DC/DC Converter

DC/DC Converter Selection Guide

Ver.9.0

Power

ROHM Co.,Ltd.

DC/DC Converter Selection Guide

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*Before using the ICs, please verify the numerical values, data, and functions listed in the latest datasheet.

Buck Converters

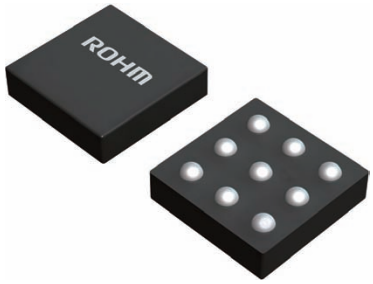
Ultra-Low-Power Switching Regulator

The BD70522GUL utilizes ROHM's ultra-low power technology Nano Energy®* to achieve a quiescent operating current consumption of just 180nA. This significantly improves standby power efficiency, making it possible to prolong battery life in portable and wearable devices.

Sample Parameters and Features

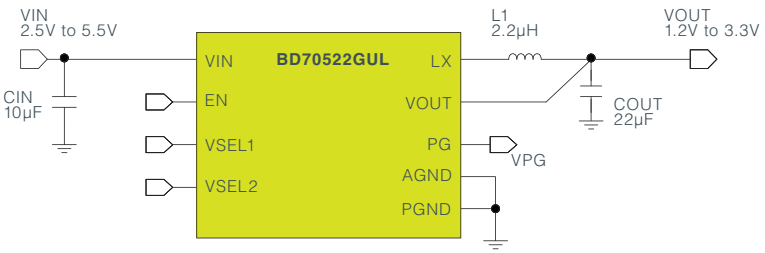
BD70522GUL

- Input voltage : 2.5V to 5.5V
- Output voltage : 1.2V to 3.3V
- Output voltage accuracy : ±2.5%
- Output current : 500mA
- Quiescent operating current : 180nA
- Standby current : 50nA
- >90% efficiency at 10uA output
- Output voltage setting via pin selection
  1.2V/1.5V/1.8V/2.0V/2.5V/2.8V/3.0V/3.2V/3.3V
- Power Good output
- 100% duty operation
- Output discharge function
- Multiple protection circuits
  Over Current Protection(OCP), Thermal Shutdown(TSD),
  Under Voltage Lock Out(UVLO)



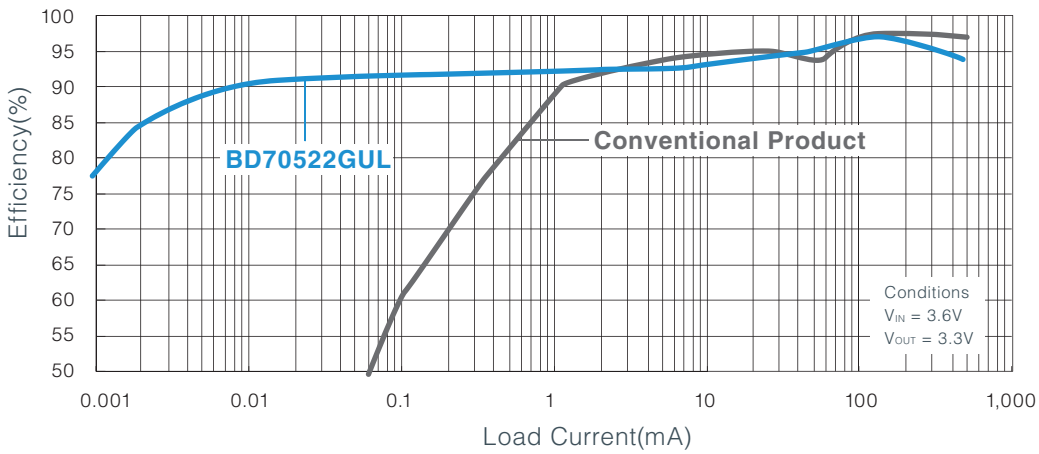
Compact CSP(Chip Scale Package)
VCSP50L1C
1.76mm(Typ)×1.56mm(Typ)×0.57mm(Max)

BD70522GUL Application Circuit Diagram



PCB
7mm×11mm

Efficiency vs Load Current



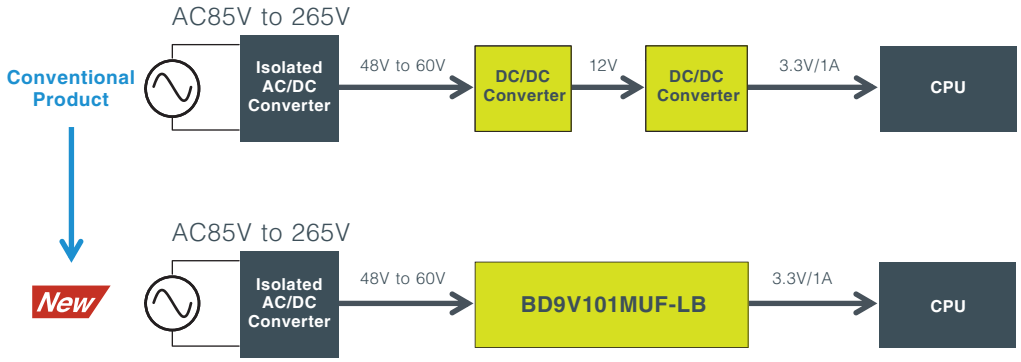
*Nano Energy® is a registered trademark of ROHM Co., Ltd.

Buck Converters

60V Max. Input High Buck Ratio Switching Regulator

Power supply solution ideal for industrial equipment

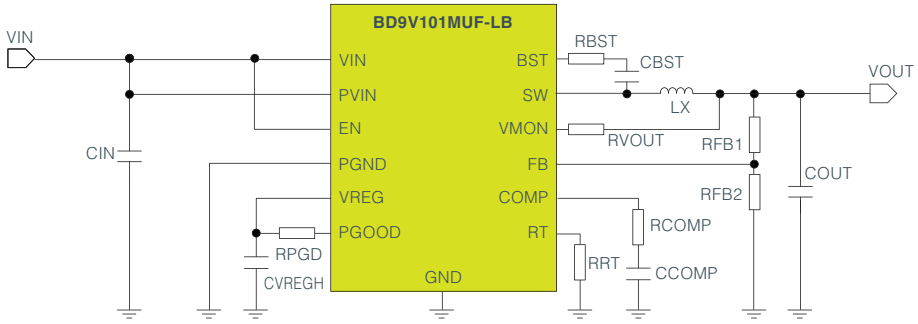
The BD9V101MUF-LB utilizes ROHM's ultra-fast pulse control technology Nano Pulse Control®* to achieve a high step-down ratio of up to 24 : 1 at 2MHz. For example, 2.5V output is possible from a 60V power supply at 2MHz. This makes it possible to reduce the number of power ICs required for step-down from high voltage to low voltage from two or more with conventional solutions to just one, contributing to set miniaturization and simpler system design.



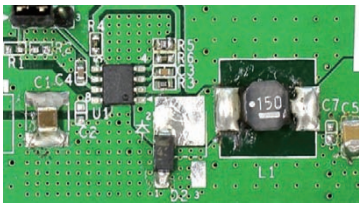
Sample Parameters and Features BD9V101MUF-LB

- Stable long term supply demanded for industrial equipment
- High buck ratio enables direct conversion from high voltage to low voltage
- The industry's lowest switching ON time : 9ns Typ, 20ns Max
- Input voltage : 16V to 60V(70V rating)
- Output voltage : 0.8V to 5.5V
- Reference voltage : 0.8V±2.0%
- Output current : 1.0A
- High-speed response via current mode control
- Synchronous rectification eliminates the need for an external diode
- Soft start prevents inrush current during power ON
- Power Good output
- Multiple protection functions
  Over Current Protection(OCP),
  Short-Circuit Protection(SCP),
  Thermal shutdown(TSD),
  Under Voltage Lock Out(UVLO),
  Over Voltage Protection(OVP),
  Over Voltage Lock Out(OVLO)

BD9V101MUF-LB Application Circuit Diagram

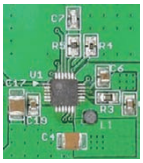


Increasing the switching frequency to 2MHz reduces the size of external components (coil), decreasing mounting area. Further space savings can be achieved by switching from a 2-stage buck configuration to single stage conversion. Also, the 2MHz switching frequency is guaranteed to not affect the AM radio band (MW).



Conventional PCB
47mm×25mm=1,175mm²

−69%



BD9V101MUF-LB PCB
18mm×20mm=360mm²

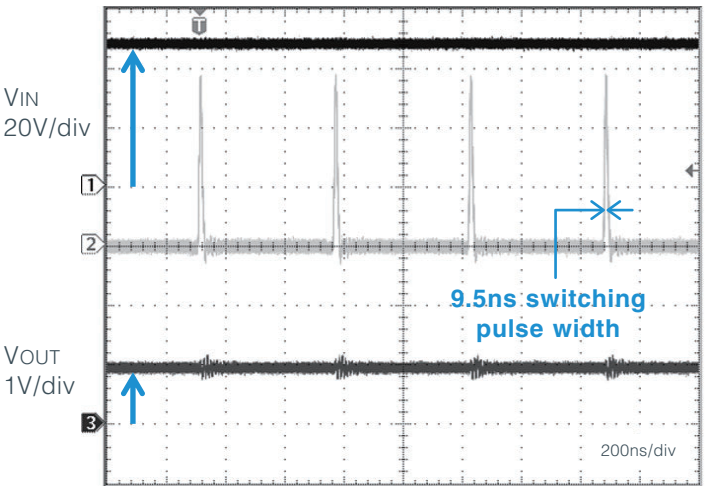
Part No.	Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Operating Temperature (C)	Package
							Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection		
New BD9V101MUF-LB	70	1	16 to 60	0.8 to 5.5	1.9 to 2.3	Current	✓	—	—	✓	—	Recovery	Recovery	✓	Tj −40 to +150	VQFN24FV4040

Ultra-High-Speed Pulse Control Technology Nano Pulse Control®*

Buck switching DC/DC converters generate an output voltage by controlling the switching pulse width. This pulse width is thicker when the step-down ratio of the input/output voltage is low and thinner when the ratio is high. As a result, when stepping down from a 60V power supply to 2.5V, the switching pulse width becomes extremely thin due to the high buck ratio (24 : 1). For example, when the switching frequency is 2MHz the switching cycle is 500ns, so with a step-down ratio of 24:1 the pulse width becomes ultra-narrow at 20.8ns. ROHM's Nano Pulse Control®* technology achieves a pulse width of just 9ns.

Current mode control detects the current flowing through the coil, but when the pulse width narrows accurate current detection is prevented due to ringing caused by the parasitic inductance within the circuit, resulting in unstable circuit operation. ROHM's original Nano Pulse Control®* technology eliminates the effects of ringing by feeding back the coil current to the IC, making it possible to stabilize the output voltage even with narrow pulse widths using current mode control.

Nano Pulse Example



V_{IN}=48V/V_{OUT}=1V/f_{SW}=2.2MHz

*Nano Pulse Control® is a registered trademark of ROHM Co., Ltd.

Buck Converters

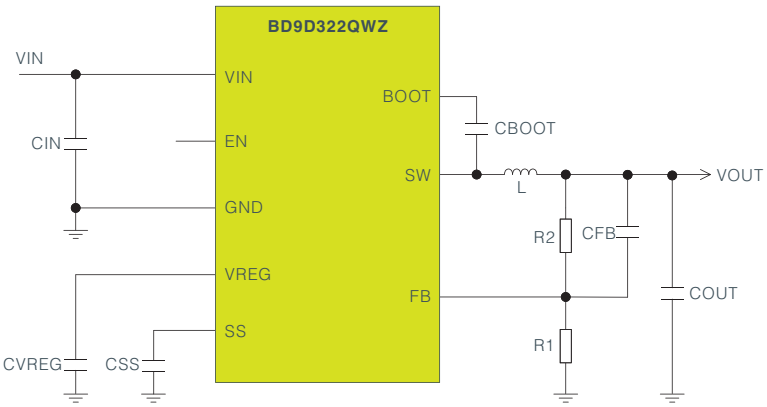
Ultra-Compact Low Ringing Switching Regulators

The BD9A302QWZ, BD9B304QWZ, BD9D322QWZ, and BD9D323QWZ utilize an ultra-compact package that not only reduces mounting area, but also minimizes the parasitic inductance within the circuit as well as decreases the trace area of the loop with large switching change on the PCB, making it possible to reduce both switching waveform ringing along with unwanted radiation.

Sample Parameters and Features — BD9D322QWZ

- Input voltage range : 4.5V to 18V
- Output voltage range : 0.765V to 7.0V
- Reference voltage : 0.765V±1.6%
- Output current : 3A
- Switching frequency : 700kHz
- Built-In switching FET : 80mΩ, 50mΩ
- Quiescent current : 0.7mA
- Fast transient response characteristics via fixed ON time control
- High efficiency Light Load Mode
- Variable Soft Start
- Multiple protection functions
  Over Current Protection(OCP),
  Thermal Shutdown(TSD), Under Voltage Lock Out(UVLO)

BD9D322QWZ Application Circuit Diagram



Ultra-Compact Package

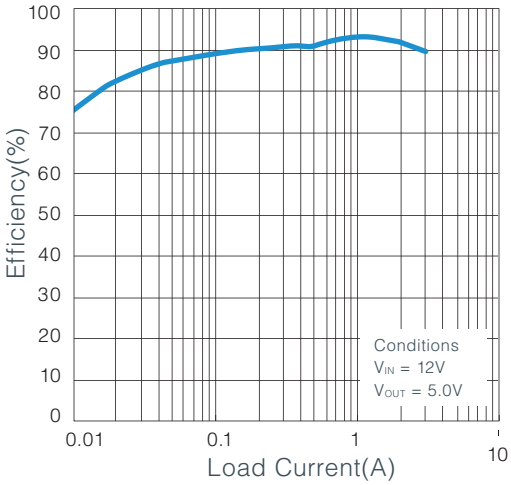
−86%

3A output
Large amount of current per unit area

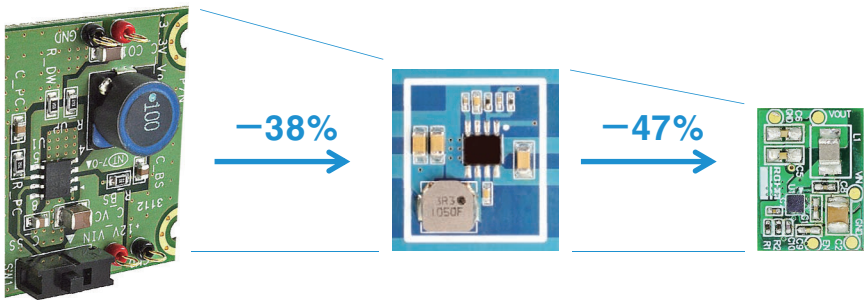
HTSOP-J8
6.0mm×4.9mm=29.4mm²

UMMP008Z2020
2.0mm×2.0mm=4.0mm²

Efficiency vs Load Current



Space-Saving



−38%

−47%

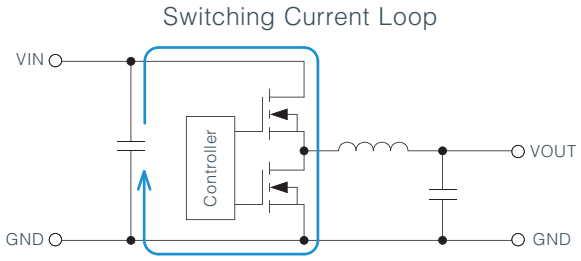
22mm×25mm=550mm²

17mm×20mm=340mm²

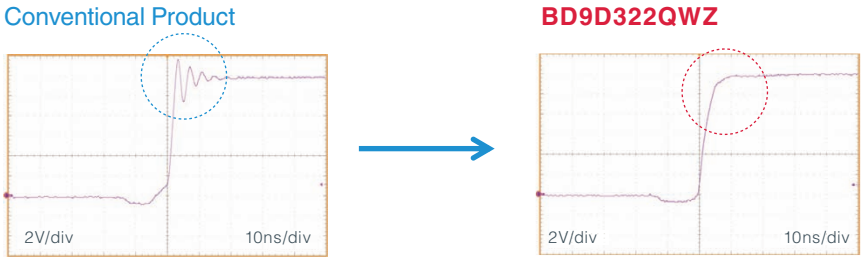
12mm×15mm=180mm²

Low Ringing+Low EMI

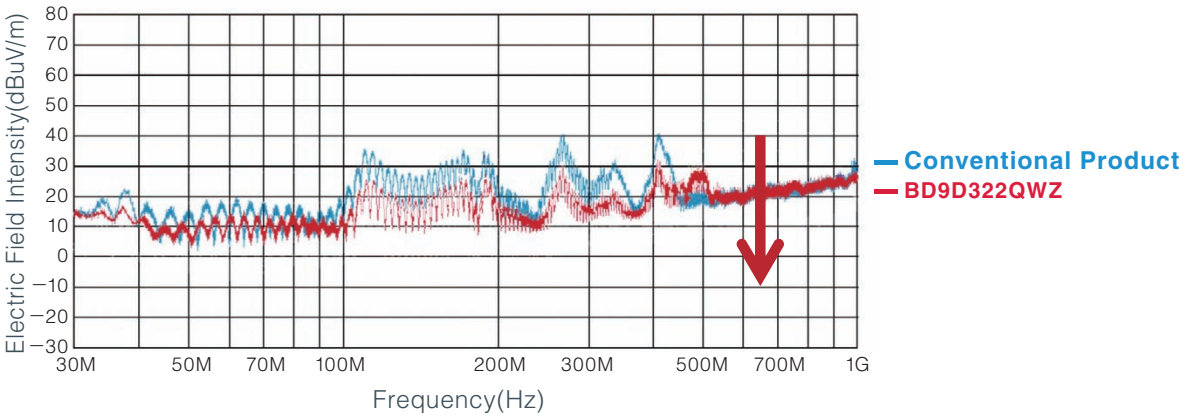
Reducing the trace area of the loop with large switching change decreases the parasitic inductance along with unwanted radiation.



Switching Waveforms



EMI Waveforms



BD9Axxx/BD9Bxxx/BD9Dxxx series Function Table

Input Power Rail Voltage	Part No.	Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions						Operating Temperature (C)	Package (W×D×H:mm)
								Power Good	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown		
5V	**BD9A302QWZ**	7	3	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	—	—	✓	✓	Recovery	Recovery	−40 to +85	UMMP008AZ020 (2.0×2.0×0.4)
	BD9B304QWZ	7	3	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON Time	—	—	✓	✓	Recovery	Recovery	−40 to +85	UMMP008AZ020 (2.0×2.0×0.4)
12V	**BD9D322QWZ**	20	3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON Time	—	✓	✓	✓	Recovery	Recovery	−40 to +85	UMMP008Z2020 (2.0×2.0×0.4)
	BD9D323QWZ	20	3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON Time	—	✓	✓	–	Recovery	Recovery	−40 to +85	UMMP008Z2020 (2.0×2.0×0.4)

Buck Converters

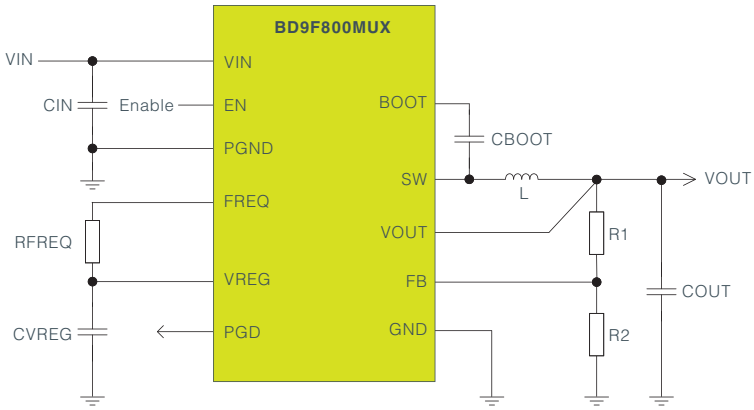
Compact High Output Current Switching Regulator

The BD9F800MUX is a synchronous rectification buck DC/DC converter that integrates a low ON resistance power MOSFET. A maximum output current of 8A is possible in a compact 3.5mm square package. In addition, fixed ON time control achieves high-speed load response characteristics and eliminates the need for an external phase compensation circuit.

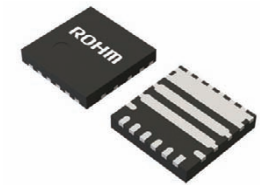
Sample Parameters and Features — BD9F800MUX

- Input voltage : 4.5V to 28V
- Output voltage : 0.765V to 13.5V
- Reference voltage : 0.765V±1.05%
- Output current : 8A
- Switching frequency : 300kHz/600kHz
- Built-In switching FET : 23mΩ, 11mΩ
- Fast transient response characteristics via fixed ON time control
- Multiple protection functions
  Over Current Protection(OCP),
  Short-Circuit Protection(SCP),
  Thermal Shutdown(TSD), Under Voltage Lock Out(UVLO)

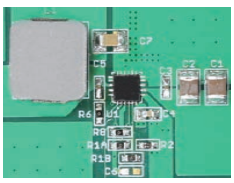
BD9F800MUX Application Circuit Diagram



Ultra-Compact Package

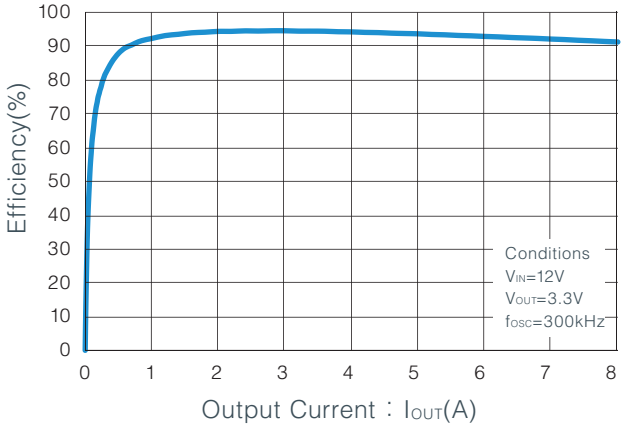


VQFN11X3535A
3.5mm(Typ)×3.5mm(Typ)×0.6mm(Max)

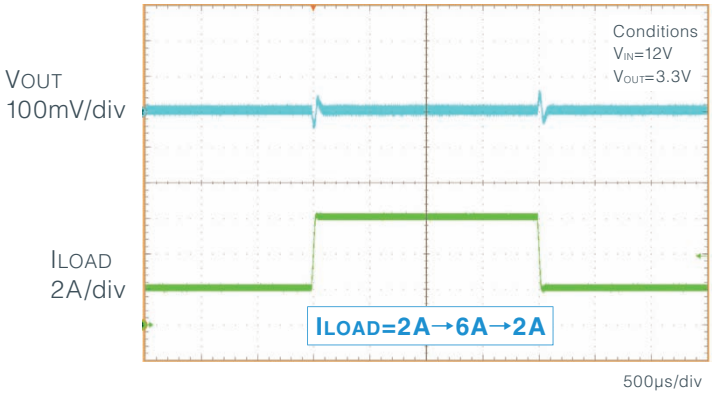


PCB
30mm×20mm=600mm²

BD9F800MUX Efficiency vs Output Current



Transient Response Characteristics

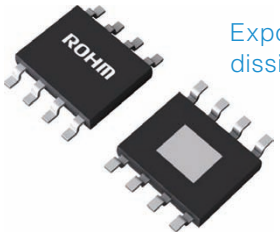


Wide Input Voltage Range Buck Switching Regulators

The BD9G201EFJ-LB and BD9G401EFJ-M are asynchronous rectification switching regulators with built-in high side MOSFET that can operate over a wide input voltage range from 4.5V to 42V. Current mode control enables high-speed load response and easy phase compensation. When used as a compact secondary power supply, step-down voltages such as 3.3V and 5V can be output from 12V/24V power supplies. In addition, synchronization with an external clock makes it possible to carry out noise management.

Sample Parameters and Features BD9G201EFJ-LB/BD9G401EFJ-M

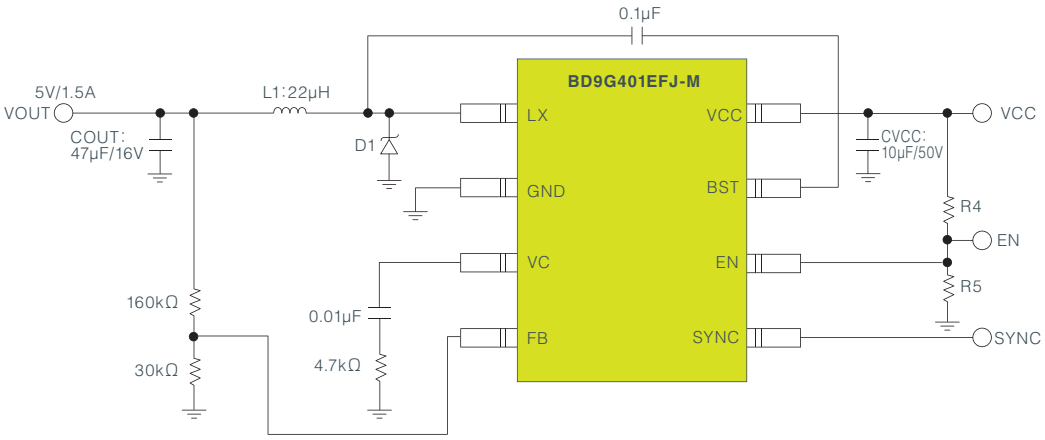
- Input voltage range : 4.5V to 42V
- Output voltage range : 0.8V to V_{CC}
- Reference voltage : 0.8V±1.5%
- Output current : 1.5A(BD9G201)
  : 3.5A(BD9G401)
- Switching frequency : 300kHz
- Built-in high side MOSFET : 140mΩ
- External clock synchronization function : 250kHz to 500kHz
- UVLO voltage setting via external resistance
- LLDO operation : 95% Max. duty
- Multiple protection functions
  Over Current Protection(OCP), Thermal Shutdown(TSD) Under Voltage Lock Out(UVLO)



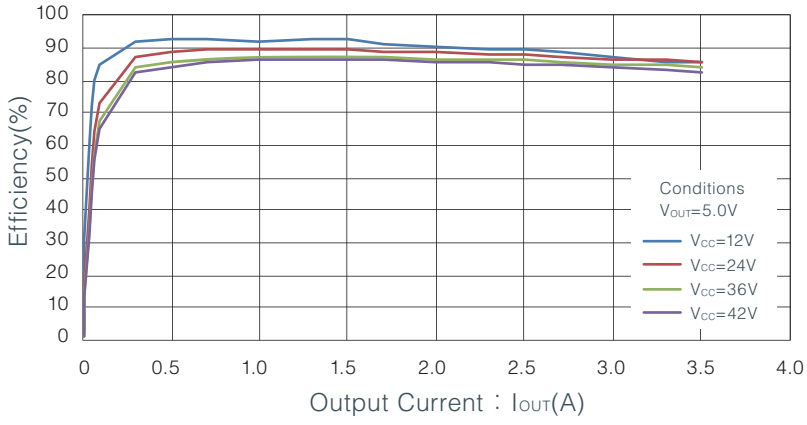
Exposed pad ensures excellent heat dissipation characteristics

HTSOP-J8ES
4.90mm(Typ)×6.00mm(Typ)×1.00mm(Max)

BD9G401EFJ-M Application Circuit Diagram



BD9G401EFJ-M BD9F800MUX Efficiency vs Output Current



Boost Converters

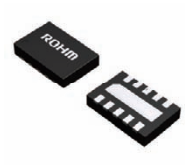
Low Current Low Input Voltage Switching Regulator

The BU33UV7NUX is a boost DC/DC converter capable of generating 3.3V from a 1- or 2-battery power supply. The starting voltage is low at just 0.9V, and once started it can output 3.3V until the battery voltage drops to as low as 0.6V. In addition, a low circuit current of 13μA contributes to longer battery life.

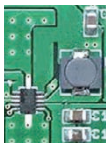
Sample Parameters and Features **BU33UV7NUX**

- Input voltage range : 0.6V to 4.5V
- Output voltage : 3.3V(+1.3%/−1.15%)
- Starting voltage : 0.9V
- Output current : 500mA(V_{IN}>1.8V, during high)
  : 50mA(V_{IN}>1.8V, low power modes)
- Circuit current : 13μA(High Power modes)
  : 7μA(Low Power modes)
- Power down current : 2.7μA
- Switching frequency : 800kHz
- Pass-through operation when V_{IN}>V_{OUT}
- Output discharge function
- Built-in voltage detector circuit prevents battery leakage (1.5V detection voltage intended for 2 batteries)
- Multiple protection circuits
  Under Voltage Lock Out(UVLO),
  Over Voltage Protection(OVP), Over Current Protection(OCP),
  Short-Circuit Protection(SCP), Thermal Shutdown(TSD)
- Includes a function that performs blocking between the input/output during UVLO and Enable OFF
- Automatically switches between PFM/PWM operation based on load current during high power mode
- Fixed PFM operation in low power mode reduces circuit current

Compact Package

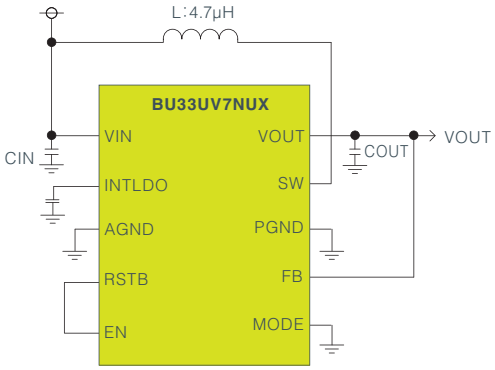


VSON10X3020
3.0mm(Typ)×2.0mm(Typ)×0.6mm(Max)

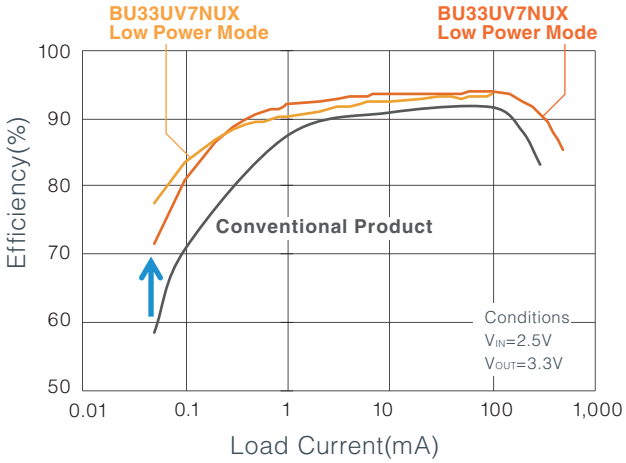


PCB
15mm×18mm

BU33UV7NUX Application Circuit Diagram



Efficiency vs Load Current



Battery Life Comparison

Conditions :
2Ah battery capacity
V_{IN}=1.2V
V_{OUT}=3.3V
I_{OUT}=50μA

IC	Battery Life(Days)
BU33UV7NUX Low Power Mode	712
BU33UV7NUX High Power Mode	657
Conventional Product	537

+175
+120

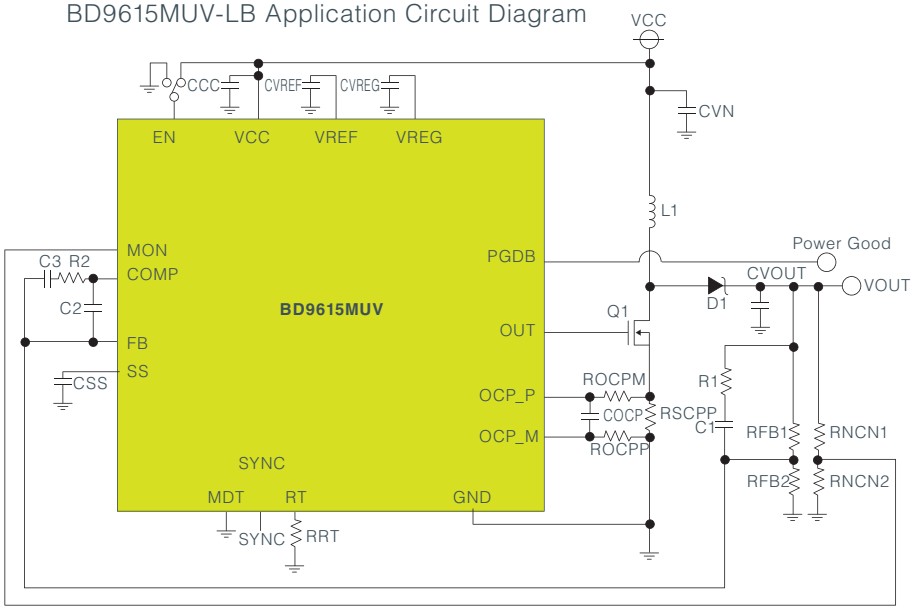
Wide Input Voltage Range Boost Switching Regulator

The BD9615MUV-LB is a low-side Nch FET controller that supports high withstand voltages (60V) for switching regulators, making it suitable for applications requiring low-side FETs such as boost flybacks.

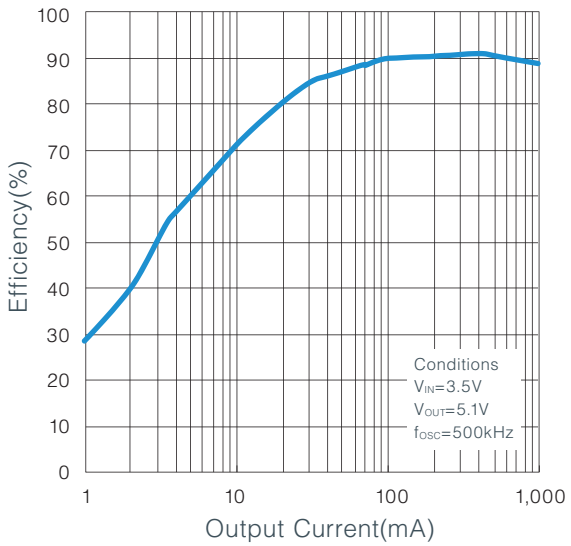
Sample Parameters and Features — BD9615MUV-LB

- Input voltage range : 3.5V to 60V
- Reference voltage : 0.8V±1.5V
- Switching frequency : 100kHz to 2.5MHz
- Guaranteed long-term supply for industrial equipment
- External clock synchronization
- Variable soft start
- ON/OFF control via EN pin
- Overvoltage protection circuit(via independent pin)
- Power Good output
- UVLO adjustment function(via external resistance)
- Max. duty switching function(50%/90%)

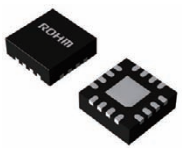
BD9615MUV-LB Application Circuit Diagram



Efficiency vs Load Current



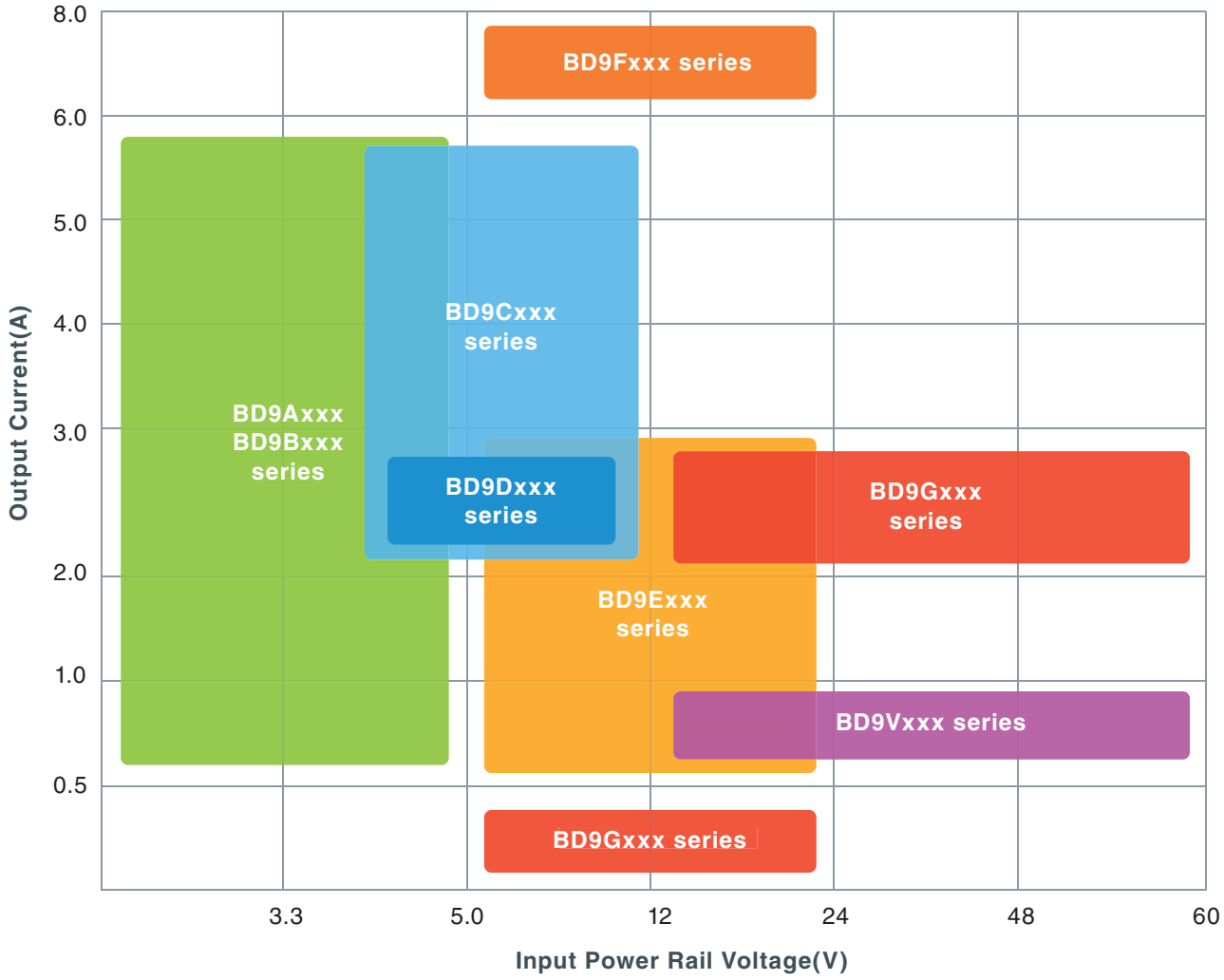
Compact Package



VQFN16KV3030
3.0mm(Typ)×3.0mm(Typ)×1.0mm(Max)

Buck Converters

BD9x Family Lineup



ROHM single output buck DC/DC converters allow designers to select the ideal power supply solution to meet specification requirements through a matrix of input voltage and output current. For the BD9x family, the '9' after the 'BD' in the part number indicates step-down, while the subsequent letter and number denote the maximum rated input voltage and output current, respectively.

Part Number Explanation

B	D	9	A	3	0	0

Topology
9 : Buck
8 : Boost, Boost-Buck, Inverting

Max. Rated Input Voltage and Control Method
A : ≤7V Current Mode
B : ≤7V ON Time
C : ≤20V Current Mode
D : ≤20V ON Time
E : ≤40V Current Mode
F : ≤40V ON Time
G, V : ≤ 80V Current Mode

Output Current
1 : ≤1A
2 : ≤2A
3 : ≤3A
4 : ≤4A
⋮
A: ≤ 10A
⋮
Z : Controller

Serial No.
00/01/02/···

Note : Some products may not comply with the above guidelines

Primary Applications

DC48V

- Industrial Equipment
- Communication Infrastructure, PoE, Telephone Equipment
- Entertainment

BD9Gxxx series P.19
BD9Vxxx series P.19

DC24V

- Industrial Equipment
- Office Equipment, Printers
- Consumer Devices, Home Appliances

BD9Gxxx series P.19
BD9Fxxx series P.17
BD9Exxx series P.17

DC12V

- TVs, Recorders, Tuners
- Projectors, AV Equipment
- PCs, Home Gateways, Routers
- Office Equipment, Printers
- FPGA Reference Boards, Motherboards
- Residential Equipment, Automotive Accessories

BD9Fxxx series P.17
BD9Exxx series P.17
BD9Dxxx series P.15
BD9Cxxx series P.15

DC7.4V (2cell)

- Digital Cameras, Video Recorders
- Portables
- Mobile Phones
- Chargers

BD9Dxxx series P.15
BD9Cxxx series P.15

DC5V

- PC Peripherals
- Storage Equipment
- Secondary/POL Power Supplies

BD9Bxxx series P.13
BD9Axxx series P.13

Buck Converters

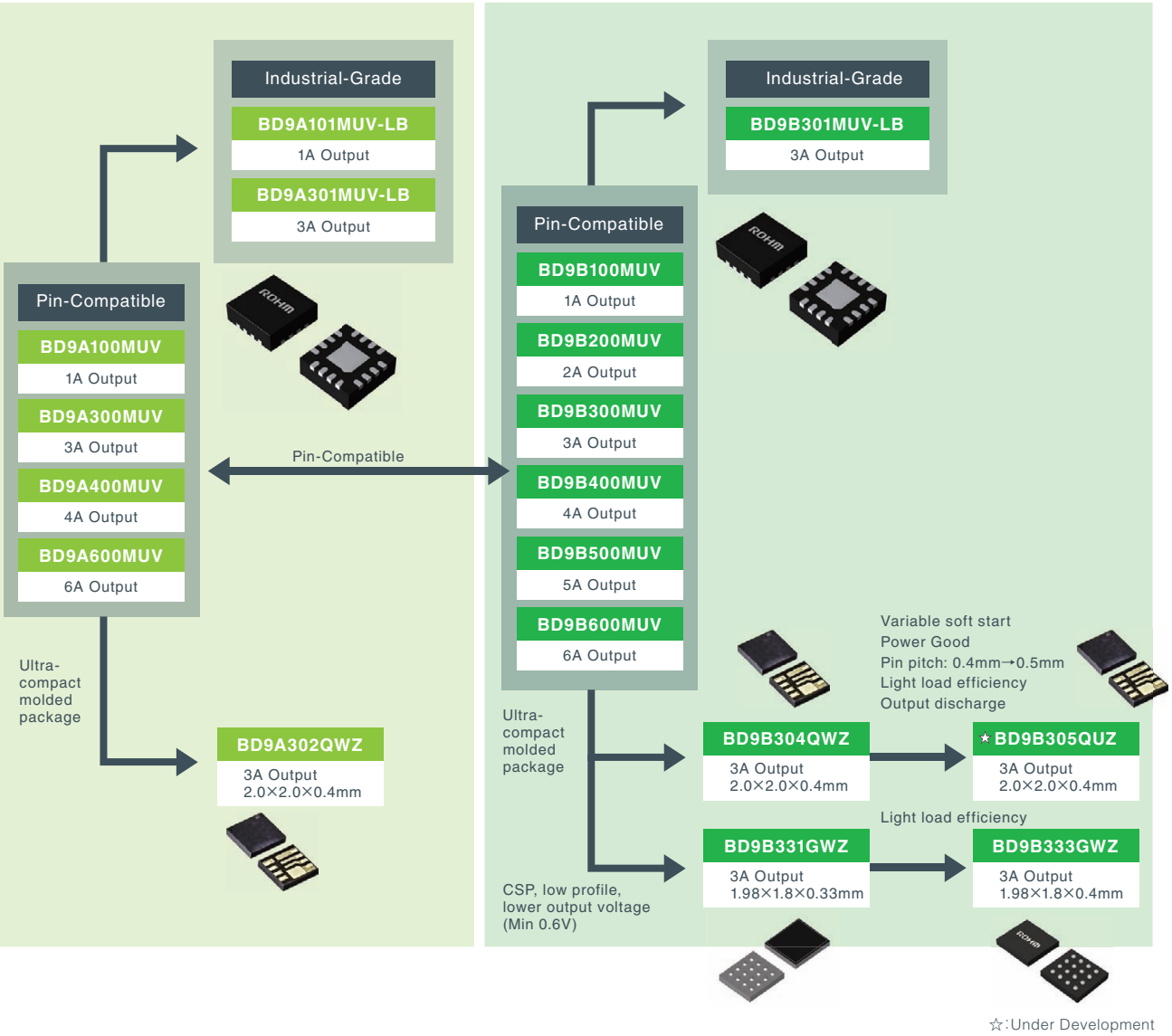
3.3V/5V Input

The BD9Axxx and BD9Bxxx series are designed to generate a low voltage such as 1.8V from 3.3V or 5V power supplies. Pin-compatible models with output currents ranging from 1A to 6A are offered, making it possible to select the optimal IC based on application requirements. When the load current is large operation is carried out at high speed under PWM mode, then automatically switches to light load mode (PFM mode) at smaller load currents. The BD9Bxxx series is the higher performance version of the BD9Axxx series, and replacement is possible with only minor board modifications needed. Changing ICs can be made easier by designing the PCB layout to support both types from the initial stage.

BD9Axxx/BD9Bxxx series

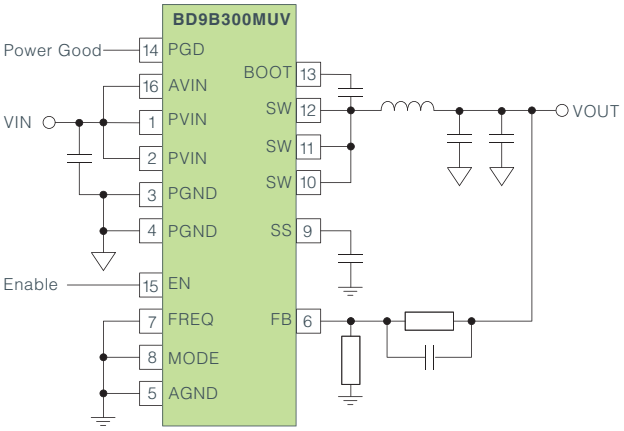
	BD9Axxx series	BD9Bxxx series
Control Method	Current mode	Fixed ON time
Light Load Operation	Light load mode	Deep light load mode
Functions	・Achieves fast transient response through current mode control	・Fixed ON time control proves faster transient response than the BD9Axxx series ・No phase compensation needed ・Higher efficiency than the BD9Axxx series across the entire load range

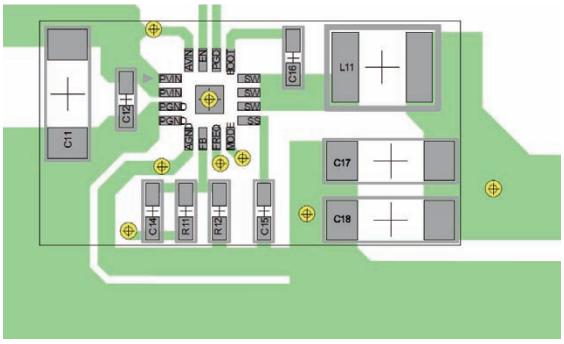
System Diagram



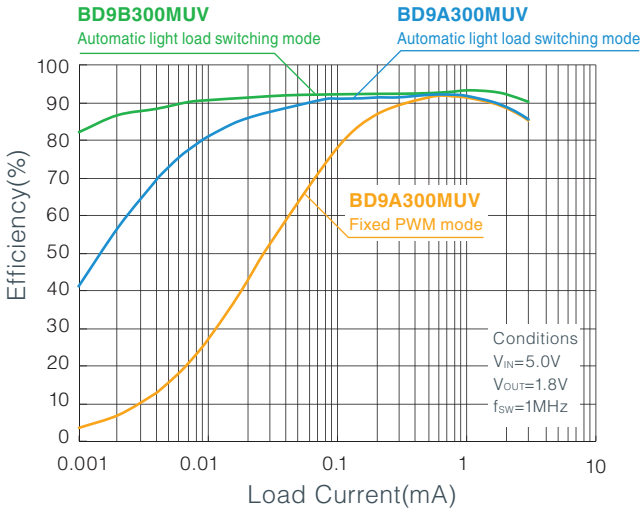
☆:Under Development

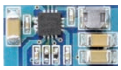
BD9B300MUV Application Circuit Diagram





Efficiency vs Load Current





BD9B300MUV PCB
15mm×8mm=120mm²

BD9Axxx/BD9Bxxx series Specifications

Part No.	Grade		Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions						Operating Temperature (℃)	Package (mm)
	Consumer	Industrial							Power Good	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown		
BD9A100MUV	✓	—	7	1	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	✓	✓	✓	✓	Recovery	Recovery	−40 to +85	VQFN016V3030
BD9A101MUV-LB	—	✓		1											−40 to +125	VQFN016V3030
BD9A300MUV	✓	—		3											−40 to +85	VQFN016V3030
BD9A301MUV-LB	—	✓		3											−40 to +125	VQFN016V3030
BD9A400MUV	✓	—		4											−40 to +85	VQFN016V3030
BD9A600MUV	✓	—		6											−40 to +85	VQFN016V3030
BD9B100MUV	✓	—		1		0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	✓	✓	✓	Recovery	Recovery	−40 to +85	VQFN016V3030
BD9B200MUV	✓	—		2											−40 to +85	VQFN016V3030
BD9B300MUV	✓	—		3											−40 to +85	VQFN016V3030
BD9B301MUV-LB	—	✓		3											−40 to +125	VQFN016V3030
BD9B400MUV	✓	—		4											−40 to +85	VQFN016V3030
BD9B500MUV	✓	—		5											−40 to +85	VQFN016V3030
BD9B600MUV	✓	—		6											−40 to +85	VQFN016V3030
BD9A302QWZ	✓	—		3		0.8 to (V_{IN}×0.7)	1	Current	—	—	✓	✓	Recovery	Recovery	−40 to +85	UMMP008AZ020 (2.0×2.0×0.4)
BD9B304QWZ	✓	—				0.8 to (V_{IN}×0.8)	1 or 2	ON time								
☆**BD9B305QUZ**	✓	—				0.6 to (V_{IN}×0.8)	1	ON time	✓	✓						VMMP08LZ2020 (2.0×2.0×0.4)
BD9B331GWZ	✓	—		3		0.6 to (V_{IN}×0.8)	1.3	ON time	✓	✓	✓	✓	Latch	Recovery	−40 to +85	UCSP30L1 (1.98×1.8×0.33)
BD9B333GWZ	✓	—											Recovery			UCSP35L1 (1.98×1.8×0.4)

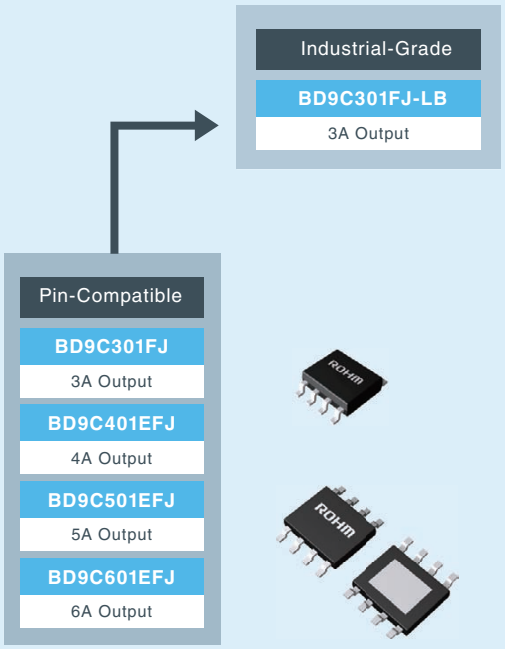
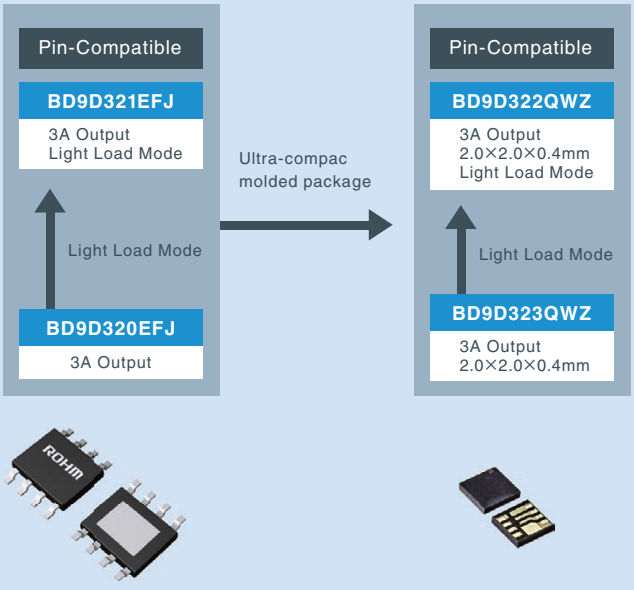
☆:Under Development

Buck Converters

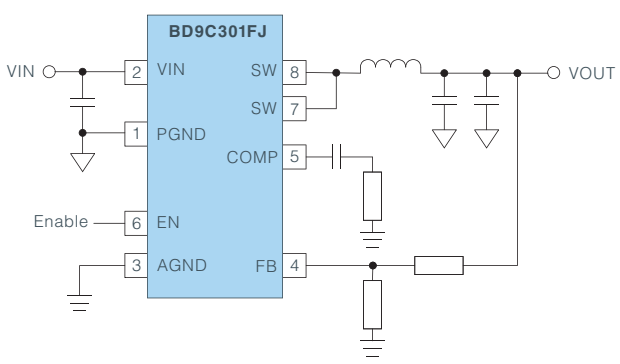
12V Input

The BD9Cxxx and BD9Dxxx series are designed to generate voltages such as 3.3V or 5V from 12V power supplies. The BD9Cxxx series consists of simple current mode buck converters. Pin-compatible models with output currents ranging from 3A to 6A are offered, making it possible to quickly replace the power supply even when the load current specifications change. The BD9Dxx series of fixed ON time mode buck converters provides faster transient response than the BD9Cxxx series. In addition, two types of power supplies, one featuring fixed PWM mode and the other integrating an automatic light load switching mode, can be selected based on system specifications.

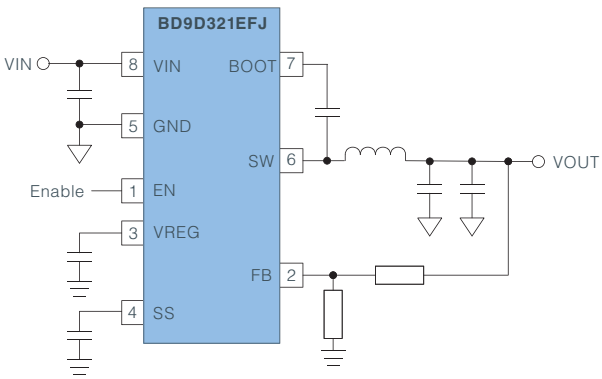
BD9Cxxx/BD9Dxxx series

	BD9Cxxx series	BD9Dxxx series
Control Method	Current Mode	Fixed ON time
Light Load Operation	—	With and without
Functions	·Achieves fast transient response through current mode control	·Fixed ON time control provides faster transient response than current mode control ·No phase compensation needed ·Light load operation ensures high efficiency across the entire load range
System Diagram		

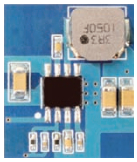
BD9C301FJ Application Circuit Diagram



BD9D321EFJ Application Circuit Diagram



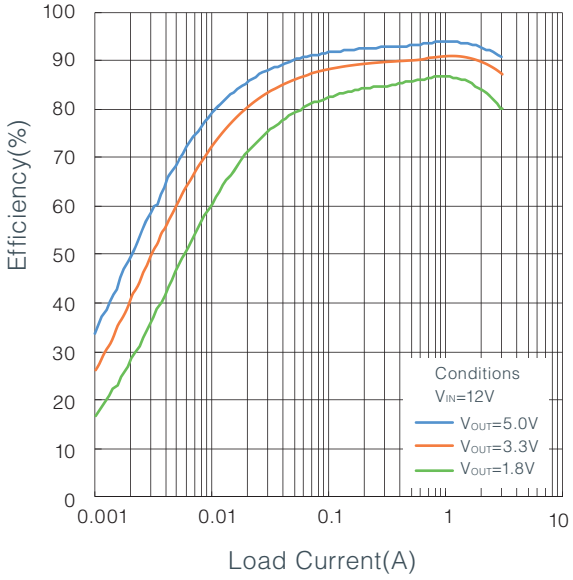
BD9C301FJ PCB
27mm×9mm=243mm²



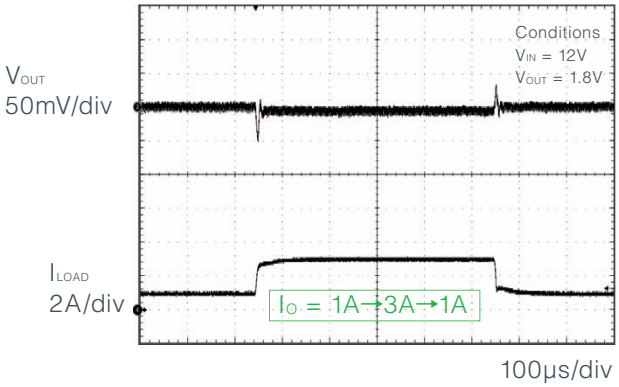
BD9D321EFJ PCB
17mm×20mm=340mm²

BD9D322QWZ PCB
12mm×15mm=180mm²

BD9D321EFJ Efficiency vs Load Current



BD9D321EFJ Transient Response Characteristics



BD9Cxxx/BD9Dxxx series Specifications

Part No.	Grade		Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions						Operating Temperature (℃)	Package (mm)
	Consumer	Industrial							Power Good	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown		
BD9C301FJ	✓	—	20	3	4.5 to 18	(VIN×0.125) to (VIN×0.7) (VIN×0.125)≧ 0.8	0.5	Current	—	—	✓	—	Latch	Recovery	−40 to +85	SOP-J8
BD9C301FJ-LB	—	✓		3											−40 to +125	SOP-J8
BD9C401EFJ	✓	—		4											−40 to +85	HTSOP-J8
BD9C501EFJ	✓	—		5		(VIN×0.075) to (VIN×0.7) (VIN×0.075)≧ 0.8									−40 to +85	HTSOP-J8
BD9C601EFJ	✓	—		6											−40 to +85	HTSOP-J8
BD9D320EFJ	✓	—		3		0.765 to 7.0 (VIN×0.07) to (VIN×0.65)	0.7	ON time	—	✓	✓	—	Recovery	Recovery	−40 to +85	HTSOP-J8
BD9D321EFJ	✓	—		3								✓				HTSOP-J8
BD9D322QWZ	✓	—		3		0.765 to 7.0 (VIN×0.07) to (VIN×0.65)	0.7	ON time	—	✓	✓	✓	Recovery	Recovery	−40 to +85	UMMP008Z2020
BD9D323QWZ	✓	—		3								—				UMMP008Z2020

Buck Converters

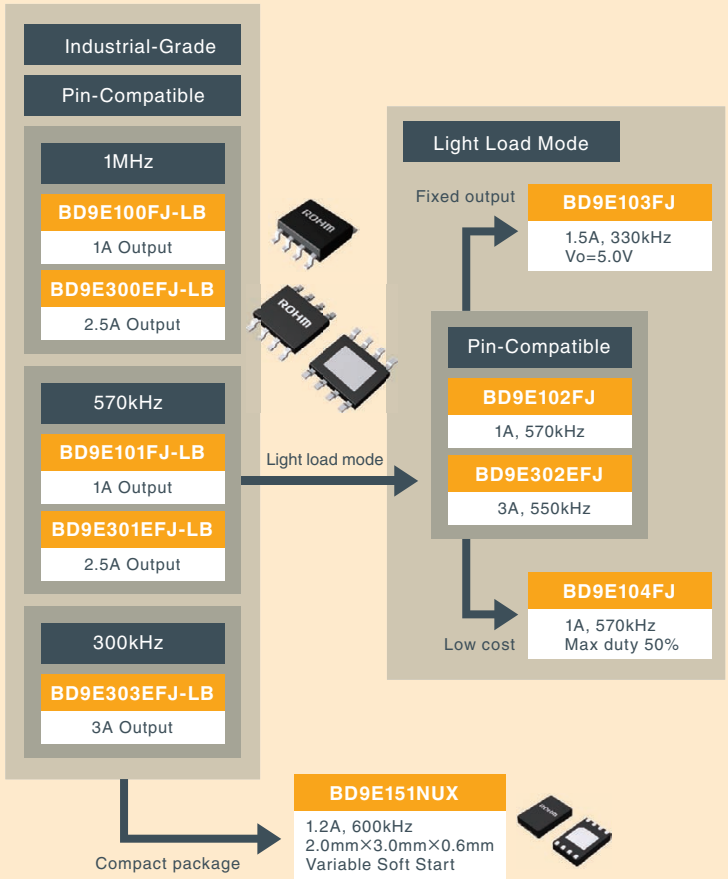
24V Input

The BD9Exxx and BD9Fxxx series are designed to generate voltages such as 3.3V or 5V from 12V or 24V power supplies. The BD9Exxx series consists of simple current mode buck converters. Users can select between 3 different switching frequencies and models with/without light load mode based on application requirements.
The BD9Fxxx series of fixed ON time mode buck converters provides fast transient response.

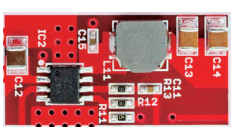
BD9Exxx/BD9Fxxx series

	BD9Exxx series	BD9Fxxx series
Control Method	Current Mode	Fixed ON time
Light Load Operation	With and without	—
Functions	・Current mode control provides fast transient response ・Light load operation ensures high efficiency across the entire load range	・Fixed ON time control provides faster transient response than current mode control ・No phase compensation needed

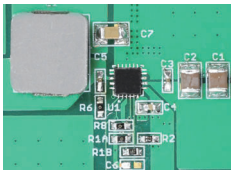
System Diagram



☆:Under Development



BD9E300EFJ-LB PCB
30mm×15mm=450mm²



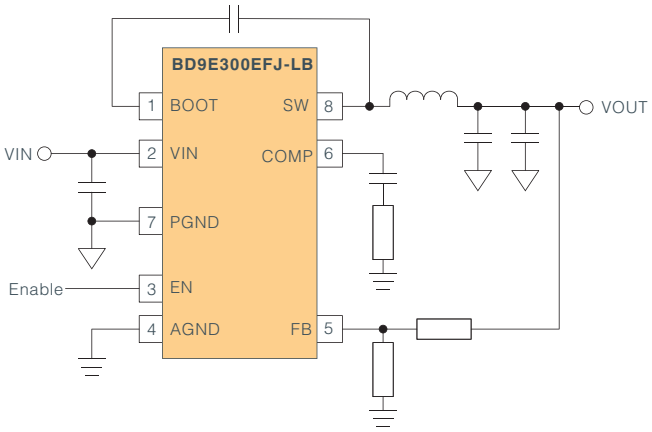
BD9F800MUX PCB
30mm×20mm=600mm²

Selectable based on system requirements

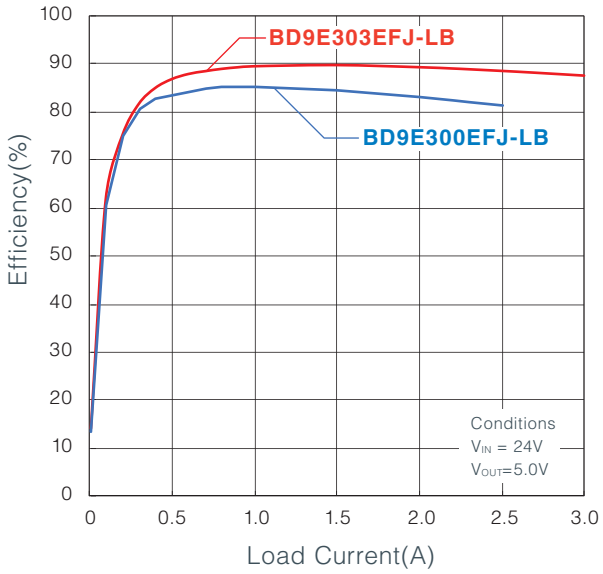
Although the BD9E300EFJ-LB and BD9E303EFJ-LB are buck DC/DC converters compatible with the same 24V power rail input, they were developed using very different concepts. The BD9E300EFJ-LB features high 1MHz switching frequency that saves valuable board space by supporting the use of smaller inductors. In contrast, the BD9E303EFJ-LB integrates a low ON resistance FET and operates at a low switching frequency of 300kHz, ensuring high efficiency and reduced heat generation with low switching loss.

Part No.	Features	Switching Frequency	Inductance	FET ON Resistance	Efficiency	Output Current (A)	Max. Duty Ratio	Min. Duty Ratio	Package Size
BD9E300EFJ-LB	Compact space-saving package	1MHz	4.7μH	170mΩ/ 140mΩ	See below	2.5A	70%	15%	27mm×10mm 270mm²
BD9E303EFJ-LB	Low heat generation	300kHz	10μH	90mΩ/ 80mΩ	See below	3.0A	80%	6%	33mm×15mm 495mm²

BD9E300EFJ-LB Application Circuit Diagram



Efficiency vs Load Current



BD9Exxx/BD9Fxxx series Specifications

Part No.	Grade		Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions							Operating Temperature (℃)	Package (mm)
	Consumer	Industrial							Power Good	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Overvoltage Protection		
BD9E100FJ-LB	—	✓	40	1	7.0 to 36	(VIN×0.15) to (VIN×0.7) (VIN×0.15)≧ 1.0	1	Current	—	—	✓	—	Recovery	Recovery	✓	−40 to +150	SOP-J8
BD9E101FJ-LB	—	✓		1		(VIN×0.0855) to (VIN×0.7) (VIN×0.0855)≧ 1.0	0.57										SOP-J8
BD9E300EFJ-LB	—	✓		2.5		(VIN×0.15) to (VIN×0.7) (VIN×0.15)≧ 1.0	1										HTSOP-J8
BD9E301EFJ-LB	—	✓		2.5		(VIN×0.0855) to (VIN×0.7) (VIN×0.0855)≧ 1.0	0.57										HTSOP-J8
BD9E303EFJ-LB	—	✓		3		(VIN×0.06) to (VIN×0.8) (VIN×0.06)≧ 1.0	0.3										HTSOP-J8
☆**BD9F500QUZ**	✓	—	39	5	4.5 to 36	0.6 to 14 *1	0.6/1/2.2	ON time	✓	✓	✓	✓	Recovery	Recovery	✓	−40 to +85	VMMP16LZ3030 (3.0×3.0×0.4)
BD9E102FJ	✓	—	30	1	7.0 to 26	(VIN×0.143) to (VIN×0.7) (VIN×0.143)≧ 1.0	0.57	Current	—	—	✓	✓	Recovery	Recovery	✓	−40 to +85	SOP-J8
BD9E302EFJ	✓	—		3	7.0 to 28		0.55										HTSOP-J8
BD9E104FJ	✓	—		1	7.0 to 26	(VIN×0.143) to (VIN×0.5) (VIN×0.143)≧ 1.0	0.57										SOP-J8
BD9E103FJ	✓	—		1.5	7.0 to 28	5.0	0.33										SOP-J8
BD9E151NUX	✓	—	30	1.2	6.0 to 28	(VIN×0.06) to (VIN×0.7) *1 (VIN×0.06)≧ 1.0	0.6	Current	—	✓	—	—	Recovery	Recovery	✓	−40 to +85	VSON008X2030
BD9F800NUX	✓	—	30	8	4.5 to 28	0.765 to 13.5 *1	0.3/0.6	ON time	✓	—	✓	—	Recovery	Recovery	—	−40 to +85	VQFN11X3535A

*1 : Limitations will exist depending on the input/output voltage conditions.

☆:Under Development

Buck Converters

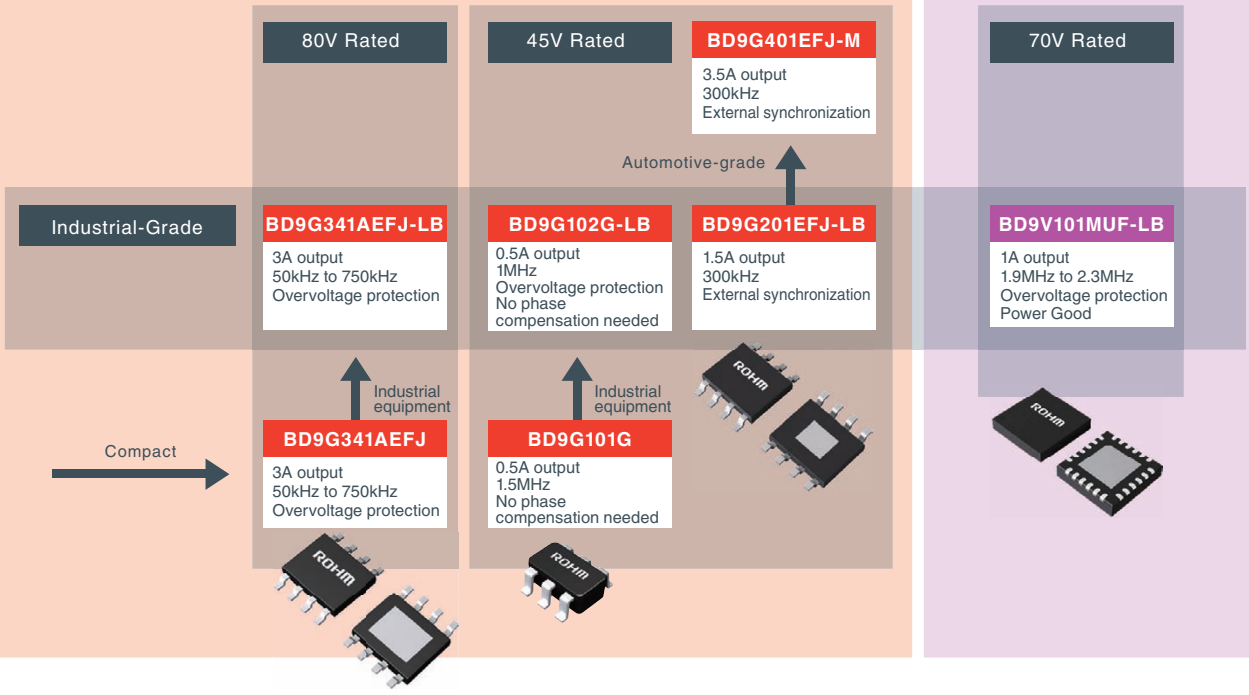
Wide Input Voltage Range: 24V/48V/60V

The BD9Gxxx series of simple current mode buck converters is designed to generate intermediate voltages of 12V or 24V from 42V and 48V power supplies. The BD9G341AEFJ features a rated current of 80V (76V input) that ensures sufficient margin even for 48V bus lines used in communication infrastructure applications, making it easy to achieve safe power supply designs for high voltage sets including phones, routers, and base stations. The BD9Vxxx series utilizes ROHM's ultra-fast pulse control technology Nano Pulse Control® to deliver the industry's highest step-down ratio. This makes it possible to generate 2.5V from a 60V power supply using a single IC, contributing to set miniaturization and simpler system design.

BD9Gxxx/BD9Vxxx series

	BD9Gxxx series	BD9Vxxx series
Control Method	Current mode	Current mode
Light Load Operation	Asynchronous rectification	Synchronous rectification
Functions	・Achieves fast transient response through current mode control	・High step-down ratio enables direct conversion from high voltage to low voltage ・Synchronous rectification eliminates the need for an external diode

System Diagram

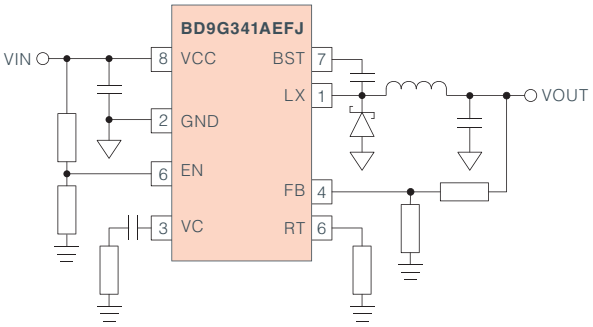


BD9Gxxx/BD9Vxxx series Specifications

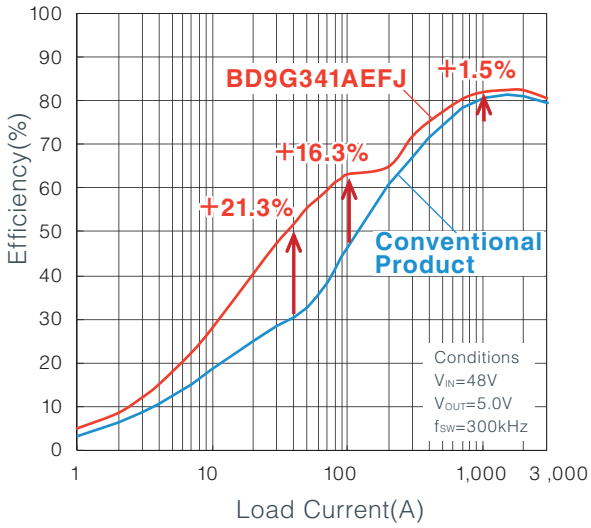
Part No.	Grade			Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Operating Temperature (℃)	Package (mm)
	Consumer	Industrial	Automotive							Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Overvoltage Protection		
BD9G101G	✓	—	—	45	0.5	6.0 to 42	(V_{IN}×0.15) to (V_{IN}×0.7) (V_{IN}×0.15)≧ 1.0	1.5	Current	—	—	—	—	—	Recovery	Recovery	—	−40 to +105	SSOP6
BD9G102G-LB	—	✓	—				(V_{IN}×0.08) to (V_{IN}×0.8) (V_{IN}×0.08)≧ 0.75	1									✓	−40 to +85	SSOP6
BD9G201EFJ-LB	—	✓	—		1.5	4.5 to 42	0.8 to V_{IN} *1	0.3	Current	—	✓	—	—	—	Recovery	Recovery	—	−40 to +105	HTSOP-J8ES
BD9G401EFJ-M	—	—	✓		3.5														HTSOP-J8ES
BD9V101MUF-LB	—	✓	—	70	1	16 to 60	0.8 to 5.5	1.9 to 2.3	Current	✓	—	—	✓	—	Recovery	Recovery	✓	−40 to +150	VQFN24FV4040
BD9G341AEFJ	✓	—	—	80	3	12 to 76	1.0 to V_{IN} *1	0.05 to 0.75	Current	—	—	—	—	—	Recovery	Recovery	✓	−40 to +85	HTSOP-J8
BD9G341AEFJ-LB	—	✓	—																HTSOP-J8

*1 : Limitations will exist depending on the input/output voltage conditions.

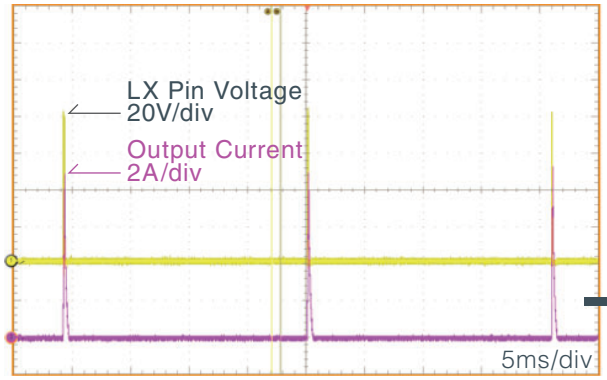
BD9G341AEFJ Application Circuit Diagram



BD9G341AEFJ Efficiency vs Load Current

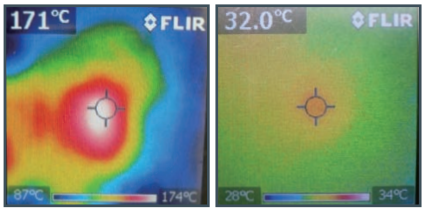


BD9G341AEFJ



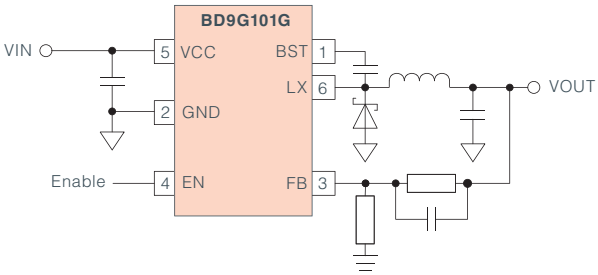
When the output is shorted, overcurrent protection in hiccup mode prevents breakdown by suppressing heat generation within the IC

Conventional Product **BD9G341AEFJ**

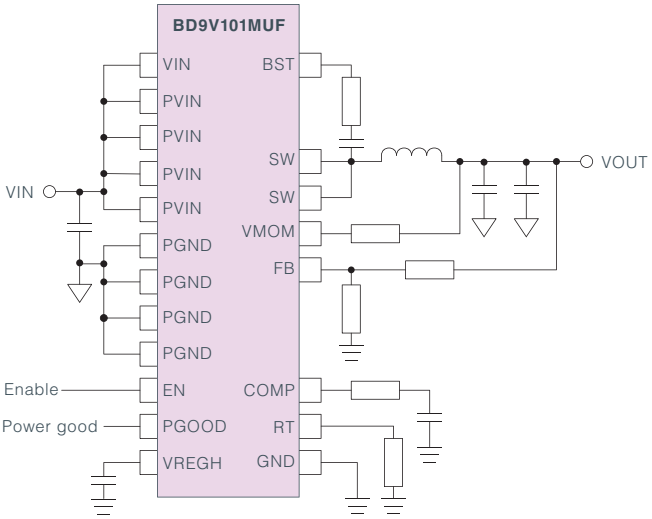


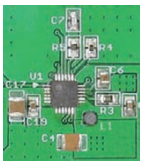
IC surface temperature when the output is shorted

BD9G101G Application Circuit Diagram



BD9V101MUF-LB Application Circuit Diagram





BD9V101MUF-LB PCB
18mm×20mm=360mm²

Buck Controller(with External Switch FET)

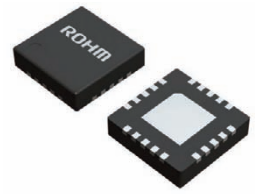
The BD9611MUV 56V (Max.) input buck controller is a 60V rated

synchronous rectification buck DC/DC controller featuring a wide input voltage range that supports high voltages. Control circuitry is built in (based on PWM/voltage mode), along with 2 external 10V Nch FET drive circuits. Additional features include an adjustment function for the oscillation frequency and soft start time, overcurrent protection function, and external clock synchronization function that provide superior design flexibility. Furthermore, a low input malfunction prevention circuit (EXUVLO) with high accuracy reference voltage is connected to the CTL pin, which can be adjusted by the resistance ratio between V_{CC} and GND. Also, pre-bias is enabled that suppresses current draw from the output side during startup.

Sample Parameters and Features

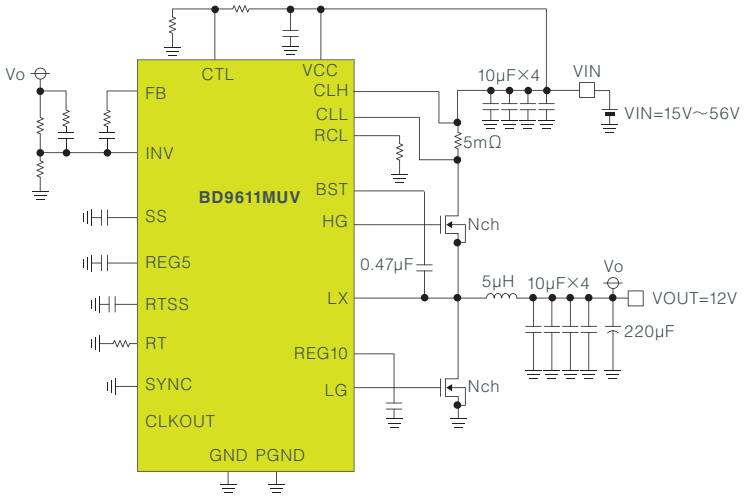
BD9611MUV

- Input voltage range : 10V to 56V(Rated 60V)
- Output voltage range : 1.0V to (V_{IN}×0.8)V
- Reference voltage : 0.8V±1.0%
- Built-in external Nch FET drive circuit
- Gate drive voltage : 9V to 11V
- Supports pre-bias
- Variable soft start prevents inrush current during power ON
- Adjustable operating frequency from 50kHz to 500kHz
- UVLO value settable using external parts
- External clock synchronization possible
- Synchronous operation of multiple output channels enabled using multiple ICs
- Multiple protection circuits : Over Current Protection (OCP), Thermal Shutdown (TSD), Under Voltage Lock Out (UVLO)

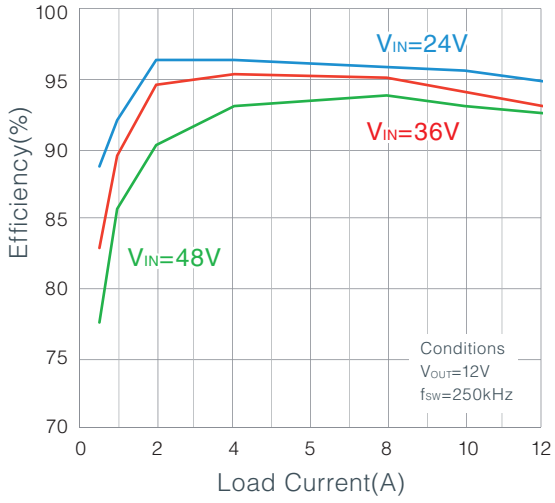


Exposed pad ensures excellent heat dissipation characteristics

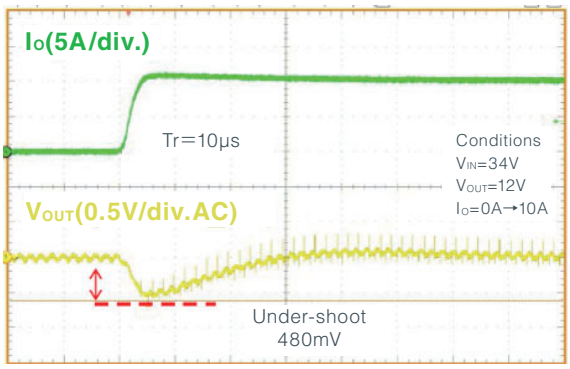
BD9611MUV Application Circuit Diagram



BD9611MUV Efficiency vs Load Current



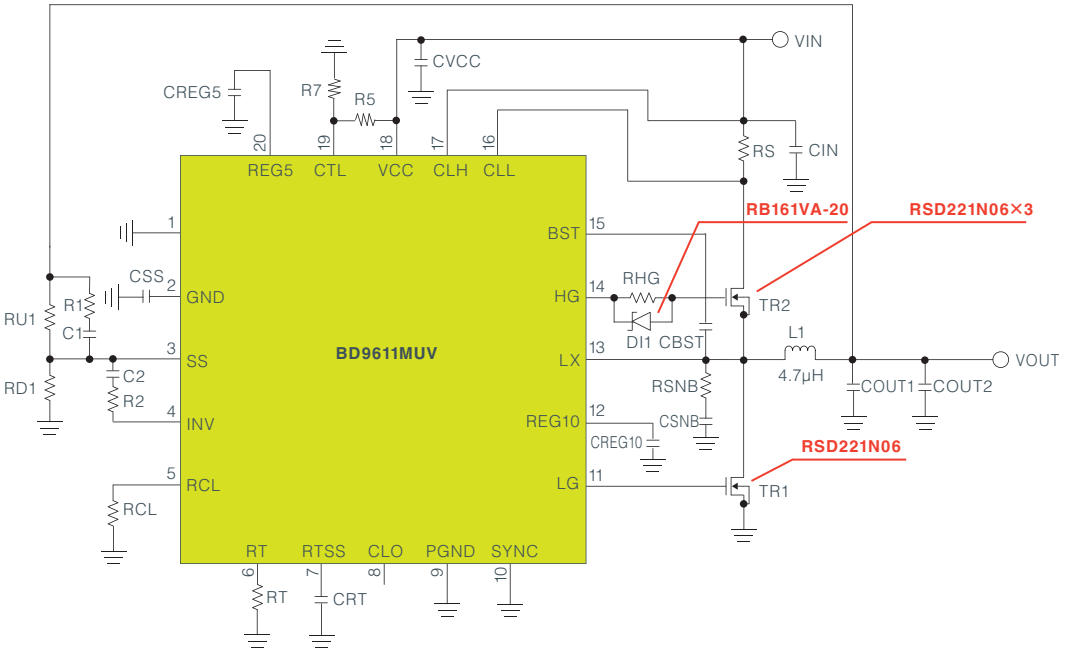
BD9611MUV Transient Response Characteristics



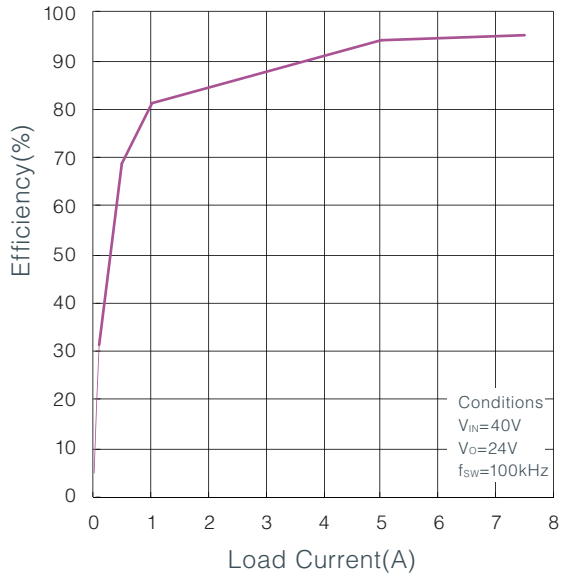
200W Power Supply Solution

- Input voltage : 40V
- Output voltage : 24V
- Output current : 0.01A to 8A
- Switching frequency : 100kHz

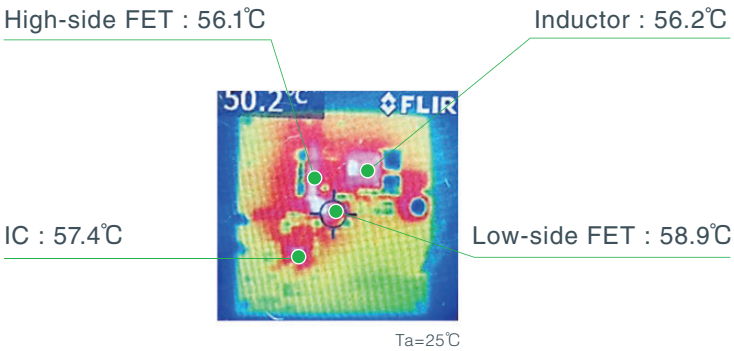
BD9611MUV 200W Output Application Circuit Diagram



BD9611MUV Efficiency vs Load Current



PCB Temperature Distribution



Ta=25℃

Isolated DC/DC Power Supplies

Flyback Converters

The BD7F100HFN-LB and BD7F100EFJ-LB are newly developed isolated flyback DC/DC converter ICs that stabilize the secondary output by controlling the flyback voltage of the primary side, eliminating the need for a return path from the output. As a result, optocouplers typically required to isolate the feedback circuit in general-purpose isolated converters are no longer needed, reducing costs and improving reliability by decreasing the number of limited life components. In terms of performance, high-speed load response is achieved by utilizing adaptive ON time control, while light load mode ensures high efficiency across the entire load range. In addition, cross-regulation is significantly improved, making them ideal for isolated power supplies in a variety of industrial equipment, such as for isolated gate drivers in inverters.

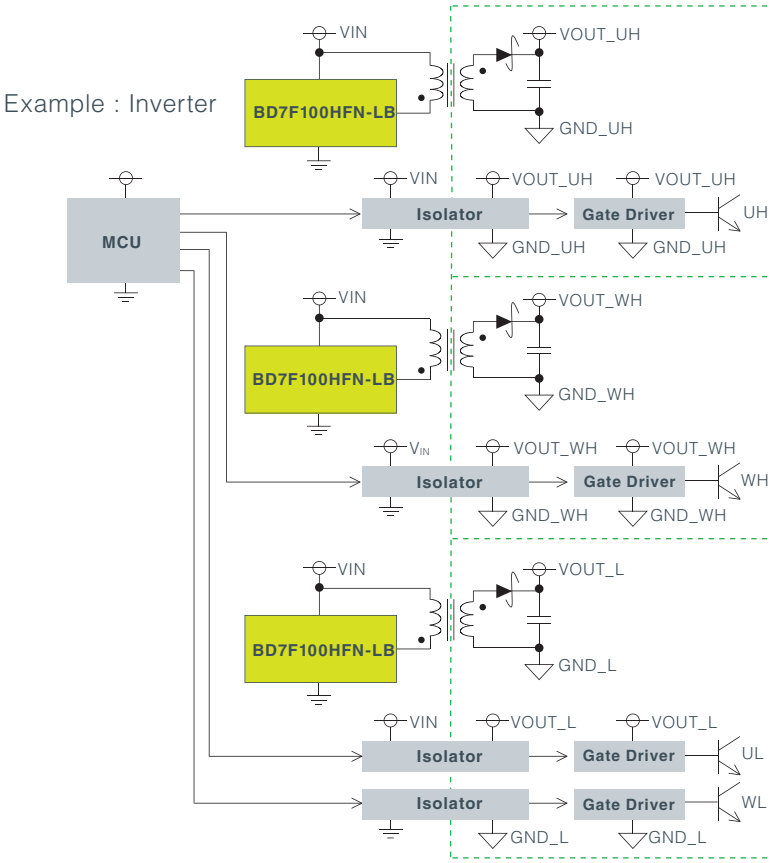
Sample Parameters and Features — BD7F100HFN-LB/BD7F100EFJ-LB

- Input voltage range：3.0V to 40V(45V rating)
- Switch pin voltage ：50V(60V rating)
- Switch current limit ：1.25A
- Operating frequency ：400kHz
- Reference voltage ：±1.5%
- High-speed load response achieved through adaptive ON time control
- Fixed frequency operation facilitates EMC countermeasures
- Automatic light load mode provides high efficiency across the entire load range
- Eliminates the need for parts that cross the isolation boundary, improving functional safety
- No limited life parts required ensures long-term operation
- Supports multi-output configuration with superior cross regulation
- Integrates a load compensation function for secondary Schottky barrier diodes
- Output voltage can be set by 2 external resistors and the transformer winding ratio
- Built-in soft start function
- Multiple protection circuits

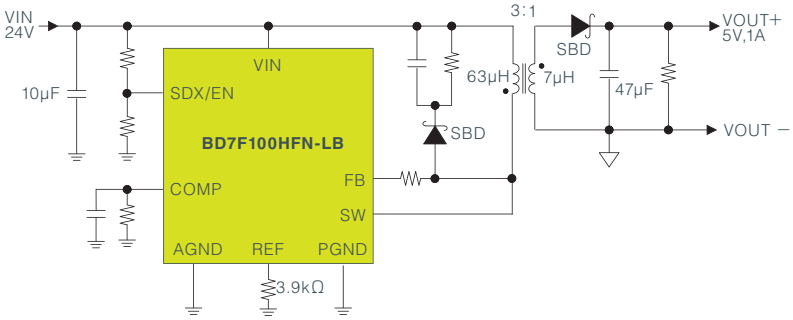
  Over Current Protection (OCP), Thermal Shutdown (TSD), Under Voltage Lock Out (UVLO)

BD7F100HFN-LB
HSON8
2.90mm×3.00mm×0.60mm

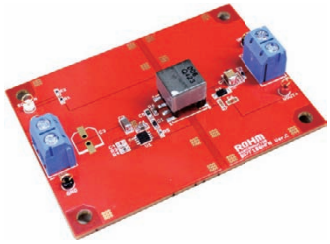
BD7F100EFJ-LB
HTSOP-J8
4.90mm×6.00mm×1.00mm



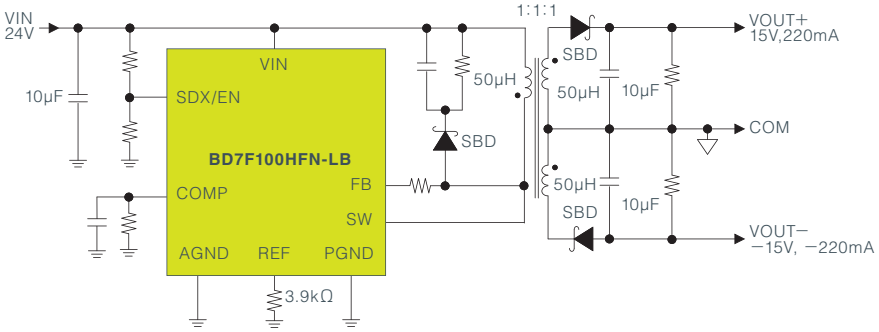
BD7F100HFN-LB Application Circuit Diagram 24V→5V



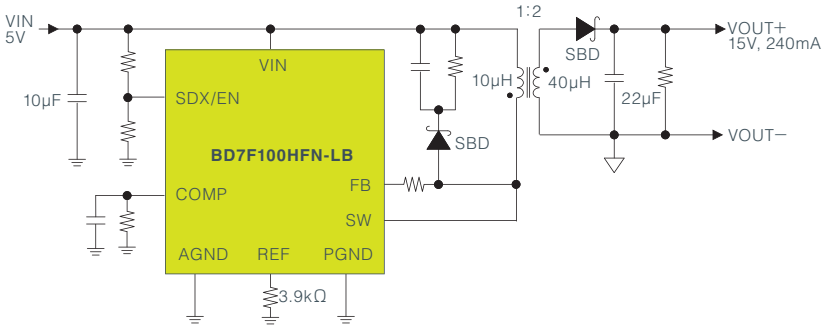
BD7F100HFN-LB Evaluation Board



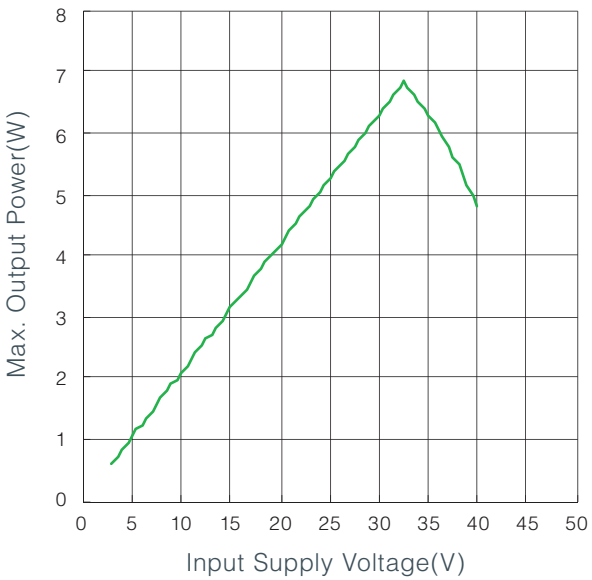
BD7F100HFN-LB Application Circuit Diagram 24V→±15V



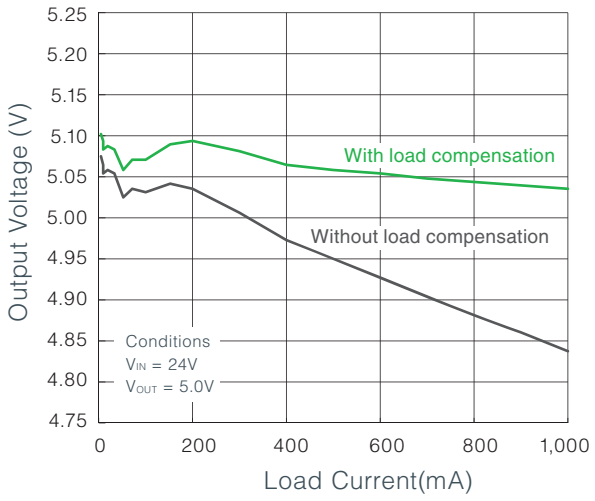
BD7F100HFN-LB Application Circuit Diagram 5V→5V



BD9F100HFN-LB
Max. Output Power vs Input Supply Voltage



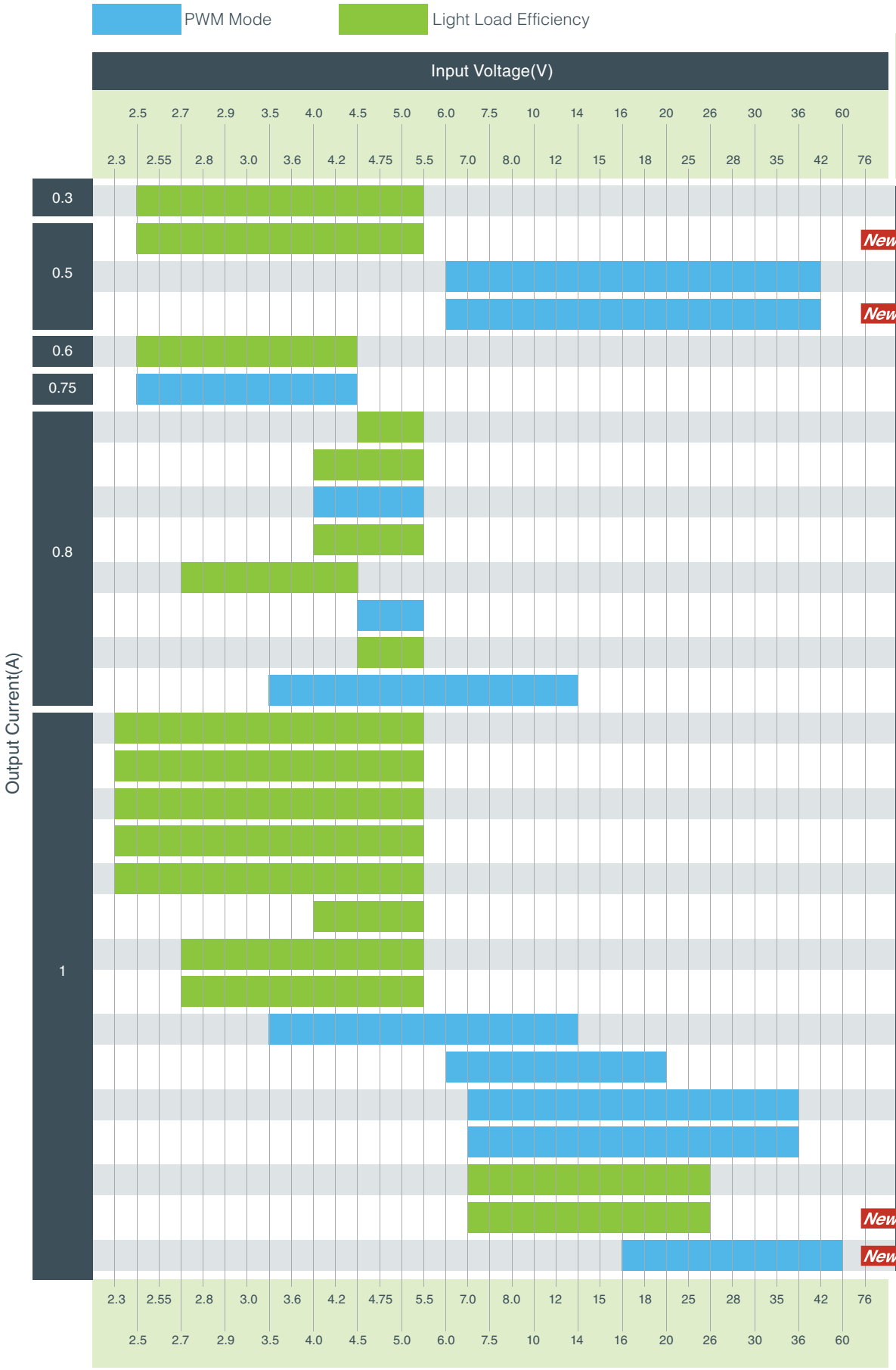
Effects of ROHM's Load Compensation Function



The load compensation function corrects output voltage drops due to the Vf characteristics of the secondary Schottky barrier diode depending on the load current

Single Output Buck Converter Selection Guide

<1A Output



	Part No.	Rated Input (V)
	BD9122GUL	7
New	BD70522GUL	6
	BD9G101G	45
New	BD9G102G-LB	45
	BD9161FVM BD9161FVM-LB	7
	BU9006GUZ	7
	BD9109FVM BD9109FVM-LB	7
	BD9102FVM	7
	BD8966FVM	7
	BD9106FVM BD9106FVM-LB	7
	BD9120HFN	7
	BD8967FVM	7
	BD9104FVM	7
	BD8312HFN	15
	BU90008GWZ BU90003GWZ	7
	BU90007GWZ BU90009GWZ	7
	BU90004GWZ BU90104GWZ	7
	BU90054GWZ	7
	BU90005GWZ BU90006GWZ	7
	BU90002GWZ	7
	BD9A100MUV BD9A101MUV-LB	7
	BD9B100MUV	7
	BD8313HFN	15
	BD9227F	22
	BD9E100FJ-LB	40
	BD9E101FJ-LB	40
	BD9E102FJ	30
New	BD9E104FJ	30
New	BD9V101MUF-LB	70

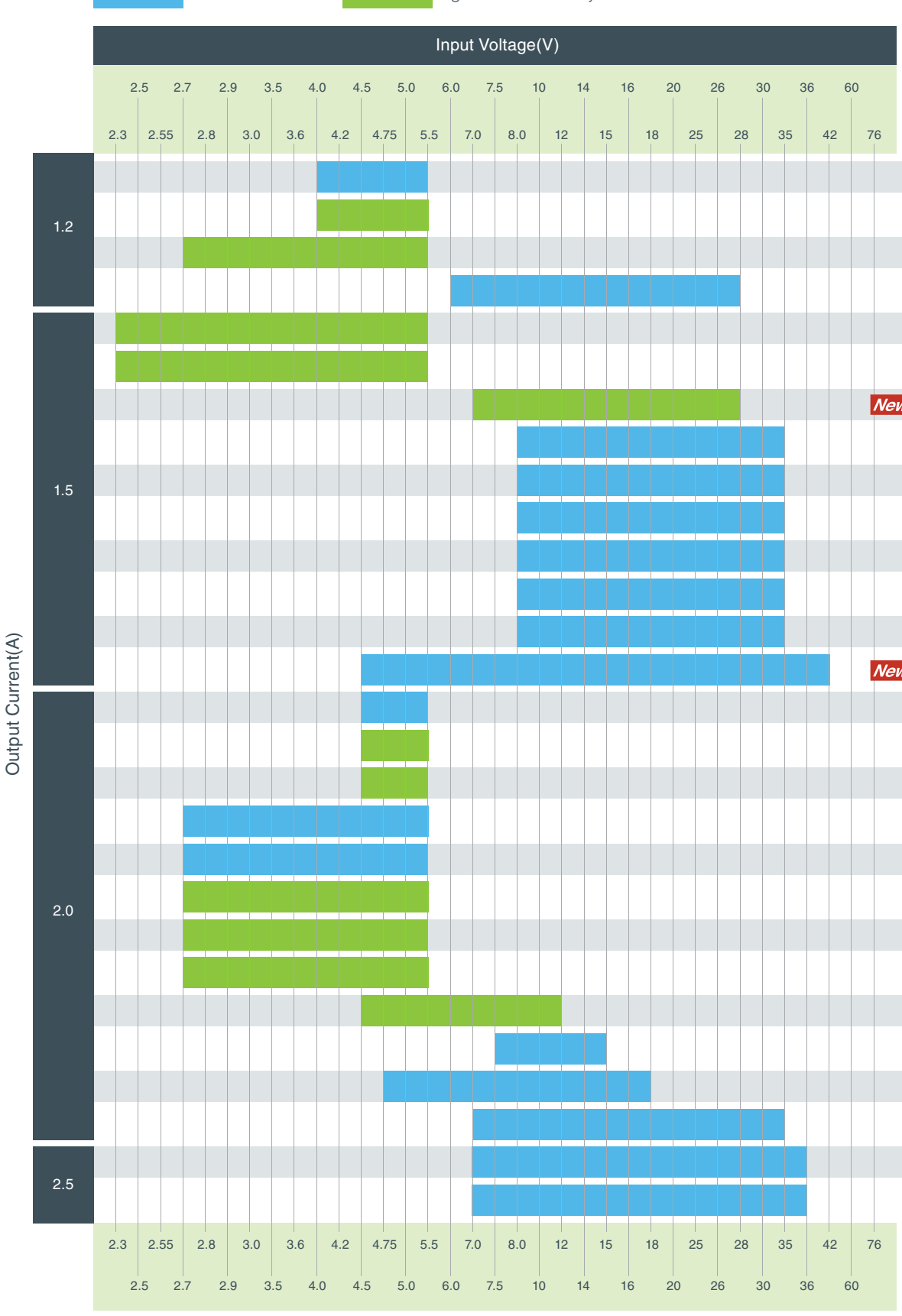
*1 : Limitations will exist depending on the input/output voltage conditions.

Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (℃)	Package (mm)
					Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
0.3	2.5 to 5.5	1.0 to 2.0	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	VCSP50L2 (2.5×1.1)
0.5	2.5 to 5.5	1.2 to 3.3*1	1	ON time	✓	—	—	✓	✓	Recovery	Recovery	—	Output discharge, 100% duty, output voltage setting via pin selection	−40 to +85	VCSP50L1C (1.76×1.56×0.57)
0.5	6 to 42	(V_{IN}×0.15) to (V_{IN}×0.7) (V_{IN}×0.15)≧1.0	1.5	Current	—	—	—	—	—	Recovery	Recovery	—	—	−40 to +105	SSOP6
0.5	6 to 42	(V_{IN}×0.008) to (V_{IN}×0.8) (V_{IN}×0.008)≧0.75	1	Current	—	—	—	—	—	Recovery	Recovery	✓	—	−40 to +85	SSOP6
0.6	2.5 to 4.5	1.0 to 3.3	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
0.75	2.5 to 4.5	0.95 to V_{IN}	2	Current	—	—	—	✓	—	Recovery	Recovery	—	Built-in input/output bypass switch, 100% duty	−35 to +85	VCSP35L1 (1.6×1.6×0.4)
0.8	4.5 to 5.5	3.3	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	4 to 5.5	1.24	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	4 to 5.5	1.0 to 2.5	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	4 to 5.5	1.0 to 2.5	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	2.7 to 4.5	1.0 to 1.5	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	HSON8
0.8	4.5 to 5.5	3.3	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	4.5 to 5.5	3.3	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
0.8	3.5 to 14	1.2 to 12.0	1.5	Voltage	—	—	—	✓	—	—	Recovery	—	—	−25 to +85	HSON8
1	2.3 to 5.5	1.0 1.2	3.6 4	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UCSP35L1 (1.3×0.9×0.4)
1	2.3 to 5.5	1.25 1.3	4 4.2	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UCSP35L1 (1.3×0.9×0.4)
1	2.3 to 5.5	1.8	5.4	ON time	—	—	—	✓	✓	Recovery	Recovery	—	Max. output capacitance10μF Max. output capacitance100μF	−40 to +85	UCSP35L1 (1.3×0.9×0.4)
1	2.3 to 5.5	1.8	5.4	ON time	—	—	—	✓	✓	Recovery	Recovery	—	Max. output capacitance10μF	−40 to +85	UCSP30L1 (1.3×0.9×0.33)
1	2.3 to 5.5	2.5 3.0	6	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UCSP35L1 (1.3×0.9×0.4)
1	4 to 5.5	3.3	6	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UCSP35L1 (1.3×0.9×0.4)
1	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85 −40 to +125	VQFN016V3030
1	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
1	3.5 to 14	1.2 to 12.0	1	Voltage	—	—	—	✓	—	—	Recovery	—	—	−40 to +85	HSON8
1	6 to 20	(V_{IN}×0.252) to V_{IN} (V_{IN}×0.252)≧1.0	1	Current	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	SOP8
1	7 to 36	(V_{IN}×0.15) to (V_{IN}×0.7) (V_{IN}×0.15)≧1.0	1	Current	—	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	SOP-J8
1	7 to 36	(V_{IN}×0.0855) to (V_{IN}×0.7) (V_{IN}×0.0855)≧1.0	0.57	Current	—	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	SOP-J8
1	7 to 26	(V_{IN}×0.143) to (V_{IN}×0.7) (V_{IN}×0.143)≧1.0	0.57	Current	—	—	—	✓	✓	Recovery	Recovery	✓	—	−40 to +85	SOP-J8
1	7 to 26	(V_{IN}×0.143) to (V_{IN}×0.5) (V_{IN}×0.143)≧1.0	0.57	Current	—	—	—	✓	✓	Recovery	Recovery	✓	—	−40 to +85	SOP-J8
1	16 to 60	0.8 to 5.5	1.9 to 2.3	Current	✓	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	VQFN24FV4040

Next Page >1.2A Output

Single Output Buck Converter Selection Guide

1.2A to 2.5A Output



Part No.	Rated Input (V)
BD8964FVM	7
BD9107FVM	7
BD9123MUV	7
BD9E151NUX	30
BU90023NUX	7
BU90028NUX	7
New BD9E103FJ	30
BD9701CP-V5	36
BD9701FP	36
BD9703CP-V5	36
BD9703FP	36
BD9870FPS	36
BD9873CP-V5	36
New BD9G201EFJ-LB	45
BD8961NV	7
BD9111NV	7
BD9110NV	7
BD89630EFJ	7
BD8960NV	7
BD9130EFJ	7
BD9130NV	7
BD9B200MUV	7
BD9141MUV	15
BD95821MUV	15.2
BD9325FJ BD9325FJ-LB	20
BD9778HFP	36
BD9E300EFJ-LB	40
BD9E301EFJ-LB	40

*1 : Limitations will exist depending on the input/output voltage conditions.

<1A Output
Previous Page

Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (°C)	Package
					Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
1.2	4 to 5.5	1.0 to 1.8	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +85	MSOP8
1.2	4 to 5.5	1.0 to 1.8	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +85	MSOP8
1.2	2.7 to 5.5	0.85 to 1.2	1	Current	✓	—	—	✓	✓	Latch	Latch	—	Output voltage setting via 3bit parallel control	−40 to +95	VQFN016V3030
1.2	6 to 28	(V_{IN}×0.06) to (V_{IN}×0.7)*1 (V_{IN}×0.06)≧1.0	0.6	Current	—	—	✓	—	—	Recovery	Recovery	✓	—	−40 to +85	VSON008X2030
1.5	2.3 to 5.5	1.23	1	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	VSON008X2030
1.5	2.3 to 5.5	1.175	1	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	VSON008X2030
1.5	7 to 28	5.0	0.33	Current	—	—	—	✓	✓	Recovery	Recovery	✓	Without Enable	−40 to +85	SOP-J8
1.5	8 to 35	1.0 to (V_{IN}−3.0)	0.1	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO220CP-V5
1.5	8 to 35	1.0 to (V_{IN}−3.0)	0.1	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO252-5
1.5	8 to 35	1.0 to (V_{IN}−3.0)	0.3	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO220CP-V5
1.5	8 to 35	1.0 to (V_{IN}−3.0)	0.3	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO252-5
1.5	8 to 35	1.0 to (0.8×(V_{IN}−I_O×R_{ON})	0.9	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO252S-5
1.5	8 to 35	1.0 to (0.8×(V_{IN}−I_O×R_{ON})	0.11	Voltage	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +85	TO220CP-V5
1.5	4.5 to 42	0.8 to V_{IN} *1	0.3	Current	—	✓	—	—	—	Recovery	Recovery	—	—	−40 to +105	HTSOP-J8ES
2	4.5 to 5.5	3.3	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +105	SON008V5060
2	4.5 to 5.5	3.3	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +105	SON008V5060
2	4.5 to 5.5	1.0 to 2.5	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +105	SON008V5060
2	2.7 to 5.5	1.0 to 2.5 *1	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +85	HTSOP-J8
2	2.7 to 5.5	1.0 to 2.5 *1	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +105	SON008V5060
2	2.7 to 5.5	1.0 to 2.5 *1	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +105	HTSOP-J8
2	2.7 to 5.5	1.0 to 2.5 *1	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−25 to +105	SON008V5060
2	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
2	4.5 to 13.2	2.5 to 6.0 *1	0.5	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +105	VQFN020V4040
2	7.5 to 15	0.8 to (V_{IN}×0.5) (V_{IN}×0.5)≦5.5	0.5 to 0.8	ON time	✓	—	—	✓	—	Latch	Recovery	✓	—	−20 to +100	VQFN016V3030
2	4.75 to 18	0.9 to (V_{IN}×0.9)	0.38	Current	—	—	✓	—	—	Recovery	Recovery	—	—	−40 to +85	SOP-J8
2	7 to 35	(V_{IN}×0.06) to V_{IN} (V_{IN}×0.06)≧1.0	0.05 to 0.5	Current	—	—	—	—	—	Recovery	Recovery	—	100% duty	−40 to +125	HRP7
2.5	7 to 36	(V_{IN}×0.15) to (V_{IN}×0.7) (V_{IN}×0.15)≧1.0	1	Current	—	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	HTSOP-J8
2.5	7 to 36	(V_{IN}×0.0855) to (V_{IN}×0.7) (V_{IN}×0.0855)≧1.0	0.57	Current	—	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	HTSOP-J8

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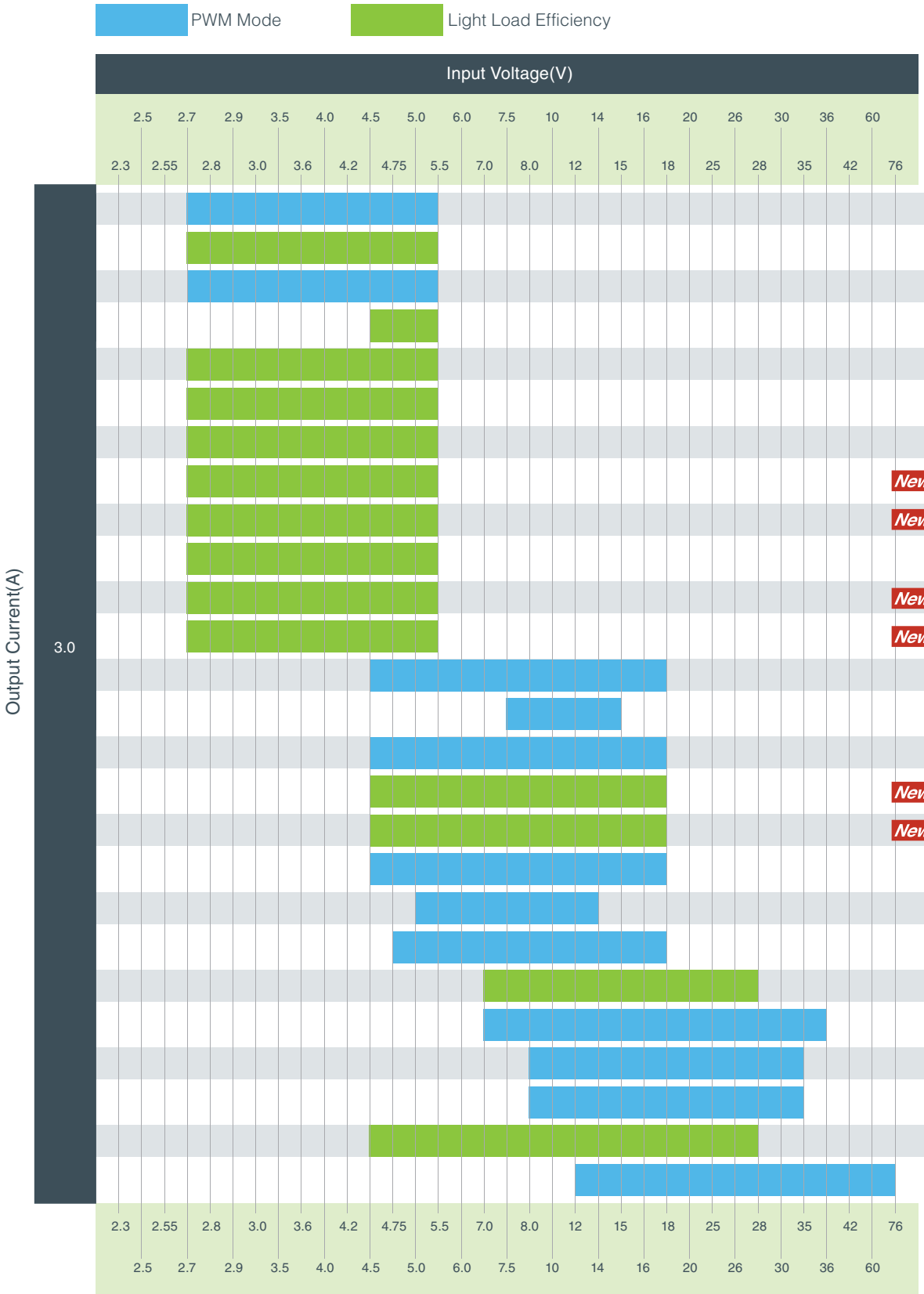
Single Output Buck Converter Selection Guide

3A Output



Part No.	Rated Input (V)
BD8962MUV	7
BD9132MUV	7
BD8963EFJ	7
BD9134MUV	7
BD9139MUV	7
BD9A300MUV BD9A301MUV-LB	7
BD9B300MUV BD9B301MUV-LB	7
New BD9A302QWZ	7
New BD9B304QWZ	7
☆ BD9B305QUZ	7
New BD9B331GWZ	7
New BD9B333GWZ	7
BD9C301FJ BD9C301FJ-LB	20
BD95831MUV	15.2
BD9D320EFJ	20
New BD9D321EFJ	20
New BD9D322QWZ	20
BD9D323QWZ	20
BD9859EFJ	15
BD9326EFJ BD9326EFJ-LB	20
BD9E302EFJ	30
BD9E303EFJ-LB	40
BD9702CP-V5	36
BD9874CP-V5	36
BD95513MUV	30
BD9G341AEFJ BD9G341AEFJ-LB	80

☆:Under Development

*1 : Limitations will exist depending on the input/output voltage conditions.

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Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (°C)	Package (mm)
					Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
3	2.7 to 5.5	0.8 to 2.5 *1	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−40 to +105	VQFN020V4040
3	2.7 to 5.5	0.8 to 3.3 *1	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +105	VQFN020V4040
3	2.7 to 5.5	1.0 to 2.5 *1	1	Current	—	—	—	✓	—	Latch	Latch	—	—	−25 to +85	HTSOP-J8
3	4.5 to 5.5	3.3	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +105	VQFN020V4040
3	2.7 to 5.5	0.8 to 3.3 *1	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +105	VQFN016V3030
3	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85 −40 to +125	VQFN016V3030
3	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85 −40 to +125	VQFN016V3030
3	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UMMP008AZ020
3	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	UMMP008AZ020
3	2.7 to 5.5	0.6 to (V_{IN}×0.8)	1	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	Output Discharge	−40 to +85	VMMP08LZ2020 (2.0×2.0×0.4)
3	2.7 to 5.5	0.6 to (V_{IN}×0.8)	1.3	ON time	✓	—	✓	✓	✓	Latch	Recovery	—	—	−40 to +85	UCSP30L1 (1.98×1.8×0.33)
3	2.7 to 5.5	0.6 to (V_{IN}×0.8)	1.3	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	UCSP35L1 (1.98×1.8×0.4)
3	4.5 to 18	(V_{IN}×0.125) to (V_{IN}×0.7) (V_{IN}×0.125)≧0.8	0.5	Current	—	—	—	✓	—	Latch	Recovery	—	—	−40 to +85 −40 to +125	SOP-J8
3	7.5 to 15	0.8 to (V_{IN}×0.5) (V_{IN}×0.5)≦5.5	0.5 to 0.8	ON time	✓	—	—	✓	—	Latch	Recovery	✓	—	−20 to +100	VQFN016V3030
3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON time	—	—	✓	✓	—	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON time	—	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON time	—	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	UMMP008Z2020 (2.0×2.0×0.4)
3	4.5 to 18	0.765 to 7.0 (V_{IN}×0.07) to (V_{IN}×0.65)	0.7	ON time	—	—	✓	✓	—	Recovery	Recovery	—	—	−40 to +85	UMMP008Z2020 (2.0×2.0×0.4)
3	5 to 14	1.0 to (V_{IN}×0.7)	0.75	Current	—	—	—	—	—	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
3	4.75 to 18	0.9 to (V_{IN}×0.9)	0.38	Current	—	—	✓	—	—	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
3	7 to 28	(V_{IN}×0.143) to (V_{IN}×0.7) (V_{IN}×0.143)≧1.0	0.55	Current	—	—	—	✓	✓	Recovery	Recovery	✓	—	−40 to +85	HTSOP-J8
3	7 to 36	(V_{IN}×0.06) to (V_{IN}×0.8) (V_{IN}×0.06)≧1.0	0.3	Current	—	—	—	✓	—	Recovery	Recovery	✓	—	−40 to +150	HTSOP-J8
3	8 to 35	1.0 to (V_{IN}−3.0)	0.11	Voltage	—	—	—	—	—	Recovery	Recovery	—	—	−40 to +85	TO220CP-V5
3	8 to 35	1.0 to (0.8×(V_{IN}−I_O×R_{ON})	0.11	Voltage	—	—	—	—	—	Recovery	Recovery	—	—	−40 to +85	TO220CP-V5
3	4.5 to 28	0.7 to 5.0	0.2 to 1.0	ON time	✓	—	✓	✓	✓	Latch	Recovery	✓	Output Discharge	−10 to +100	VQFN032V5050
3	12 to 76	1.0 to V_{IN} *1	0.05 to 0.75	Current	—	—	—	—	—	Recovery	Recovery	✓	—	−40 to +85	HTSOP-J8

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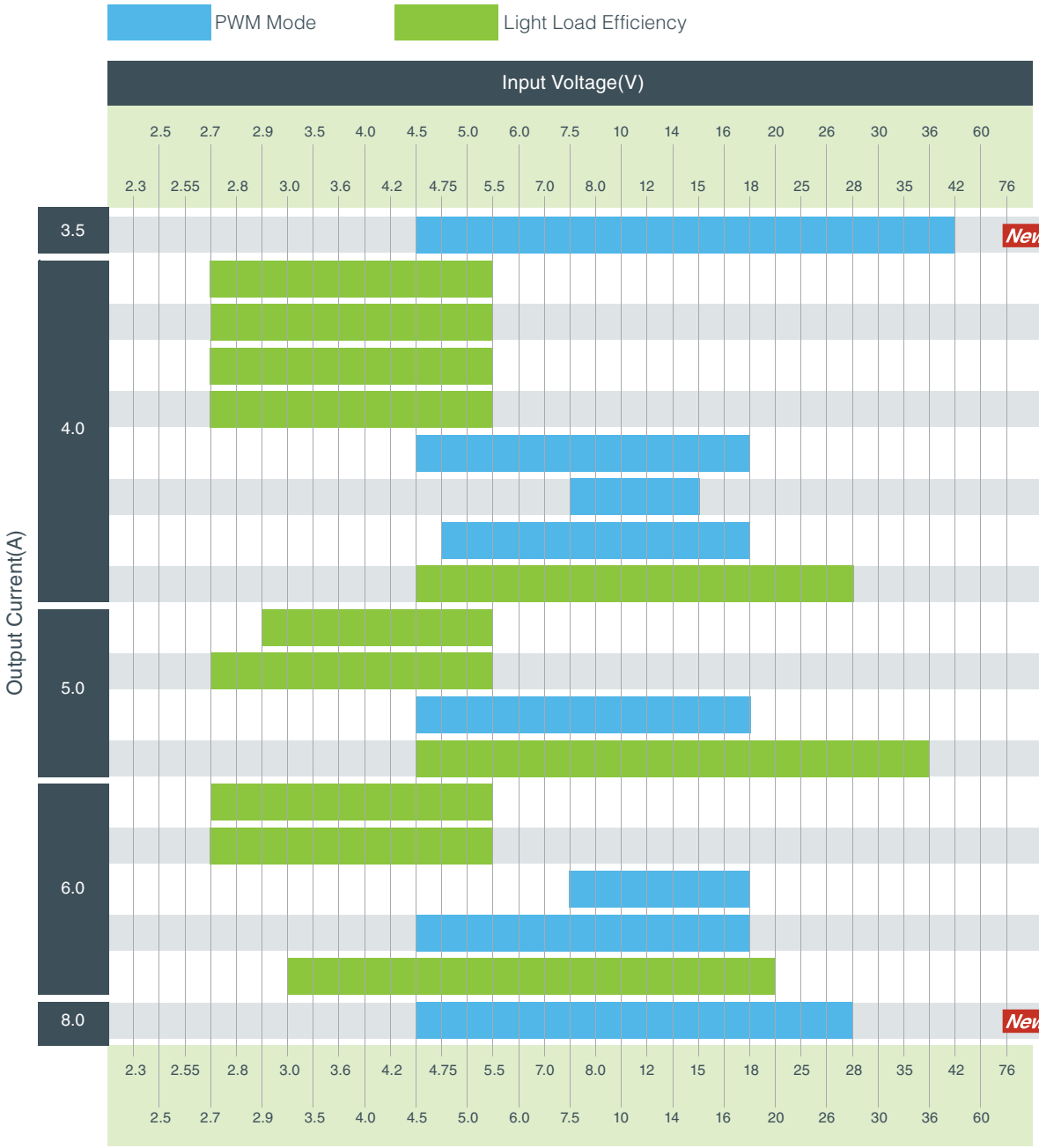
Single Output Buck Converter Selection Guide

3.5A to 8.0A Output



Part No.	Rated Input (V)
New BD9G401EFJ-M	45
BD9137MUV	7
BD91361MUV	7
BD9A400MUV	7
BD9B400MUV	7
BD9C401EFJ	20
BD95841MUV	15.2
BD9327EFJ BD9327EFJ-LB	20
BD95514MUV	30
BD91364BMUU	7
BD9B500MUV	7
BD9C501EFJ	20
☆ BD9F500QUZ	39
BD9A600MUV	7
BD9B600MUV	7
BD95861MUV	20
BD9C601EFJ	20
BD95500MUV	24
New BD9F800MUX	30

☆:Under Development

*1 : Limitations will exist depending on the input/output voltage conditions.

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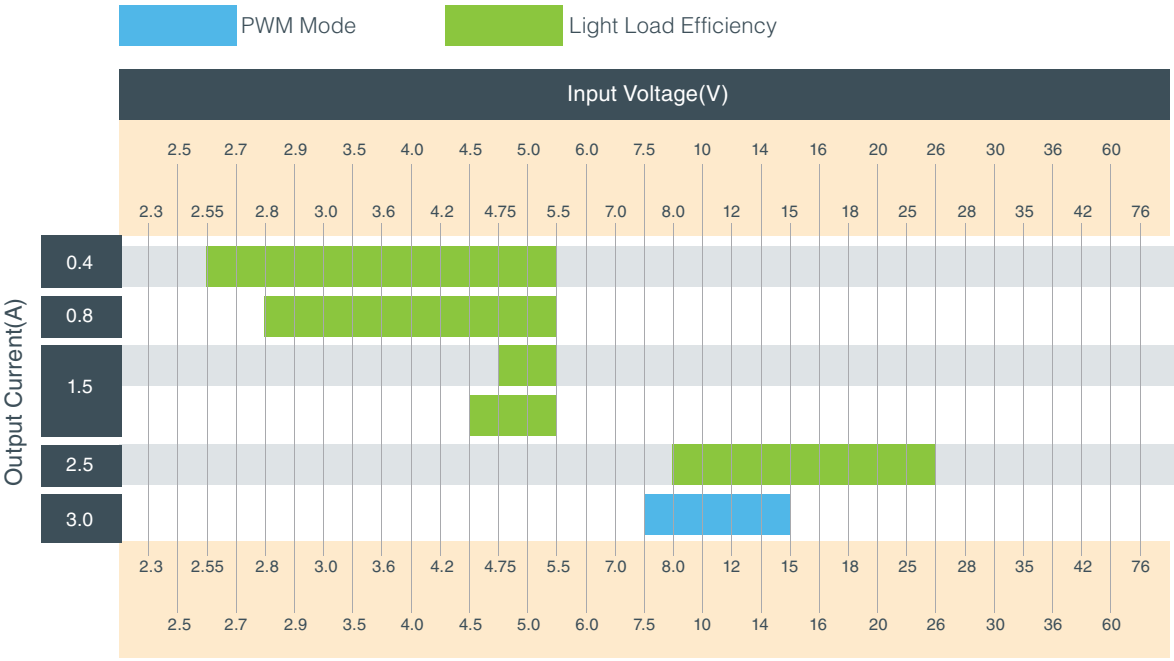
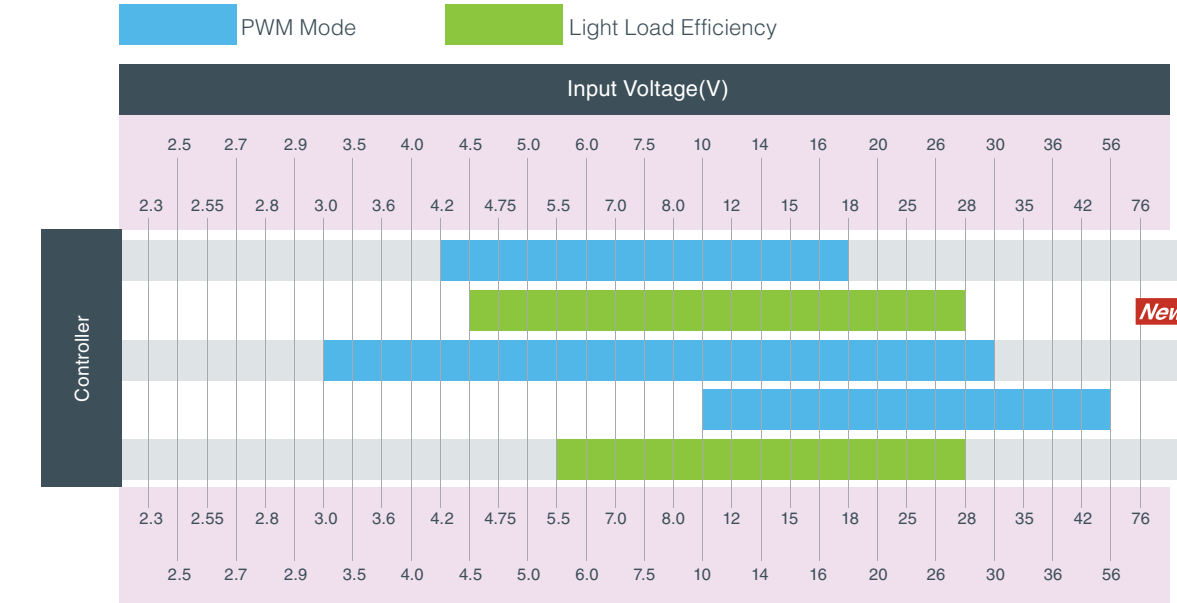
Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (°C)	Package (mm)
					Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
3.5	4.5 to 42	0.8 to V_{IN} *1	0.3	Current	—	✓	—	—	—	Recovery	Recovery	—	—	−40 to +105	HTSOP-J8ES
4	2.7 to 5.5	0.8 to 3.3 *1	1	Current	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +105	VQFN020V4040
4	2.7 to 5.5	0.8 to 3.3 *1	1	Current	—	—	—	✓	✓	Latch	Latch	—	Output voltage setting via 2bit parallel control Output discharge	−40 to +105	VQFN020V4040
4	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
4	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
4	4.5 to 18	(V_{IN}×0.125) to (V_{IN}×0.7) (V_{IN}×0.125)≧0.8	0.5	Current	—	—	—	✓	—	Latch	Recovery	—	—	−40 to +85	HTSOP-J8
4	7.5 to 15	0.8 to (V_{IN}×0.5) (V_{IN}×0.5)≦5.5	0.5 to 0.8	ON time	✓	—	—	✓	—	Latch	Recovery	✓	—	−20 to +100	VQFN016V3030
4	4.75 to 18	0.9 to (V_{IN}×0.9)	0.38	Current	—	—	✓	—	—	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
4	4.5 to 28	0.7 to 5.0	0.2 to 1.0	ON time	✓	—	✓	✓	✓	Latch	Recovery	✓	Output discharge	−10 to +100	VQFN032V5050
5	2.9 to 5.5	0.8 to (V_{IN}×0.8)	1.7	ON time	✓	—	✓	✓	✓	Latch	Recovery	—	—	−40 to +105	VQFN20U4040M
5	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
5	4.5 to 18	(V_{IN}×0.075) to (V_{IN}×0.7) (V_{IN}×0.075)≧0.8	0.5	Current	—	—	—	✓	—	Latch	Recovery	—	—	−40 to +85	HTSOP-J8
5	4.5 to 36	0.6 to 14 *1	0.6/1/2.2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	✓	—	−40 to +85	VMMP16LZ3030 (3.0×3.0×0.4)
6	2.7 to 5.5	0.8 to (V_{IN}×0.7)	1	Current	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
6	2.7 to 5.5	0.8 to (V_{IN}×0.8)	1 or 2	ON time	✓	—	✓	✓	✓	Recovery	Recovery	—	—	−40 to +85	VQFN016V3030
6	7.5 to 18	0.8 to (V_{IN}×0.5) (V_{IN}×0.5)≦5.5	0.35 to 0.8	ON time	✓	—	—	✓	—	Latch	Recovery	✓	—	−20 to +100	VQFN024V4040
6	4.5 to 18	(V_{IN}×0.075) to (V_{IN}×0.7) (V_{IN}×0.075)≧0.8	0.5	Current	—	—	—	✓	—	Latch	Recovery	—	—	−40 to +85	HTSOP-J8
6	3 to 20	0.7 to 5.0	0.2 to 1.0	ON time	✓	—	✓	✓	✓	Latch	Recovery	✓	Output discharge	−10 to +100	VQFN040V6060
8	4.5 to 28	0.765 to 13.5 *1	0.3/0.6	ON time	✓	—	—	✓	—	Recovery	Recovery	—	—	−40 to +85	VQFN11X3535A

Dual Output Buck Converter Selection Guide



Part No.	No. of Outputs
BD91501MUV	2
BD9151MUV	2
BD9150MUV	2
BD9152MUV	2
BD93291EFJ	2
BD95830MUV	2

Buck Controller (External Switch) Selection Guide



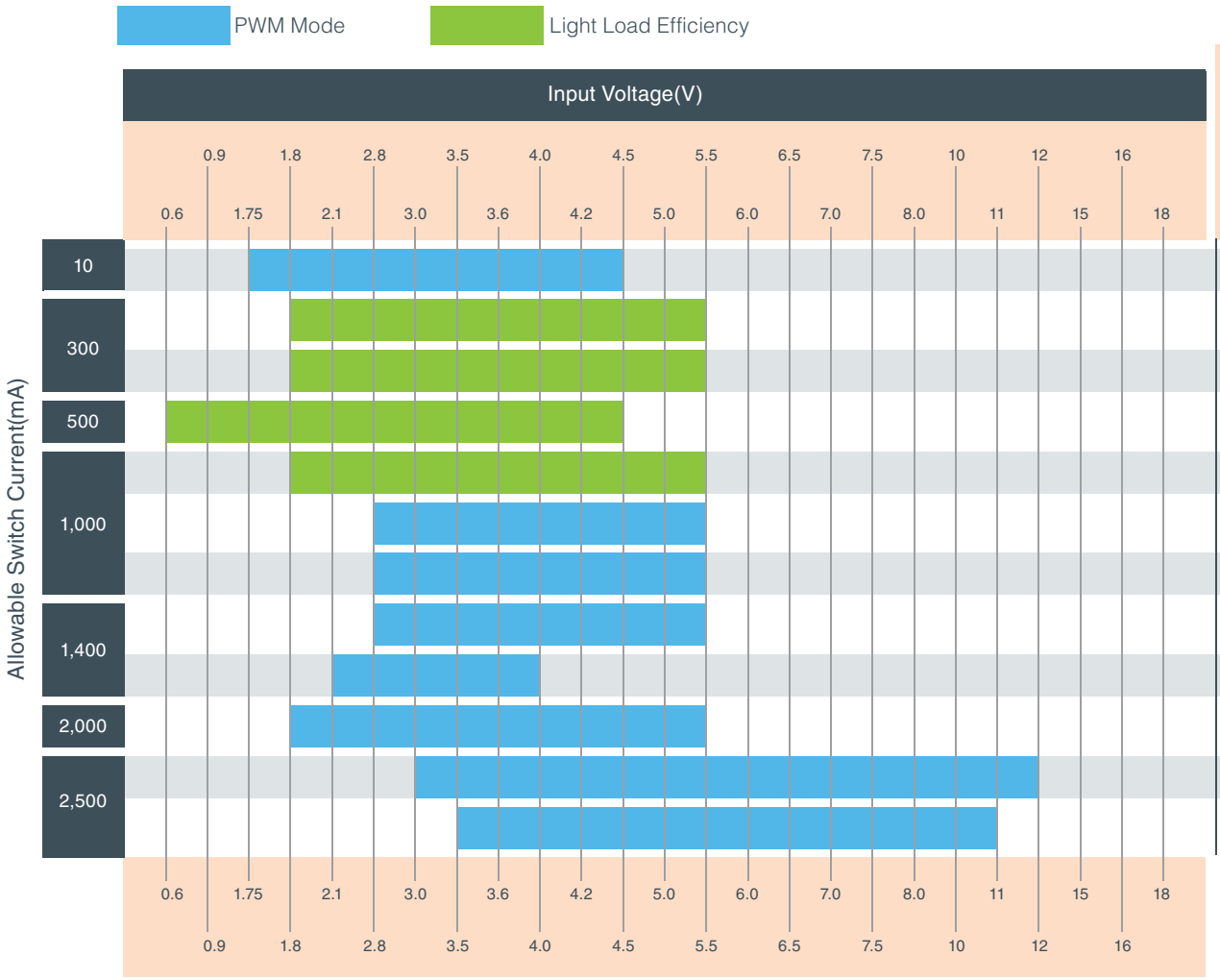
Part No.	No. of Outputs
BD9305AFVM	1
New BD9FZ00F	1
BD63536FJ	1
BD9611MUV	1
BD95602MUV/ BD95602MUV-LB	2

*1 : Limitations may exist depending on each condition

Rated Input (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (°C)	Package
						Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
7	Io1 : 0.4 Io2 : 0.3	2.55 to 5.5	Vo1 : 2.55 Vo2 : 1.80	1.65	Current	—	—	—	✓	✓	Latch	Recovery	—	100% duty	−30 to +105	VQFN016V3030
7	Io1 : 0.4 Io2 : 0.8	2.8 to 5.5	Vo1 : 1.8 Vo2 : 1.2	1	Current	—	—	—	✓	✓	Latch	Latch	—	Voltage detector High side gate controller	−40 to +85	VQFN020V4040
7	Io1 : 1.5 Io2 : 1.5	4.75 to 5.5	Vo1 : 3.3 Vo2 : 0.8 to 2.5	1.5	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +85	VQFN020V4040
7	Io1 : 1.5 Io2 : 1.5	4.5 to 5.5	Vo1 : 3.3 Vo2 : 0.8 to 2.5	1	Current	—	—	—	✓	✓	Latch	Latch	—	—	−40 to +85	VQFN020V4040
30	Io1 : 2.5 Io2 : 1.5	8 to 26	Vo1 : 5.0 Vo2 : 0.8 to 4.0	1.5 to 2.5	ON time	—	—	—	✓	✓	Recovery	Recovery	—	—	−40 to +85	HTSOP-J8
15.1	Io1 : 3.0 Io2 : 3.0	7.5 to 15	Vo1 : 0.8 to 5.5 Vo2 : 0.8 to 5.5	0.4 to 0.8	ON time	—	—	—	✓	—	Latch	Recovery	Latch	—	−20 to +100	VQFN032V5050

Rated Input (V)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Functions								Other Functions	Operating Temperature (°C)	Package
					Power Good	External Synchronization	Variable Soft Start	Synchronous Rectification	Light Load Efficiency	Over Current Protection	Thermal Shutdown	Over Voltage Protection			
20	4.2 to 18	1.25 to V_{IN}*1	0.1 to 0.8	Voltage	—	—	—	—	—	Latch	Recovery	—	—	−40 to +85	MSOP8
30	4.5 to 28	0.85 to (V_{IN}×0.7) (V_{IN}×0.7)≤12	0.3	ON time	✓	—	✓	✓	✓	Latch	Recovery	Recovery	Output Discharge	−40 to +85	SOP16
32	3 to 30	1.25 to V_{IN}*1	0.01 to 0.3	Voltage	—	—	—	—	—	Recovery	Recovery	Recovery	—	−25 to +85	SOP-J8
60	10 to 56	1.0 to (V_{IN}×0.8)	0.05 to 0.5	Voltage	—	✓	✓	✓	—	Recovery	Recovery	—	Supports pre-bias, variable UVLO	−40 to +105	VQFN020V4040
30	5.5 to 28	1.0 to 5.5	0.15 to 0.5	ON time	✓	—	✓	✓	✓	Latch	Recovery	Recovery	Output discharge, 3.3V LDO, 5V LDO	−20 to +85	VQFN032V5050

Boost Converter Selection Guide



Part No.	No. of Outputs
BU33DV5G	1
BU33DV7NUX	1
BU34DV7NUX	1
BU33UV7NUX	1
☆BD83070GUL	1
BD8316GWL	2
BD8317GWL	2
BD8152FVM	1
BD8158FVM	1
BD8306MUV	1
BD8314NUV	1
BD8311NUV	1

☆:Under Development

Boost Controller (External Switch) Selection Guide

Part No.	No. of Outputs
BD8303MUV	1
BD9306AFVM	1
BD9851EFV	2
BA9743AFV	2
BA9744FV	2
BA9741F/ BA9741FS	2
New BD9615MUV-LB	1

*1: Limitations may exist depending on the external components and IC settings

Allowable Switch Current (mA)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (kHz)	Control Method	Functions											Operating Temperature (°C)	Package (mm)
					Boost	Buck-Boost	SEPIC	Inverting	Synchronous Rectification	Light Load Efficiency	Soft Start	Input Pass-Through	UVLO	Overcurrent Protection	Thermal Shutdown		
10	1.75 to 4.5	3.3	100	Current	✓	—	—	—	✓	—	—	—	✓	Recovery	✓	−40 to +85	SSOP5
300	1.8 to 5.5	3.3	600	Current	✓	—	—	—	✓	✓	✓	✓	✓	Recovery	✓	−40 to +85	VSON010V3030
300	1.8 to 5.5	3.4	600	Current	✓	—	—	—	✓	✓	✓	✓	✓	Recovery	✓	−40 to +85	VSON010V3030
500	0.6 to 4.5	3.3	800	Current	✓	—	—	—	✓	✓	✓	✓	✓	Recovery	✓	−40 to +85	VSON010X3020
1,000	1.8 to 5.5	3.3	1500	Current	—	✓	—	—	✓	✓	✓	—	✓	Recovery	✓	−40 to +85	UCSP50L1C(1.2×1.6)
1,000	2.5 to 5.5	Vo1 : −9.0 to −1.0 Vo2 : V_{IN} to 18	1600	Current	✓	—	—	✓	—	—	✓	—	✓	Latch	✓	−35 to +85	UCSP50L1(1.8×1.5)
1,000	2.5 to 5.5	Vo1 : −9.0 to −1.0 Vo2 : V_{IN} to 18	800	Current	✓	—	—	✓	—	—	✓	—	✓	Latch	✓	−35 to +85	UCSP50L1(1.8×1.5)
1,400	2.5 to 5.5	V_{IN} to 14	600/1,200	Current	✓	—	✓	—	—	—	Variable	—	✓	Recovery	✓	−40 to +85	MSOP8
1,400	2.1 to 4	V_{IN} to 14	600/1,200	Current	✓	—	✓	—	—	—	Variable	—	✓	Recovery	✓	−40 to +125	MSOP8
2,000	1.8 to 5.5	1.8 to 5.2	300 to 2,000	Voltage	—	✓	—	—	✓	—	✓	—	✓	Latch	✓	−40 to +85	VQFN016V3030
2,500	3 to 12	4.0 to 12	1,200	Voltage	✓	—	—	—	—	—	✓	—	✓	Latch	✓	−25 to +85	VSON010V3030
2,500	3.5 to 11	4.0 to 11	1,200	Voltage	✓	—	—	—	—	—	✓	—	✓	Latch	✓	−25 to +85	VSON010V3030

Rated Input (V)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (kHz)	Control Method	Functions									Other Functions	Operating Temperature (°C)	Package
					Boost	Buck-Boost	Inverting	Buck	Enable	Variable Soft Start	Synchronous Rectification	Short-Circuit Protection	Thermal Shutdown			
15	2.7 to 14	1.8 to 12	200 to 1,000	Voltage	—	✓	—	—	✓	—	✓	Latch	Recovery	—	−25 to +85	VQFN016V3030
20	4.2 to 18	V_{IN} to (V_{IN}/0.3)	100 to 800	Voltage	✓	—	—	—	✓	—	—	Latch	Recovery	—	−40 to +85	MSOP8
20	4 to 18	1.0 or more *1	10 to 3,000	Voltage	✓	—	✓	✓	—	✓	—	Latch	Recovery	—	−40 to +85	HTSSOP-B20
36	3.6 to 35	2.505 or more *1	10 to 800	Voltage	✓	—	✓	✓	—	✓	—	Latch	Recovery	Dead time adjustment	−40 to +85	SSOP-B16
36	2.5 to 35	1.222 or more *1	10 to 800	Voltage	✓	—	✓	✓	—	✓	—	Latch	Recovery	Dead time adjustment	−40 to +85	SSOP-B16
36	3.6 to 35	2.5 or more *1	10 to 800	Voltage	✓	—	✓	✓	—	✓	—	Latch	Recovery	Dead time adjustment	−40 to +85	SOP16/ SSOP-A16
62	3.5 to 60	V_{IN} to (V_{IN}/0.2)	100 to 2,500	Voltage	✓	—	—	—	✓	✓	—	Recovery	Recovery	External synchronization Power Good	−40 to +105	VQFN16KV3030

Isolated DC/DC Power Supplies

Part No.	Output Power (W)	Rated Input (V)	Allowable Switch Current (A)	Input Voltage (V)	Switching Frequency (kHz)	Control Method	Functions						Operating Junction Temperature (°C)	Package
							Enable	Soft Start	Light Load Efficiency	UVLO	Over Current Protection	Thermal Shutdown		
BD7F100HFN-LB/ BD7F100EFJ-LB	1W(at 5.0V V_{IN}) 5W(at 24V V_{IN})	45	1.25	3.0 to 40	400	Adaptive ON time	✓	✓	✓	✓	Recovery	Recovery	−40 to +125	HSON8/ HTSOP-J8
BD7F200HFN-LB/ BD7F200EFJ-LB	2W(at 5.0V V_{IN}) 10W(at 24V V_{IN})	45	2.75	5.0 to 40	400	Adaptive ON time	✓	✓	✓	✓	Recovery	Recovery	−40 to +125	HSON8/ HTSOP-J8
☆ **BD7J200HFN-LA/** ☆ **BD7J200EFJ-LA**	10W(at 48V V_{IN})	80	1.38	8.0 to 80	400	Adaptive ON time	✓	✓	✓	✓	Recovery	Recovery	−40 to +125	HSON8/ HTSOP-J8

☆:Under Development

Guide to ROHM's Website https://www.rohm.com

For the full lineup of power supply ICs, please visit ROHM's website, which offers technical materials and tools including datasheets, application notes, reference circuits, evaluation boards, and Spice models.

Tech Web, a dedicated technical site for power supply ICs, provides technical information useful for designers seeking basic knowledge on power ICs along with seminar information.

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