

Linear Regulators, Switching Regulator ICs

LDO, DC-DC Converter Design Tool Selection Guide

Using the Design Tools on the ROHM Website

Ver. 2.0





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LDO, DC-DC Converter Design Tool Selection Guide

Using the Design Tools on the ROHM Website

On the ROHM website, we provide technical data including application notes, online simulators, various simulation models, and other design tools such as spreadsheets for calculation of constants. This guide explains how to use various design tools throughout the development steps for LDO and DC-DC converters.

How to use this guide:

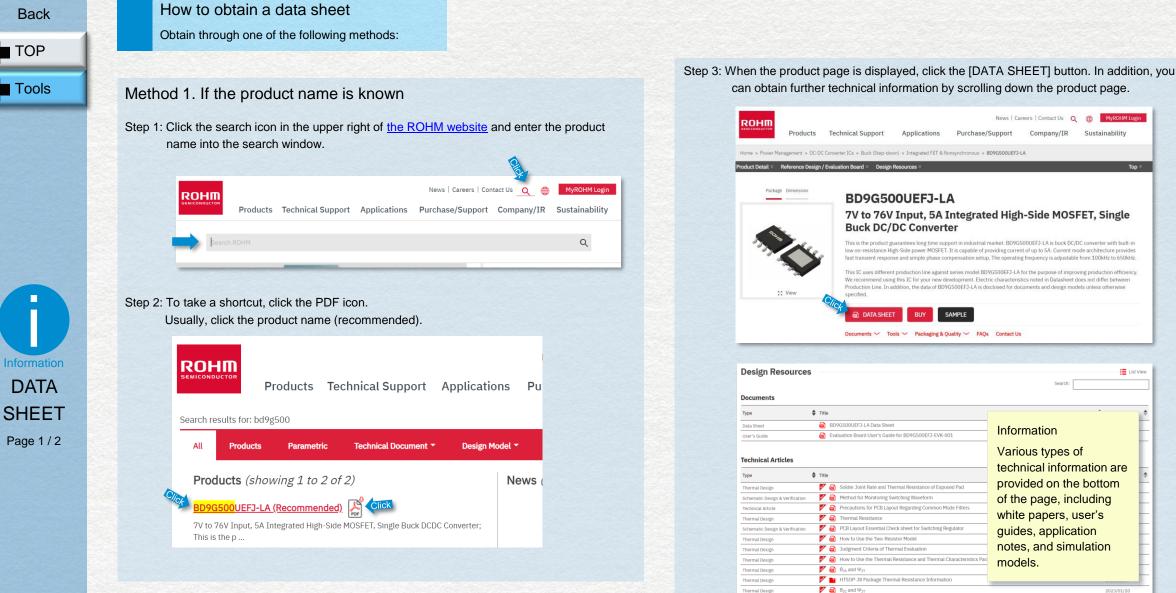
- Since the guide requires access to the ROHM website, ensure you have a reliable Internet connection.
- Do not use the functions of your PDF browser to move back and forth between pages. Use the buttons on the pages instead.
- This guide may not display correctly if the PDF file is viewed with a web browser. Use a PDF reader such as Adobe Acrobat.

	Tools for each development step						
Initial Study	Circuit Design	PCB Design	Evaluation				
Topology SelectionReference Design	Reference DesignDATA SHEET	 Package Information PCB Library 	- Application Note				
DATA SHEETEvaluation Board (EVK)	 Calculation Sheet Application Note 	 3D Model Application Note 					
- Web Simulation	- Evaluation Board (EVK)						
	Web SimulationDesign Model						

Start Here

Notes

Ф ТОР		Initial Study	Circuit Design		PCB Design	Evaluation
	1	Topology Selection Shows the devices best suited for the respective topologies.	6 Calculation Sheet Design calculation tool in Excel to assist you in designing the constants of peripheral parts.	9	Package Information Information including reference land patterns and mounting conditions is provided.	
	2	Reference Design Evaluation results on the system level and design	data are provided as reference designs.	10	PCB Library Footprints and symbol data for PCB CAD are provided.	
	3	DATA SHEET Specification documents describing the electrical of	haracteristics of products, precautions, pin layouts, exar	nples	of application circuits, etc.	
Tools	4	Evaluation Board (EVK: Evaluation Kin Evaluation board to perform initial considerations a online distributors.	t) and characterizations, which can be purchased from	11	3D Model Models representing outline images on 3D CAD are provided as STEP data.	
	5	Web Simulation (ROHM Solution Simu Free online simulator allowing you to easily design (i) Catalog www				
		Click the button for the tool you want to view Button descriptions	 Application Note Application notes have been published to help cir i Catalog 	cuit de	sign, thermal design, PCB design, and evaluation methods.	
© 2022-2024 RG	ОНМ Со	 Tool introduction www Displays the website Catalog Displays the catalog ., Ltd. 	8 Design Model Provides models for SPICE and other CAE tools including thermal analysis.			



BD9G500UEFJ-LA 7V to 76V Input, 5A Integrated High-Side MOSFET, Single Buck DC/DC Converter This is the product guarantees long time support in industrial market. BD9G500UEFJ-LA is buck DC/DC converter with built-in low on-resistance High-Side power MOSFET. It is capable of providing current of up to 5A. Current mode architecture provides fast transient response and simple phase compensation setup. The operating frequency is adjustable from 100kHz to 650kHz. This IC uses different production line against series model BD9G500EFJ-LA for the purpose of improving production efficiency. We recommend using this IC for your new development. Electric characteristics noted in Datasheet does not differ between Production Line. In addition, the data of BD9G500EFJ-LA is disclosed for documents and design models unless otherwise SAMPLE BUY Documents 🗸 Tools 🗸 Packaging & Quality 🗸 FAQs Contact Us List View Information Evaluation Board User's Guide for BD9G500EFJ-EVK-001 Various types of technical information are provided on the bottom 🚩 👜 Solder Joint Rate and Thermal Resistance of Exposed Pad of the page, including 🚩 🍙 Precautions for PCB Layout Regarding Common Mode Filters white papers, user's 🚩 🗃 PCB Layout Essential Check sheet for Switching Regulator

MyROHM Login

Next page

Sustainability

News | Careers | Contact Us Q 🌐

Purchase/Support Company/IR

guides, application notes, and simulation models.

Schematic Design & Verification 🚩 🗟 Efficiency of Buck Converter 2022/12/13 Thermal Design 🚩 🗐 PCB Layout Thermal Design Guide B Heat Dissipation Effect of Thermal Via in Exposed Pad Type Package 2022/07/08 8 Cutting-Edge Web Simulation Tool "ROHM Solution Simulator" Capable of Complete Circuit Verification of Power Device 2022/03/11 Design Guide and Example of Stencil for Exposed Pad 2021/11/19 Schematic Design & Verification Types of Capacitors Used for Output Smoothing of Switching Regulators and their Precautions 2021/11/05 Basics of Thermal Resistance and Heat Dissipation Thermal Design 2021/08/18 What Is Thermal Design 2021/06/24 Method for Calculating Junction Temperature from Transient Thermal Resistance Data

Thermal Design

Thermal Design

Thermal Design

White Paper Thermal Design

How to obtain a data sheet (continued)





Previous page

Method 2. If the product name is not certain

Step 1: Select "Power Management" in "Products" on the ROHM website.

ROHM					Co	mpany	Sustainability	R&D	Careers
SEMICONDUCTOR	Products	Techn	ical Support	Applicatio	ons Sale	es Bu	y or Sampl	e Sea	arch ROH
Amplifiers 8	& Linear	Clic	Power Mana	agement					
Click Power Mana	agement uator Drivers		DC-DC Cor	werter ICs		Linea	Regulators		
	Transistors / Di	odes	Buck (Step-	down)			r Manageme	nt ICs	for

Step 2: Enter the conditions and click the [SHOW] button.

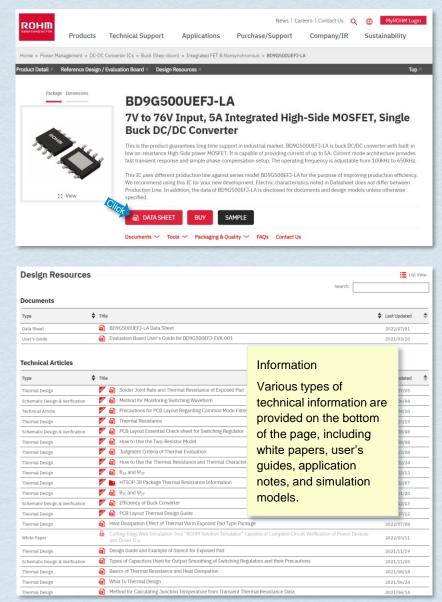
DC-DC Converter ICs (218)	DC-DC Converter ICs Ouic	k Soarch		
ROHM DC-DC converter ICs (switching regulators) are available with or without integrated FET (boost/buck/buck-boost) in single- and multi- channel configurations that deliver broad compatibility. Our industry-	Type	Input	Ļ	
leading DC-DC converters and evaluation boards allow customers to develop and differentiate their power designs. They are ideally suited for	O Any	Vin Min.	40	[\
industrial equipment applications, cellular base stations, <u>consumer</u> computers and peripherals, and automotive applications.	Buck	Vin Max.	55	[\
Do you need help finding the correct power solution for your needs? We	 Boost 	Output		
provide a clear explanation for selecting the ideal DC-DC converter from our broad lineup. Support materials including datasheets, videos, application	 Buck / Boost 	Vout	3.3	[\
notes and commentary are available to facilitate evaluation and	 Boost / Inverting 	Iout	1	[A
development.	 Buck / Boost / Inverting 	g		
Boost (Step-up) (11)	Click SHOW 6 PRODUCTS	ESET		
→ Buck-Boost / Inverting (16)				

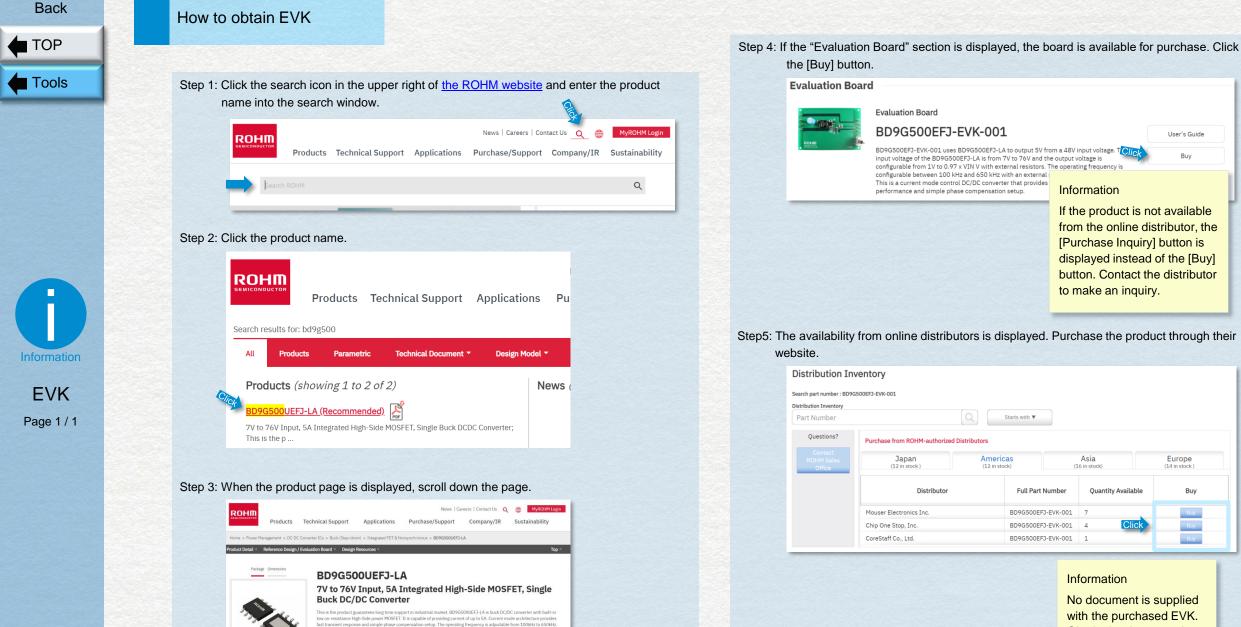
Step 3: The search result is displayed. To take a shortcut, click the PDF icon.

Usually, click the product name (recommended).

Matching Parts : 6	Å						
Compa	Olick	Topology 🗘	Vin1 (Max.) [V] ‡		Vout1 (Min.) [V] ‡	Iout1 (Max.) [A] ‡	Grade
BD9G500UEFJ-LA (New)	INQUIRY	Buck	76	68.4	1	5	Indus
BD9G341AEFJ	BUY SAMPLE	Buck	76	76	1	3	Stand
BD9G341AEFJ-LB	BUY SAMPLE	Buck	76	76	1	3	Indus
BD9G500EFJ-LA	BUY SAMPLE	Buck	76	68.4	1	5	Indus
BD9V100MUF-C	BUY SAMPLE	Buck	60	5.5	0.8	1	Autom
BD9V101MUF-LB	BUY SAMPLE	Buck	60	5.5	0.8	1	Indus

Step 4: When the product page is displayed, click the [DATA SHEET] button. In addition, you can obtain further technical information by scrolling down the product page.





This IC uses different production line against series model BD9G500EFJ-LA for the purpose of improving production efficiency We recommend using this IC for your new development. Electric characteristics noted in Datasheet does not differ between

Production Line. In addition, the data of BD9G500EFJ-LA is disclosed for documents and design models unless oth

BUY SAMPLE Packaging & Quality ~ FAOs Contact U with the purchased EVK. Obtain the document by clicking the [User's Guide] button in Step 4.

ТОР

Tools



ROHM Solution Simulator Page 1/2

What is the ROHM Solution Simulator?

✓ Simulation tool you can run on the website

- ✓ Can verify the designs using circuits close to applications
- Can select from an extensive range of solution circuits, including mainly power devices and gate drivers
- High reproducibility of simulations achieved by incorporating high precision SPICE models. Coordination with certain evaluation boards
- Exportable to external simulators. Can be developed to customer's simulator circuits



Driver IC and peripheral parts (Gate drivers, etc.)

To realize the maximum potential of power devices, know-how for tuning between parts is required

While tuning, ideal circuit parameters can be derived

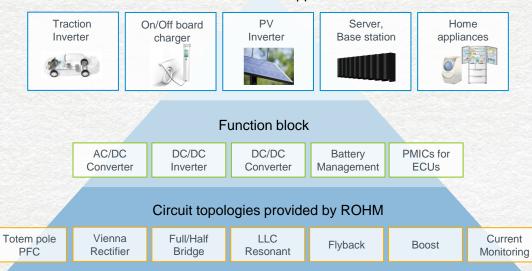
Using the ROHM Solution Simulator Utilizing the solutions provided by ROHM



From the steps for selecting parts and considering the validity of circuits, system level simulations can be repeatedly performed for analysis. Therefore, critical problems are less likely to occur after a trial, reducing the number of retrials and the hours for development.

Provides solution circuits suited for various applications

Simulation circuit diagrams cover various power electronics applications



Power electronics applications

Next page

🛑 ТОР

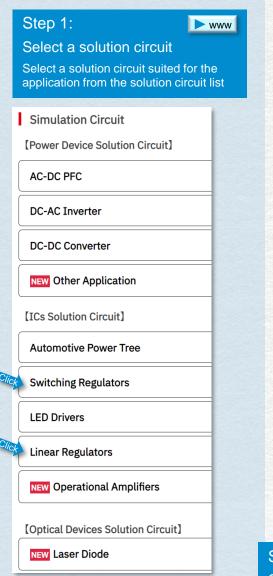
Tools

What can be done with the ROHM Solution Simulator

Information

Previous page

ROHM Solution Simulator Page 2/2



Step 4:

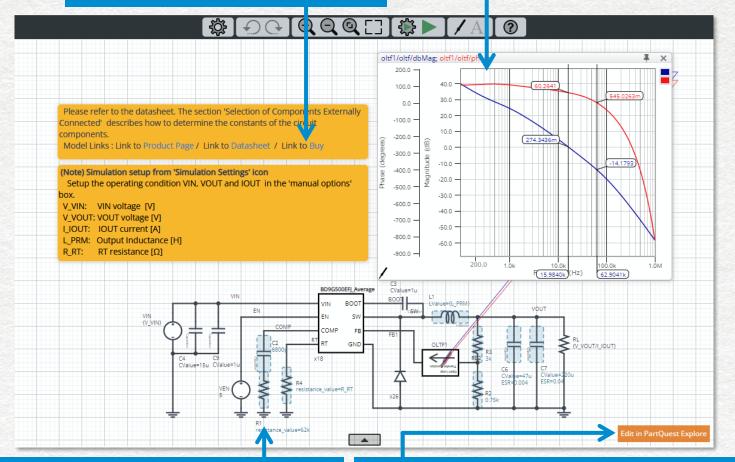
Order samples

You can purchase samples for trial evaluation and evaluation boards via the links of the distribution partners shown in the circuit diagrams.

Step 3:

Perform simulations and monitor results

You can set and operate simulations intuitively. After performing simulations, you can check the results easily with the powerful waveform analysis tool.



Step 2:

Select devices and change values

The simulation screen is displayed. The constants recommended by ROHM have been entered in advance. Use these as base values for adjusting the parameters.

Step 5:

Expand circuits in an external environment

In addition to adjusting the parameters, you can export the circuit data to PartQuest Explore to expand system circuits and develop original circuits by changing the circuit types or adding different circuits.

ТОР

Tools

Information

Calculation Sheet Page 1 / 5 Design calculation tool What is the Calculation Sheet?

ROHM has published the Calculation Sheet that assists you in designing peripheral circuits for DC-DC and AC-DC converter ICs.

The Calculation Sheet is a design tool for application circuits based on the method of selecting parts described in product data sheets. Since the tool is equipped with calculation formulas required for determining the peripheral parts and other tasks, you can easily determine the circuit parameters that satisfy desired characteristics by setting values according to the instructions.

This tool is provided in a Microsoft Excel file format.

DC-DC converter

- Automatically calculates the theoretical equation for the peripheral circuit design described in the data sheet, and automatically judges whether or not the value is within the setting range
- Outputs the BOM list and summary sheet of the design result

AC-DC converter

- Can calculate coils, transformers, and other peripheral parts of flyback converters and buck converters
- Main components, including IC and peripheral parts such as Schottky barrier diodes, fast recovery diodes, electrolytic capacitors, and transformers, are compiled into a database, allowing you to sort the parts and select them on the spot.

I laure da la beda in	the Oslandation Ob			
How to obtain	the Calculation Sh	Ctop		
		Display	the product page of the	uct name you want.
Products		New Oplications Purchase/Sup Integrated FET & Synchronous >> BD9F		MyROHM Login ainability
-	/ Evaluation Board > Design Res			Тор 🖄
Package Dimensions	BD9P105	EFV-C		
NUMBER OF STREET	2.2MHz Buc BD9P1x5EFV-C Series are	k DC/DC Converte	40V Input, 1A Single er For Automotive /DC converter integrating POWER MOSFETS Step 2:	
c: View		E ADAS AND INFO-DISPLAY BUY SAMPLE	Click "Tools".	
	Documents ~ Tools ~	Packaging & Quality Y FAQs	Contact Step 3: Scroll down and lood "CALCULATION TO Tile name downloads computer. The tools	OOLS". Clicking the sthe tools to your
ools			the "CALCULATION	
Туре	Title		not displayed.	
Calculation Tools ?	Calculation-	sheet for the circuit theoretica	l formula - BD9Pxx5EFV/MUF-C	2021/09/16
Calculation Tools 😨			l formula - BD9Pxx5EFV/MUF-C quency Response (ROHM Solution	2021/09/16 2021/03/05
	Simulation (Simulator)	Guide for BD9P105EFV-C / Free		2021/03/05

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How to use

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Calculation Sheet Page 2/5

BD9Pxx5EFV-C, BD9Pxx5MUF-C Calculation Sheet

この計算シートはデータシートに記載されている理論式を計算します。 実際の評価ボードの特性は、寄生や部品誤差などによって、理論式の計算結果と異なる場合があります。 最終的には、実際の評価ボードで特性を必ず評価して下さい。また、特性の調整が必要な場合は目的の特性に近つけるために周辺部品の値や条件を調整して

This calculation sheet calculates the theoretical formula described in the data sheet. Actual evaluation board characteristics may not match the results of the theoretical for nula due to part errors (accuracy, parasitics, etc.). It is highly recommended to check the characteristics on an actual evaluation board you need to improve the characteristics, adjust the external part values

Datasheetを見ながらこの計算シートを使用してください。 Use this calculation sheet while looking at Datasheet.

auto calculated value (or the value copied from another cell) value of external parts / customer's condition :Internal characteristics (Datasheet value) :Setting range is limited

メニューから製品名を選択してください。 Select the product name from the pull-down menu.

推奨動作条件(データシートn10上目抜粋)

推奨動作業件(ナーダントトPiua	、り抜杆)	BD9P105EFV	MUE-C	m				- 8
Recommended operating conditions	s (extracted from the datashe	BD9P135EFV						- 1
Parameters	Symbols	BD9P155EFV	/MUF-C	- W	ax	Units	Conditions	- 6
入力電圧	VVIN, VPVIN	3.5			0	v		
Input Voltage	VVIN, VPVIN	5.5	-	4		v		- 6
出力電圧	Vout	0.8	_	Q	.5	v		
Output Voltage	VOUT	0.0	-	0.		•		
SW最小ON時間	+			5	0	ns		- 6
SW Minimum ON Time	t _{onmin}	-	-	5	0	115		-
SW最小OFF時間	•			41	30	ns	VREG = 3.3V	
SW Minimum OFF Time	toffmin	-	-	14	50	ns		
出力電流	1				1	А	OCP_SEL = H	<注
Output Current	lout	-	-		.	~		<nc< td=""></nc<>

(*)

-

BD9P205EFV/MUF-C

BD9P235EFV/MUF-C BD9P255EFV/MUF-C

電気的特性 (テータシートp10より抜粋)

Electrical characteristics (extracted fi	rom the datasheet p10)					
Parameters	Symbols	Min	Тур	Max	Units	Conditions
スイッチング周波数	f _{sw}	2.0	2.2	2.4	MHz	
Switching Frequency	ISW	2.0	2.2	2.4	1011 12	
ソフトスタート時間	+	2.5	3.0	3.9	ms	
Soft Start Time	t _{ss}	2.0	3.0	3.8	1115	
過電流保護スレッショルド		1.000	1.250	1.500	А	
Over Current Protection Threshold	I _{OCP}	1.000	1.230	1.500	¢	

以下の黄色で示されたセルに設計値を入力してください。

Fill the design parameters in the vellow cells below

λ

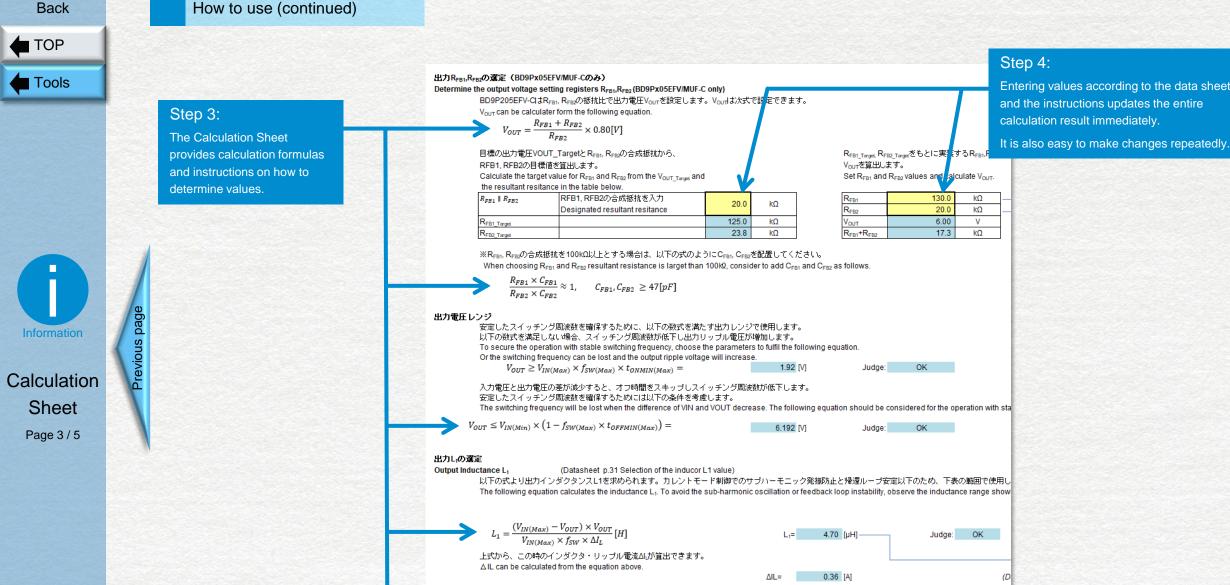
Category	Parameters	Symbols	Value	Units	Conditions		l
入力条件 nputu Conditions	入力電圧(最小値) Input Voltage (Minimum)	V _{IN(Min)}	9.0	V	$3.5V \le V_{IN(Min)} \le V_{IN(Max)}$	۱» [۱	ŀ
	入力電圧 Input Voltage	V _{IN}	12.0	۷	$V_{IN(Min)}\!\leq\!V_{IN}\!\leq\!V_{IN(Max)}$		
	入力電圧(最大値)	V _{IN/Max})	16.0	V	V _{IN/Min})≦V _{IN/Max})≦40V	W	1

Step 1:

The cells are color-coded according to their functions. The yellow cells are for selecting or inputting values. The blue cells display the calculation results. The gray cells display the setting values on the data sheet.

Step 2:

If the Calculation Sheet supports the series of models, selecting a product automatically sets the relevant entries such as recommended operation conditions.



ムビニ 0.36 [A] 出力リップル電圧 ΔV_{P+P} の算出 (Datasheet P31) Output peak-to-peak ripple voltage ΔV_{P+P} Calculation ムルが減少すると、インダクタのコア損失、C_{OUT}のESRIこよる損失が減少し、出力リップル電圧 ΔV_{P+D} が減少します。 ΔV_{P+I} は次の方程式で求まります。 The inductor core loss or the loss from C_{OUT} ESR will become smaller when ΔI_L decrease. The following equation gives ΔV_{P+P} $\Delta V_{P+P} = \Delta I_L \times ESR + \frac{\Delta I_L}{8 \times C_{OUT} \times f_{W}} [V]$ $\Delta V_{P+P} = 1.33$ [mV] TOP

Tools

Information

Calculation

Sheet

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How to use (continued)

Stop 5

Using the Calculation Sheet prevents overlooking the design constraints and allows you to select parts that satisfy the operating conditions.

If an input value i working range, th an error message you to correct the 以下の黄色で示されたセ Fill the design parameters in	ne tool outputs e and urges e value. いに設計値を入力してください。					
Category	Parameters		Sy, bols	Value	Units	Conditions
入力条件 Inputu Conditions	入力電圧(最小値) Input Voltage (Minimum)		V _{IN(M})	9.0	V	$3.5V \leq V_{IN(Min)} \leq V_{INO}$
	入力電圧 Input Voltage		VIN	12.0	V	V _{IN(Min)} ≦V _{IN} ≦V _{IN(Ma}
	入力電圧(最大値) Input Voltage (Maximum)		V _{IN(Max)}	16.0	V	$V_{IN(Min)} \leq V_{IN(Max)} \leq 4$
出力条件 Output Conditions	出力電圧目標値 Target of the output voltage V _{ouт}		V _{OUT_Target}	10	V	0.8V<=VOUT_Target<
	起動時負荷による出力電流最大値 Maximum load current during start	-	IOUT_START(Max)		range is vn as the	_{CP} (Min)
出力インダクタ Output Inductance	インダクタンス Indcutance		L ₁	4.7 outp	ut voltage	μH to 15μH
出力キャパシタ Output Capacitor	容量 Capacitance 等価直列抵抗	Micro	C _{οιπ} osoft Excel	44.00	e above.	>
	Equivalent Series Resistor 定格リッブル電流 Ripple Current Rating	Â	Data out			
出力R _{FB1} ,R _{FB2} の選定(BD	99x05EFV/MUF-Cのみ) tage setting registers R _{FR1} ,R _{FR2} (BD9Px1		Continue Yes	<u>N</u> o	Can	cel <u>H</u> elp

comply with the specifications, review and reset the input values. 出力R_{FB1},R_{FB2}の選定(BD9Px05EFV/MUF-Cのみ) Determine the output voltage setting registers RFB1,RFB2 (BD9Px05EFV/MUF-C only) BD9P205EFV-ClはR_{FB1}, R_{FB2}の抵抗比で出力電圧V_{OUT}を設定します。V_{OUT}は次式で設定できます。 VOLT can be calculater form the following equation $V_{OUT} = \frac{R_{FB1} + R_{FB2}}{R_{FB2}} \times 0.80[V]$ RFB1_Target, RFB2 rgstをもとに実装するRFB1,RFB2を) 目標の出力電圧VOUT_TargetとRFB1, RFB2の合成抵抗から、 Voutを算出しま RFB1, RFB2の目標値を算出します。 Set R_{FB1} and R_F Calculate the target value for R_{FB1} and R_{FB2} from the $V_{OUT\ Target}$ and 2 values and calculate Vour. the resultant resitance in the table below. $R_{FB1} \parallel R_{FB2}$ RFB1, RFB2の合成抵抗を入力 10.0 kΩ kΩ 20.0 20.0 Designated resultant resitance kΩ R_{FB2} 125.0 kΩ 1.20 ٧ R_{FB1_Target} VOUT 23.8 6.7 kΩ R_{FB2_Target} kΩ R_{FB1}+R_{FB2} ※R_{FB1}, R_{FB2}の合成抵抗を100kΩ以上とする場合は、以下の式のようにC_{FB1}, C_{FB2}を配置してください。 When choosing R_{FB1} and R_{FB2} resultant resistance is larget than 100kΩ, consider to add C_{FB1} and C_{FB2} as follows. $\frac{R_{FB1} \times C_{FB1}}{c} \approx 1, \qquad C_{FB1}, C_{FB2} \geq 47[pF]$ $\overline{R_{FB2} \times C_{FB2}}$ 出力電圧レンジ 安定したスイッチング周波数を確保するために、以下の数式を満たす出力レンジで使用します。 以下の数式を満足しない場合、スイッチング周波数が低下し出力リップル電圧が増加します。 To secure the operation with stable switching frequency, choose the parameters to fulfil the following equation. Or the switching frequency can be lost and the output ripple voltage will increase. $V_{OUT} \ge V_{IN(Max)} \times f_{SW(Max)} \times t_{ONMIN(Max)} =$ 1.92 [V] Judge: NG 入力電圧と出力電圧の差が減少すると、オフ時間をスキップしスイッチング周波数が低下します。 安定したスイッチング周波数を確保するためには以下の条件を考慮します。 The switching frequency will be lost when the difference of VIN and VOUT decrease. The following equation should be considered for the operation with sta $V_{OUT} \le V_{IN(Min)} \times (1 - f_{SW(Max)} \times t_{OFFMIN(Max)}) =$ 6.192 [V] Judge: OK 出力しの選定 (Datasheet p.31 Selection of the inducor L1 value) Output Inductance L₁ 以下の式より出力インダクタンスに1を求められます。カレントモード制御でのサブハーモニック発掘防止と帰還ループ安定以下のため、下表の範囲で使用し The following equation calculates the inductance L1. To avoid the sub-harmonic oscillation or feedback loop instability, observe the inductance range show $L_{1} = \frac{(V_{IN(Max)} - V_{OUT}) \times V_{OUT}}{V_{IN(Max)} \times f_{SW} \times \Delta I_{L}} [H]$ L₁= 4.70 [µH]-Judge: OK

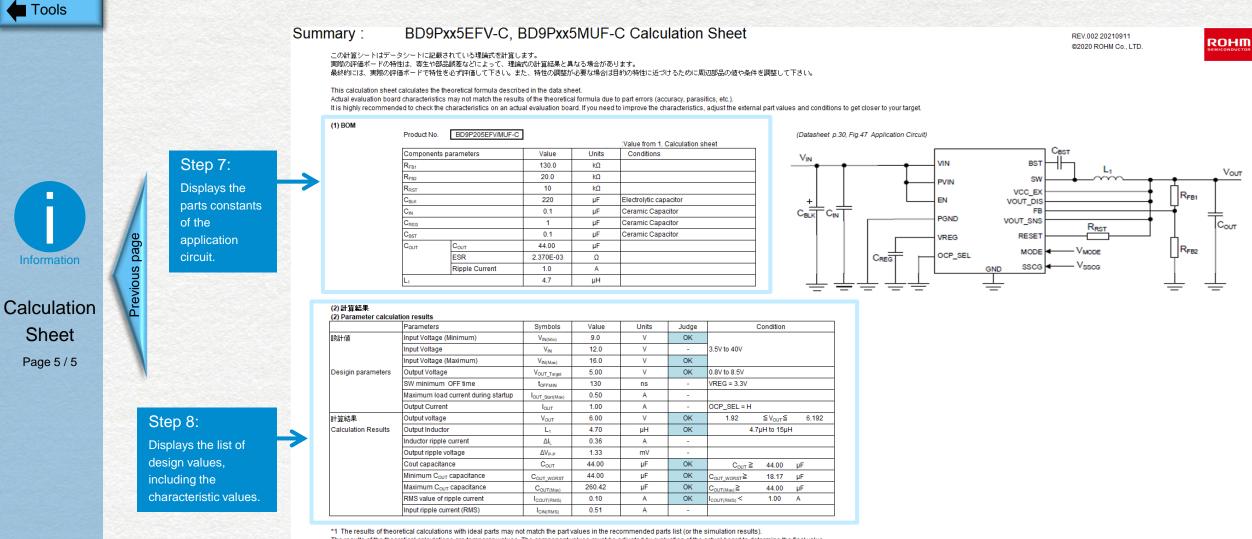
Step 6:

Judges the calculation result and reports the results If the calculation result does not

TOP

How to use (continued)

A summary sheet showing the design result is prepared. You can use it directly in the design report.



*1 The results of theoretical calculations with ideal parts may not match the part values in the recommended parts list (or the simulation results). The results of the theoretical calculations are temporary values. The component values must be adjusted by evaluation of the actual board to determine the final value. 理想的な部品を用いた理論計算の結果は、推奨部品リストの部品値(またはシミュレーション結果)と一致しない場合があります。 理論計算の結果は仮の値です。最終的な値を決定するには、実際の基板の評価で語品値を調整する必要があります。

Back	How to obtain application notes (various technical documents)		
4 705	Obtain through one of the following methods:		
Ф ТОР			· · · · · · · · ·
Tools		Step 3: The "Documents" section shows documents highly relevant "Technical Articles" section shows documents related to th "Search" feature on the upper right of the display, you can document titles.	is product name. With the
	ROHM News Careers Contact Us 🔍 🌐 MyROHM Login		
	Products Technical Support Applications Purchase/Support Company/IR Sustainability	Design Resources	List View
	Home » Power Management » DC-DC Converter ICs » Buck (Step-down) » Integrated FET & Nonsynchronous » BD9G341AEFJ	Search:	
	Product Detail 🐐 Reference Design / Evaluation Board 🐇 Design Resources 🗞 Top A	Documents	
	Package Dimensions	Type 🜲 Title	🜲 Last Updated 🔶
	BD9G341AEFJ	Data Sheet 🔂 BD9G341AEFJ Data Sheet	2021/03/30
	1ch Buck Converter Integrated FET	Thermal Design 🔂 Two-Resistor Model : BD9G341AEFJ	2021/11/19
	The BD9G341AEFJ is a buck switching regulator with integrated 150mΩ power MOSFET. Current mode architecture provides fast transient response and a simple phase compensation setup. The operating frequency is programmable from 50kHz to 750kHz. Additional protection features are included such as Over Current Protection, Thermal shutdown	Schematic Design & Buck DC/DC Converter Recommended Inductor List	2020/12/04
	and Under voltage lockout. The under voltage lockout and hysteresis can be set by external resistor.	User's Guide 🔂 Evaluation Board User's Guide	2019/12/16
	DATA SHEET BUY* SAMPLE* * This is a standard-grade product.	User's Guide Evaluation Board Data	2018/05/22
Information	A DATA SHEET OUT "SAMPLE" For Automotive usage, please contact Sales.	Reference Design 🛛 BD9G341AEFJ Reference Circuits and Bomlist	2015/12/21
Application Note	Design Resources	Technical Articles	Last Updated
Note	Step 2:	Thermal Design 🛛 🖉 🗟 Solder Joint Rate and Thermal Resistance of Exposed	Pad 2024/07/05
Page 1 / 2	Documents Below the "Design Resources" section, Type	Schematic Design & 📂 🗃 Method for Monitoring Switching Waveform	2024/06/04
	Type Trife various technical documents are shown. Quarticular last updated Data Sheet 2021/03/30	Technical Article 🛛 🖉 🝙 Precautions for PCB Layout Regarding Common Mode	Filters 2024/04/10
	Thermal Design 🖨 Two-Resistor Model : BD9G341AEFJ 2021/11/19	Thermal Design 🗾 🖉 📾 Thermal Resistance	2024/03/19
	Schematic Design & Verification ¹	Schematic Design & 🚩 🗃 PCB Layout Essential Check sheet for Switching Regul	lator 2023/08/08
	User's Guide Verluation Board Data 2018/05/22 Reference Design BD9G341AEFJ Reference Circuits and Bomlist 2015/12/21	Thermal Design 🛛 🖉 👜 How to Use the Two-Resistor Model	2023/08/08
	Reference Design a BD9G341AEFJ Reference Circuits and Bomlist 2015/12/21	Thermal Design 🛛 🖉 👜 Judgment Criteria of Thermal Evaluation	2023/03/08
	Technical Articles	Thermal Design For the the thermal Resistance and Thermal Characteristics Parameters	2023/02/24
	Type 🔶 Title 🔶 Last Updated 🔶	Thermal Design \mathbf{V} and Ψ_{JT}	2023/02/13
	Thermal Design Image: Control of the state and Thermal Resistance of Exposed Pad 2024/07/05 Schematic Design & Verification Image: Control of the state and Thermal Resistance of Exposed Pad 2024/06/04	Thermal Design 🛛 🛛 HTSOP-J8 Package Thermal Resistance Information	2023/02/07
	Technical Article P all Precautions for PCB Layout Regarding Common Mode Filters 2024/04/10	Thermal Design $\mathbf{V} = \mathbf{\theta}_{JC}$ and $\mathbf{\Psi}_{JT}$	2023/01/20
	Thermal Design 🛛 🖉 🧧 Thermal Resistance 2024/03/19		
	Schematic Design & Verification Image: Constraint of the second sec	Verification Efficiency of Buck Converter	2022/12/13
1111	Thermal Design Image: Solution of thermal Evaluation 2023/03/08 Thermal Design Image: Solution of thermal Evaluation 2023/03/08	Thermal Design 🗾 🖉 🔂 PCB Layout Thermal Design Guide	2022/07/12
	Thermal Design P Θ How to Use the Thermal Resistance and Thermal Characteristics Parameters 2023/02/14 Thermal Design P Θ haw to Use the Thermal Resistance and Thermal Characteristics Parameters 2023/02/13	Thermal Design 👜 Heat Dissipation Effect of Thermal Via in Exposed Pad Typ	e 2022/07/08

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Next page



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Tools

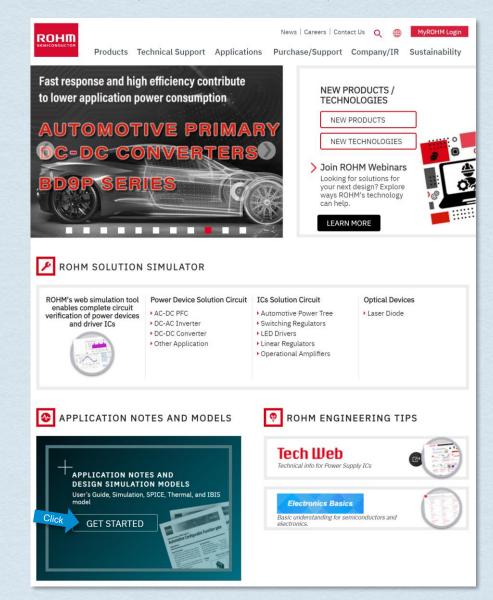


Previous page

Application Note Page 2/2 How to obtain application notes (various technical documents) (continued)

Method 2. Using keywords to search through the website

Step 1: From the home page, access the document search page.



Step 2: Entering a keyword into the "Search" area on the left side of the screen displays the results in a window on the right. Do not confuse the area with the search field on the upper right of the display. With the default setting, all documents and design models including data sheets are targets of the search. As a result, many unnecessary results may be displayed, hiding necessary information.

In such a case, select the type of documents in the list on the left. This displays filtered results. In case of application notes, they may be contained in different categories, such as Schematic Design or Thermal Design. Select the categories sequentially.

конш		Company Sustainabilit	y R&D Careers Contact Us	MyROHM Login
EMICONDUCTOR	hnical Suppo	ort Applications Sales B	uy or Sample	[
Home » Application Notes and I	Design Simu	lation Models		
Application Notes a	nd Desi	gn Simulation Mo	dels	
Search		Title	Description 🗍	Last updated
		BD9F500QUZ PSpice Model	-	2022/08/03
Document Type		STZU6.2N Datasheet	-	2022/08/03
Technical Document	_	SMLP14WBCN1W Datasheet	-	2022/08/02
 Data Sheet Application Note User's Guide 		1SS355VMFH SPICE Model	-	2022/08/01
 Quick Start Guide Reference Design 		1SS400SM SPICE Model	-	2022/08/01
 Schematic Design Thermal Design 		1SS400SMFH SPICE Model	-	2022/08/01
 White Paper Simulation Guide 		BU12JA3DG-C Datasheet	-	2022/08/01
Design Model	+	BU15JA3DG-C Datasheet	-	2022/08/01
3D Data	+	BU18JA3DG-C Datasheet	-	2022/08/01
Symbol / Footprint	+	BU25JA3DG-C Datasheet	-	2022/08/01
Simulation	+	Showing 1 to 10 of 24,434 en	tries	
Simulation	T	Previous	1 2 3 4	5 2444 Next

How to obtain design models

Tools

TOP

The design models include the following. Different models are provided depending on the product names.

Electrical simulation models for IC

- PSpice Model: encrypted model file for PSpice.
- Unencrypted SPICE Model: unencrypted model file.
- Spice Modeling Report: modeling report for models listed above.

Electrical simulation models for discrete devices

- SPICE Model: unencrypted model file.
- SPICE Thermal Model: thermal model to be used by electrical simulators.
- PLECS Model: model file for PLECS.

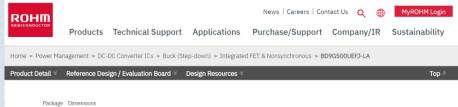
53 View

For thermal simulations

- Tow-Resistor Model Report: document describing the values of the two-resistor model.

Design Model Page 1/2

Step 1: Display the product page of the product name you want and scroll down the page.



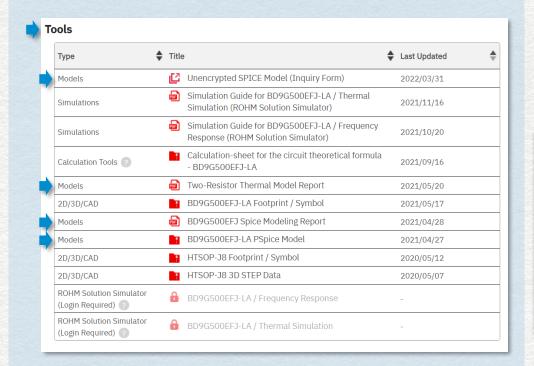
BD9G500UEFJ-LA 7V to 76V Input, 5A Integrated High-Side MOSFET, Single Buck DC/DC Converter

This is the product guarantees long time support in industrial market. BD9G500UEFJ-LA is buck DC/DC converter with built-in low on-resistance High-Side power MOSFET. It is capable of providing current of up to 5A. Current mode architecture provides fast transient response and simple phase compensation setup. The operating frequency is adjustable from 100kHz to 650kHz.

This IC uses different production line against series model BD9G500EFJ-LA for the purpose of improving production efficiency. We recommend using this IC for your new development. Electric characteristics noted in Datasheet does not differ between Production Line. In addition, the data of BD9G500EFJ-LA is disclosed for documents and design models unless otherwise specified.



Step 2: "MODELS" is located below the "Tools" section. Models for electrical and thermal simulations are provided. Click the necessary items to download them.





[>]revious page

Design Model Page 2 / 2

How to obtain Unencrypted SPICE Model

Step 1: Click "Unencrypted SPICE Model (Inquiry Form)".

To	ools				
	Туре 🗳	Title	🖨 Last	Updated	\$
	Models Click	Unencrypted SPICE Model (Inquiry Form)	2022	/03/31	
	Simulations	Simulation Guide for BD9G500EFJ-LA / Therm Simulation (ROHM Solution Simulator)	nal 2021	/11/16	

Х

Step 2: Read the licensing agreement. If you accept, check "I accept the License Agreement." and click the [OK] button.

UNENCRYPTED SPICE MODEL LICENSE AGREEMENT

Disclaimer and Copyright Notice.

This SPICE Model is protected under copyright laws. The copyright in this SPICE Model and all other intellectual property rights therein belong to ROHM Co., Ltd., its affiliates and licensors (collectively "ROHM"), and all rights are reserved.

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You may modify this SPICE Model to suit your specific applications, but the rights to derivative works and said modifications shall belong to ROHM. You may make copies of this SPICE Model as necessary for internal use only within your company.

Any and all your act that violates the terms and conditions herein shall be deemed to constitute an act of intentional infringement on ROHM's copyright and other intellectual property rights. In this case, ROHM shall have the right to seek an immediate injunction or other remedial action and claim for any and all damages incurred by ROHM as the result of your act of infringement and you may not file any objection to such ROHM's

By Clicking the "OK" button to move to the inquiry form.

Two copies of the document download URL and password will be sent to the email address you provide. Please note that it may take some time for the materials to be delivered. Please note that we may not accept applications from companies handling competing products or model vendors.



Step 3: When the "Contact us" form is displayed, enter the required details and click the [Submit] button.

ROHM Contact us

Thank you your interest in ROHM. Please fill in the following information and a representative will contact you to answer your questions and provide the information you requested.

Terms of	use		-
		t be handled according to <u>the ROHM's privacy policy</u> . Your data en onsidered that you read and agreed with the ROHM's privacy polic	
sharing s	ome information w	ation you provide for legitimate business purposes which may incl with related companies in the ROHM group and ROHM's distributor atives. Your data entry to the form below should be considered the base	s,
		* Req	uired Field
	First name	•	
	Last name	•	
	Company	•	
		Please type your full company name. Do not abbreviate.	
	Email address	•	
		Please enter your company email address.	
	Country	* Select V	
	Part Number	BD9G500EFJ-LA	
	Document Type	* Unencrypted SPICE Model	
		Click Submit	

Step 4: The URL and password for download are sent to the email address entered. Follow the procedure described in the email to obtain the SPICE Model.

ТОР

Tools



Package Information Page 1 / 1

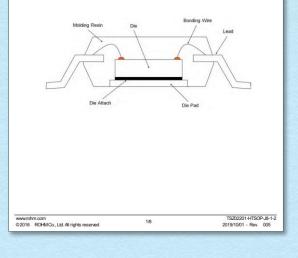
How to obtain package information

The package information contains the following details.

- Package Structure
- Packing Specification
- Footprint dimensions
- Marking Specification
- Storage conditions
- Soldering conditions

SEMICORDUCTOR	ickage init	ormation : HTSOP-J8
. Package Informatio		
		HTSOP-18
Package Name	0	
Type	0	SOP
	0	
Туре		SOP
Type Pin Count		SOP 8

2. Package Structure



Step 1: Display the product page of the product name you want. Clicking the package name displays the package information.

Products Tech	hnical Support Applications Sales Buy or Sample Search ROHM	[
Home » Power Management » DC-DC C	Converter ICs » Buck (Step-down) » Integrated FET & Nonsynchronous » BD9G341AEFJ	
Product Detail S Evaluation Board S	Related Products < Design Resources <	т
Package Dimensions		
	BD9G341AEFJ	
	1ch Buck Converter Integrated FET	
	architecture provides fast transient response and a simple phase compensation setup. The frequency is programmable from 50kHz to 750kHz. Additional protection features are inclu Over Current Protection, Thermal shutdown and Under voltage lockout. The under voltage lo hysteresis can be set by external resistor.	ided such
St View	DATA SHEET BUY* SAMPLE* *This is a standard-grade product. For Automotive usage, please contact Documents ∨ Tools ∨ Packaging & Quality ∨ FAQs Contact Us	t Sales.
Product Detail		
Product Detail Part Number: BD9G341AEFJ-E2	Status; Recommended Package; HTSOP-J8	ck
	Status: Recommended Minimum Package Quantity: 2500 Packing Type: Taping Clic	ck
Part Number BD9G341AEFJ-E2		ck
Part Number BD9G341AEFJ-E2 Unit Quantity 2500		ck
Part Number BD9G341AEFJ-E2 Unit Quantity 2500 RoHS <u>Yes</u>	Minimum Package Quantity 2500 Packing Type Taping	ck
Part Number BD9G341AEFJ-E2 Unit Quantity 2500 RoHS Yes SPECIFICATIONS:	Minimum Package Quantity: 2500 Packing Type: Taping FEATURES:	ck

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PCB

Library

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DesignSpark

CAD tool format.

- Accel EDA 14 & 15

Cadence Allegro

- Altium 6 to current version

Autodesk Fusion 360

- Eagle Libraries
- KiCad
- Mentor Graphics
- BoardStation
- Mentor Graphics Design Architect

How to obtain PCB library data

The PCB library data (.bxl file) is neutral CAD data independent of CAD tools.

Ultra Librarian[®] Free Reader supports 30 types of CAD formats and more.

-

- STL

You can import this file into Ultra Librarian[®] Free Reader and export symbols and footprints in a specific

- Mentor Graphics Design - 3D STEP - Expedition 99 and 2000 - TARGET 3001! - OrCAD 9.X PCB and Capture View Logic ViewDraw
- PADS PowerPCB 3, 3.5, 4.X, and 5.X - Quadcept
- PADS PowerPCB and PowerLogic 3.0 - PCAD 2000, 2001, 2002, 2004, and 2006 -
- Zuken CadStar 3 and 4 Zuken CR-5000 and CR-8000
 - Zuken eCADSTAR 2020 and 2021

Step 1: Display the product page of the product name you want and scroll down the page. News | Careers | Contact Us 🛛 📿 ⊕ MyROHM Login ROHM Products Technical Support Applications Purchase/Support Company/IR Sustainability Home » Power Management » DC-DC Converter ICs » Buck (Step-down) » Integrated FET & Nonsynchronous » BD9G500UEFJ-LA Top ≈

Pulsonix 8.5 or newer



DATA SHEET

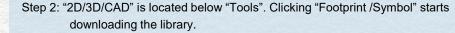
53 View

BD9G500UEFJ-LA 7V to 76V Input, 5A Integrated High-Side **MOSFET, Single Buck DC/DC Converter**

This is the product guarantees long time support in industrial market. BD9G500UEFJ-LA is buck DC/DC converter with built-in low on-resistance High-Side power MOSFET. It is capable of providing current of up to 5A. Current mode architecture provides fast transient response and simple phase compensation setup. The operating frequency is adjustable from 100kHz to 650kHz.

This IC uses different production line against series model BD9G500EFJ-LA for the purpose of improving production efficiency. We recommend using this IC for your new development. Electric characteristics noted in Datasheet does not differ between Production Line. In addition, the data of BD9G500EFJ-LA is disclosed for documents and design models unless otherwise specified.

SAMPLE



Туре	Title		Last Updated	
Models	Ľ	Unencrypted SPICE Model (Inquiry Form)	2022/03/31	
Simulations	B	Simulation Guide for BD9G500EFJ-LA / Thermal Simulation (ROHM Solution Simulator)	2021/11/16	
Simulations	B	Simulation Guide for BD9G500EFJ-LA / Frequency Response (ROHM Solution Simulator)	2021/10/20	
Calculation Tools 🔋	1	Calculation-sheet for the circuit theoretical formula - $BD9G500EFJ$ LA	2021/09/16	
Models	B	Two-Resistor Thermal Model Report	2021/05/20	
2D/3D/CAD	Ŧ	BD9G500EFJ-LA Footprint / Symbol	2021/05/17	-
Models	BE	BD9G500EFJ Spice Modeling Report	2021/04/28	
Models	1	BD9G500EFJ-LA PSpice Model	2021/04/27	
2D/3D/CAD	1	HTSOP-J8 Footprint / Symbol	2020/05/12	
2D/3D/CAD		HTSOP-J8 3D STEP Data	2020/05/07	
ROHM Solution Simulator (Login Required) ?	ô	BD9G500EFJ-LA / Frequency Response	-	
ROHM Solution Simulator (Login Required)	â	BD9G500EFJ-LA / Thermal Simulation	-	

Product Detail 🗧 Reference Design / Evaluation Board 🗧 Design Resources Package Dimensions

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3D Model

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How to obtain 3D models

The 3D package model data representing the 3D outline images of electronic components is provided as a STEP (Standard for the Exchange of Product data) file. The STEP files comply with the international standard, ISO 10303. They can be imported into many CAD systems. In addition, they are saved in the text format so that various CAD systems can interpret them. The data published on the website are outline models in which internal structures cannot be viewed.

Step 1: Display the product page of the product name you want and scroll down the page.



Step 2: "2D/3D/CAD" is located below "Tools". Clicking "3D STEP Data" starts downloading the model.

ools				
Туре	Title		Last Updated	\$
Models	Ľ	Unencrypted SPICE Model (Inquiry Form)	2022/03/31	
Simulations	B	Simulation Guide for BD9G500EFJ-LA / Thermal Simulation (ROHM Solution Simulator)	2021/11/16	
Simulations	B	Simulation Guide for BD9G500EFJ-LA / Frequency Response (ROHM Solution Simulator)	2021/10/20	
Calculation Tools	1	Calculation-sheet for the circuit theoretical formula - $BD9G500EFJ$ LA	2021/09/16	
Models	B	Two-Resistor Thermal Model Report	2021/05/20	
2D/3D/CAD	Ŧ	BD9G500EFJ-LA Footprint / Symbol	2021/05/17	
Models	B	BD9G500EFJ Spice Modeling Report	2021/04/28	
Models	Ţ	BD9G500EFJ-LA PSpice Model	2021/04/27	
2D/3D/CAD	1	HTSOP-J8 Footprint / Symbol	2020/05/12	
2D/3D/CAD		HTSOP-J8 3D STEP Data	2020/05/07	
ROHM Solution Simulator (Login Required)	ô	BD9G500EFJ-LA / Frequency Response	-	
ROHM Solution Simulator (Login Required)	ô	BD9G500EFJ-LA / Thermal Simulation	-	

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Solution

Simulator Page 1/4 **Simulation Circuit**

Select a circuit to be simulated

Switching Regulator ICs : Automotive

						Simulati	on Circuit					
Part number	I _{ОՍТ} [А]	V _{IN} [V]	V _{OUT} [V]	V _{OUT} [V] Package		Frequency Response	Start Up	Load Response	Line Response			
BD9P105EFV-C							0.8 to 8.5	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>
BD9P105MUF-C			0.0 10 0.5	VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P135EFV-C	1	3.5 to 40	3.3	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P135MUF-C	1	3.5 10 40	0.0	VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P155EFV-C			5.0	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P155MUF-C			5.0	VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P205EFV-C	2		0.8 to 8.5	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P205MUF-C		2	2	2			0.0 10 0.5	VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>
BD9P235EFV-C					0.5 45 40	2.2	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>	
BD9P235MUF-C		3.5 to 40	3.3	VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P255EFV-C			5.0	HTSSOP-B20	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P255MUF-C				VQFN20FV4040	<u>Online</u>	-	<u>Online</u>	<u>Online</u>				
BD9P108MUF-C	1			VQFN24FV4040	<u>Online</u>	-	-	-				
BD9P208MUF-C	2	$3.5 \sim 40$		VQFN24FV4040	<u>Online</u>	-	-	-				
BD9P308MUF-C	3	$3.5 \sim 40$	$0.8\sim 8.5$	VQFN24FV4040	<u>Online</u>	-	-	-				
BD9P608MFF-C	6			VFN20FV4535	<u>Online</u>	-	-	-				
BD9S200MUF-C	2			VQFN16FV3030	<u>Online</u>	-	-	-				
BD9S300MUF-C	3	2.7 to 5.5	0.8 to 4.4	VQFN16FV3030	<u>Online</u>	-	-	-				
BD9S400MUF-C	4			VQFN16FV3030	<u>Online</u>	-	-	-				
BD9S201NUX-C	2	2.7 to 5.5	0.8 to 5.5	VSON008X2020	<u>Online</u>	-	-	-				
BD9S402MUF-C	4	$2.7\sim 5.5$	$0.6 \sim 4.125$	VQFN16FV3030	<u>Online</u>	-	-	-				
BD9G201(U)EFJ-M	1.5	1 E to 10	0.0 45 40	HTSOP-J8ES	<u>Online</u>	-	-	-				
BD9G401(U)EFJ-M	3.5	4.5 to 42	0.8 to 42	HTSOP-J8ES	<u>Online</u>	-	-	-				

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For the latest lineup of simulation circuits, check our website.

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Switching Regulator ICs : Automotive (Continued)

Simulation Circuit (Continued)

Select a circuit to be simulated

						Simulatio	on Circuit		
Part number	Part number ^I OUT V _{IN} [V] V _{OUT} [V] Package	Frequency Response	Start Up	Load Response	Line Response				
BD8P250MUF-C	2	3.5 to 36	5.0	VQFN24FV4040	<u>Online</u>	-	-	-	
BD90610EFJ-C	1.25				HTSOP-J8	<u>Online</u>	<u>Online</u>	-	-
BD90620EFJ-C	25			HTSOP-J8	<u>Online</u>	<u>Online</u>	-	-	
BD90620HFP-C	2.5	3.5 to 36	0.8 to 36	HRP7	<u>Online</u>	<u>Online</u>	-	-	
BD90640EFJ-C	Α			HTSOP-J8	<u>Online</u>	<u>Online</u>	-	-	
BD90640HFP-C	4			HRP7	<u>Online</u>	<u>Online</u>	-	-	
BD8P250MUF-C + BD90302NUF-C	2	2.7 to 36	5.0	VQFN24FV4040 + VSON10FV3030	<u>Online</u>	-	-	-	

Switching Regulator ICs : Industrial

						Simulation Circuit					
Part number	I _{ОUT} [А]	V _{IN} [V]	V _{OUT} [V]	Package	Frequency Response	Start Up	Load Response	Line Response	Thermal		
BD9A201FP4-LBZ	2	2.7 to 5.5	0.8 to 3.85	TSOT23-8L	<u>Online</u>	-	-	-	-		
BD9E100FJ-LB	4		4 0 40 05 0		<u>Online</u>	-	-	-	-		
BD9E101FJ-LB	1		1.0 to 25.2	SOP-J8	<u>Online</u>	-	-	-	-		
BD9E300EFJ-LB	25	7.0 to 36	4 0 40 05 0	HTSOP-J8	<u>Online</u>	-	-	-	-		
BD9E301EFJ-LB	2.5		1.0 to 25.2	2 HISOF-Jo	<u>Online</u>	-	-	-	-		
BD9E303EFJ-LB	3		1.0 to 28.8	HTSOP-J8	<u>Online</u>	-	-	-	-		
BD9E304FP4-LBZ	3	4.5 to 36	0.7 to 28	TSOT23-8L	<u>Online</u>	-	-	-	-		
BD9G102G-LB	0.5	6.0 to 42	0.75 to 33.6	SSOP6	<u>Online</u>	-	-	-	-		
BD9G201(U)EFJ-LB	1.5	4.5 to 42	0.8 to 42	HTSOP-J8ES	<u>Online</u>	-	-	-	-		
BD9G341AEFJ-LB	3	12 to 76	1.0 to 76	HTSOP-J8	<u>Online</u>	-	<u>Online</u>	<u>Online</u>	-		
BD9G500EFJ-LA	5	7.0 to 76	1.0 to 68.4	HTSOP-J8	<u>Online</u>	-	-	-	<u>Online</u>		
BD9615MUV-LB	-	$3.5\sim 60$	-	VQFN16KV3030	<u>Online</u>	-	-	-	-		

Next page

Information For the latest lineup of simulation circuits, check our website.

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Simulation Circuit (Continued)
Select a circuit to be simulated

Switching Regulator ICs : Standards

			V _{out} [V]	Package		Simulation Circuit					
Part number	^I о∪т [А]	V _{IN} [V]			Frequency Response	Start Up	Load Response	Line Response			
BD9A300MUV	3	2.7 to 5.5	0.8 to 3.85	VQFN016V3030	<u>Online</u>	-	-	-			
BD9D300MUV	3	4.0 to 17	0.9 to 5.25	VQFN016V3030	<u>Online</u>	-	-	-			
BD9E104FJ	1	7.0 to 26	1.0 to 13	SOP-J8	<u>Online</u>	-	-	-			
BD9E105FP4-Z	1	$4.5 \sim 28$	$0.7\sim22$	TSOT23-6L	<u>Online</u>	-	-	-			
BD9E200FP4-Z	2	4.5 to 26	0.7 to 20.8	TSOT23-6L	<u>Online</u>	-	<u>Online</u>	-			
BD9E201FP4-Z	2	4.5 to 28	0.7 to 22	TSOT23-6L	<u>Online</u>	-	<u>Online</u>	-			
BD9E202FP4-Z	2	$4.5 \sim 28$	$0.7\sim22.4$	TSOT23-6CJ	<u>Online</u>	-	<u>Online</u>	-			
BD9E302EFJ	3	7.0 to 28	1.0 to 19.6	HTSOP-J8	<u>Online</u>	-	-	-			
BD9F500QUZ	5	4.5 to 36	0.6 to 14	VMMP16LZ3030	<u>Online</u>	-	-	-			
BD9F800MUX-Z	8	4.5 to 28	0.765 to 13.5	VQFN11X3535A	<u>Online</u>	-	-	-			
BD9611MUV	-	$10\sim 56$	$1.0 \sim 44.8$	VQFN020V4040	<u>Online</u>	-	-	-			

Information

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Linear Regulato	ors : Aut	omotive					
					S	imulation Circu	it
Part number	I _{оυт} [А]	V _{IN} [V]	V _{OUT} [V]	Package	Load Response	Line Response	Thermal
BD433M2EFJ-C	0.2	3.9 to 42		HTSOP-J8	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD433M2FP3-C	0.2	3.9 10 42	3.3	SOT223-4F	<u>Online</u>	<u>Online</u>	-
BD433M5FP-C	0.5	4.0 to 42	3.3	TO252-3	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD433M5FP2-C	0.5	4.0 10 42		TO263-3	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD450M2EFJ-C	0.2	5.5 to 42		HTSOP-J8	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD450M2FP3-C	0.2	5.5 10 42	5.0	SOT223-4F	<u>Online</u>	<u>Online</u>	-
BD450M5FP-C	0.5	5.5 to 42	5.0	TO252-3	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD450M5FP2-C	0.5	5.5 10 42		TO263-3	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD733L2EFJ-C	0.2	4.37 to 45	3.3	HTSOP-J8	<u>Online</u>	<u>Online</u>	-
BD733L5FP-C	0.5	4.17 to 45		TO252-3	<u>Online</u>	<u>Online</u>	-
BD750L2EFJ-C	0.2	5.8 to 45	5.0	HTSOP-J8	<u>Online</u>	<u>Online</u>	-
BD750L5FP-C	0.5	5.6 to 45	5.0	TO252-3	<u>Online</u>	<u>Online</u>	-
BD933N1G-C				00005	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD933N1WG-C		4 E to 40	2.2	SSOP5	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD933N1EFJ-C		4.5 to 42	3.3		<u>Online</u>	<u>Online</u>	<u>Online</u>
BD933N1WEFJ-C	0.45			HTSOP-J8	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD950N1G-C	0.15			00005	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD950N1WG-C		6.0 to 42	5.0	SSOP5	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD950N1EFJ-C		0.0 to 42	5.0		<u>Online</u>	<u>Online</u>	<u>Online</u>
BD950N1WEFJ-C				HTSOP-J8	<u>Online</u>	<u>Online</u>	<u>Online</u>
BD00C0AWFP-C	4	4 0 to 20 5	1.0 to 15	T0050 5	<u>Online</u>	<u>Online</u>	-
BD80C0AWFP-C	1	4.0 to 26.5	8.0	TO252-5	<u>Online</u>	<u>Online</u>	-

Simulation Circuit (Continued)

Select a circuit to be simulated

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[EN] [JP] [CN]	Linear Regulator Specifications
[EN] [JP]	Table of resistance for output voltage setting on linear regulator ICs
[EN] [JP]	Reverse Voltage Protection
[EN] [JP]	Power Source ON/OFF Characteristics for Linear Regulator
[EN] [JP]	Connecting LDOs in Parallel
[EN] [JP]	Problem Situations: Power Supply Does Not Start
[EN] [JP]	BAxxCC0 Series Circuit Using a Ceramic Output Capacitor
[EN] [JP]	Suppression Method of Switching Noise Using Linear Regulator and Low Pass Filter
[EN] [JP] [CN] [KR]	Impedance Characteristics of Bypass Capacitor
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[EN] [JP] [CN]	Basics of Thermal Resistance and Heat Dissipation
[EN] [JP] [CN] [KR]	Thermal resistance and thermal characterization parameter
[EN] [JP] [CN]	θ_{JA} and Ψ_{JT}
[EN] [JP] [CN]	θ_{JC} and Ψ_{JT}
[EN] [JP] [CN]	How to Use the Thermal Resistance and Thermal Characteristics Parameters
[EN] [JP] [CN]	Judgment Criteria of Thermal Evaluation
[EN] [JP]	Thermal Design for Three-Terminal Voltage Regulators
[EN] [JP]	Thermal Calculation for Linear Regulator
[EN] [JP] [CN]	Two-Resistor Model for Thermal Simulation
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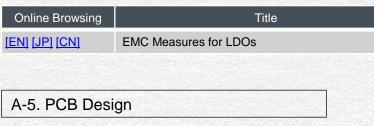
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A. Linear Regulators (Continued)

A-3. Simulation

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[EN] [JP]	Usage of SPICE MacroModel (for LDO)

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Online Browsing	Title
[EN] [JP] [CN]	Design Guide and Example of Stencil for Exposed Pad
[EN] [JP] [CN]	PCB Layout Thermal Design Guide
[EN] [JP] [CN]	Heat Dissipation Effect of Thermal Via in Exposed Pad Type Package

A-6. Evaluation

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[EN] [JP]	Measurement Method for Phase Margin with Frequency Response Analyzer (FRA)
[EN] [JP]	Simple Test Method for Estimating the Stability of Linear Regulators
[EN] [JP]	Problem Situations: Power Supply Does Not Start

A-7. Thermal Measurement

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[EN] [JP]	Notes for Temperature Measurement Using Thermocouples
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A. Linear Regulators (Continued)

A-8. Design Data

	Part number	Application Information Provides hints for IC mounting	Reference Circuit	Dropout Voltage Design reference values	Typical Performance Curves	PCB Layout	
	BA178xx series	[EN] [JP]	-	[EN] [JP]	[EN] [JP]		
	BA178Mxx series	[EN] [JP]	-	[EN] [JP]	[EN] [JP]	[EN] [JP]	
	BA1117 series	[EN] [JP]	-	<u>[EN] [JP]</u>	-	[EN] [JP]	
BA	BAxxBC0 series	[EN] [JP]	-	<u>[EN] [JP]</u>	[EN] [JP]		
	BAxxCC0 series	[EN] [JP]	-	<u>[EN] [JP]</u>	[EN] [JP]		
	BAxxDD0 series	[EN] [JP]	-	<u>[EN] [JP]</u>	[EN] [JP]	<u>[EN] [JP]</u>	
	BAxxJC5 series	-	-	<u>[EN] [JP]</u>	-		
	BDxxGC0 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-		
	BDxxGA5 series	[EN] [JP]	[EN] [JP]	<u>[EN] [JP]</u>	-		
	BDxxGA3 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-		
	BDxxHC5 series	[EN] [JP]	[EN] [JP]	<u>[EN] [JP]</u>	-		
	BDxxHC0 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-	[EN] [JP]	
	BDxxHA5 series	[EN] [JP]	[EN] [JP]	<u>[EN] [JP]</u>	-		
BD	BDxxHA3 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-		
60	BDxxIC0 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-		
	BDxxIA5 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-		
	BDxxKA5 series	[EN] [JP]	[EN] [JP]	[EN] [JP]	-	[EN] [JP]	
	BD00D0A series	-	-	[EN] [JP]	-	-	
	BD00EA5 series	-	-	<u>[EN] [JP]</u>	-	-	
	BDxxFC0 series	-	[EN] [JP]	[EN] [JP]	-	[EN] [JP]	
	BDxxFD0 series	-	-	<u>[EN] [JP]</u>	-	-	

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A. Linear Regulators (Continued)

A-8. Design Data (Continued)

Part number	Application Information	Reference Circuit	Dropout Voltage	Typical Performance	PCB Layout
	Provides hints for IC mounting		Design reference values	Curves	1 02 Layout
BDxxC0A series	-	[EN] [JP]	-	-	[EN] [JP]
BDxxD0A series	-	[EN] [JP]	-	-	
BDxxFA1MG-M series	<u>[EN] [JP]</u>	-	[EN] [JP]	-	
BDxxFA1FP3 series	<u>[EN] [JP]</u>	-	[EN] [JP]	-	[<u>EN]</u> [JP]
BD35395FJ	-	-	-	-	[EN] [JP]
BUxxJA2MNVX-C series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxJA2DG,VG series	-	-	[EN] [JP]	-	-
BUxxTD2 series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxTD3 series	[EN] [JP]	-	[EN] [JP]	-	[EN] [JP]
BUxxSA4 series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxSA5 series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxTA2 series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxSD2 series	-	-	[EN] [JP]	-	[EN] [JP]
BUxxSD5 series	-	-	[EN] [JP]	-	[EN] [JP]
BHxxM0A series	-	-	-	-	[EN] [JP]
BHxxMA3 series	-	-	-	-	[EN] [JP]
BHxxNB1 series	-	-	-	-	[EN] [JP]
BHxxPB1 series	-	-	-	-	[EN] [JP]
BHxxRB1 series	-	-	-	-	[EN] [JP]
BHxxSA3 series	-	-	-	-	[EN] [JP]
	BDxxD0A series BDxxFA1MG-M series BDxxFA1FP3 series BDxxFA1FP3 series BD35395FJ BUxxJA2MNVX-C series BUxxJA2DG,VG series BUxxTD2 series BUxxTD3 series BUxxSA4 series BUxxSA5 series BUxxSA5 series BUxxSD2 series BUxxSD2 series BUxxSD5 series BHxxM0A series BHxxM0A series BHxxNB1 series BHxxRB1 series	Part numberProvides hints for IC mountingBDxxC0A series-BDxxD0A series-BDxxFA1MG-M series[EN] [JP]BDxxFA1FP3 series[EN] [JP]BD35395FJ-BUxxJA2MNVX-C series-BUxxJA2DG,VG series-BUxxTD2 series-BUxxTD3 series[EN] [JP]BUxxSA4 series-BUxxSA5 series-BUxxSD2 series-BUxxSD5 series-BUxxSD5 series-BHxxM0A series-BHxxMB1 series-BHxxRB1 series-BHxxRB1 series-	Part numberProvides hints for IC mountingReference CircuitBDxxC0A series-[EN] [JP]BDxxD0A series[EN] [JP]-BDxxFA1MG-M series[EN] [JP]-BDxxFA1FP3 series[EN] [JP]-BD35395FJBUxxJA2MNVX-C seriesBUxxJA2DG,VG seriesBUxxTD2 seriesBUxxSA4 series[EN] [JP]-BUxxSA4 seriesBUxxSD2 seriesBUxxSD2 seriesBUxxSD5 seriesBUxxSD5 seriesBHxxM0A seriesBHxxMB1 seriesBHxxRB1 seriesBHxxRB1 series	Part HumberProvides hints for IC mountingReference CricuitDesign reference valuesBDxxC0A series-[EN] [JP]-BDxxD0A series[EN] [JP]-[EN] [JP]BDxxFA1MG-M series[EN] [JP]-[EN] [JP]BDxxFA1FP3 series[EN] [JP]-[EN] [JP]BD35395FJ[EN] [JP]BDxxD0A series-[EN] [JP]-BDxxFA1FP3 series[EN] [JP]-[EN] [JP]BD35395FJ[EN] [JP]BUxxJA2MNVX-C series-[EN] [JP]BUxxJA2DG,VG series-[EN] [JP]BUxxTD2 seriesBUxxTD3 series[EN] [JP][EN] [JP]BUxxSA4 series-[EN] [JP]BUxxSA5 seriesBUxxSD2 series-[EN] [JP]BUxxSD5 seriesBUxxSD5 seriesBUxxSD5 seriesBHxxM0A seriesBHxxNB1 seriesBHxxRB1 seriesBHxxR	Path HumberProvides hints for IC mountingReference CircuitDesign reference valuesCurvesBDxxCOA series-[EN] [JP]BDxxDA series[EN] [JP]IEN] [JP]BDxxFA1MG-M series[EN] [JP]-[EN] [JP]-BDxxFA1MG-M series[EN] [JP]-[EN] [JP]-BDxxFA1FP3 series[EN] [JP]-[EN] [JP]-BDxxFA1FP3 series[EN] [JP]-[EN] [JP]-BDxxSA1FP3 series[EN] [JP]-IEN] [JP]-BUxxJA2MVX-C series-IEN] [JP]BUxxJA2DG, VG series[EN] [JP]-BUxxTD3 series[EN] [JP]-IEN] [JP]-BUxxSA seriesIEN] [JP]-IEN] [JP]-BUxxSA seriesIEN] [JP]-BUxxSD seriesIEN] [JP]-BUxxSD seriesIEN] [JP]-BUxxSD seriesIEN] [JP]-BUxxSD seriesIEN] [JP]-BHxxMA3 seriesIEN] [JP]-BHxxB1 seriesBHxxB1 seriesBHxxB1 series

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[EN] [JP] [CN]	TO252 Package Thermal Resistance Information
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[EN] [JP]	Thermal Resistance Data: TO220CP-V5
[EN][JP]	Thermal Resistance Data: TO263-5 (BD4xxM5WFP2-C)
[EN] [JP]	Thermal Resistance Data: SSOP5 (BUxxJA2DC-C, VG-C)
[<u>EN]</u> [JP]	Thermal Resistance Data: SSOP5 (BUxxJA3DC-C)
[EN] [JP]	Thermal Resistance Data: SSOP5 (BUxxTD3WG)
[<u>EN]</u> [JP]	Thermal Resistance Data: SSOP5 (BD7xxL05G-C)
[EN] [JP]	Thermal Resistance Data: SSOP5 (BD9xxN1G-C)
[EN] [JP]	Thermal Resistance Data: VSON008X2030 (BDxxGA3WNUX)
[EN] [JP]	Thermal Resistance Data: HVSOF6 (BD00IA5MHFV-M)
[EN] [JP]	Thermal Resistance Data: SSON004X1010 (BUxxTD2WNVX)
[EN] [JP]	Thermal Resistance Data: HRP7 (BD8374HFP LED driver) [Reference data]

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[EN] [JP] [CN]	Calculation of Power Loss (Synchronous)
[EN] [JP] [CN]	Considerations for Power Inductors Used for Buck Converters
[EN] [JP] [CN]	Snubber Circuit for Buck Converter IC
[EN] [JP] [CN]	Efficiency of Buck Converter
[EN] [JP] [CN] [KR]	Phase Compensation Design for Current Mode Buck Converter
[EN] [JP]	Bootstrap Circuit in the Buck Converter
[EN] [JP] [CN]	Method for Determining Constants of Peripheral Parts of Buck DC/DC Converter
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[EN] [JP]	Power Supply Sequence Circuit with General Purpose Power Supply IC
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[EN] [JP] [CN] [KR]	Impedance Characteristics of Bypass Capacitor
<u>[EN] [JP]</u>	Types of Capacitors Used for Output Smoothing of Switching Regulators and their Precautions
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[EN] [JP] [CN]	Judgment Criteria of Thermal Evaluation
[EN] [JP] [CN]	Two-Resistor Model for Thermal Simulation
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[EN] [JP]	Design and Application Considerations of Input Filter to reduce Conducted Emissions caused by DC/DC converter	
[<u>EN]</u>	Considerations for Power Inductors: How Flux Orientation Can Reduce Radiated Emission	
[EN] [JP]	Precautions for PCB Layout Regarding Common Mode Filters	

PCB Layout Techniques of Buck Converter

PCB Layout Techniques of Boost Converter

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B-8. Des	ign Data		
	Part number	Reference Circuit	PCB Layout
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	BD9A101MUV-LB	[<u>EN]</u> [JP]	
BD9Axxx	BD9A300MUV		
series	BD9A301MUV-LB	[<u>EN]</u> [JP]	[EN] [JP]
	BD9A400MUV	[EN] [JP]	
	BD9A600MUV	[EN] [JP]	
	BD9B100MUV	[EN] [JP]	
	BD9B200MUV	[EN] [JP]	
	BD9B300MUV		
BD9Bxxx series	BD9B301MUV	[<u>EN]</u> [JP]	[EN] [JP]
001100	BD9B400MUV	[EN] [JP]	
	BD9B500MUV	[EN] [JP]	
	BD9B600MUV	[EN] [JP]	
	BD9C301FJ	[EN] [JP]	
BD9Cxxx	BD9C401EFJ	[EN] [JP]	
series	BD9C501EFJ	[EN] [JP]	[EN] [JP]
	BD9C601EFJ	[EN] [JP]	
BD9Dxxx	BD9D320EFJ	[EN] [JP]	
series	BD9D321EFJ	[EN] [JP]	[EN] [JP]

	Part number	Reference Circuit	PCB Layout
	BD9E100FJ	[EN] [JP]	
	BD9E101FJ	[EN] [JP]	[EN] [JP]
	BD9E104FJ	-	
BD9Exxx series	BD9E300EFJ	[EN] [JP]	
	BD9E301EFJ	[EN] [JP]	[EN] [JP]
	BD9E302EFJ	[EN] [JP]	-
	BD9E303EFJ	[EN] [JP]	[EN] [JP]
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	BD9137MUV	[EN] [JP]	-
	BD9139MUV	[EN] [JP]	-
	BD9141MUV	[EN] [JP]	-
others	BD9611MUV	[EN] [JP]	-
ouners	BD9851EFV	[EN] [JP]	-
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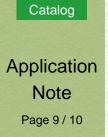


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B-9. Thermal Resistance Data

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[EN] [JP] [CN]	Gate-Source Voltage Behavior in a Bridge Configuration
[EN] [JP] [CN]	Gate-Source Voltage Surge Suppression Methods
[EN] [JP] [CN]	SiC MOSFET Snubber Circuit Design Methods
[EN] [JP] [CN]	5 kW High-Efficiency Fan-less Inverter
[EN] [JP] [CN]	800 V Three-Phase Output LLC DC-DC Resonant Converter
[EN] [JP] [CN]	5 kW Inverter Circuit Using 4th Generation SiC MOSFETs
[EN] [JP] [CN]	4th Gen SiC MOSFETs Discrete Package: Characteristics and Precautions for Circuit Design Application Note
[EN] [JP] [CN]	Design Method for Comparator-less Miller Clamp Circuits
[EN] [JP] [CN]	Basics and Design Guidelines for Gate Drive Circuits
[EN] [JP] [CN]	Oscillation Countermeasures for MOSFETs in Parallel
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Online Browsing	Title
[EN] [JP] [CN]	Precautions During Gate-Source Voltage Measurement
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C-5. Thermal Measurement

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