

## System Reference series for Automotive application

# REFRPT001-EVK-001 User's Guide

The REFRPT001-EVK-001 is a board included in power tree solution reference design named as REFRPT001 developed for infotainment devices such as vehicle clusters and center information displays, as well as for ADAS ECUs. The power system that can support functional safety is integrated on a single board, realizing an optimal configuration as a power tree. Good EMC performance that meets CISPR25 Class 5 even when all power supplies are operating, and reduces heat generation of each device by distributing high-efficiency DCDC. In addition, two voltage monitoring ICs with self-diagnosis functions can monitor the output of all systems and contribute to a higher level of functional safety. This document provides an overview of the REFRPT001-EVK-001 board, the names of each part, and how to use it.

This document consists of following chapters.

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## System Block Diagram

System Block Diagram of REFRPT001-EVK-001 is shown below.

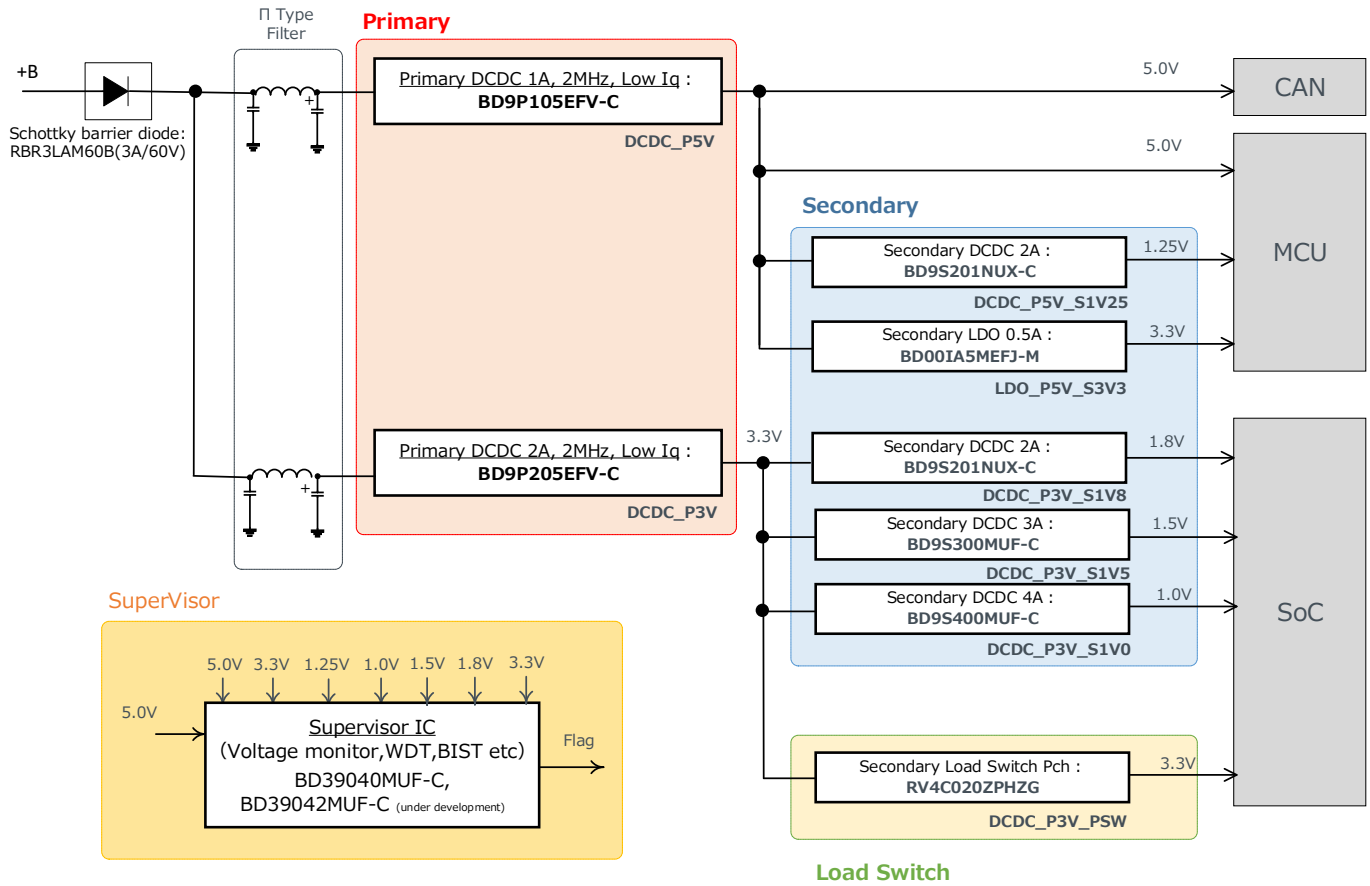


Figure 1 Block Diagram of REFRPT001-EVK-001

In this document, to distinguish between multiple products mounted on a board, the following symbol names are used here in after.

Table 1 Symbol name of products mounted on REFRPT001-EVK-001

Symbol Name	Product Name	Input Voltage(typ) [V]	Output Voltage (typ) [V]
DCDC_P5V	BD9P105EFV-C	12.0	5.0
DCDC_P5V_S1V25	BD9S201NUX-C	5.0	1.3
LDO_P5V_S3V3	BD00IA5MEFJ-M	5.0	3.3
DCDC_P3V	BD9P205EFV-C	12.0	3.3
DCDC_P3V_S1V0	BD9S400MUF-C	3.3	1.0
DCDC_P3V_S1V5	BD9S300MUF-C	3.3	1.5
DCDC_P3V_S1V8	BD9S201NUX-C	3.3	1.8
DCDC_P3V_PSW	RV4C020ZPHZG	3.3	3.3

## Operating Conditions

Operating condition of REFRPT001-EVK-001 is shown in the Table.2

**Table 2 Operating condition of REFRPT001-EVK-001**

Parameter	Symbol in power tree	Limit			Unit	Conditions
		Min	Typ	Max		
Supply Voltage	+B	9.0	12.0	16.0	V	Break down Voltage 42V
Output Current*	DCDC_P5V	-	-	1.0	A	Vout 5.0V (typ), When operating alone
	DCDC_P5V_S1V25	-	-	1.25	A	Vout 1.25V (typ)
	LDO_P5V_S3V3	-	-	0.2	A	Vout 3.3V (typ)
	DCDC_P3V	-	-	2.0	A	Vout 3.3V (typ), When operating alone
	DCDC_P3V_S1V0	-	-	1.5	A	Vout 1.0V (typ)
	DCDC_P3V_S1V5	-	-	1.0	A	Vout 1.5V (typ)
	DCDC_P3V_S1V8	-	-	0.5	A	Vout 1.8V (typ)
	DCDC_P3V_PSW	-	-	0.15	A	Vout 3.3V (typ)

\*Output current specification with consideration of heat generated by the current load of each power supply IC

## Outline of the board and name of functional blocks

The REFRPT001-EVK-001 board appearance and part names are shown below.

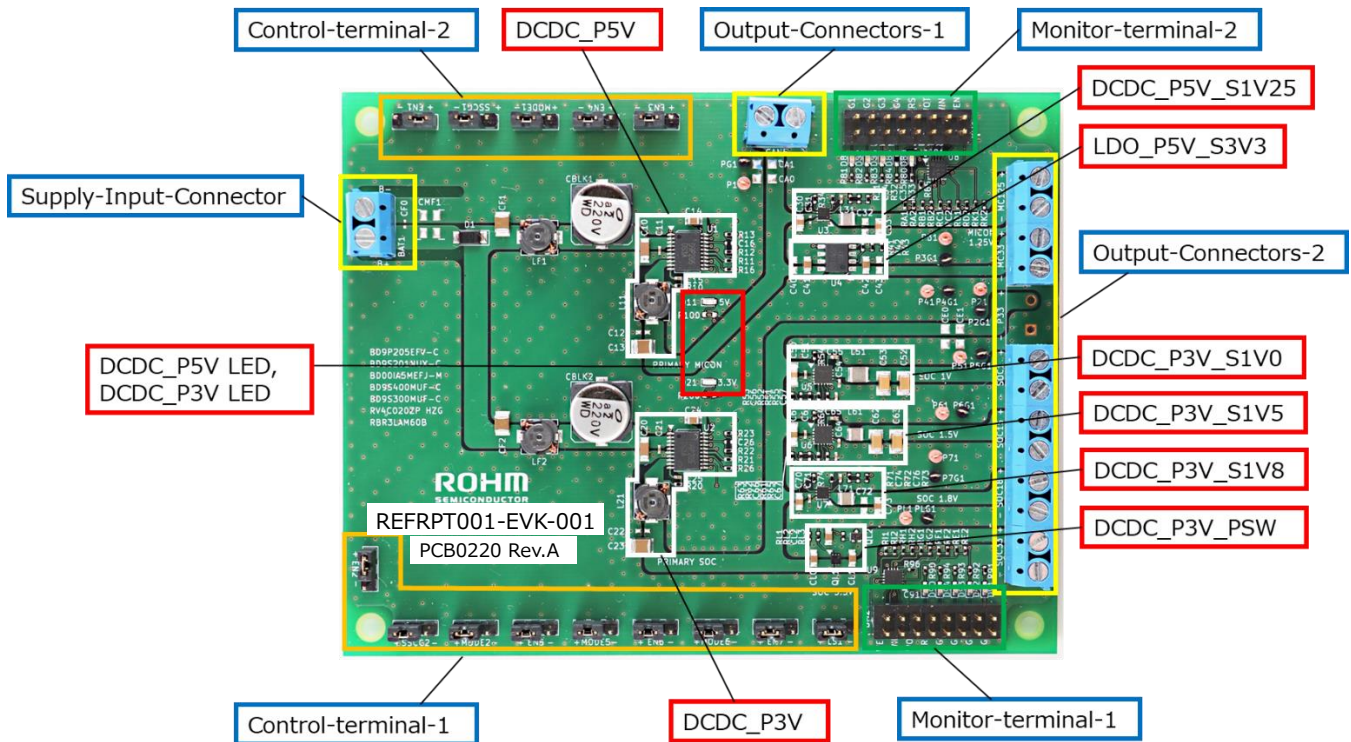


Figure 2 RPT62-EVK external overview and symbol name of board functional blocks

Product name of the board	REFRPT001-EVK-001
Board X, Y dimension	121.9 x 96.5 mm
Layer structure	FR-4 4layer, 1.6mm thickness

## Operating method

REFRPT001-EVK-001 can start by following procedure

1. Set the Enable control and Mode control of each power supply IC according to Tables 3 and 4 below. If necessary, connect each Enable terminal to a pin header so that it can be controlled from an external device.
2. Connect the power input to the Supply-Input-Connector, and connect the power supply destination device and device to the Output-Connectors-1 / -2.
3. Turn on power input and start power supply
4. Check that DCDC\_P5V (D11 LED) and DCDC\_P3V (D21 LED) are on

## Configuration of enable and mode control

**Table 3 Control-terminal-1 function**

Name	Function	Control function by Jumper status			Comment
		+	-	default	
EN2	Control DCDC_P3V	Enable	Disable	+	
SSCG2	SSCG enable control for DCDC_P3V	Enable	Disable	+	Note1)
MODE2	Mode control for DCDC_P3V	Forced PWM mode	AUTO mode	+	Note2)
EN5	Control DCDC_P3V_S1V0	Enable	Disable	+	
MODE5	Mode control for DCDC_P3V_S1V0	SLLM mode	Forced PWM mode	-	Note3)
EN6	Control DCDC_P3V_S1V5	Enable	Disable	+	
MODE6	Mode control for DCDC_P3V_S1V5	SLLM mode	Forced PWM mode	-	Note4)
EN7	Control DCDC_P3V_S1V8	Enable	Disable	+	
LS1	Control DCDC_P3V_PSW	Enable	Disable	+	

**Table 4 Control-terminal-2 function**

Name	Function	Control function by Jumper status			Comment
		+	-	default	
EN1	Control DCDC_P5V	Enable	Disable	+	
SSCG1	SSCG enable control for DCDC_P5V	Enable	Disable	+	Note1)
MODE1	Mode control for DCDC_P5V	Forced PWM mode	AUTO mode	+	Note2)
EN4	Control LDO_P5V_S2V2	Enable	Disable	+	
EN3	Control DCDC_P5V_S1V25	Enable	Disable	+	

Note1) Refer to datasheet of BD9P205EFJ-C/BD9P105EFJ-C for more detail about SSCG function.

Note2) Refer to datasheet of BD9P205EFJ-C/BD9P105EFJ-C for more detail about Mode function.

Note3) Refer to datasheet of BD9S400MUF-C for more detail about Mode function.

Note4) Refer to datasheet of BD9S300MUF-C for more detail about Mode function.

## Power supply monitoring function

The REFRPT001-EVK-001 is equipped with two power supply monitoring ICs, which can monitor the DCDC\_P5V system and DCDC\_P3V system power trees, respectively. The Power Good signal, XRSTOUT signal, and Watch Dog Timer output from the power supply monitoring IC can be checked with Monitor-terminal-1 / -2. Refer to Table 5 and Table 6 below for the signal arrangement. The output result (PGx, XRSTOUT, WDTOUT) signal of the power monitoring IC can be checked by LED.

**Table 5 Monitor-terminal-1 signal assignment**

symbol name	pin#	Description	Comment
PG1	9	Power Good signal for DCDC_P5V	Connected to LED D81
PG2	10	Power Good signal for DCDC_P5V_S1V25	Connected to LED D82
PG3	11	Power Good signal for LDO_P5V_S3V3	Connected to LED D83
PG4	12	Not used	
XRSTOUT	13	Reset output pin for DCDC_P5V tree	Note1) Connected to LED D80
WDOUT	14	WDT output pin for WDT function	Note1)
WDIN	15	Clock input pin for WDT function	Note1)
WDEN	16	Enable input pin for WDT function	Note1)

**Table 6 Monitor-terminal-2 signal assignment**

symbol name	pin#	Description	Comment
PG1	9	Power Good signal for DCDC_P3V_S1V0	Connected to LED D91
PG2	10	Power Good signal for DCDC_P3V_S1V5	Connected to LED D92
PG3	11	Power Good signal for DCDC_P3V_S1V8	Connected to LED D93
PG4	12	Power Good signal for DCDC_P3V_PSW	Connected to LED D94
XRSTOUT	13	Reset output pin for DCDC_P3V tree	Note1) Connected to LED D90
WDOUT	14	WDT output pin for WDT function	Note1)
WDIN	15	Clock input pin for WDT function	Note1)
WDEN	16	Enable input pin for WDT function	Note1)

Note1) Refer to BD39040MUF-C / BD39042MUF-C datasheet for details of WDT and XRST functions

## Board schematic

Board schematic of REFRPT001-EVK-001 (available from the website) is shown below.

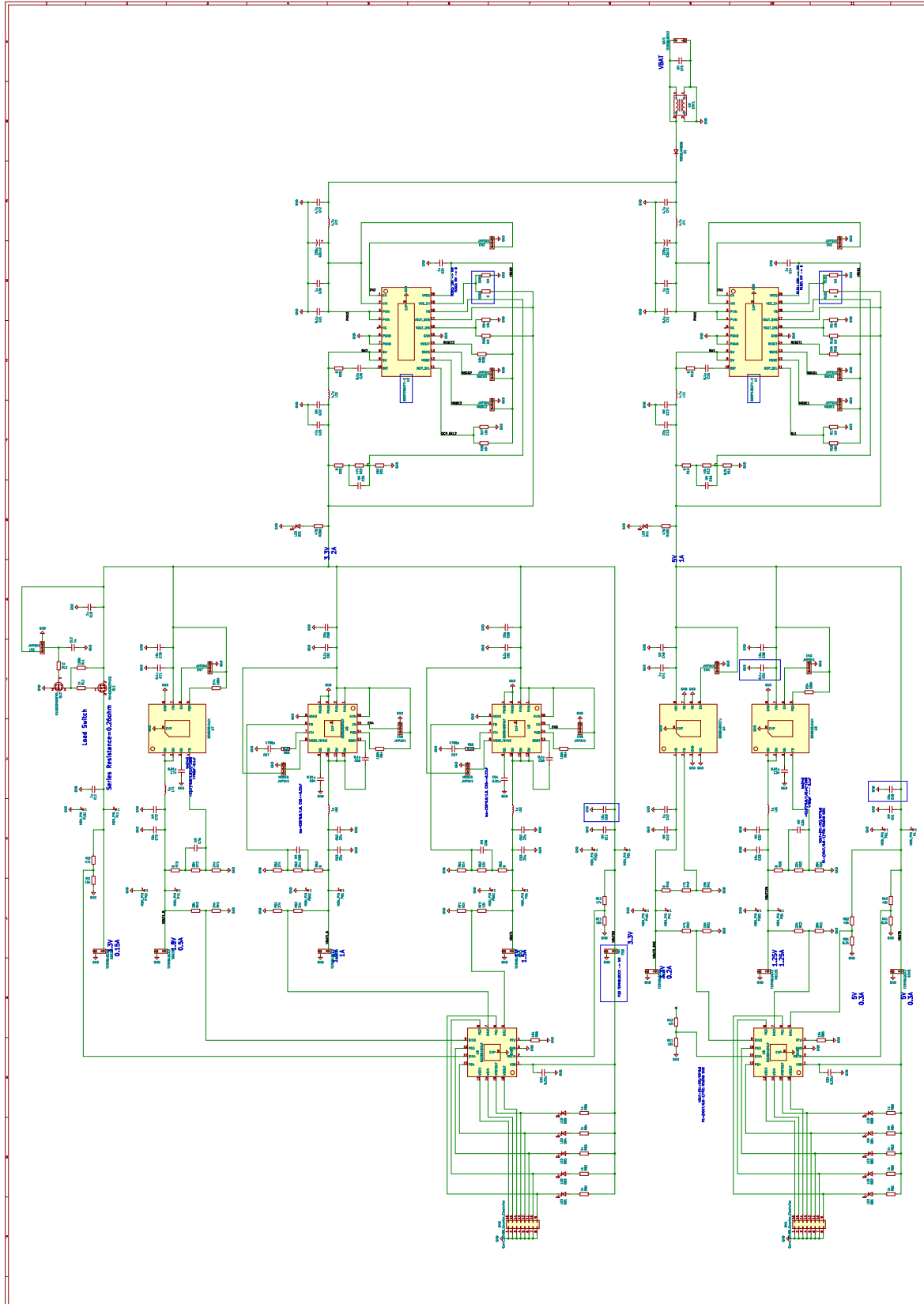


Figure 3 REFRPT001-EVK-001 Schematic

## Parts list

Parts list of REFRPT001-EVK-001 is shown in table below.

**Table 7 REFRPT001-EVK-001 Parts list (Input Filter)**

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
D1	Diode			RBR3LAM60B	ROHM	SOD-128
CBLK1	Aluminum Electrolytic Capacitor	220 $\mu$ F	20%, 35V	UWD1V221MCL1GS	NICHICON	$\phi$ 10x10
CBLK2	Aluminum Electrolytic Capacitor	220 $\mu$ F	20%, 35V	UWD1V221MCL1GS	NICHICON	$\phi$ 10x10
CF0	Ceramic Capacitor	-	Not installed	-	-	1005
CF1	Ceramic Capacitor	4.7 $\mu$ F	10%, X7R, 50V	GCM32ER71H475K	Murata	3225
CF2	Ceramic Capacitor	4.7 $\mu$ F	10%, X7R, 50V	GCM32ER71H475K	Murata	3225
LF1	Inductor	4.7 $\mu$ H	30%, 0.023 $\Omega$ , 3.6A	CLF6045NIT-4R7N-D	TDK	W6.0 x H4.5 x L6.3
LF2	Inductor	4.7 $\mu$ H	30%, 0.023 $\Omega$ , 3.6A	CLF6045NIT-4R7N-D	TDK	W6.0 x H4.5 x L6.3
CMF1	Filter	-	Not installed	-	-	DLW5BTM102T Q2
BAT1	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch



Table 8 REFRPT001-EVK-001 Parts list (DCDC\_P5V)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U1	Buck DC/DC Converter			BD9P105EFV-C	ROHM	HTSSOP-B20
C10	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCJ31MR71H105K	Murata	3216
C11	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C12	Ceramic Capacitor	-	Not installed	-	-	1608
C13	Ceramic Capacitor	22 $\mu$ F	10%, X7R, 50V	GCM32ER71A226K	Murata	3225
C14	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCM21BR71C105K	Murata	2012
C15	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C16	Ceramic Capacitor	-	Not installed	-	-	1005
C26	Ceramic Capacitor	-	Not installed	-	-	1005
R10	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R11	Resistor	8.2k $\Omega$	1%, 1/16W	MCR01MZPF8201	ROHM	1005
R12	Resistor	43k $\Omega$	1%, 1/16W	MCR01MZPF4302	ROHM	1005
R13	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R14	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
R15	Resistor	-	Not installed	-	-	1005
R16	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
R17	Resistor	-	Not installed	-	-	1005
R18	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
L11	Inductor	4.7 $\mu$ H	30%, 0.023 $\Omega$ , 3.6A	CLF6045NIT-4R7N-D	TDK	W6.0 x H4.5 x L6.3
R101	Resistor	-	Not installed	-	-	1005
R102	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
D11	LED	Green		SML-D12FWT86	ROHM	SML-D12X8
R100	Resistor	470	1%, 1/10W	MCR03EZPF4700	ROHM	1608
MODE1	Header Pin 3x1			PH-1X3SG	USECONN	3x1
EN1	Header Pin 3x1			PH-1X3SG	USECONN	3x1
SSCG1	Header Pin 3x1			PH-1X3SG	USECONN	3x1

Table 9 REFRPT001-EVK-001 Parts list (DCDC\_P3V)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U2	Buck DC/DC Converter			BD9P205EFV-C	ROHM	HTSSOP-B20
C20	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCJ31MR71H105K	Murata	3216
C21	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C22	Ceramic Capacitor	-	Not installed	-	-	1608
C23	Ceramic Capacitor	47 $\mu$ F	10%, X7R, 6.3V	GCM32ER70J476K	Murata	3225
C24	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCM21BR71C105K	Murata	2012
C25	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
R20	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R21	Resistor	15k $\Omega$	1%, 1/16W	MCR01MZPF1502	ROHM	1005
R22	Resistor	47k $\Omega$	1%, 1/16W	MCR01MZPF4702	ROHM	1005
R23	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R24	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
R25	Resistor	-	Not installed	-	-	1005
R26	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
R27	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
R28	Resistor	-	Not installed	-	-	1005
L21	Inductor	4.7 $\mu$ H	30%, 0.023 $\Omega$ , 3.6A	CLF6045NIT-4R7N-D	TDK	W6.0 x H4.5 x L6.3
R201	Resistor	-	Not installed	-	-	1005
R202	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
D21	LED	Orange		SML-D12D1WT86	ROHM	SML-D12X8
R200	Resistor	470	1%, 1/10W	MCR03EZPF4700	ROHM	1608
MODE2	Header Pin 3x1			PH-1X3SG	USECONN	3x1
EN2	Header Pin 3x1			PH-1X3SG	USECONN	3x1
SSCG2	Header Pin 3x1			PH-1X3SG	USECONN	3x1

Table 10 REFRPT001-EVK-001 Parts list (DCDC\_P5V\_S1V25)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U3	Buck DC/DC Converter			BD9S201NUX-C	ROHM	VSON008X2020
C30	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C31	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C32	Ceramic Capacitor	-	Not installed	-	-	2012
C33	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C34	Ceramic Capacitor	0.01 $\mu$ F	10%, X7R, 50V	GCM155R71H103K	Murata	1005
C35	Ceramic Capacitor	-	Not installed	-	-	1005
R31	Resistor	39k $\Omega$	1%, 1/16W	MCR01MZPF3902	ROHM	1005
R32	Resistor	22k $\Omega$	1%, 1/16W	MCR01MZPF2202	ROHM	1005
R33	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R34	Resistor	100 k $\Omega$	1%, 1/16W	MCR01MZPF1003	ROHM	1005
L31	Inductor	1 $\mu$ H	20%, 0.042 $\Omega$ , 4.7A	TFM252012ALMA1R OMTAA	TDK	2520
RC1	Resistor	39k $\Omega$	1%, 1/16W	MCR01MZPF3902	ROHM	1005
RC2	Resistor	22k $\Omega$	1%, 1/16W	MCR01MZPF2202	ROHM	1005
MC125	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
EN3	Header Pin 3x1			PH-1X3SG	USECONN	3x1
P31	Test Pin	Orange		SLC-33-G-O	Sunhayato	
P3G1	Test Pin	Black		SLC-33-G-K	Sunhayato	

Table 11 REFRPT001-EVK-001 Parts list (LDO\_P5V\_S3V3)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U4	LDO			BD00IA5MEFJ-M	ROHM	HTSOP-J8
C40	Ceramic Capacitor	-	Not installed	-	-	2012
C41	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCM21BR71C105K	Murata	2012
C42	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 50V	GCM21BR71C105K	Murata	2012
C43	Ceramic Capacitor	-	Not installed	-	-	2012
R41	Resistor	15k $\Omega$	1%, 1/16W	MCR01MZPF1502	ROHM	1005
R42	Resistor	47k $\Omega$	1%, 1/16W	MCR01MZPF4702	ROHM	1005
R43	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
RD1	Resistor	15k $\Omega$	1%, 1/16W	MCR01MZPF1502	ROHM	1005
RD2	Resistor	47k $\Omega$	1%, 1/16W	MCR01MZPF4702	ROHM	1005
MC33	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
EN4	Header Pin 3x1			PH-1X3SG	USECONN	3x1
P41	Test Pin	Orange		SLC-33-G-O	Sunhayato	
P4G1	Test Pin	Black		SLC-33-G-K	Sunhayato	

Table 12 REFRPT001-EVK-001 Parts list (DCDC\_P3V\_S1V0)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U5	Buck DC/DC Converter			BD9S400MUF-C	ROHM	VQFN16FV3030
C50	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C51	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C52	Ceramic Capacitor	22 $\mu$ F	10%, X7R, 6.3V	GCM31CR70J226K	Murata	3216
C53	Ceramic Capacitor	22 $\mu$ F	10%, X7R, 6.3V	GCM31CR70J226K	Murata	3216
C54	Ceramic Capacitor	0.01 $\mu$ F	10%, X7R, 50V	GCM155R71H103K	Murata	1005
C55	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C56	Ceramic Capacitor	-	Not installed	-	-	1005
C57	Ceramic Capacitor	4700pF	10%, X7R, 50V	GCM155R71H472K	Murata	1005
R51	Resistor	51k $\Omega$	1%, 1/16W	MCR01MZPF5102	ROHM	1005
R52	Resistor	13k $\Omega$	1%, 1/16W	MCR01MZPF1302	ROHM	1005
R53	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R54	Resistor	100 k $\Omega$	1%, 1/16W	MCR01MZPF1003	ROHM	1005
R55	Resistor	8.2k $\Omega$	1%, 1/16W	MCR01MZPF8201	ROHM	1005
L51	Inductor	1 $\mu$ H	20%, 0.037 $\Omega$ , 5.1A	TFM322512ALMA1R0MTAA	TDK	3225
RF1	Resistor	51k $\Omega$	1%, 1/16W	MCR01MZPF5102	ROHM	1005
RF2	Resistor	13k $\Omega$	1%, 1/16W	MCR01MZPF1302	ROHM	1005
SOC1	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
MODE5	Header Pin 3x1			PH-1X3SG	USECONN	3x1
EN5	Header Pin 3x1			PH-1X3SG	USECONN	3x1
P51	Test Pin	Orange		SLC-33-G-O	Sunhayato	
P5G1	Test Pin	Black		SLC-33-G-K	Sunhayato	

Table 13 REFRPT001-EVK-001 Parts list (DCDC\_P3V\_S1V5)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U6	Buck DC/DC Converter			BD9S300MUF-C	ROHM	VQFN16FV3030
C60	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C61	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C62	Ceramic Capacitor	22 $\mu$ F	10%, X7R, 6.3V	GCM31CR70J226K	Murata	3216
C63	Ceramic Capacitor	22 $\mu$ F	10%, X7R, 6.3V	GCM31CR70J226K	Murata	3216
C64	Ceramic Capacitor	0.01 $\mu$ F	10%, X7R, 50V	GCM155R71H103K	Murata	1005
C65	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C66	Ceramic Capacitor	-	Not installed	-	-	1005
C67	Ceramic Capacitor	4700pF	10%, X7R, 50V	GCM155R71H472K	Murata	1005
R61	Resistor	27k $\Omega$	1%, 1/16W	MCR01MZPF2702	ROHM	1005
R62	Resistor	24k $\Omega$	1%, 1/16W	MCR01MZPF2402	ROHM	1005
R63	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R64	Resistor	100 k $\Omega$	1%, 1/16W	MCR01MZPF1003	ROHM	1005
R65	Resistor	8.2k $\Omega$	1%, 1/16W	MCR01MZPF8201	ROHM	1005
L61	Inductor	1 $\mu$ H	20%, 0.042 $\Omega$ , 4.7A	TFM252012ALMA1R0MTAA	TDK	2520
RG1	Resistor	27k $\Omega$	1%, 1/16W	MCR01MZPF2702	ROHM	1005
RG2	Resistor	24k $\Omega$	1%, 1/16W	MCR01MZPF2402	ROHM	1005
SOC15	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
MODE6	Header Pin 3x1			PH-1X3SG	USECONN	3x1
EN6	Header Pin 3x1			PH-1X3SG	USECONN	3x1
P61	Test Pin	Orange		SLC-33-G-O	Sunhayato	
P6G1	Test Pin	Black		SLC-33-G-K	Sunhayato	

Table 14 REFRPT001-EVK-001 Parts list (DCDC\_P3V\_S1V8)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U7	Buck DC/DC Converter			BD9S201NUX-C	ROHM	VSON008X2020
C70	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C71	Ceramic Capacitor	0.1 $\mu$ F	10%, X7R, 50V	GCM155R71H104K	Murata	1005
C72	Ceramic Capacitor	-	Not installed	-	-	2012
C73	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
C74	Ceramic Capacitor	0.01 $\mu$ F	10%, X7R, 50V	GCM155R71H103K	Murata	1005
C76	Ceramic Capacitor	-	Not installed	-	-	1005
R71	Resistor	24k $\Omega$	1%, 1/16W	MCR01MZPF2402	ROHM	1005
R72	Resistor	30k $\Omega$	1%, 1/16W	MCR01MZPF3002	ROHM	1005
R73	Jumper	0 $\Omega$	0 $\Omega$	MCR01MZPJ000	ROHM	1005
R74	Resistor	100 k $\Omega$	1%, 1/16W	MCR01MZPF1003	ROHM	1005
L71	Inductor	1 $\mu$ H	20%, 0.042 $\Omega$ , 4.7A	TFM252012ALMA1R0MTAA	TDK	2520
RH1	Resistor	24k $\Omega$	1%, 1/16W	MCR01MZPF2402	ROHM	1005
RH2	Resistor	30k $\Omega$	1%, 1/16W	MCR01MZPF3002	ROHM	1005
SOC18	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
EN7	Header Pin 3x1			PH-1X3SG	USECONN	3x1
P71	Test Pin	Orange		SLC-33-G-O	Sunhayato	
P7G1	Test Pin	Black		SLC-33-G-K	Sunhayato	

Table 15 REFRPT001-EVK-001 Parts list (DCDC\_P3V\_PSW)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
QL1	Pch MOS Transistor			RV4C020ZPHZG	ROHM	DFN1616-6W
QL2	Nch MOS Transistor			RJU003N03FRA	ROHM	UMT3
CL0	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 16V	GCM21BR71C105K	Murata	2012
CL1	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 16V	GCM21BR71C105K	Murata	2012
CL2	Ceramic Capacitor	1 $\mu$ F	10%, X7R, 16V	GCM21BR71C105K	Murata	2012
RL1	Resistor	100 k $\Omega$	1%, 1/16W	MCR01MZPF1003	ROHM	1005
RL2	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
RL3	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
LS1	Header Pin 3x1			PH-1X3SG	USECONN	3x1



Table 16 REFRPT001-EVK-001 Parts list (Supervisor for 5.0V)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U8	Supervisor IC			BD39042MUF-C	ROHM	VQFN16FV3030
D80	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D81	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D82	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D83	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D84	LED	-	Not installed	-	-	SML-D12X8
C81	Ceramic Capacitor	0.22 $\mu$ F	10%, X7R, 16V	GCM155R71C224K	Murata	1005
CA0	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
CA1	Ceramic Capacitor	-	Not installed	-	-	3216
R80	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R81	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R82	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R83	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R84	Resistor	NM				1005
R85	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
RA1	Resistor	8.2k $\Omega$	1%, 1/16W	MCR01MZPF8201	ROHM	1005
RA2	Resistor	43k $\Omega$	1%, 1/16W	MCR01MZPF4302	ROHM	1005
RB1	Resistor	8.2k $\Omega$	1%, 1/16W	MCR01MZPF8201	ROHM	1005
RB2	Resistor	43k $\Omega$	1%, 1/16W	MCR01MZPF4302	ROHM	1005
RK1	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
RK2	Resistor	-	Not installed	-	-	1005
CAN5	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
BM1	Header Pin 8x2			PS-16PE-D4T1-PN1	JAE	8x2
P1	Test Pin	Orange		SLC-33-G-O	Sunhayato	

Table 17 REFRPT001-EVK-001 Parts list (Supervisor for 3.3V)

Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Package type, Size(mm)
U9	Supervisor IC			BD39042MUF-C	ROHM	VQFN16FV3030
D90	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D91	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D92	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D93	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
D94	LED	Red		SML-D12U1WT86	ROHM	SML-D12X8
C91	Ceramic Capacitor	0.22 $\mu$ F	10%, X7R, 16V	GCM155R71C224K	Murata	1005
CE0	Ceramic Capacitor	10 $\mu$ F	10%, X7R, 10V	GCM21BR71A106K	Murata	2012
CE1	Ceramic Capacitor	-	Not installed	-	-	3216
R90	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R91	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R92	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R93	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R94	Resistor	1 k $\Omega$	1%, 1/16W	MCR01MZPF1001	ROHM	1005
R96	Resistor	10 k $\Omega$	1%, 1/16W	MCR01MZPF1002	ROHM	1005
RE1	Resistor	15k $\Omega$	1%, 1/16W	MCR01MZPF1502	ROHM	1005
RE2	Resistor	47k $\Omega$	1%, 1/16W	MCR01MZPF4702	ROHM	1005
RI1	Resistor	15k $\Omega$	1%, 1/16W	MCR01MZPF1502	ROHM	1005
RI2	Resistor	47k $\Omega$	1%, 1/16W	MCR01MZPF4702	ROHM	1005
P33	-	-	Not installed	-	-	-
SOC33	Terminal			OSTTC022162	ON SHORE TECHNOLOGY	5.08Pitch
BM2	Header Pin 8x2			PS-16PE-D4T1-PN1	JAE	8x2
P21	Test Pin	Orange		SLC-33-G-O	Sunhayato	
PL1	Test Pin	Orange		SLC-33-G-O	Sunhayato	
PL1	Test Pin	Black		SLC-33-G-K	Sunhayato	
P2G1	Test Pin	Black		SLC-33-G-K	Sunhayato	
PLG1	Test Pin	Black		SLC-33-G-K	Sunhayato	

### PCB Layout

REFRPT001-EVK-001 PCB layout is shown below. This PCB is consist of 4layers. Layout data can be downloaded from web site.

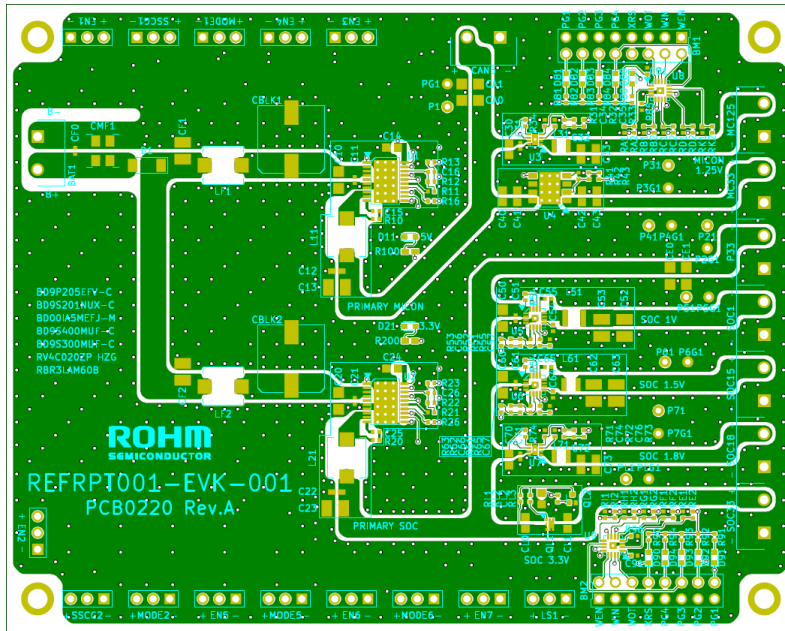


Figure 4 REF RPT001-EVK-001 Top metal, Silk, Top resist layer (Top View)

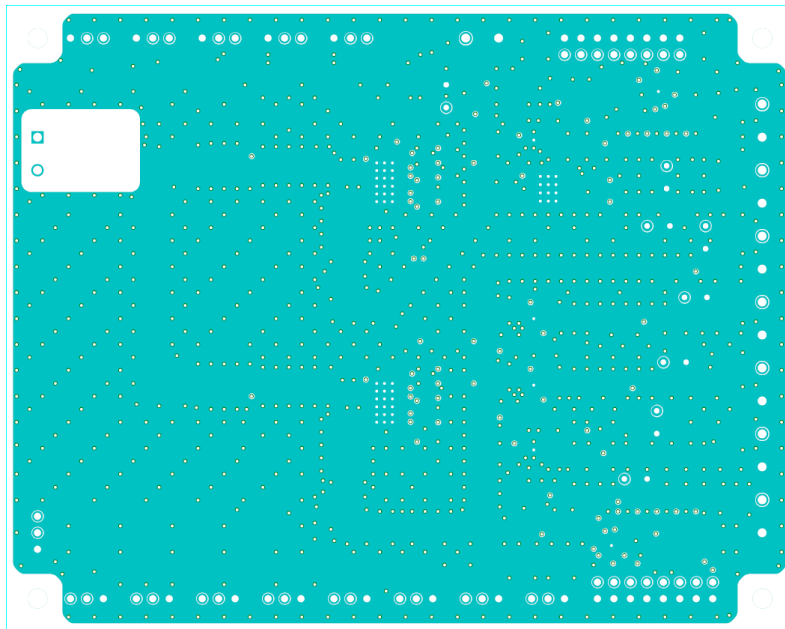


Figure 5 REF RPT001-EVK-001 L1 inner second layer (Top View)

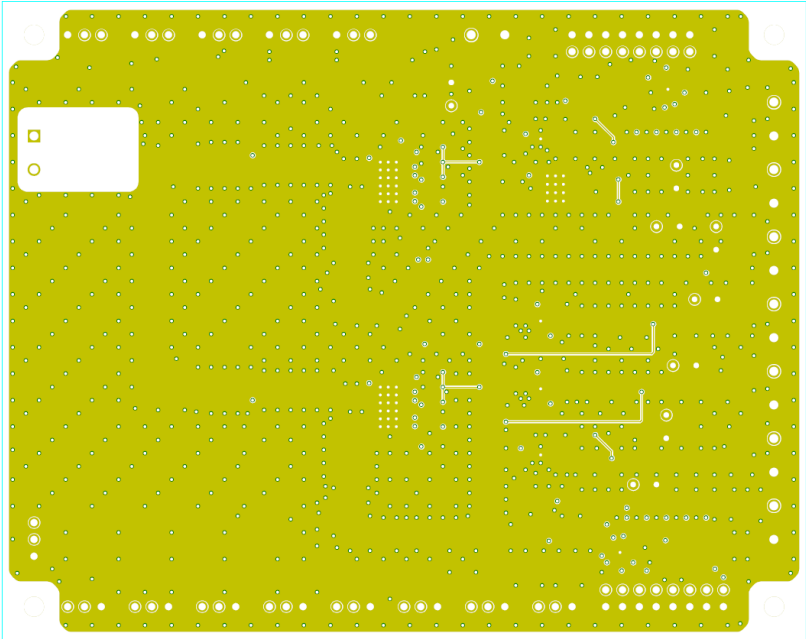


Figure 6 REFRPT001-EVK-001 L2 inner third layer (Top View)

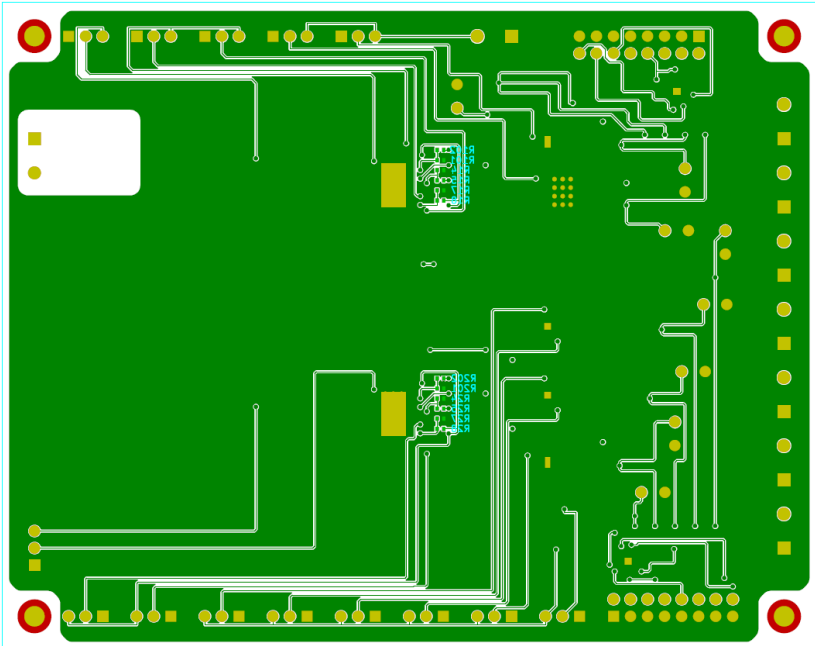


Figure 7 REFRPT001-EVK-001 Bottom layer (Top View)

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