

System Reference series for Automotive application

## CISPR25 Class5 Compliant, 8 rails power tree reference design for automotive ADAS and Info-Display

REFRPT001

### General Description

The REFRPT001 is a reference design 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.

### Key Specifications

- Input Voltage: 9.0V to 16.0V
- Output Channel: 8-channels
- Output Voltage: 5.0Vx2 / 3.3Vx2 / 1.8V / 1.5V / 1.25V / 1.0V
- EMC Performance: Verified to satisfy CISPR 25 Class 5

### Board Image

Board No.	W (Typ) x D (Typ)
REFRPT001-EVK-001	121.9 mm x 96.5 mm

### Features

- Automotive Infotainment/ADAS 8-channels power tree reference design
- Verified to satisfy EMC CISPR 25 class 5 standard without common mode filter
- In order to avoid the AM radio frequency bands All DC/DC converters operate at a switching frequency of 2.2 MHz or higher.
- Thermal characteristics tested
- voltage monitoring for 8-channel power tree to improve the functional safety ASIL level
- Space saving by integrating multiple power trees

### Applications

- [ADAS](#) sensors, cameras and radar
- Car infotainment, clusters,
- and body control modules (BCM)

### Web page

<https://www.rohm.com/reference-designs/refrpt001>

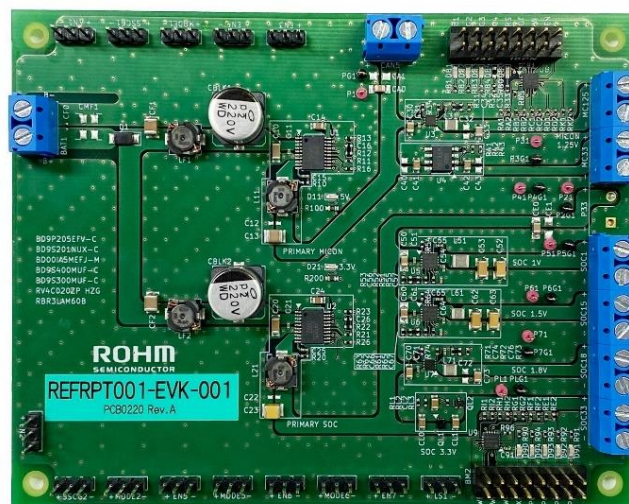


Figure1. REFRPT001-EVK-001 Board

## System block diagram

System block diagram depict overview of "power tree" system which can be applied to automotive application such as ADAS ECUs or Infotainment system. Total 8ch of power rails are included in the design, which can supply voltage and current to MCU and/or SoC in such systems. System Block Diagram of REFRPT001-EVK-001 is shown below.

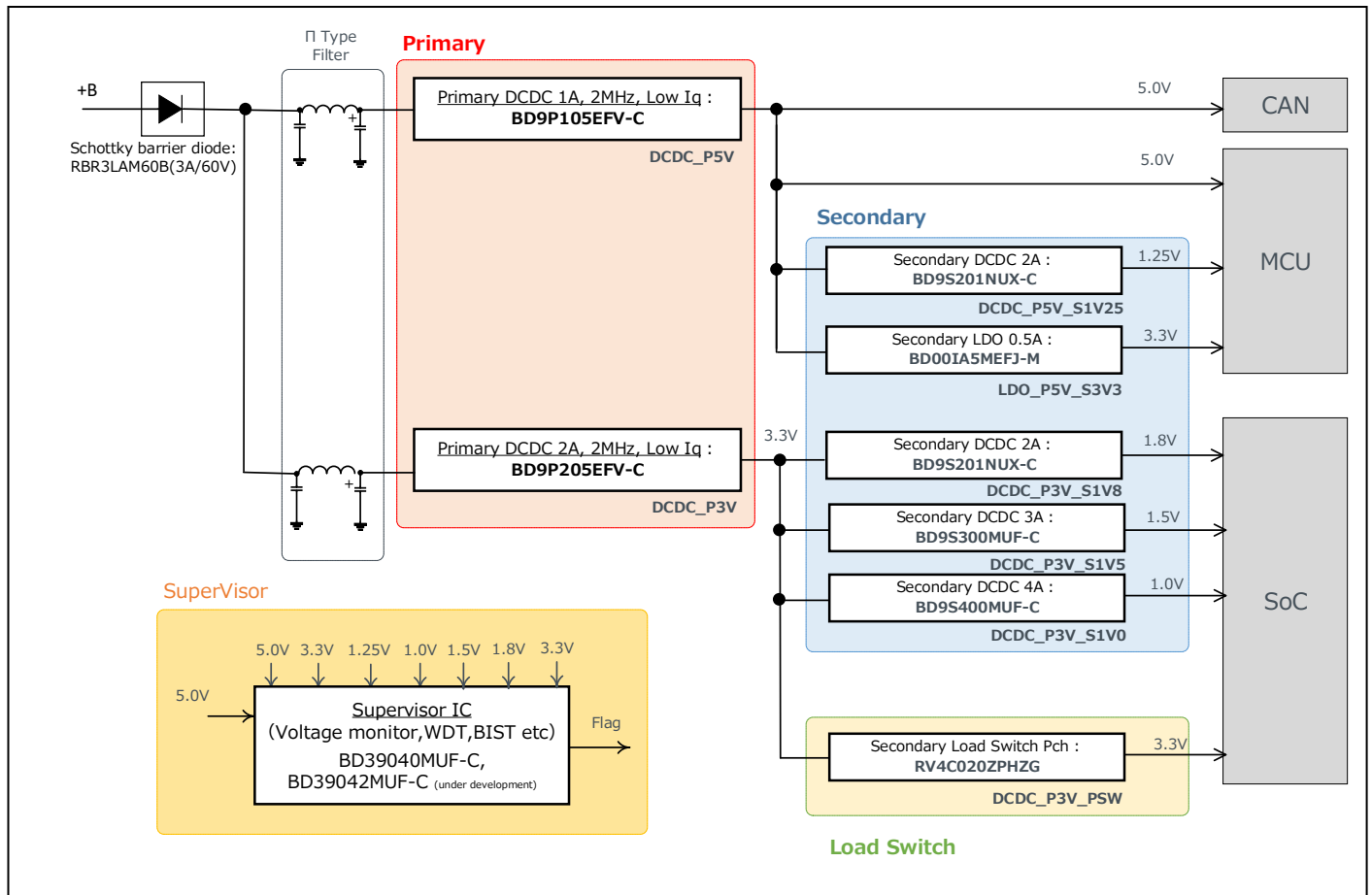


Figure2. REFRPT001 Block Diagrams

## Electrical Characteristic

**Table 1 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)

## Key components in the design

**Table 2 Key components list of REFRPT001**

Key components	Product type
<a href="#">BD9P105EFV-C</a>	Nano Pulse Control™, 3.5V to 40V Input, 1A Single 2.2MHz Buck DC/DC Converter For Automotive
<a href="#">BD9P205EFV-C</a>	Nano Pulse Control™, 3.5V to 40V Input, 2A Single 2.2MHz Buck DC/DC Converter For Automotive
<a href="#">BD9S201NUX-C</a>	2.7V to 5.5V Input, 2A Single Synchronous Buck DC/DC Converter for Automotive
<a href="#">BD9S300MUF-C</a>	2.7V to 5.5V Input, 3A Integrated MOSFET Single Synchronous Buck DC/DC Converter For Automotive
<a href="#">BD9S400MUF-C</a>	2.7V to 5.5V Input, 4A Integrated MOSFET Single Synchronous Buck DC/DC Converter For Automotive
<a href="#">BD00IA5MEFJ-M</a>	Automotive 0.5A Variable Output LDO Regulator
<a href="#">BD39040MUF-C</a>	System Power Good + Watchdog Timer + Reset for Automotive
<a href="#">RV4C020ZPHZG</a>	Pch -20V -2.0A Small Signal MOSFET for Automotive
<a href="#">RBR3LAM60B</a>	Low VF, 60V, 3A, SOD-128, Schottky Barrier Diode

## Design support contents

In the ROHM official web site, various design support contents are available to download.

<https://www.rohm.com/reference-designs/refrpt001>

It is possible to start your pcb design based on design resources such as

- Schematic
- PCB layout (gerber data)
- Parts list

In addition to those design resources, device models and tools of key components are also available. Models and tools including SPICE model, calculation sheet and 2 resistor compact thermal models

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