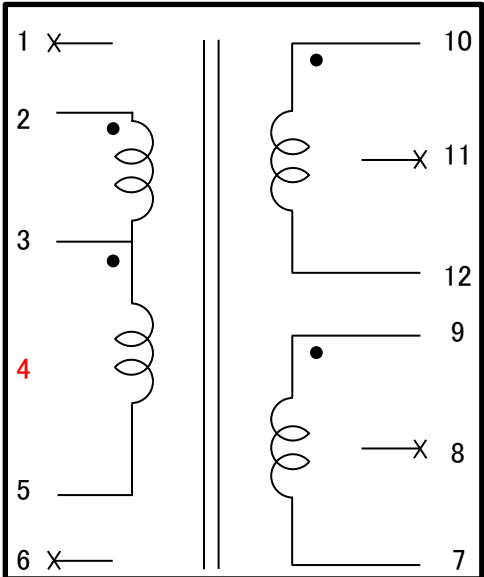
0029



Top View




Bottom View

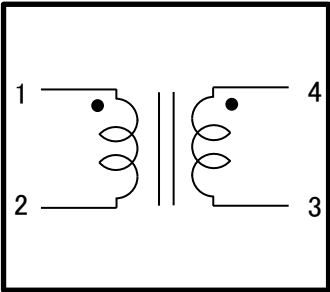


Equivalent Circuit

0030,0054




Top View

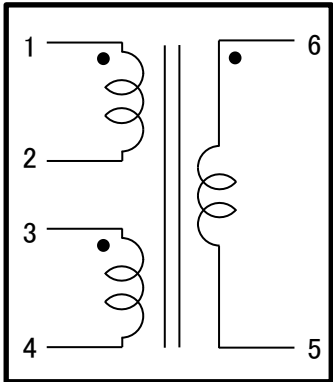


Equivalent Circuit

0031



Top View



Equivalent Circuit

0035,0039



G S

0042,0043,0044

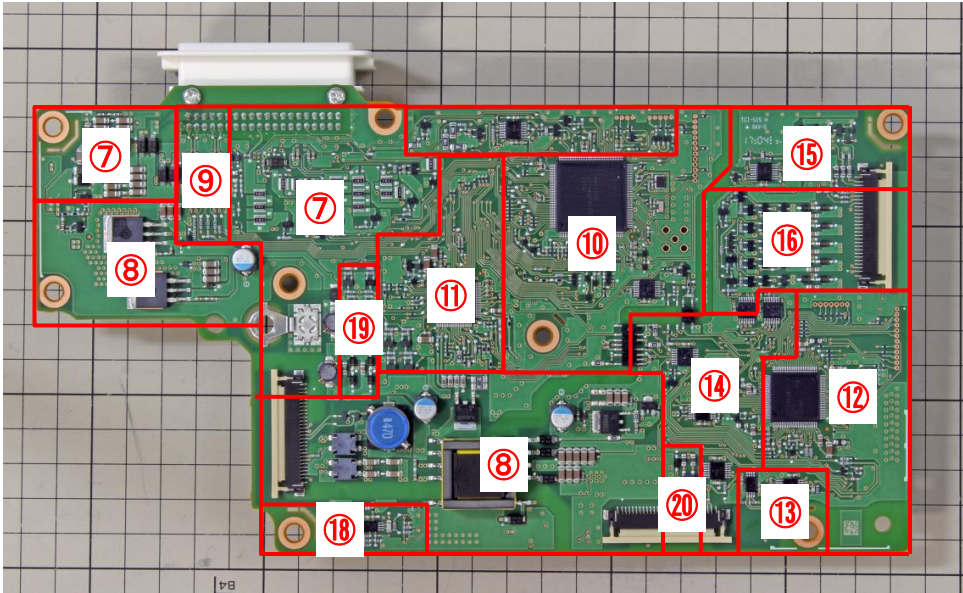


1 2

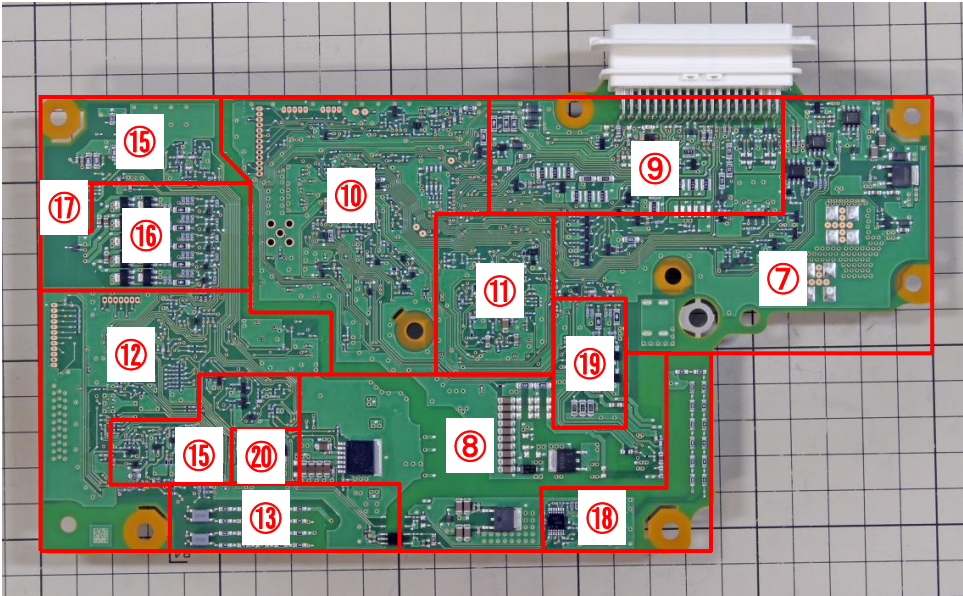
Blue : Mounted position* corresponding to Parts List
Black : Terminal No.
Red : Terminal No. (w/o terminal)

Fig. 3 Power Source Board, mounted components (partial)

Analysis Area



Top View



Bottom View

	Function	
7	Power Switch	14 Charge Protection1,PFC Control
8	Internal Power Supply	15 Charge Protection2
9	Communication	16 PFC Driver,DC/PSFB Pre-Driver
10	Communication MCU Block	17 PFC Voltage Monitor
11	Power Supply Custom ASIC Block	18 Output Voltage Monitor
12	Charge MCU Block	19 LLC Pre-Driver
13	Input Voltage Monitor	20 Relay Control

Fig. 4 Contriol Board, Analysis Area

Components Mounted Position

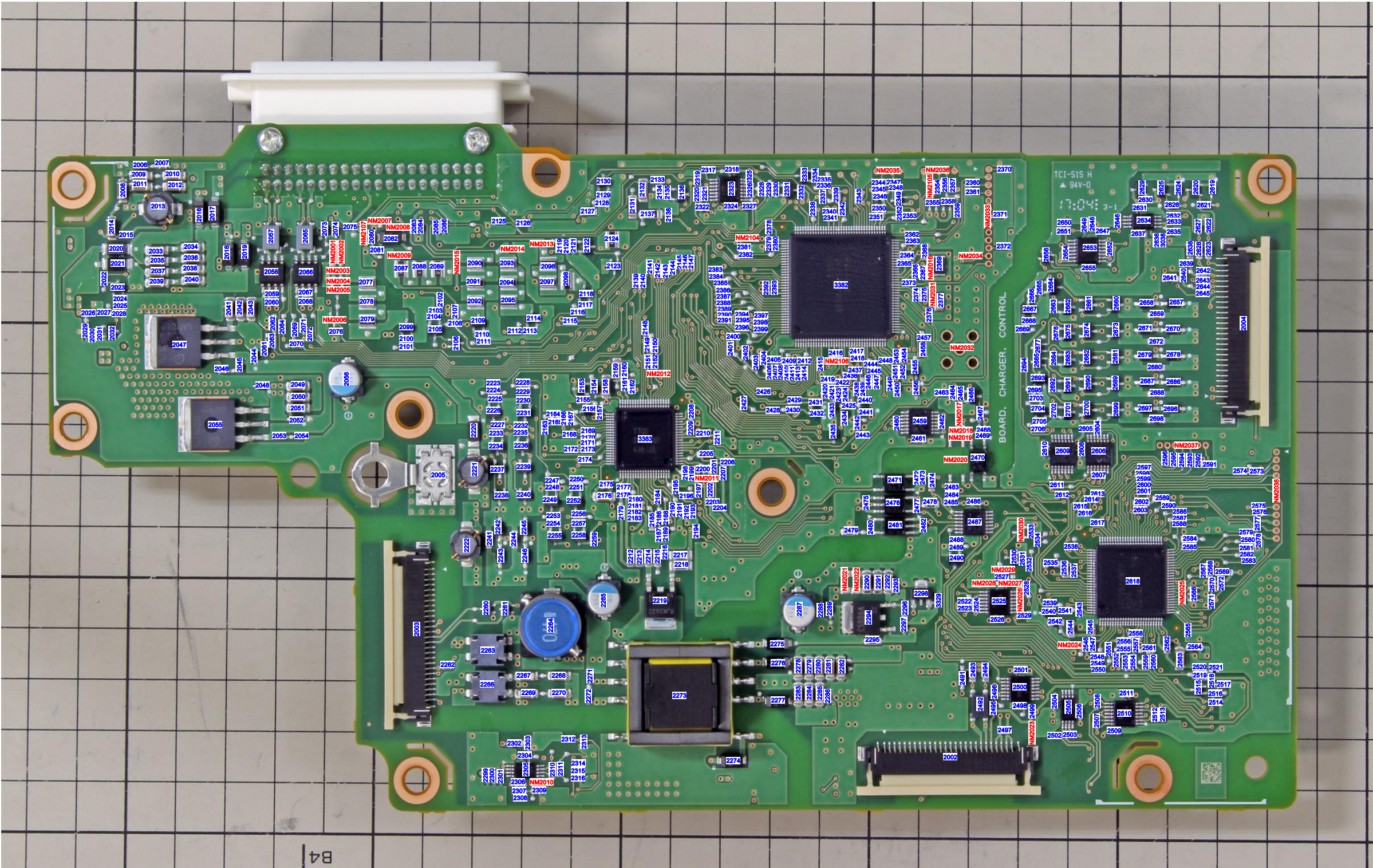
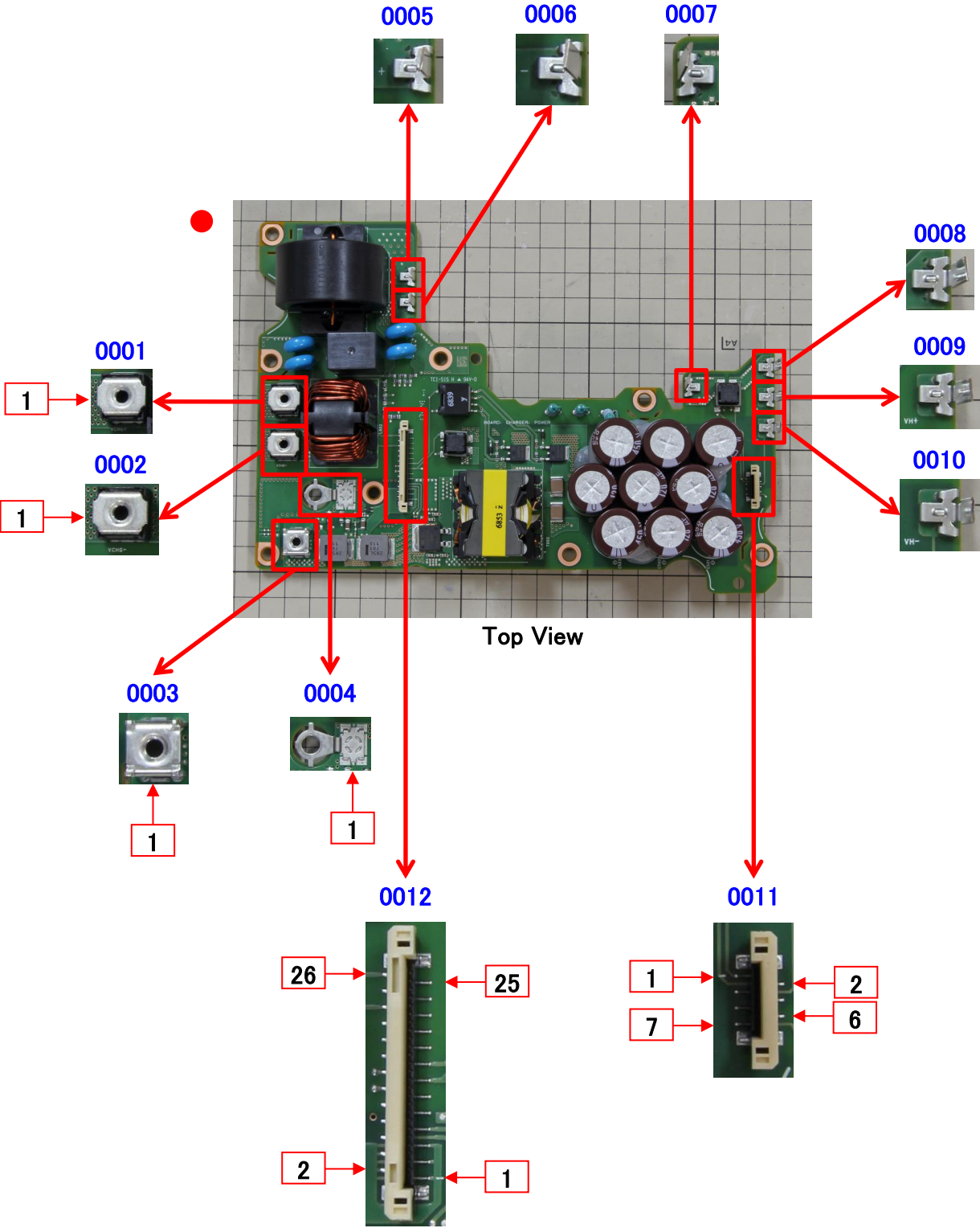


Fig. 5 Control Board, positions of components (Top View)

NM : No Mount

Components Information (partial)

No	Silk	Marking	Supplier	Function	Nominal	Measure	Remark
0001	VCHG+	-	-	Connector 1pin between Power Source Board & External Connector 3		-	inference
0002	VCHG-	-	-	Connector 1pin between Power Source Board & External Connector 3		-	inference
0003	-	-	-	Connector 1pin between Power Source Board & External Connector 3		-	inference
0004	-	-	-	Connector 1pin FG terminal	-	-	inference
0005	+	-	-	Connector 1pin between Power Source Board & Diode Module	-	-	inference
0006	-	-	-	Connector 1pin between Power Source Board & Diode Module	-	-	inference
0007	-	-	-	Connector 1pin between Power Source Board & Transformer		-	inference
0008	-	-	-	Connector 1pin between Power Source Board & Bus bar		-	inference
0009	VH+	-	-	Connector 1pin between Power Source Board & Bus bar		-	inference
0010	VH-	-	-	Connector 1pin between Power Source Board & Bus bar		-	inference
0011	-	IRS B5	IRISO ELECTRONICS	Connector 7pin between Power Supply Board & Driver Board		-	inference
0012	-	IRS PA9T C1	IRISO ELECTRONICS	Connector 26pin between Power Source Board & Control Board		-	inference
0013	-	2R5L 781 113	-	Inductor	2.5u H	2.582u H	inference



Blue : Mounted position• corresponding to Parts List
Black : Terminal No.

Fig. 6 Power Source Board, connectors

Section Analysis

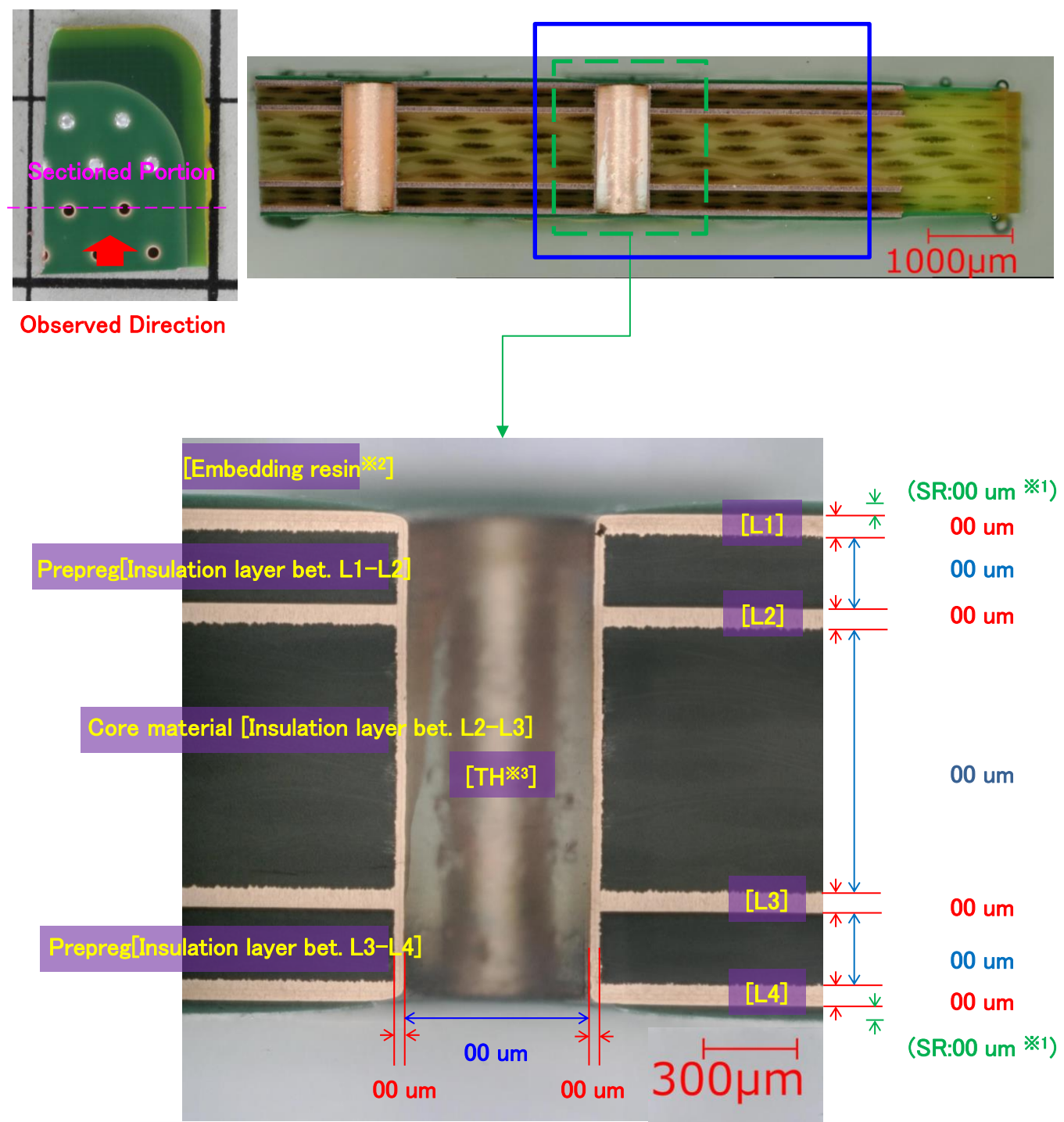
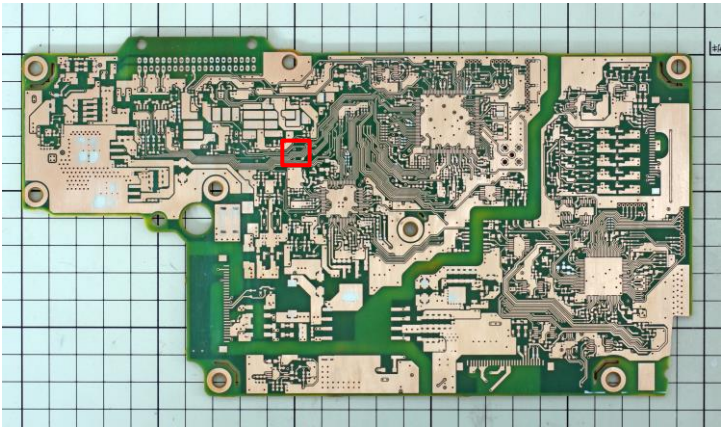


Fig. 7 Power Source Board,
dimensional measurement on section

※2 copper-plated layers are formed

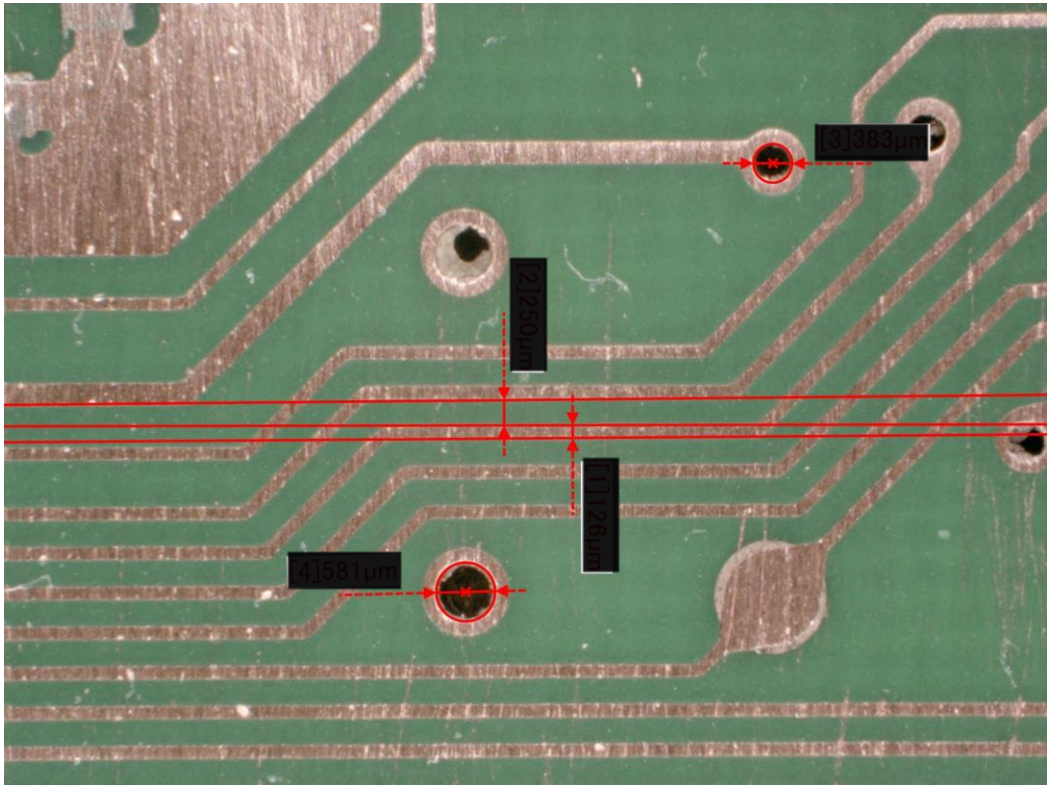
※1 SR = Solder resist
※2 Embedded resin =
resin for sample fixing
※3 TH = Through-hole

Measured Dimensions of wiring



Top View

 :Measured portion



Top View

- L1 min. wiring width: 00um
- L1 min. distance of wires: 00um
- L1via. inner dia. 1: 00um
- L1via. inner dia. 2: 00um

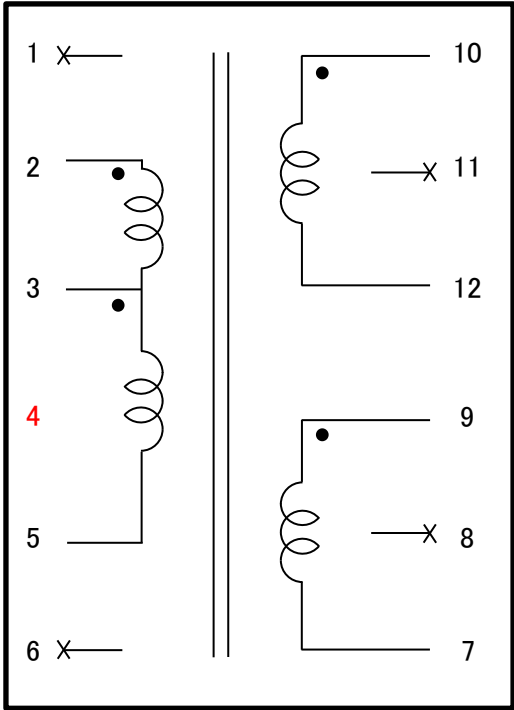
Fig. 8 Control Board L1, wiring dimensions



Top View



Bottom View



Equivalent Circuit

Blue : Mounted position• corresponding to Parts List
Black : Terminal No.
Red : Terminal No. (w/o terminal)

Frequency at measurement: 100kHz
Measurement equipment: IM3523 by HIOKI

*Inductance ratio, winding number are rounded to the first decimal place

Fig. 9 Transformer, measurement

Insulation Rules (board)

AC power side

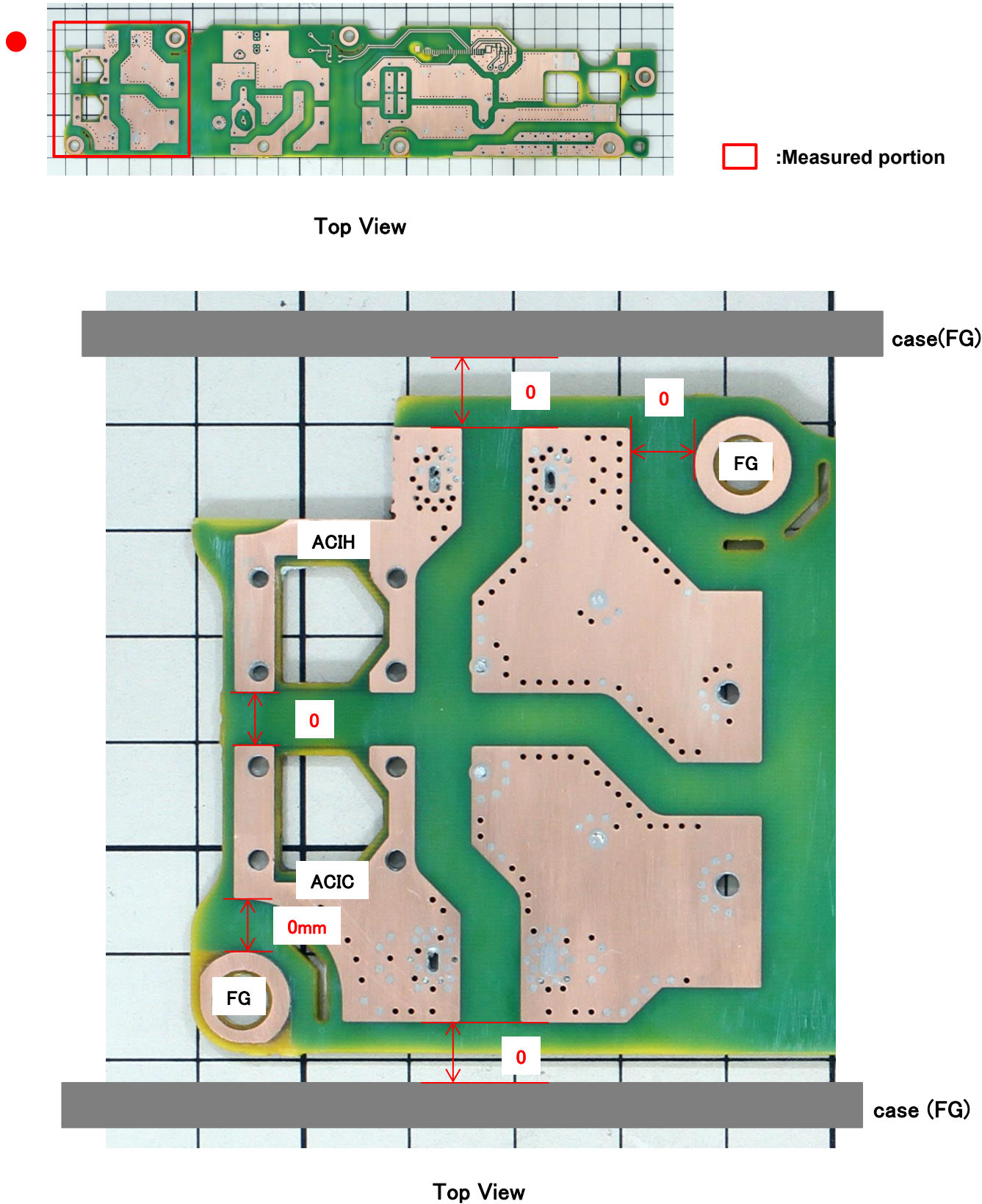
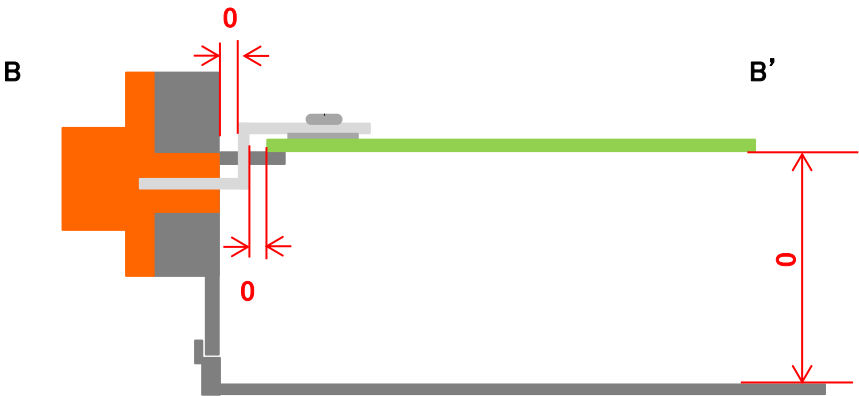
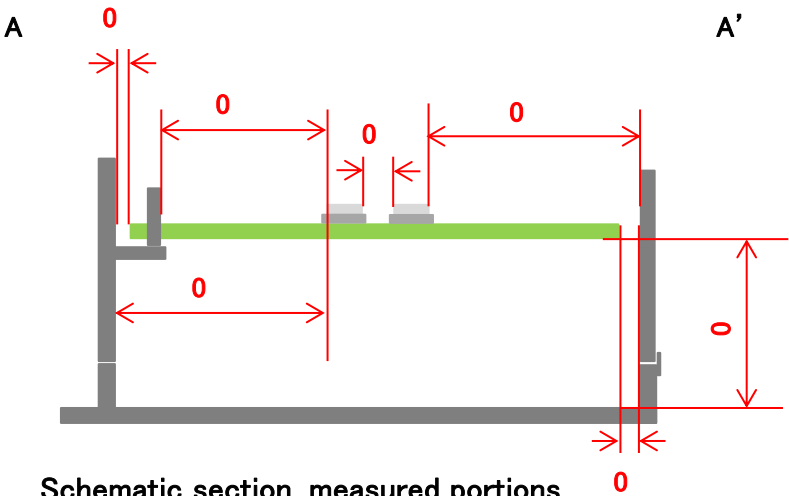
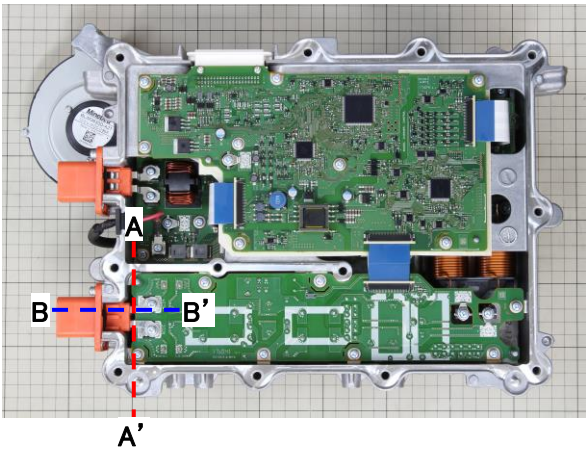


Fig. 10 Filter Board L1, measured dimensions

Insulation Rules (system)

AC power side



Dimensions in mm

Fig. 11 AC power side, measured results (partial)

Heat radiation structure

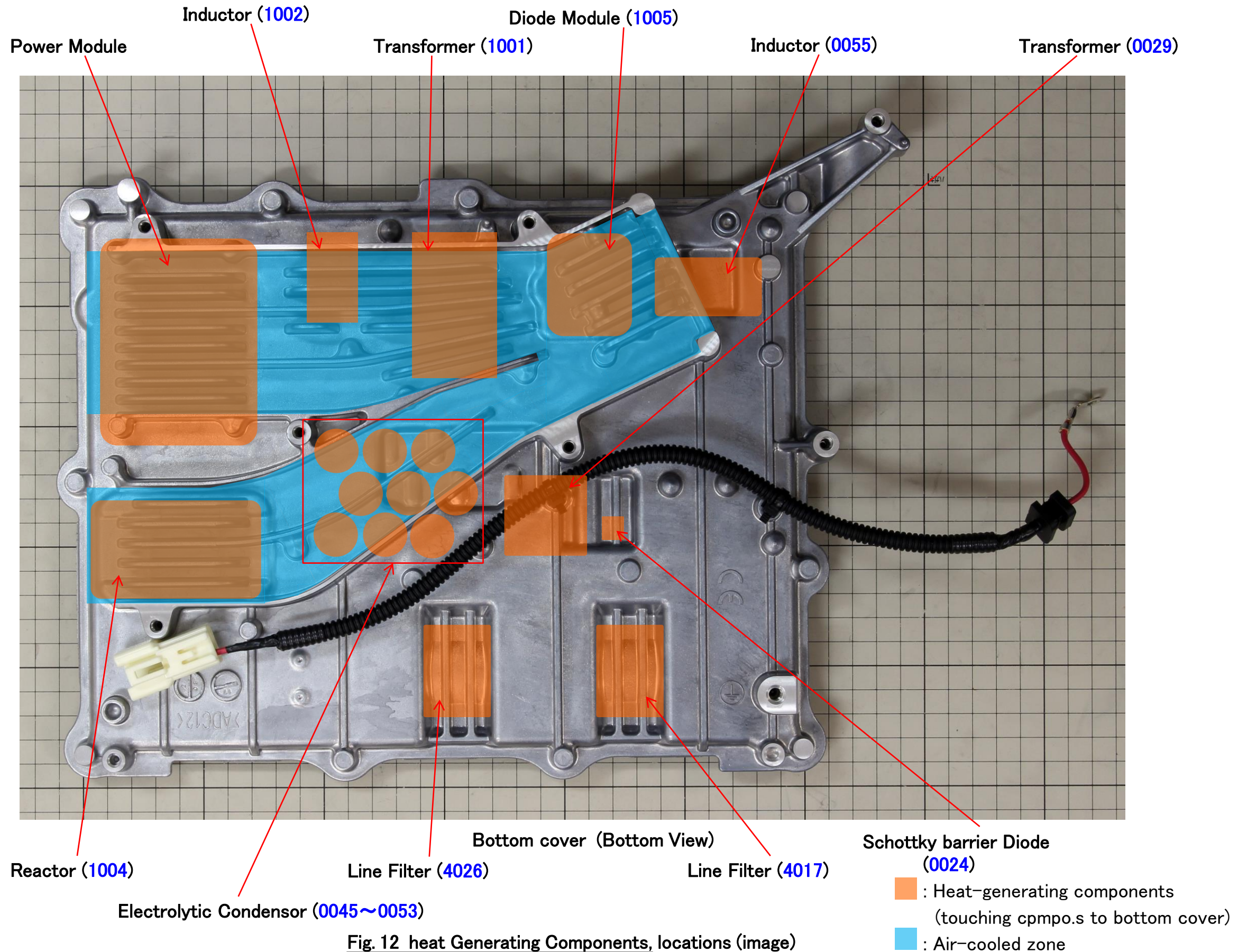


Fig. 12 heat Generating Components, locations (image)