



Power Management ICs

- Switching Regulators
- Isolated Converters
- Power Modules
- Linear Regulators
- Voltage Detectors
- Power Management Switches

March 07, 2014

Finn Lange - Europe Product Marketing

A promotional graphic for ROHM Semiconductor. At the top left is the ROHM SEMICONDUCTOR logo. Below it is the website address www.rohmeurope.com. The main headline reads "Advanced Solutions for Your Applications". The central image shows a smiling woman with blonde hair, her hand near her face, surrounded by various ROHM semiconductor chips. To the left of the woman, a list of product categories is provided: Power Management, Motor Drivers, EEPROM Memories, LED Drivers, Video and Sound Processing ICs, Sensors, Opto Solutions, Discrete Semiconductors, and "...and many more...". To the right of the woman, a box titled "Featuring:" lists benefits: Smallest Footprints, Energy efficiency, Cost-effectiveness, New Materials, Highest Quality, and 100% Inhouse Production. At the bottom, the slogan "INNOVATIONS EMBEDDED" is written in large, bold, white capital letters on a red background.

ROHM
SEMICONDUCTOR

www.rohmeurope.com

Advanced Solutions for Your Applications

Power Management
Motor Drivers
EEPROM Memories
LED Drivers
Video and Sound Processing ICs
Sensors
Opto Solutions
Discrete Semiconductors
...and many more...

Featuring:
Smallest Footprints
Energy efficiency
Cost-effectiveness
New Materials
Highest Quality
100% Inhouse Production

INNOVATIONS EMBEDDED

Overview & Technology



- Portfolio
- ECO Design
- ECO IP Cores
- H³Reg Technology

LOW I_Q POWER MANAGEMENT

■ Energy Savings ■ Linear Regulators ■ Switching Regulators

ROHM offers a new low quiescent current technology for linear regulators and switching regulators to reduce current consumption during stand-by.

Low I_Q LDO: BD7xxLx Series

- Input: 3.0 to 45V
- Output: 3.3V or 5.0V - 200mA or 500mA
- Quiescent current: typ. 6.5μA
- Low saturation voltage by using PMOS output transistor
- Supporting low ESR ceramic capacitor
- AEC-Q100 qualified



HTSOP-J8
4.9 x 6.0 x 1.0 mm³

Low I_Q DCDC: BD9901x Series

- Input: 3.6 to 42V
- Output: 3.3V or 5.0V - 2A
- Quiescent current: typ. 22μA
- Synchronous rectifier: integrated MOSFETs
- Switching frequency: 200k to 500kHz
- Current Mode Control
- AEC-Q100 qualified



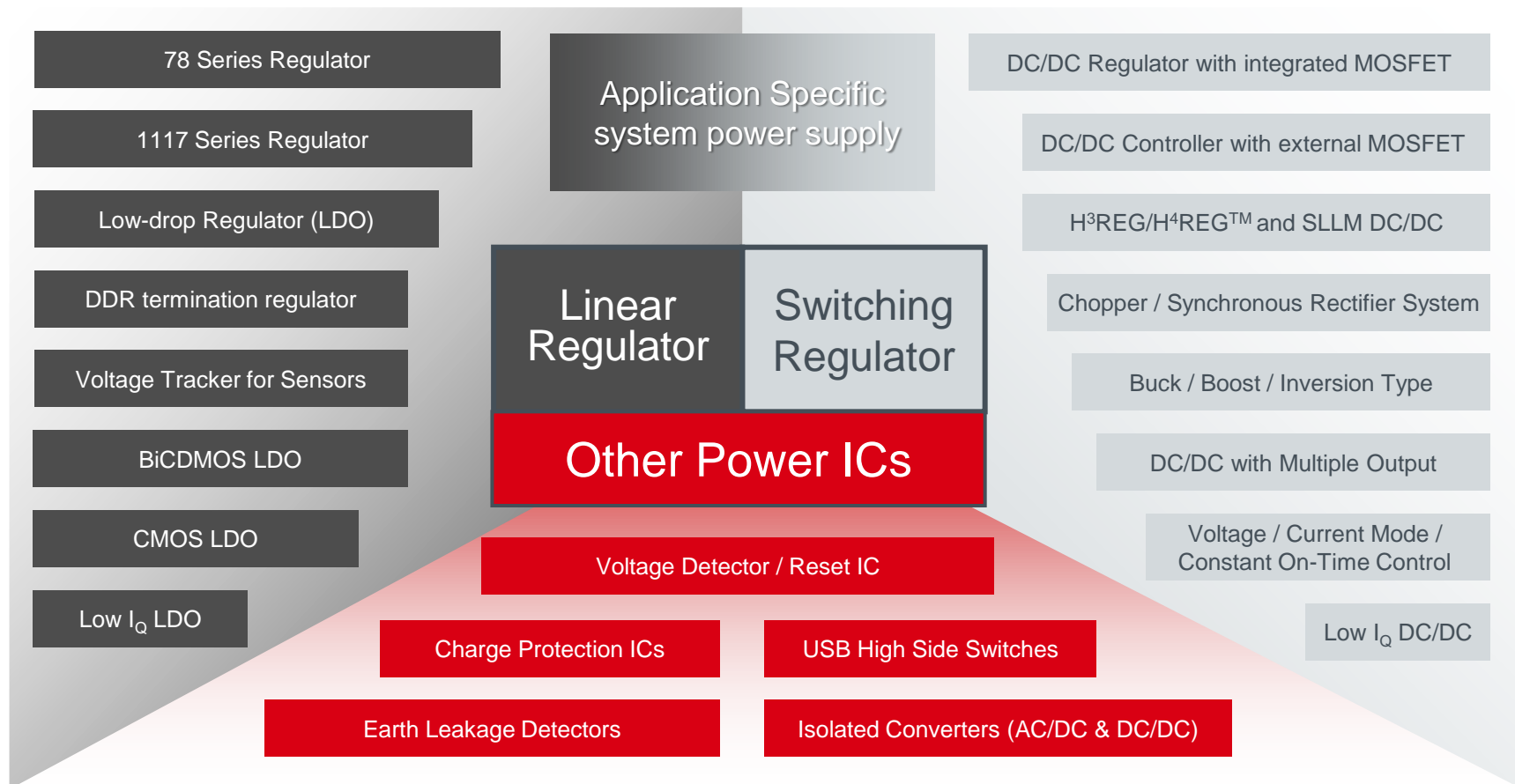
HTSSOP-B24
7.8 x 7.6 x 1.0 mm³

Technology for you Sense it Light it Power it !

www.rohm.com/eu

ROHM Semiconductor Portfolio – Power Management

ROHM has been positioned in excellent supplier on Power solutions based on Own rich IP/Wide line-up/Specific PM/Technical support



Power Management – ECO Design

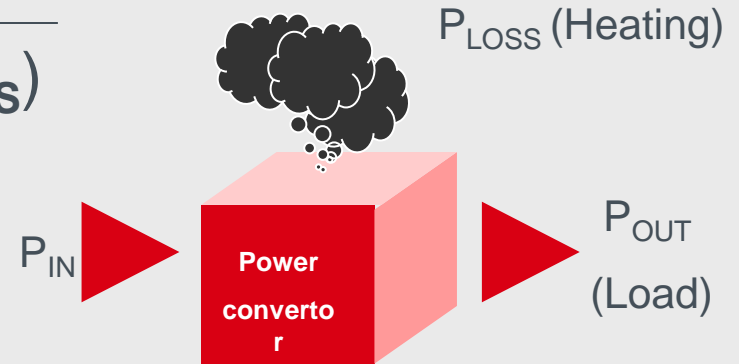
How to realize ECO?

$$\text{Efficiency} = \frac{P_{\text{OUT}}}{P_{\text{IN}} (= P_{\text{OUT}} + P_{\text{Loss}})}$$

$$P_{\text{Loss}} = P_{\text{sw}} + P_{\text{IC}}$$

P_{sw} : Converter loss

P_{IC} : Power consumption internal



ROHM ECO IP cores

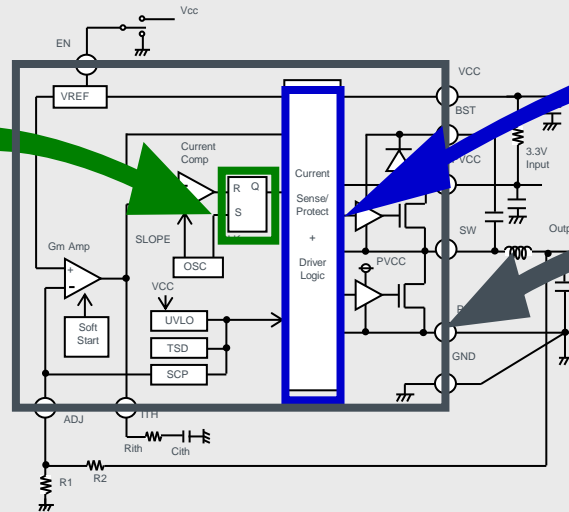
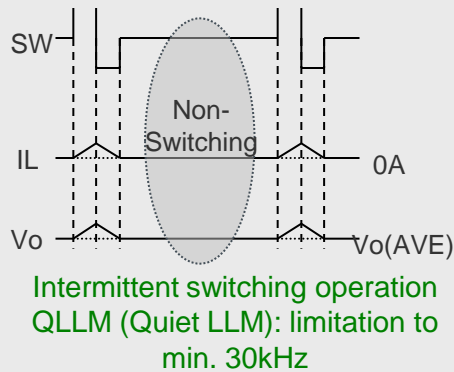
- **SLLM™** (Simple Light Load Mode) minimizes P_{sw}
- **Deep SLLM™** for reducing P_{IC}
- **Low Iq** for minimization P_{IC}



Power Management – ECO IP Cores

ROHM ECO IP cores

SLLM™ (Simple Light Load Mode)



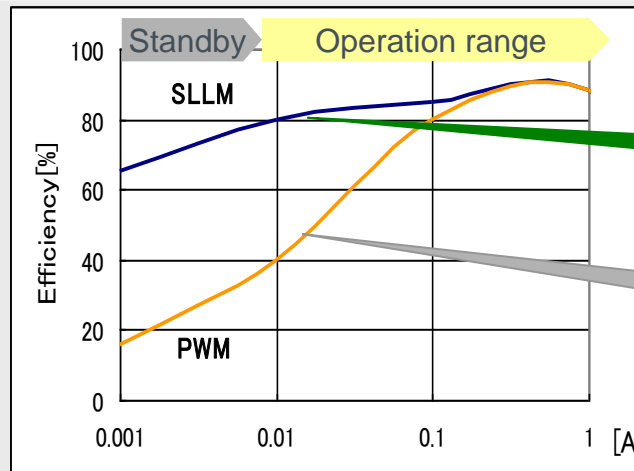
Deep SLLM™

Internal circuit shutdown
during intermitted switching

Low Iq

Minimized circuit current
Target 20uA
Wa-process 0.6μm
High voltage BiCDMOS

Efficiency improvement



SLLM™

Conventional
PWM

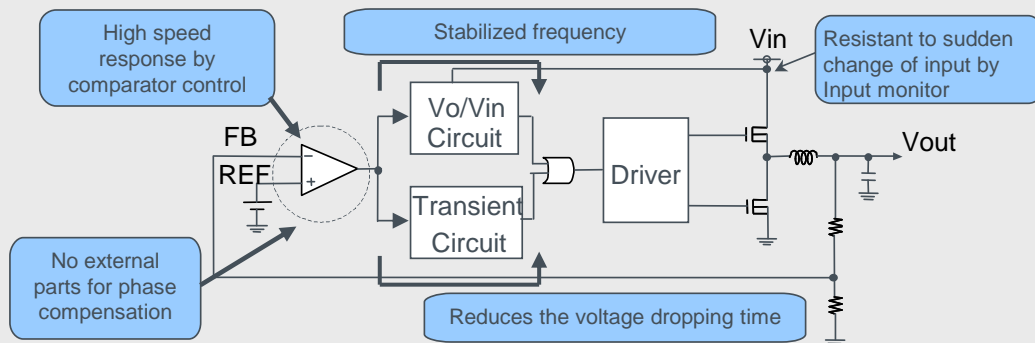
Power Management – H³Reg™ Technology

H³Reg™ Technology

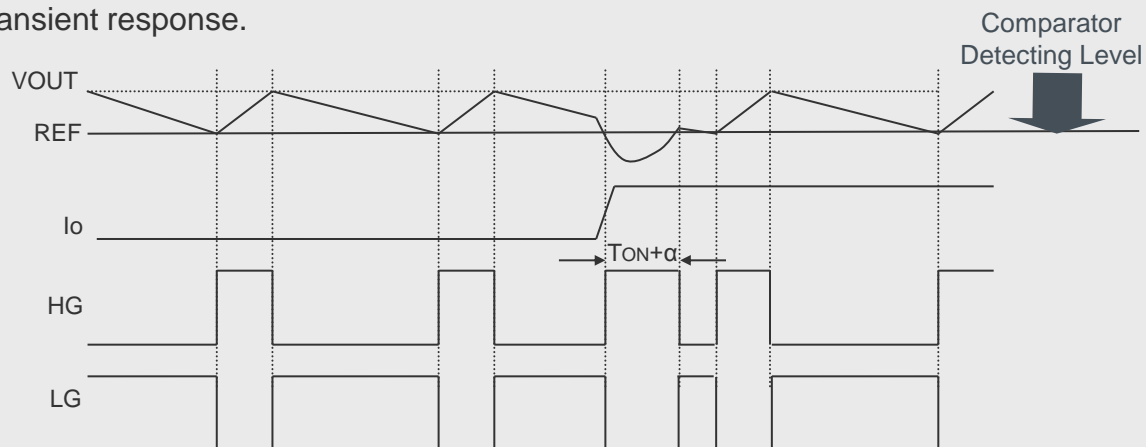
High speed
High efficiency
High performance

Characteristic 1: High speed
response by comparator
control

Characteristic 2: High
Efficiency



When V_{OUT} drops due to a rapid load change, and the voltage remains below REF after the programmed T_{ON} time interval has elapsed, the system quickly restores V_{OUT} by immediate switching on (and extending the T_{ON} time), improving the transient response.



INNOVATIONS EMBEDDED

ROHM
SEMICONDUCTOR



DC/DC Solutions

■ High Efficiency ■ High Performance ■ High Reliability

DC/DC Solutions for Consumer, Industrial and Automotive.

Built for Higher Overall Efficiency and Performance.



Product Overview:

- POL (Point-of-Load) Regulators
- Standard Switching Regulators
- Boost, Buck-Boost Converter
- System Switching Regulators

Features:

- Input Voltage range up to 48 V
- Output currents up to 6A
- Switching frequencies up to 6 MHz
- High efficiency Synchronous rectifier
- SLLM (Simple light Load Mode) to ensure high efficiency under all load conditions
- Integrated protection circuits: Short-circuit protection, Over current protection, Power Good, UVLO and Thermal shutdown, Soft start
- Fast transient response with current mode PWM
- Full package line-up including CSP solutions

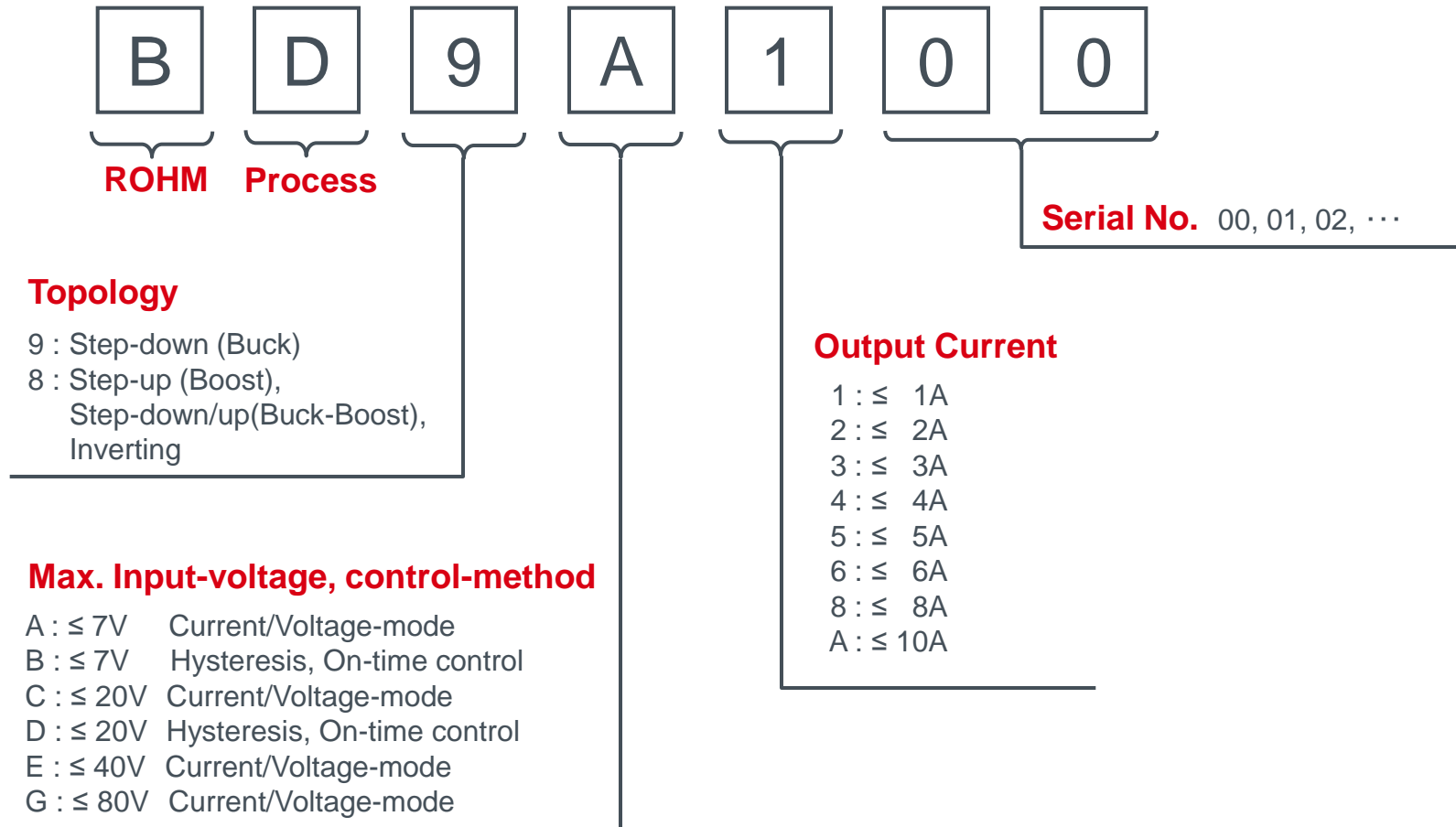


www.rohmeurope.com

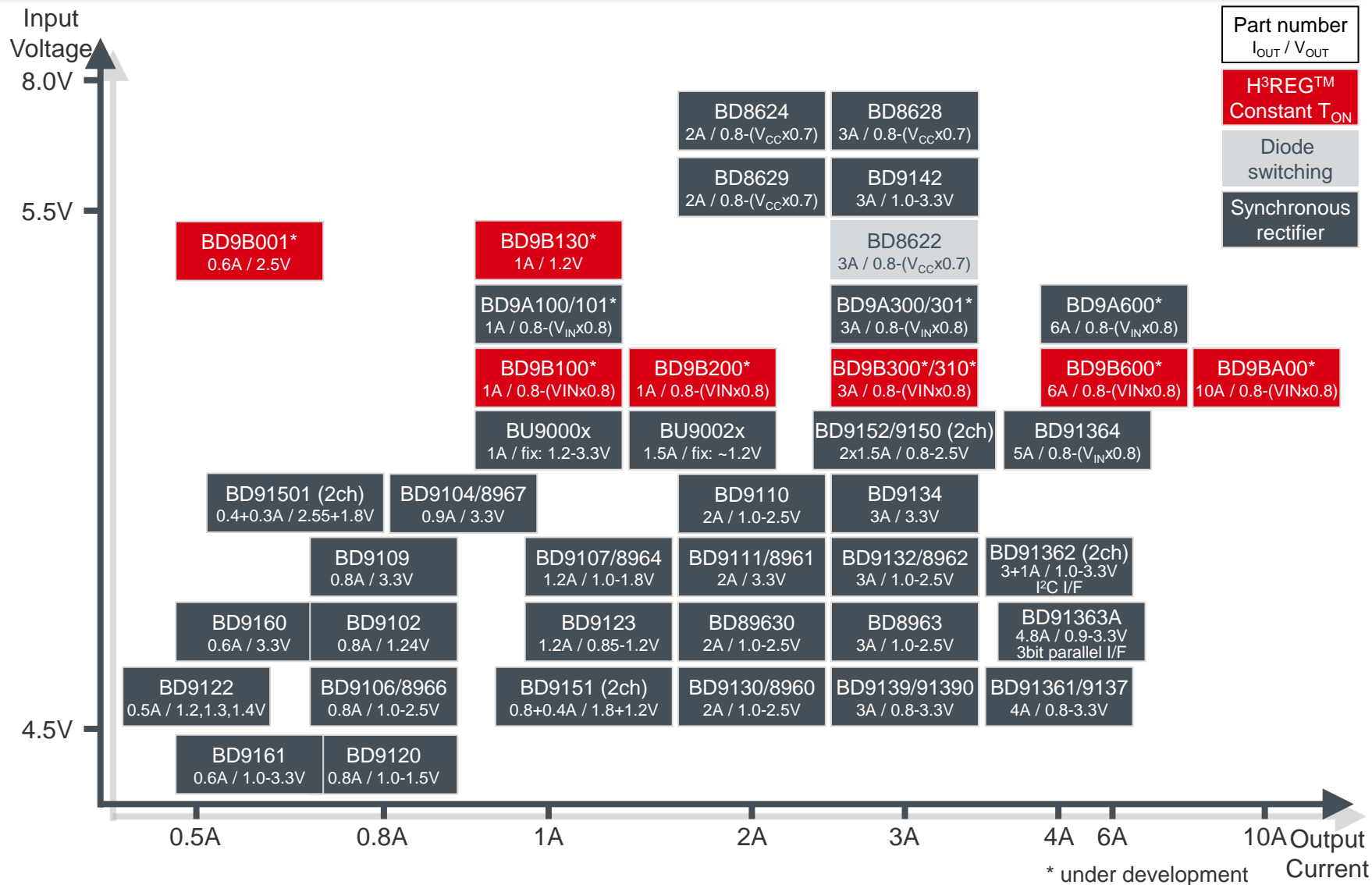
Switching Regulators

- Overview
- Buck Converters
 - 3 to 8V input voltage range (low)
 - 12 to 36V input voltage range (medium)
 - 42 to 80V input voltage range (high)
- Boost Converters
 - BUxxDV/UV Series (low voltage)
- Buck-Boost Converters
- DCDC Controller
- Power Supply for dedicated Applications

Overview - Unification of part numbering



Switching Regulator 3-8V_{IN} – Line-up



BD91xx (BD9Axxx) Series – Overview

Features

- Input Voltage Range: 2.5V to 5.5V (13.2V)
- Output Voltage Range: 0.8V to 3.3V (6V)
- V_{REF} Accuracy: $\pm 1.5\%$ or $\pm 2.0\%$
- Output Current: 0.3A to 4.8A
- Switching Frequency: fixed 0.5MHz to 3.0MHz
- Integrated Power MOSFETs for synchronous rectification (high side p-type and low side n-type)
- Fixed Soft Start Time: typ. 0.8ms to 5ms
- SLLM mode for increased efficiency at low load
- Int. Protection Function: SCP, TSD, UVLO

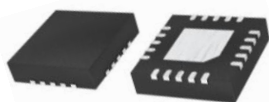
Package

MSOP8



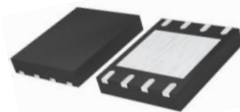
2.9x4.0x0.9

VQFN



4.0x4.0x1.0 or 3.0x3.0x1.0

SON008



5.0x6.0x1.0

VCSP



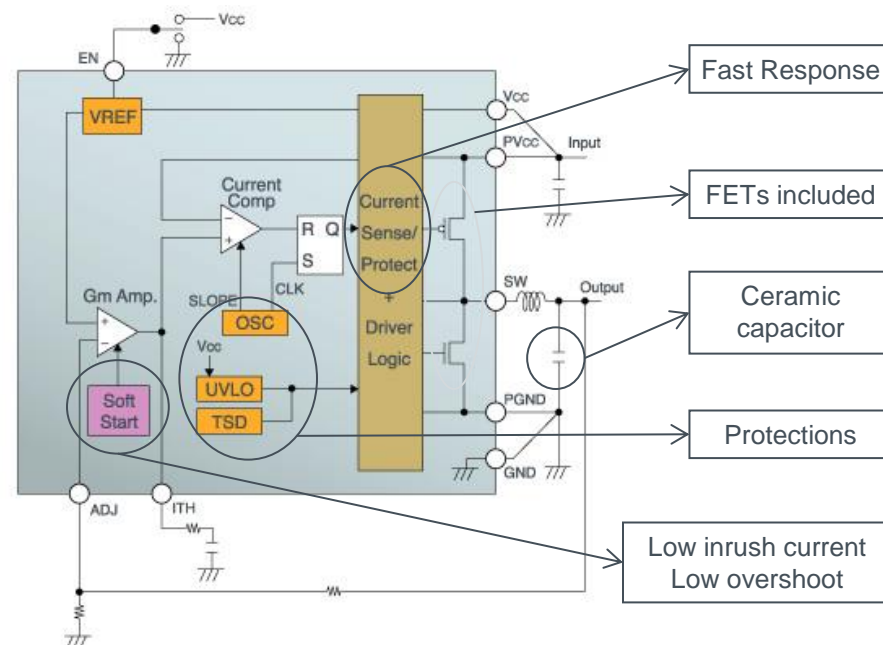
1.1x2.5x0.55

Advantages

ROHM's BD91xx Family is a synchronous buck converter series that integrates low resistances MOSFETs. It achieves a continuous output current of up to 4.8A and offers 1, 2 or 3 output voltages.

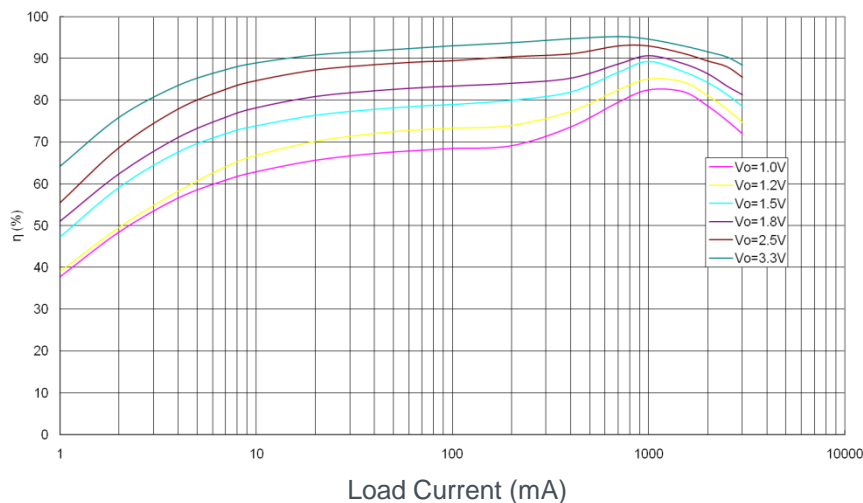
Current mode operation provides a fast transient response and an easy phase compensation. The SLLM technology guarantees a high efficiency over all load conditions.

Application

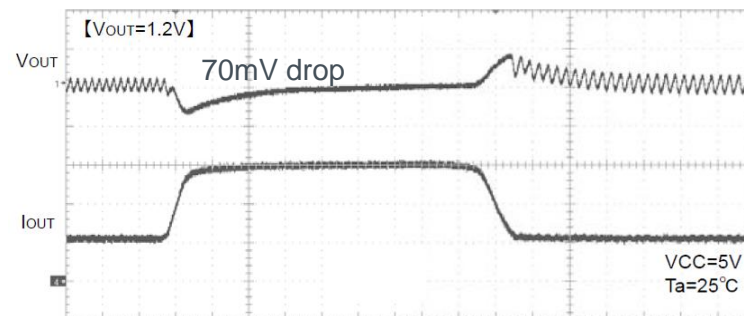


BD91xx (BD9Axxx) Series – Characteristics

Efficiency



Transient Response

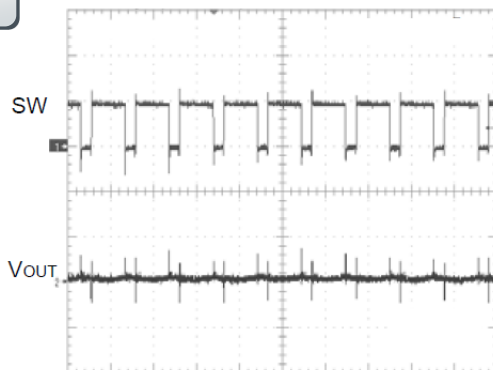


Line-up extraction

PN	V_{IN} [V]	V_{OUT} [V]	I_{OUT} [A]	F_S [MHz]	Package
BD9161	2.5-4.5	1.0-3.0	0.6	1	MSOP8
BD9152	4.5-5.5	3.3 0.8-2.5	1.5 1.5	1	VQFN
BD9153	4.5-5.5	1.8-3.3 0.8-2.5 0.8-2.5	1.5 1.5 1.5	1	VQFN
BD9141	4.5-13.2	2.5-6.0	2.0	0.5	VQFN
BD9139	2.7-5.5	0.8-3.3	3.0	1	VQFN

Output ripple

BD9139MUV
 $V_{IN}=5V$
 $V_{OUT}=3.3V$
 max. load



BU900xx (BU9Bxxx) Series – Overview

Features

- Input Voltage Range: 2.3V to 5.5V
- Output Voltage Range: 1.2V to 3.3V
- V_{REF} Accuracy: $\pm 1.5\%$ or $\pm 2.0\%$
- Output Current: 0.6A, 1A or 1.5A
- Switching Frequency: fixed 0.6, 1, 4, 5.4, 6MHz
- Low Quiescent Current: typ. 30 μ A, 40 μ A or 53 μ A
- Integrated Power MOSFETs for synchronous rectification (high side p-type and low side n-type)
- Fixed Soft Start Time: typ. 120 μ s or 240 μ s
- Unique PWM/PFM mode switching function
- Int. Protection Function: OCP, TSD, UVLO

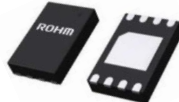
Package

WLCSP



1.3 x 0.9 x 0.4

VSON008



2.0 x 3.0 x 0.6

SSOP6



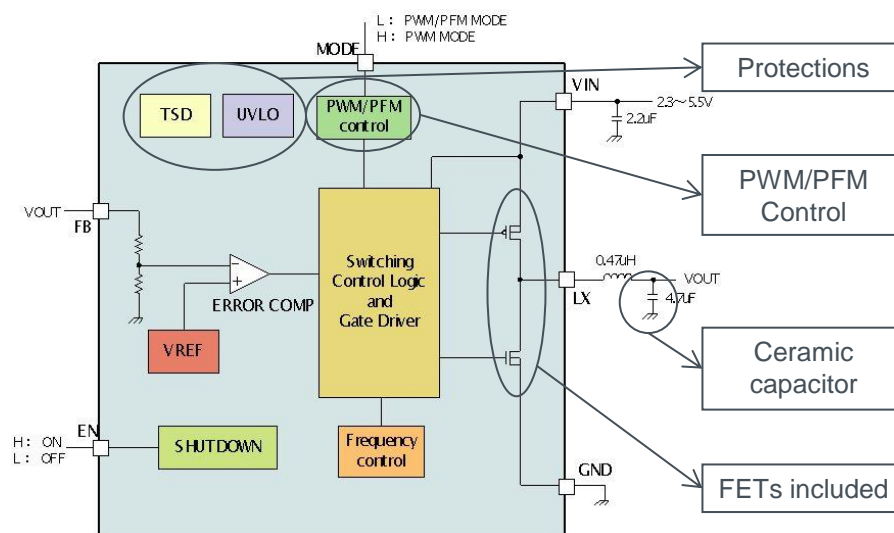
2.9 x 2.8 x 1.25

Advantages

ROHM's BU900xx Family is a synchronous buck converter series that integrates low resistances MOSFETs. It achieves a continuous output current of 0.6A, 1A or 1.5A.

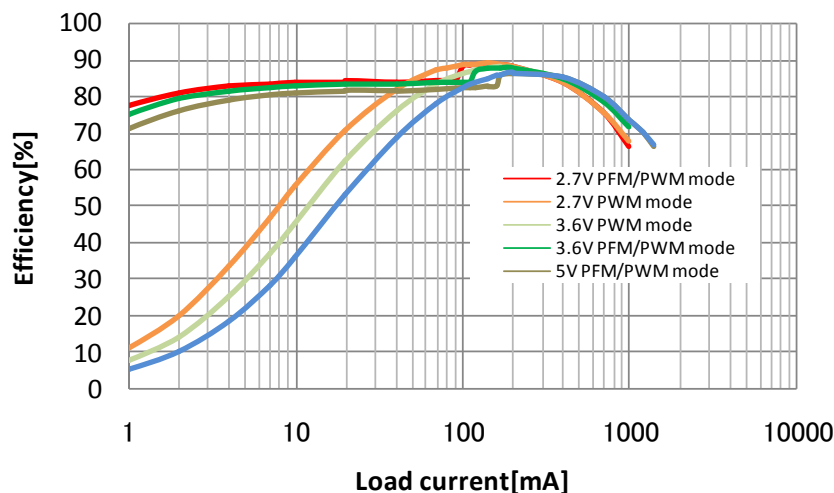
The high switching frequency up to 6MHz allows the use of low cost chip inductor and capacitors. Due to the ultra low current PFM mode it offers a good efficiency over all load conditions.

Application

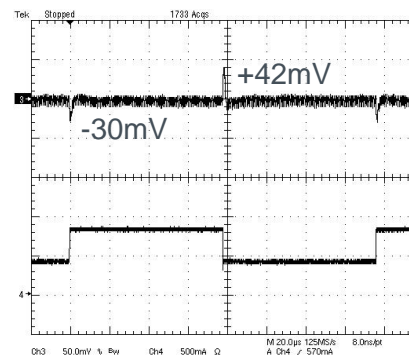


BU900xx (BU9Bxxx) Series – Characteristics

Efficiency



Transient Response



BU90023MUV, 0.4A \Rightarrow 0.8A

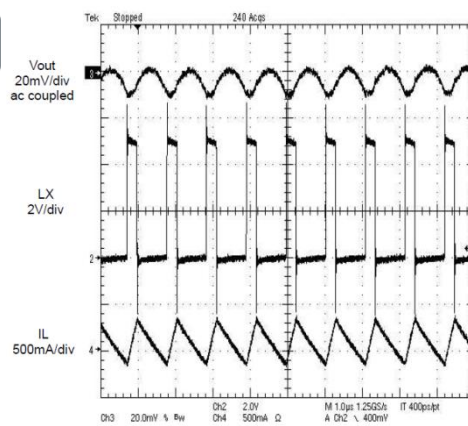
Line-up extraction

PN	V_{IN} [V]	V_{OUT} [V]	I_{OUT} [A]	F_S [MHz]	Package
BU90002	4.0-5.5	3.3	1.0	6.0	WLCSP
BU90003	2.3-5.5	1.2	1.0	4.0	WLCSP
BU90004	2.3-5.5	1.8	1.0	5.4	WLCSP
BU90005	2.3-5.5	2.5	1.0	6.0	WLCSP
BU90006	2.3-5.5	3.0	1.0	6.0	WLCSP
BU90007	2.3-5.5	1.25	1.0	4.0	WLCSP
BU90023	2.3-5.5	1.23	1.5	1.0	VSON
BU90028	2.3-5.5	1.175	1.5	1.0	VSON
BU9B130*	2.3-4.8	1.2	1.0	6.0	WLCSP
BU9B001*	2.3-5.5	2.5	0.6	1.2	SSOP6

*under development

Output ripple

BU90023MUV
 $V_{IN}=5V$
 $V_{OUT}=1.23V$
 50mA load



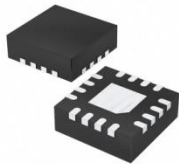
BD9A/Bx00 – Overview

Features

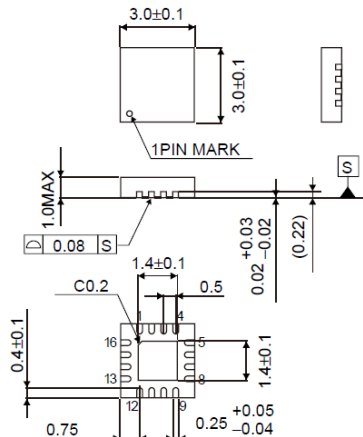
- Input Voltage Range: 2.9V to 5.5V
- Output Voltage Range: 0.8V to ($V_{IN} \times 0.7$)V
- Reference Voltage: $0.8V \pm 1.0\%$
- Output Current: 1.0A, 3.0A or 6.0A
- Switching Frequency: typ. 1MHz (BD9Ax00)
1 or 2MHz (BD9Bx00)
- Integrated Power MOSFETs for synchronous rectification (high and low side n-type)
- Adjustable Soft Start Time
- Power Good (all), SLLM (BD9A), Deep SLLM (BD9B), Current Mode (BD9A) Constant On-Time (BD9B)
- Int. Protection Function: OCP, TSD, UVLO

Package

VQFN



3.0 x 3.0 x 1.0

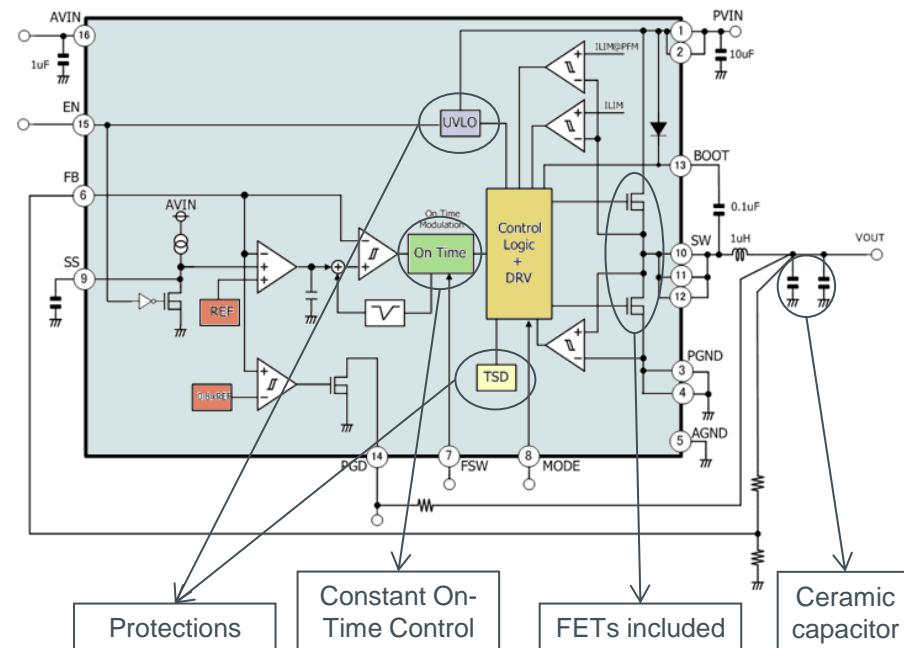


Advantages

ROHM's BD9A/Bx00MUV is a synchronous buck converter that integrates low resistances MOSFETs. It achieves 1, 3 or 6A continuous output current over a wide input supply range and high efficiency.

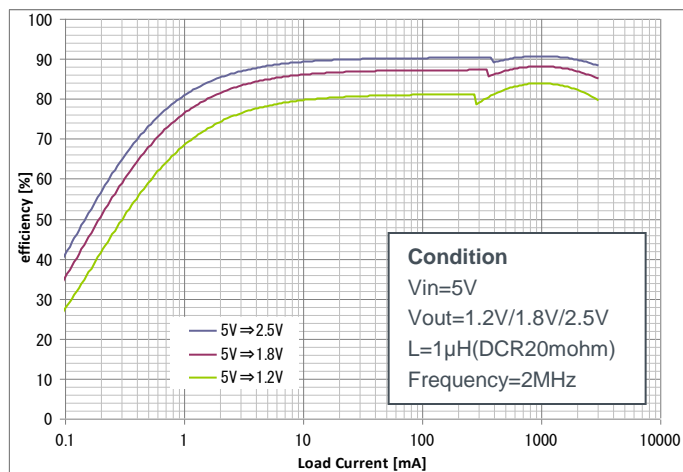
The proprietary Constant On-time Control or the current mode topology provides a fast transient response.

Application

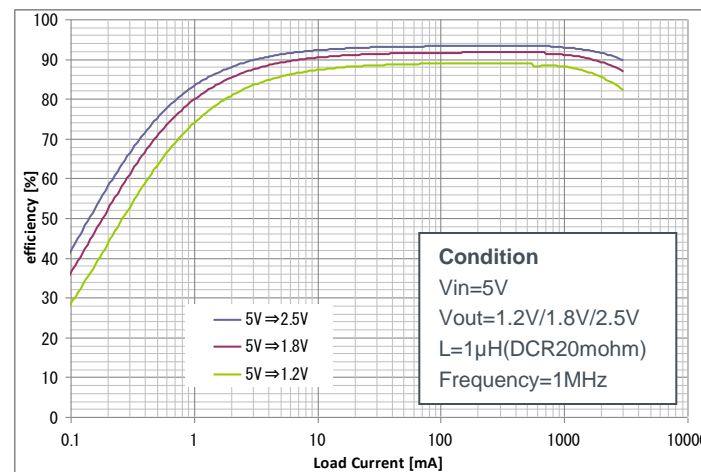


BD9A/Bx00 – Characteristics

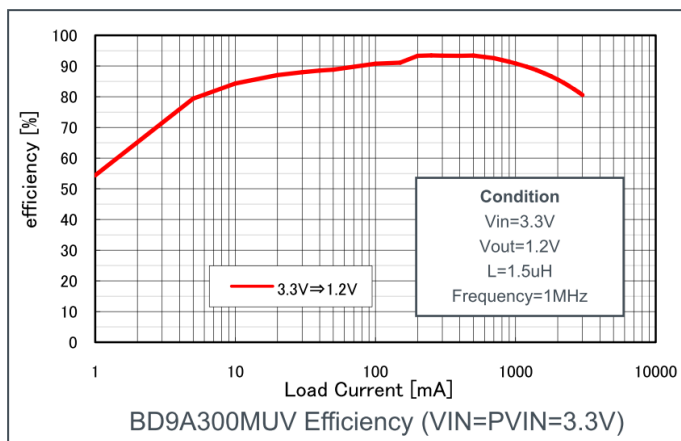
Efficiency



BD9B300MUV, $V_{IN}=5V$, 2MHz



BD9B300MUV, $V_{IN}=5V$, 1MHz

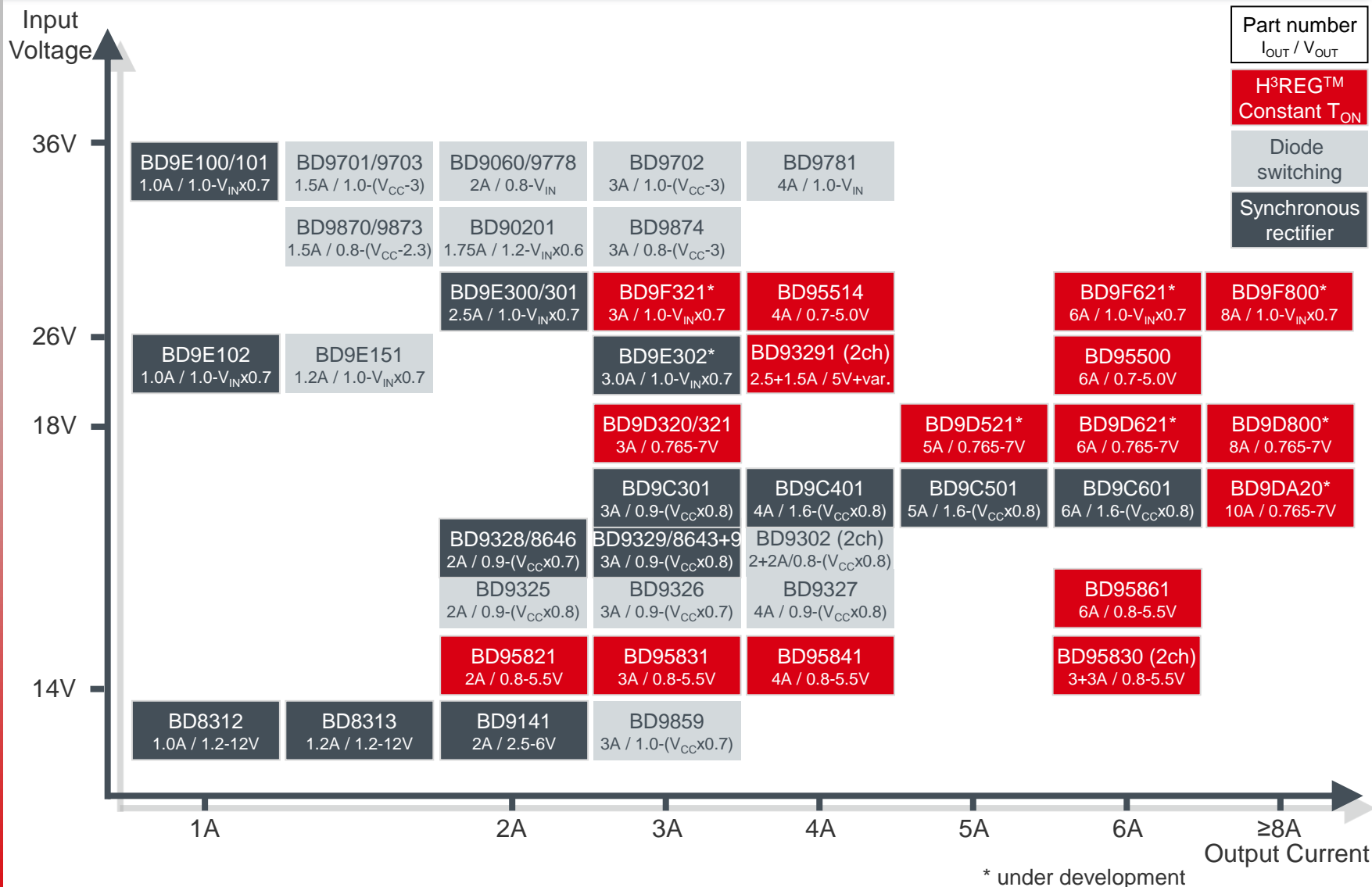


Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	F _S [MHz]	Package
BD9A100	2.7-5.5	0.8V to (V _{IN} × 0.7)	1.0	1.0	VQFN016
BD9A300			3.0		
BD9A600*			6.0		
BD9B100*			1.0	1.0 or 2.0	
BD9B300*			3.0		
BD9B600*			6.0		

*under development

Switching Regulator 12-36V_{IN} – Line-up



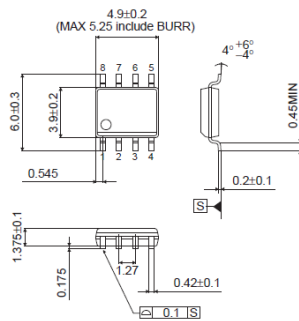
BD9Cx01 Series – Overview

Features

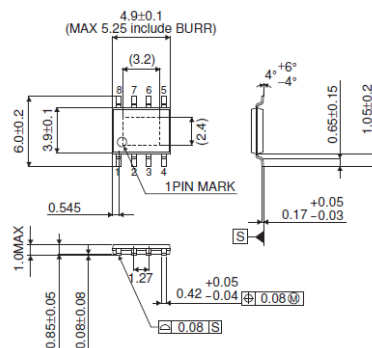
- Input Voltage Range: 4.5V to 18V
- Output Voltage Range: 0.9V/1.6V to ($V_{IN} \times 0.8$)V
- Reference Voltage: $0.8V \pm 1.0\%$
- Output Current: 3A, 4A, 5A, 6A
- Switching Frequency: 500kHz (typ.)
- Integrated Power MOSFETs for synchronous rectification (high side p-type and low side n-type)
- Fixed Soft Start Time (typ. 1ms)
- Int. Protection Function: OCP, SCP, TSD, UVLO OVP

Package

SOP-J8



HTSOP-J8

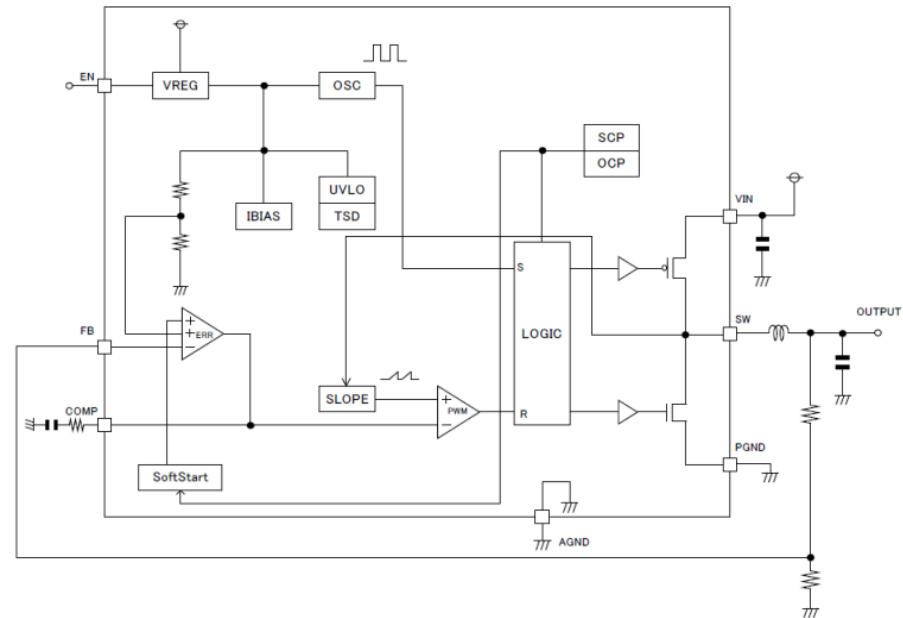


Advantages

ROHM's BD9Cx01 Family is a synchronous buck converter series that integrate low resistances MOSFETs. It achieves a continuous output current of 3A to 6A over a wide input supply range.

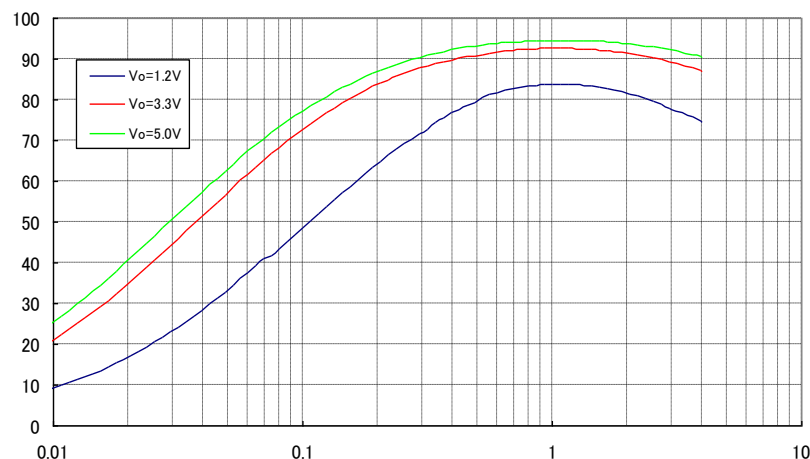
Current mode operation provides a fast transient response and an easy phase compensation.

Application



BD9Cx01 Series – Characteristics

Efficiency

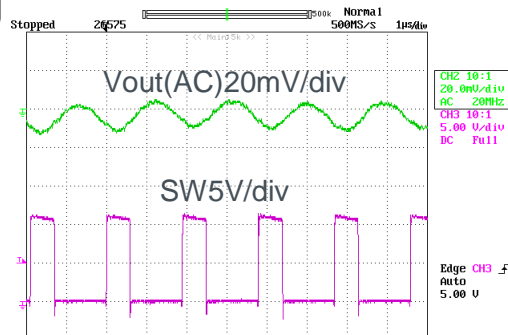


Load Current (A)

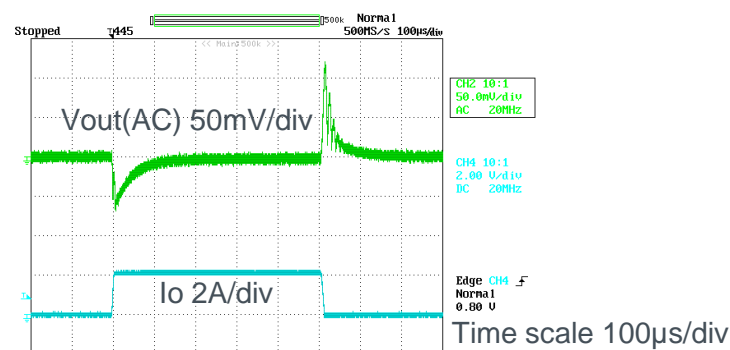
BD9C601EFJ, V_{IN}=12V

Output ripple

BD9C601EFJ
V_{IN}=12V
V_{OUT}=3.3V
max. load



Transient Response



BD9C601EFJ, 0A => 2A

Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	F _S [kHz]	Package
BD9C301	4.5-18	0.9-0.8V _{IN}	3	500	SOP-J8
BD9C401	4.5-18	1.6-0.8V _{IN}	4	500	HTSOP-J8
BD9C501	4.5-18	1.6-0.8V _{IN}	5	500	HTSOP-J8
BD9C601	4.5-18	1.6-0.8V _{IN}	6	500	HTSOP-J8

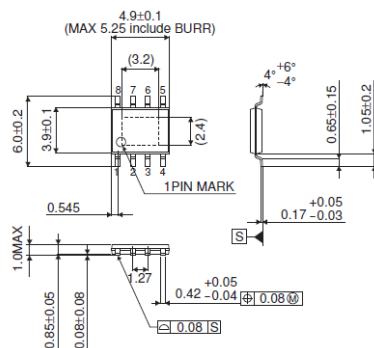
BD9D320/321 Series – Overview

Features

- Input Voltage Range: 4.5V to 18V
- Output Voltage Range: 0.765V to ($V_{IN} \times 0.7$)V max. 7V
- Reference Voltage: 0.765V \pm 1.5%
- Output Current: 3A
- Switching Frequency: 700kHz (typ.)
- Integrated Power MOSFETs for synchronous rectification (high and low side n-type)
- Adjustable Soft Start Time
- Constant On-Time Control (all), SLLM (BD9D321)
- Int. Protection Function

Package

HTSOP-J8

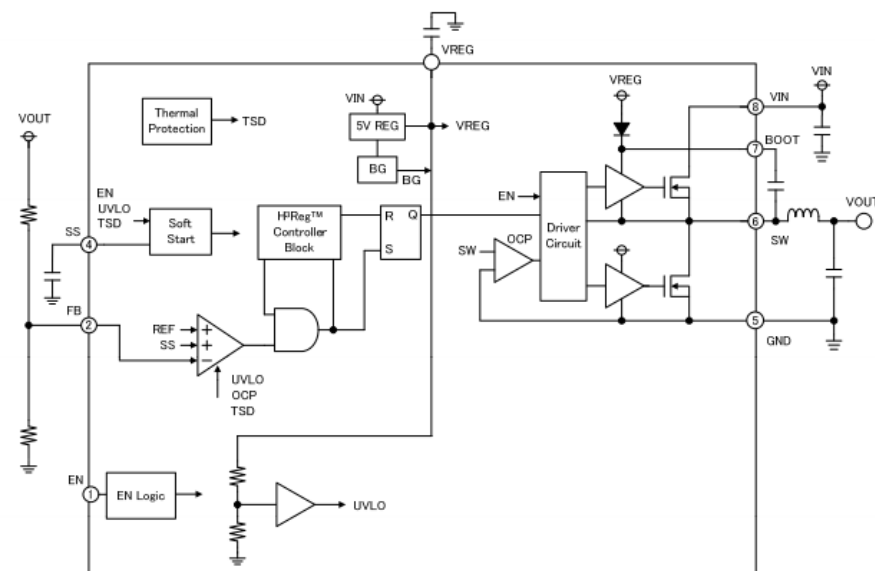


4.9 x 6.0 x 1.0

Advantages

ROHM's BD9D320/321 Families are synchronous buck converters that integrate low resistances MOSFETs. They achieve a continuous output current of 3A over a wide input supply range. Constant On-Time control operation provides a fast transient response.

Application



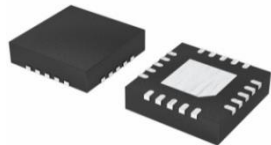
BD958x1 Series – Overview

Features

- Input Voltage Range: 7.5V to 15V / 18V
- Output Voltage Range: 0.8V to 5.5V
- Reference Voltage: $0.8V \pm 1.0\%$
- Output Current: 2A, 3A, 4A or 6A
- Switching Frequency: typ. 700kHz
- Integrated Power MOSFETs for synchronous rectification (high side p-type and low side n-type)
- Fixed Soft Start Time: typ. 1ms
- Constant On-Time Control
- Int. Protection Function: OCP, SCP, TSD, UVLO, OVP

Package

VQFN

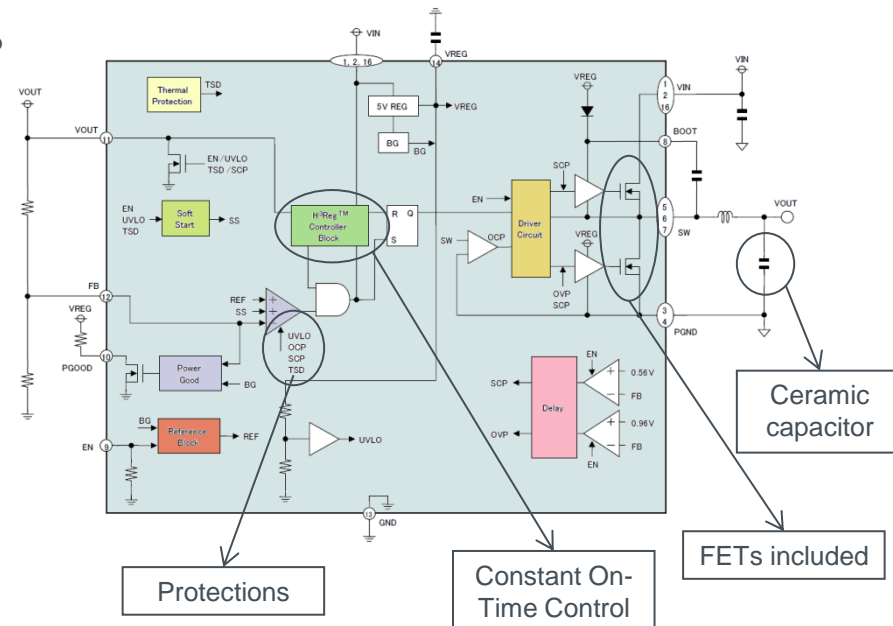


3.0 x 3.0 x 1.0 or 4.0 x 4.0 x 1.0

Advantages

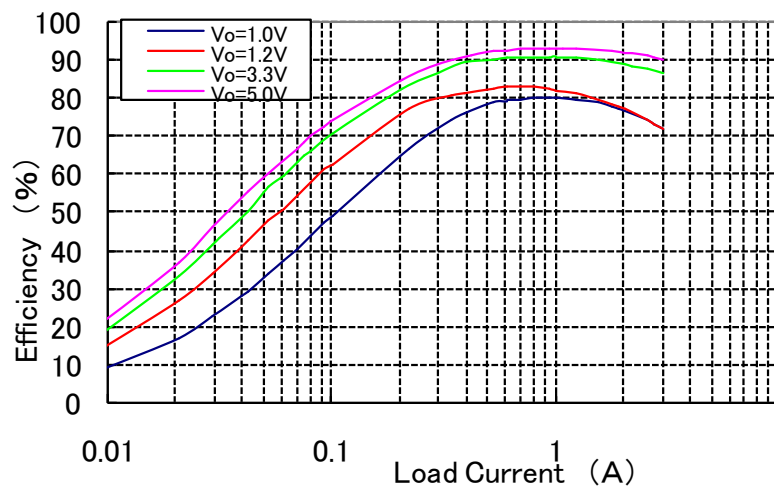
ROHM's BD958x1 Family (BD9Dx01) is a synchronous buck converter that integrates low resistances MOSFETs. It achieves a continuous output current of 2 to 6A over a wide input supply range. H³REG operation provides a fast transient response. All products of this series have the same pin configuration.

Application



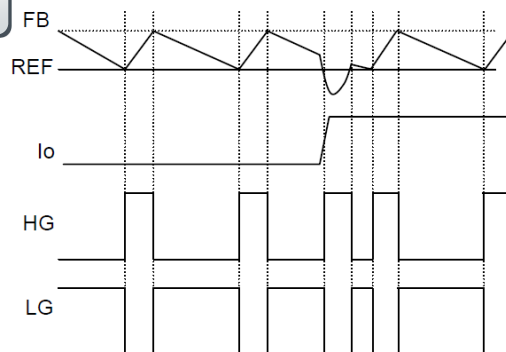
BD958x1 Series – Characteristics

Efficiency

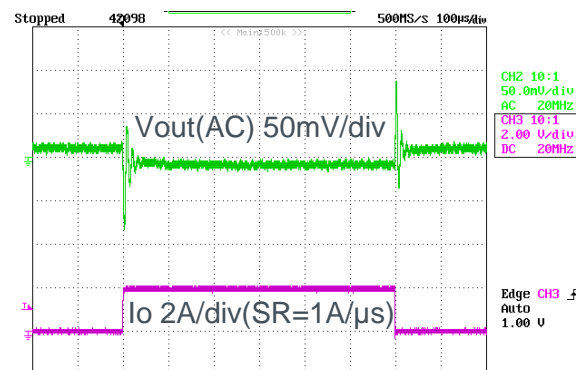


BD95821MUV, $V_{IN}=12V$

H³REG



Transient Response



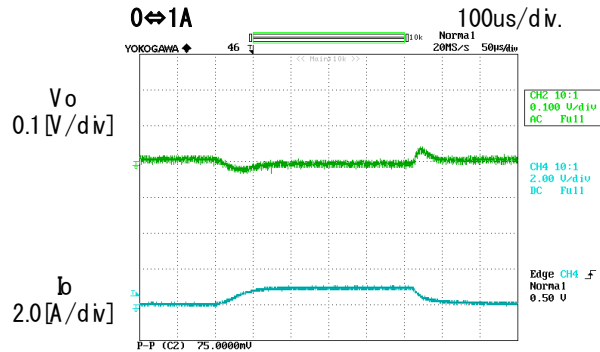
BD95821MUV, 0A => 2A

Line-up extraction

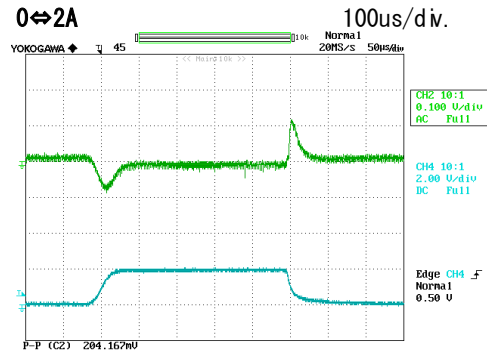
PN	V_{IN} [V]	V_{OUT} [V]	I_{OUT} [A]	F_s [kHz]	Package
BD95821	7.5-15	0.8-5.5	2	700	VQFN016
BD95831	7.5-15	0.8-5.5	3	700	VQFN016
BD95841	7.5-15	0.8-5.5	4	700	VQFN016
BD95861	7.5-18	0.8-5.5	6	700	VQFN024

BD95835 vs. BD9329 – Response comparison

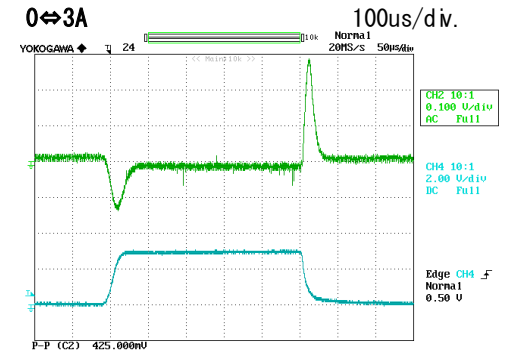
BD95835EFJ



Vp-p = 75mV

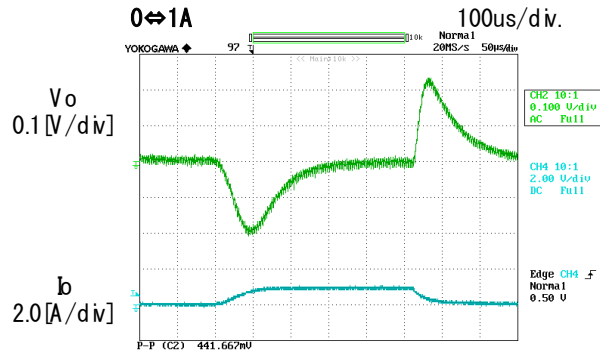


Vp-p = 204mV

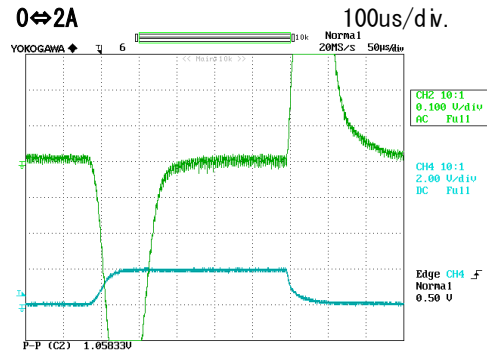


Vp-p = 425mV

BD9329EFJ



Vp-p = 442mV



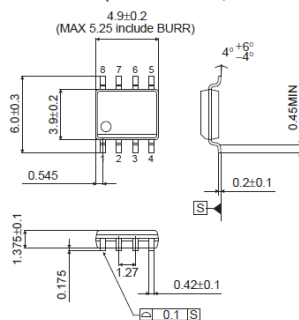
BD9Ex0x Series – Overview

Features

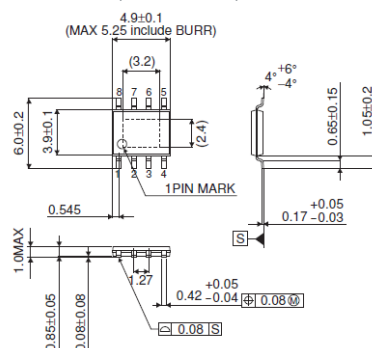
- Input Voltage Range: 7V to 36V (26V with SLLM)
- Output Voltage Range: 1.0V to ($V_{IN} \times 0.7$)V
- Reference Voltage: 1.0V $\pm 2\%$
- Output Current: 1A or 2.5A
- Switching Frequency: typ. 1MHz or typ. 570kHz
- Integrated Power MOSFETs for synchronous rectification (high and low side n-type)
- Fixed Soft Start Time: typ. 3ms
- Current mode control, SLLM (BD9Ex02)
- Int. Protection Function: OCP, TSD, UVLO

Package

SOP-J8
(BD9E10x)



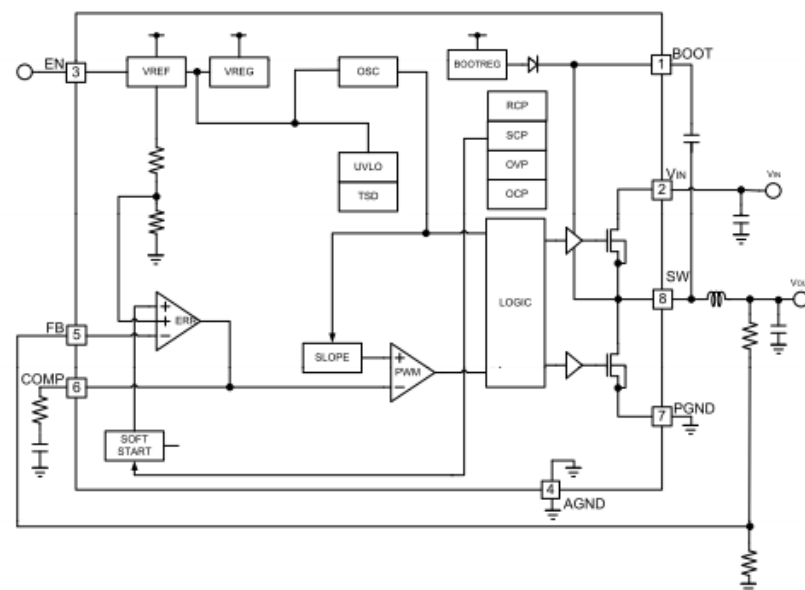
HTSOP-J8
(BD9E30x)



Advantages

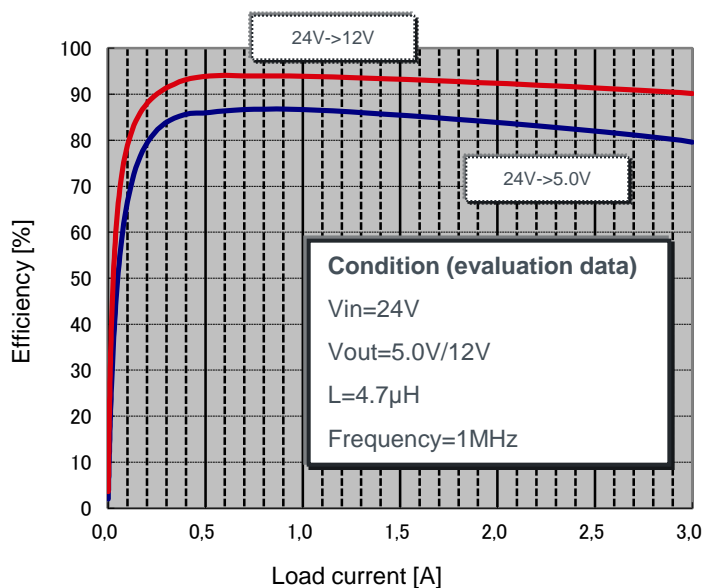
BD9E30xEFJ-LB is a synchronous buck converter series that integrates low resistances MOSFETs. It achieves 2.5A continuous output current over a wide input supply range. Current mode operation provides fast transient response and easy phase compensation.

Application



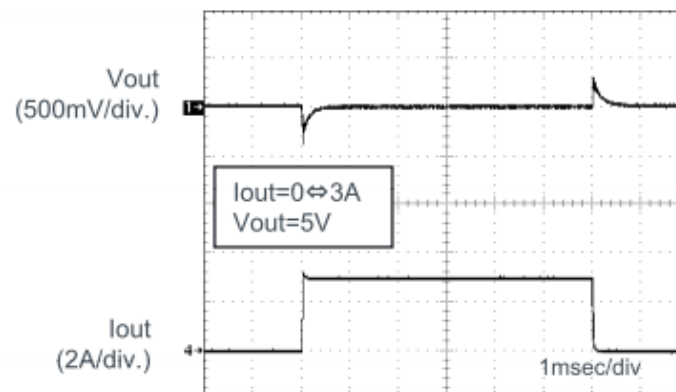
BD9Ex0x Series – Characteristics

Efficiency



BD9E300EFJ, $V_{IN}=24V$

Transient Response



Line-up

PN	V_{IN} [V]	V_{OUT} [V]	I_{OUT} [A]	F_s [kHz]	Package
BD9E100	7.0-36	1V to 0.7x V_{IN}	1.0	1,000	SOP-J8
BD9E101	7.0-36		1.0	570	SOP-J8
BD9E102	7.0-26		1.0	570	SOP-J8
BD9E300	7.0-36		2.5	1,000	HTSOP-J8
BD9E301	7.0-36		2.5	570	HTSOP-J8
BD9E302*	7.0-26		2.5	570	HTSOP-J8

*under development

BD93291 – Overview

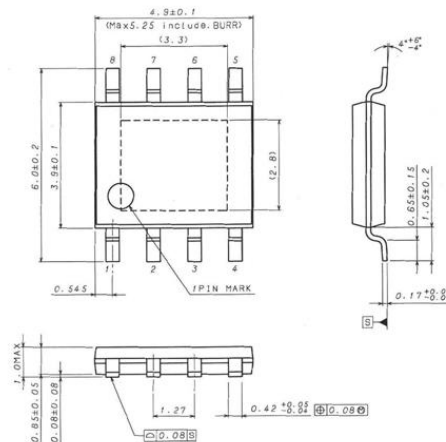
Features

- Input Voltage Range: 8.0V to 26V
- Output Voltage:
ch1: fixed 5.0V
ch2: 0.8V to 4.0V
- Reference Voltage: $0.8V \pm 1.5\%$
- Output Current: 2.5A (ch1), 1.5A (ch2)
- Switching Frequency: 300 to 600kHz (ch1)
1.5 to 2.5MHz (ch2)
- Integrated Power MOSFETs for synchronous rectification
- Fixed Soft Start Time (typ. 5ms / 2.5ms)
- Int. Protection Function: OCP, TSD, UVLO

Package

HTSOP-J8

4.9 x 6.0 x 1.0

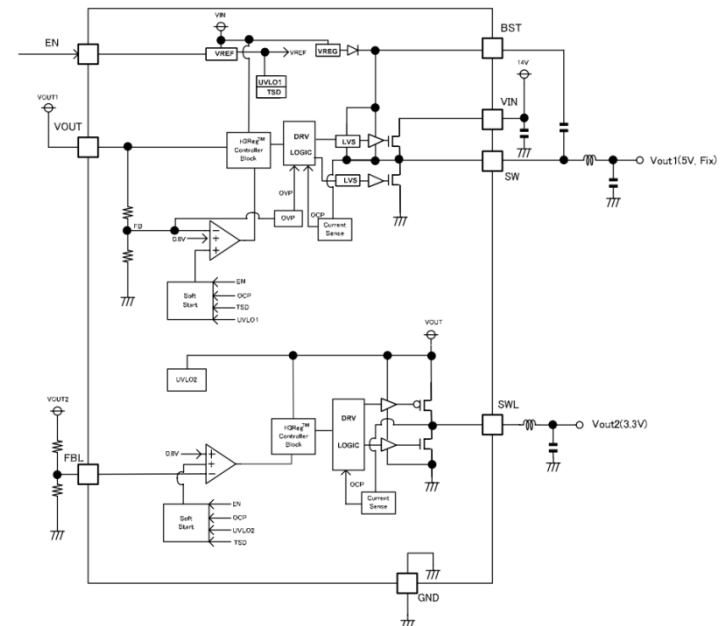


Advantages

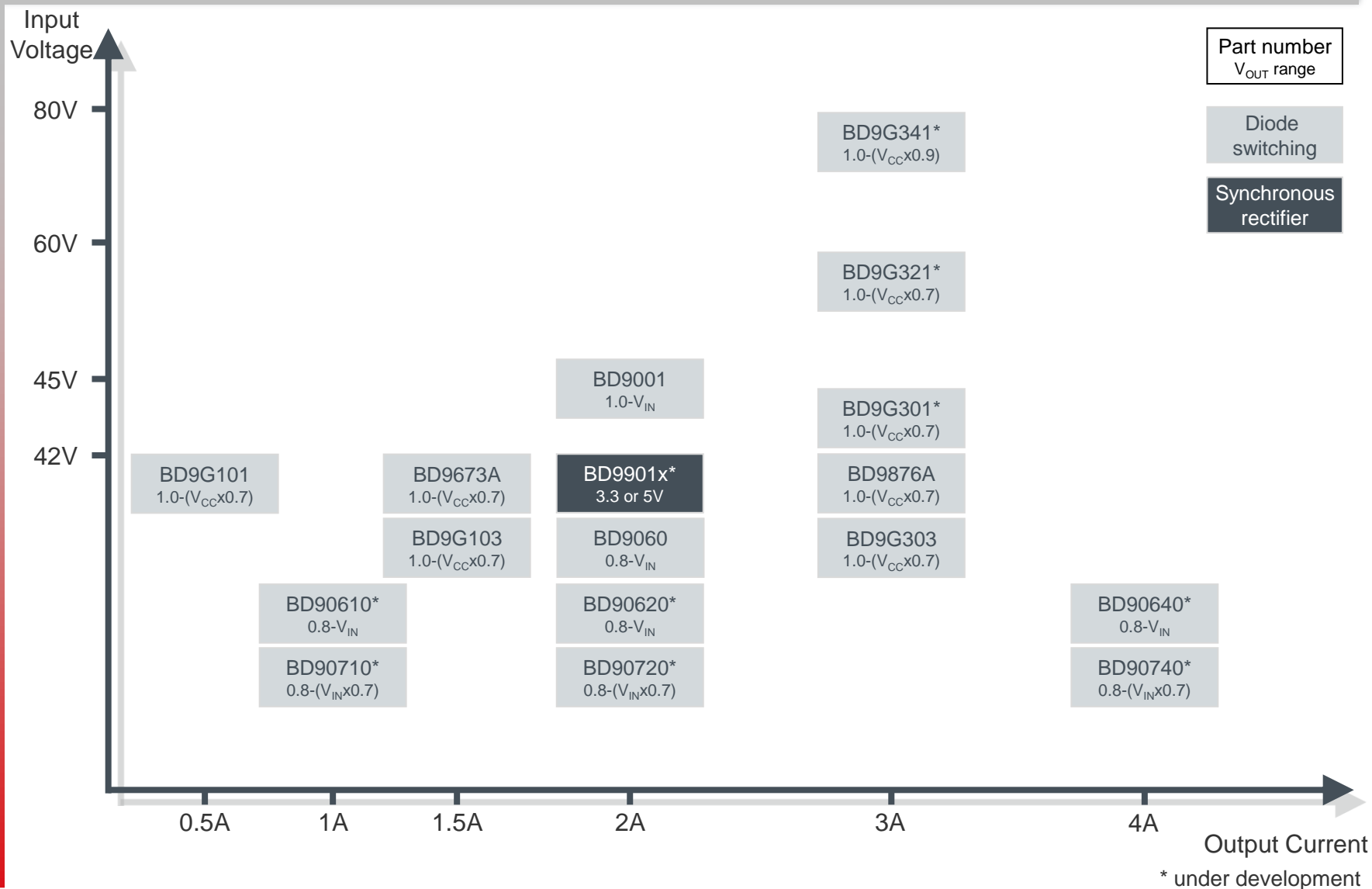
The BD93291EFJ is a dual synchronous buck converter. It integrates wide input voltage range (8-26V) synchronous buck converter and low input voltage (5.0V) synchronous buck converter.

The IC also incorporates a new technology called H³Reg™, SLLM technology, soft start function and N-MOS power transistors in an HTSOP-J8 package. .

Application



Switching Regulator 42-80V_{IN} – Line-up



BD9G101 Series – Overview

Features

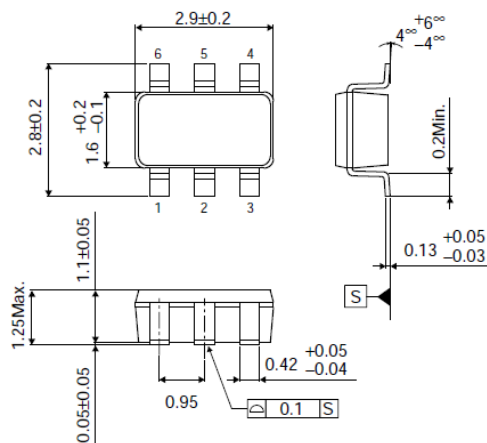
- Input Voltage Range: 6.0V to 42V
- Output Voltage Range: 1.0V to ($V_{CC} \times 0.7$)V
- Reference Voltage: $0.75V \pm 2.0\%$
- Output Current: 0.5A
- Switching Frequency: 1.5MHz (typ.)
- Integrated Power MOSFET for asynchronous rectification
- Fixed Soft Start Time (typ. 4ms)
- Int. Protection Function: OCP, TSD, UVLO

Package

SSOP6



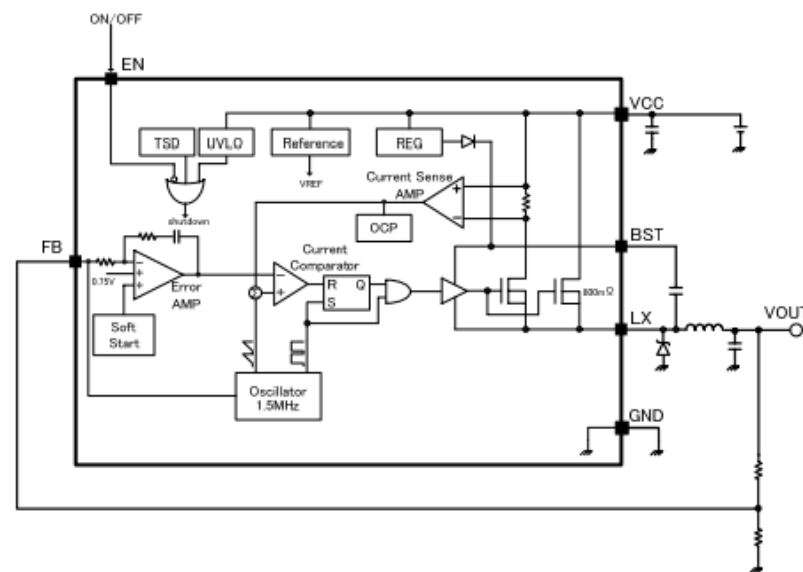
2.9 x 2.8 x 1.25



Advantages

ROHM's BD9901x Family is a asynchronous buck converter providing 0.5A output current in a small SOT23 package. The switching frequency is fixed to 1.5MHz allowing the usage of a small inductor and ceramic capacitors. The optimized current mode control provides a fast response. All components for phase compensation are integrated.

Application



BD9673A & BD9876A – Overview

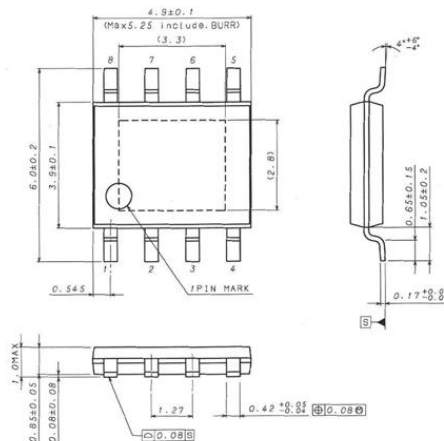
Features

- Input Voltage Range: 7.0V to 42V
- Output Voltage Range: 1.0V to ($V_{CC} \times 0.7$)V
- Reference Voltage: $1.0V \pm 1\%$
- Output Current: 1.5A or 3A
- Switching Frequency: typ. 200k to 500kHz
- Integrated Power MOSFET (high side n-type)
- Integrated low-side MOSFET (10 Ω) for ringing noise reduction of the coil
- Fixed Soft Start Time (typ. 10ms)
- Int. Protection Function: OCP, TSD, UVLO

Package

HTSOP-J8

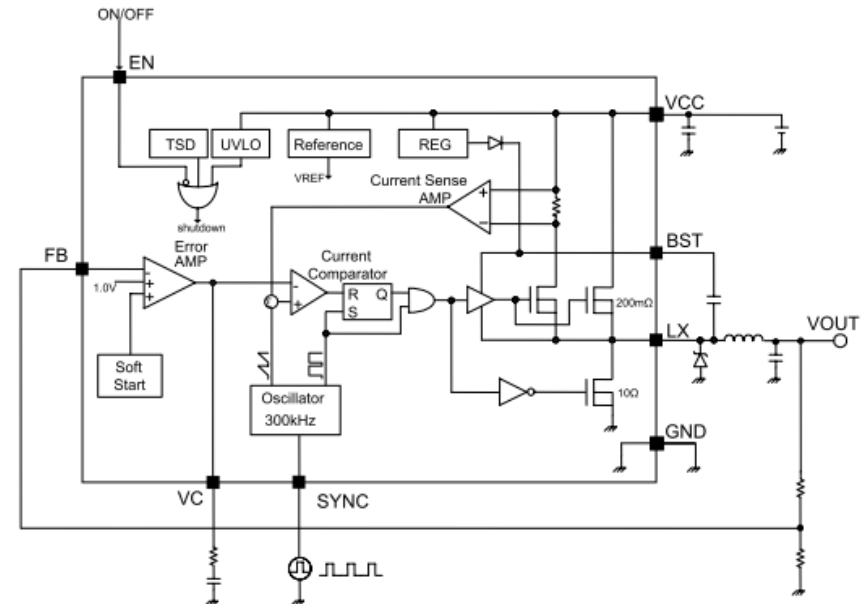
4.9 x 6.0 x 1.0



Advantages

ROHM's BD9673 and BD9876 are asynchronous buck converters that integrate low resistance high-side MOSFETs. It achieves 1.5A or 3A continuous output current over a wide input supply range up to 42V. Current Mode Control offers a simple external phase compensation system, so that a compact power supply can be designed easily.

Application



BD9Gx03 Series – Overview

Features

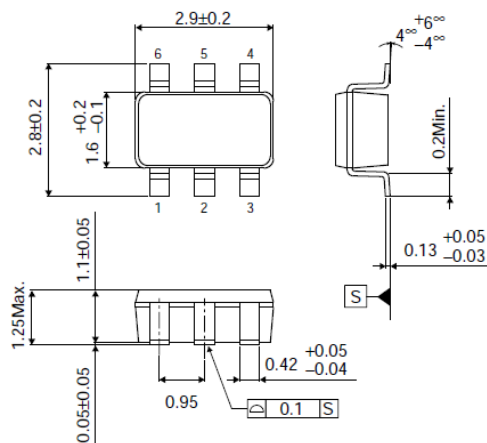
- Input Voltage Range: 7.0V to 42V
- Output Voltage Range: 1.0V to ($V_{CC} \times 0.7$)V
- Reference Voltage: $0.75V \pm 1.0\%$
- Output Current: 1.5A or 3A
- Switching Frequency: 0.1 to 2.5MHz (typ.)
- Integrated Power MOSFET for asynchronous rectification (n-MOS)
- Fixed Soft Start Time
- Int. Protection Function: OCP, TSD, UVLO, EXUVLO

Package

SSOP6



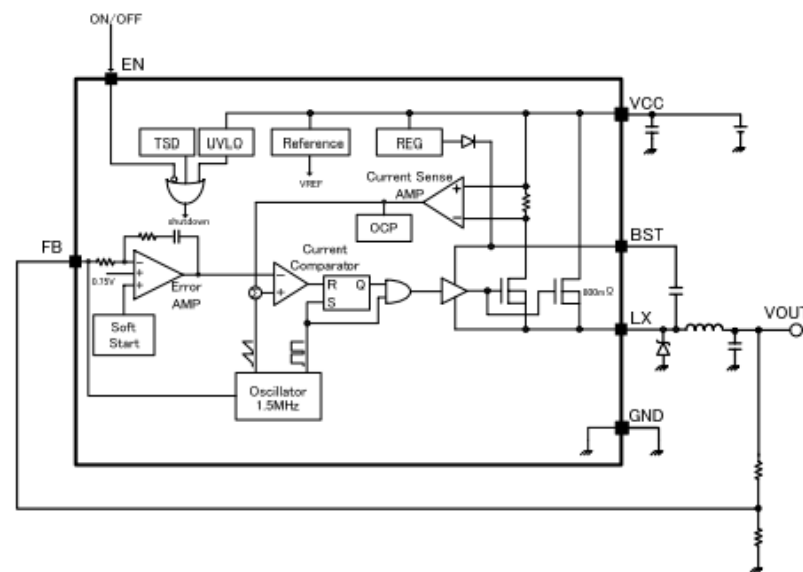
2.9 x 2.8 x 1.25



Advantages

ROHM's BD9Gx03 Family is an asynchronous buck converter series providing up to 3A output current. Because of the wide input voltage range it is possible to use in 24V and 42V systems. The extended Under Voltage Lockout (EXUVLO) is configurable by external resistance ratio between VCC and GND. The switching frequency is adjustable up to 2.5MHz.

Application



BD9901x Series – Overview

-under development-

Features

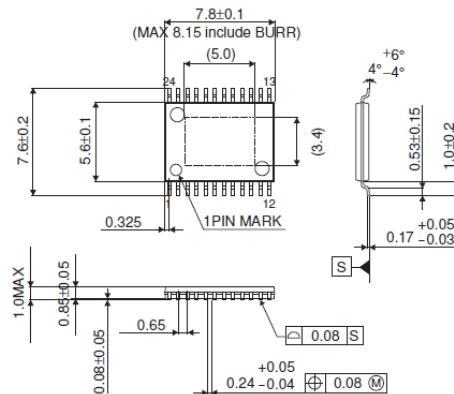
- Input Voltage Range: 3.6V to 42V
- Output Voltage: 3.3V or 5.0V
- Reference Voltage: $1.2V \pm 1.0\%$
- Output Current: 2.0A
- Switching Frequency: 200 to 500kHz (typ.)
- Low Quiescent Current: typ. 22 μ A
- Integrated Power MOSFETs for synchronous rectification (high side p-type and low side n-type)
- Fixed Soft Start Time (typ. 6ms)
- Int. Protection Function: OCP, SCP, TSD, UVLO, OVP

Package

HTSOP-B24



7.8 x 7.6 x 1.0

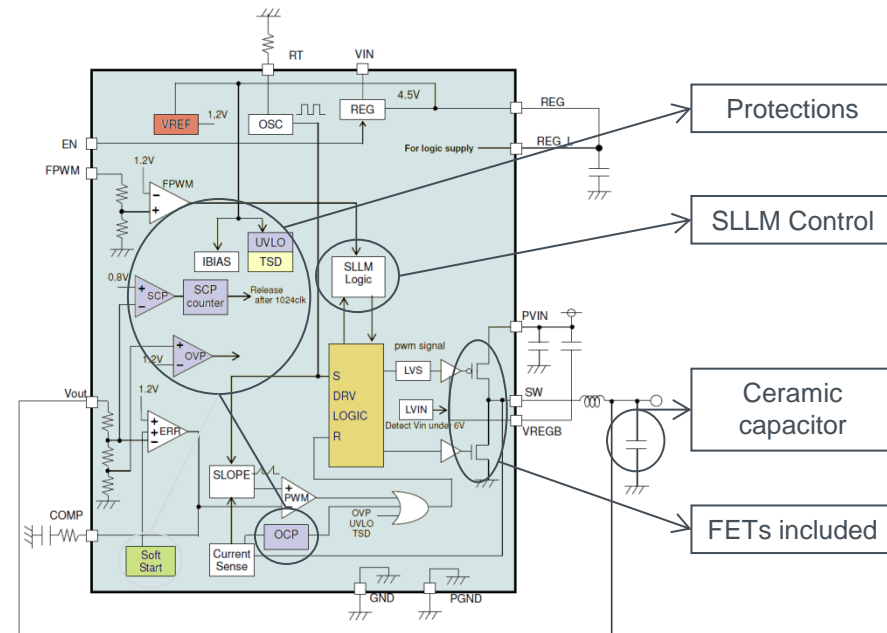


Advantages

ROHM's BD9901x Family is a synchronous buck converter series that integrates low resistances MOSFETs. It achieves a continuous output current of 2A over a wide input supply range.

The SLLM control ensures an ultra low quiescent current and high efficiency at low load situation as well as a high efficiency at high load situations.

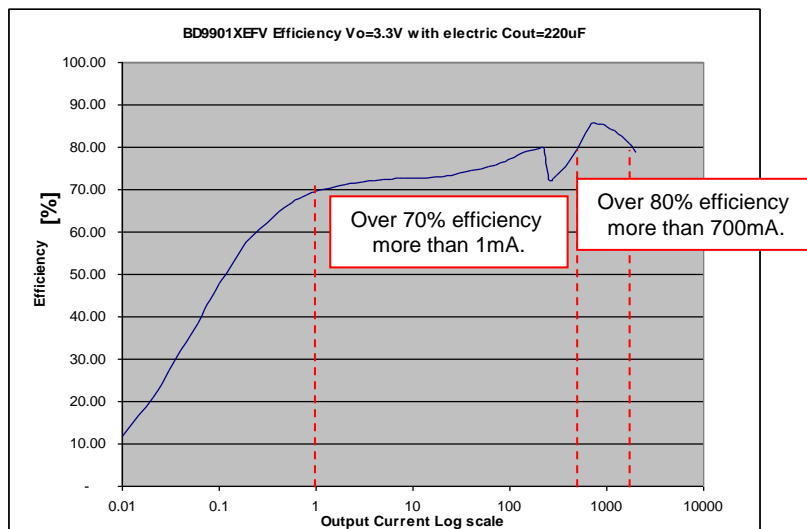
Application



BD9901x Series – Characteristics

-under development-

Efficiency

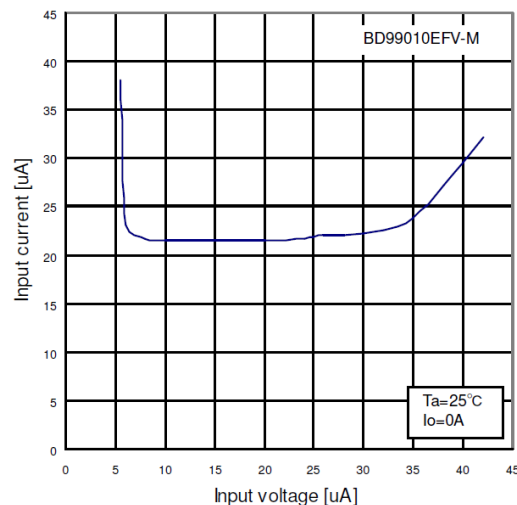
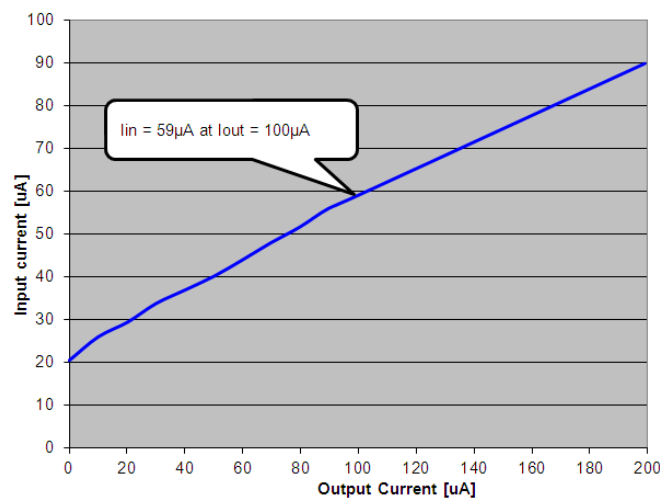


BD9010EFJ, $V_{IN}=13.2V$

Schedule

Samples: available
CS: December 2012
MP: July 2013

Quiescent Current



BD99010EFV
 $V_{IN}=13.2V$, $I_{OUT} \sim$
 $V_{IN} \sim$, $I_{OUT}=0\mu A$

BD9G3x1 – Overview

-under development-

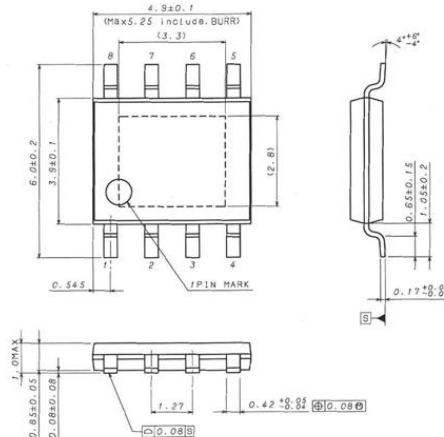
Features

- Input Voltage Range: 3.5V to 42V (BD9G301)
6.0V to 56V (BD9G321)
12V to 76V (BD9G341)
- Output Voltage Range: 1.0 to ($V_{IN} \times 0.7$)
- Reference Voltage: $1.0V \pm 1.5\%$ (+25°C)
 $\pm 2.0\%$ (-25 to 105°C)
- Output Current: 3.0 A
- Switching Frequency: 300 kHz or ext. (BD9G301)
50k to 750kHz (others)
- Integrated Power MOSFET (n-type) for asynchronous rectification
- Int. Protection Functions: OCP, TSD, UVLO

Package

HTSOP-J8

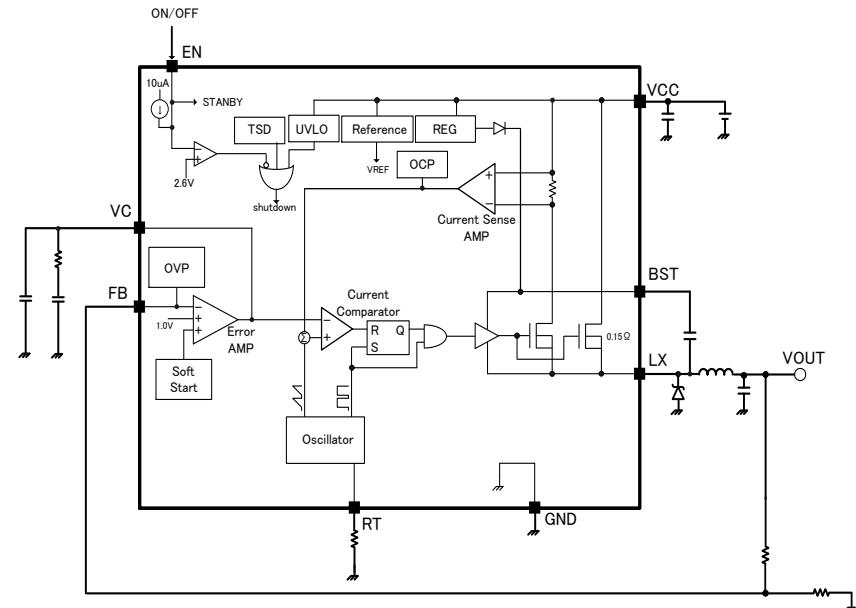
4.9 x 6.0 x 1.0



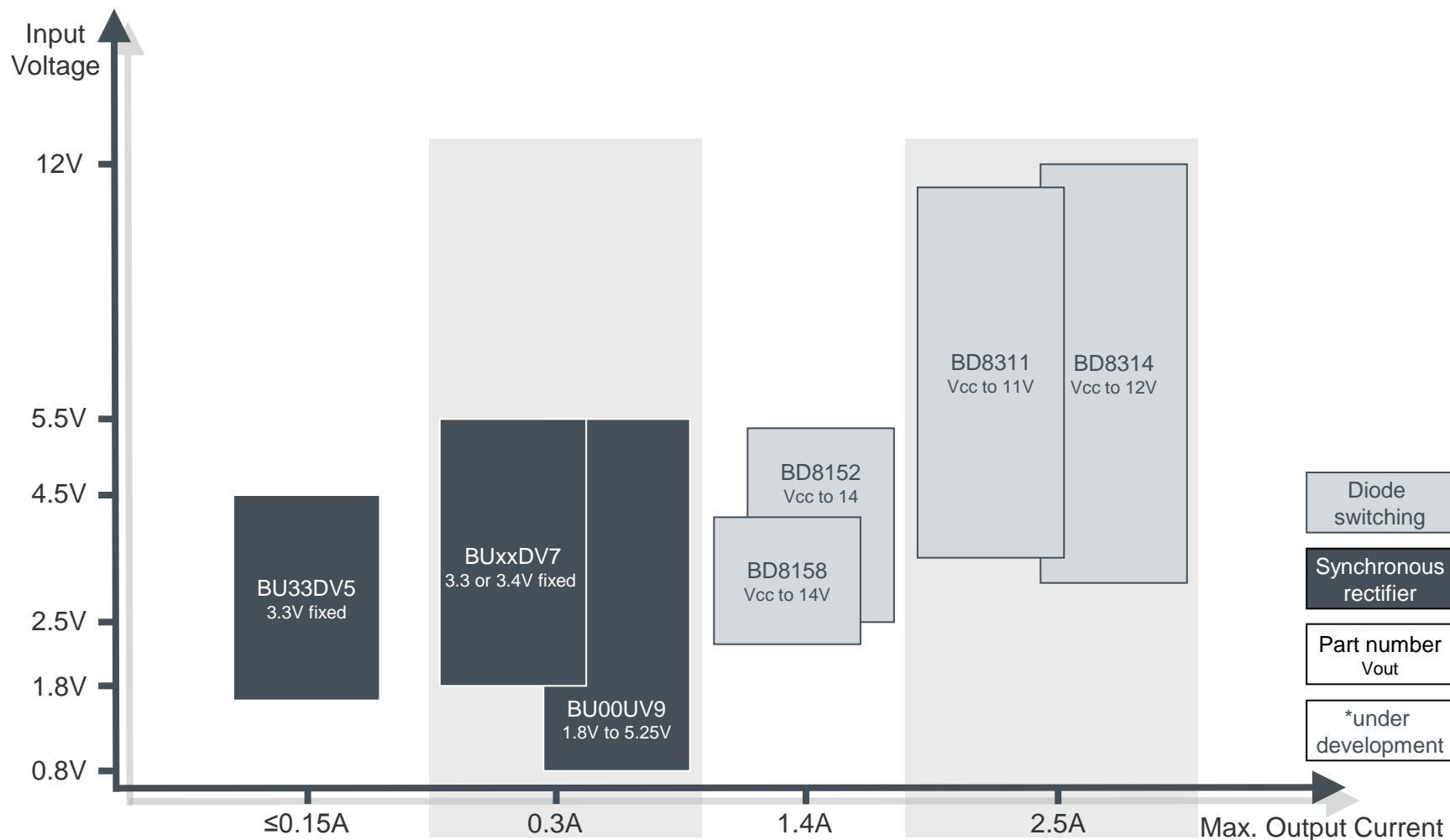
Advantages

The BD9G3x1 series is developed for a wide input voltage range up to 80V.

Application




Step-up DCDC with integrated MOSFET



Low Input Voltage Step-up Converter

B U 3 3 D V 1 G

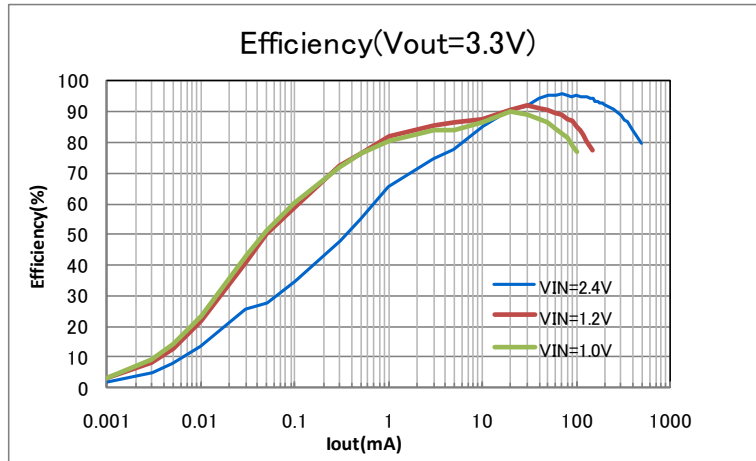
Symbol	V _{OUT}
30	3.0V
31	3.1V
32	3.2V
	
49	4.9V
50	5.0V
00	Variable

Symbol	V _{IN}
DV	1.8~4.5V 1.8~5.5V
UV	0.8~5.5V

Function		
Symbol	Feature	rectification
5	High Efficiency at low load	synchronous
7	High Efficiency at wide load	
9	High Efficiency at wide load	

BU00UV9 – Characteristics

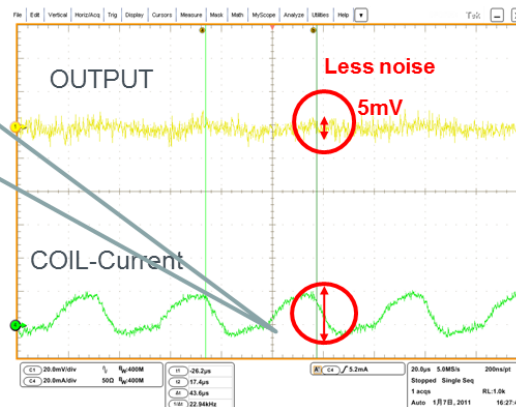
Efficiency



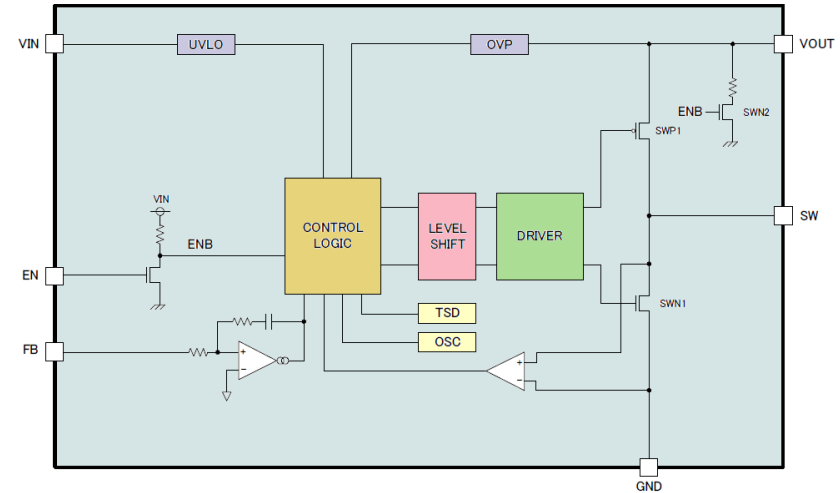
Technology

Mixing PWM

Low noise realized by mixing 20kHz and 800kHz frequency

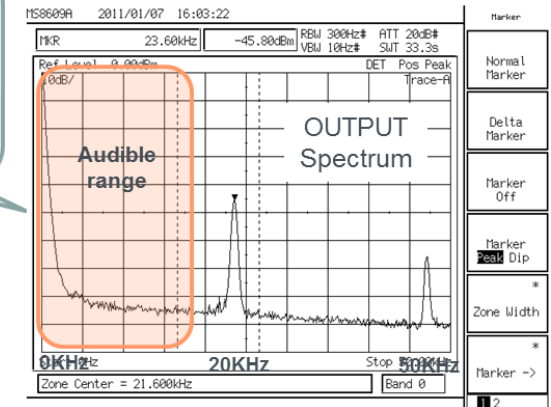


Block Diagram

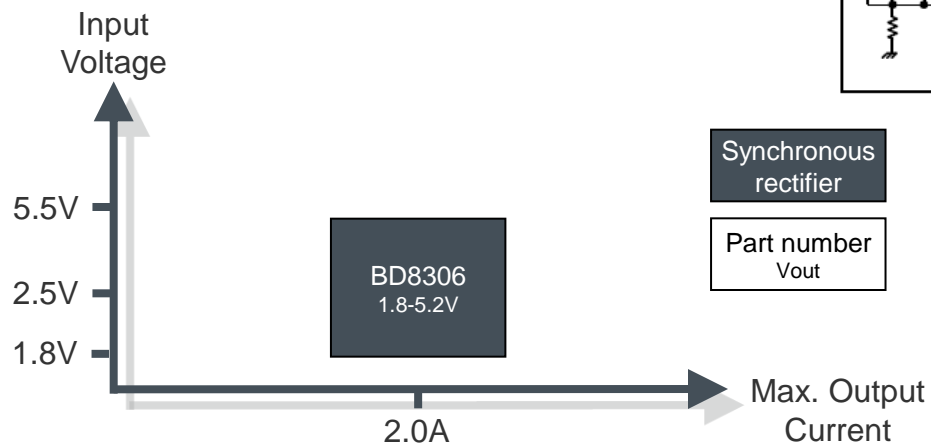
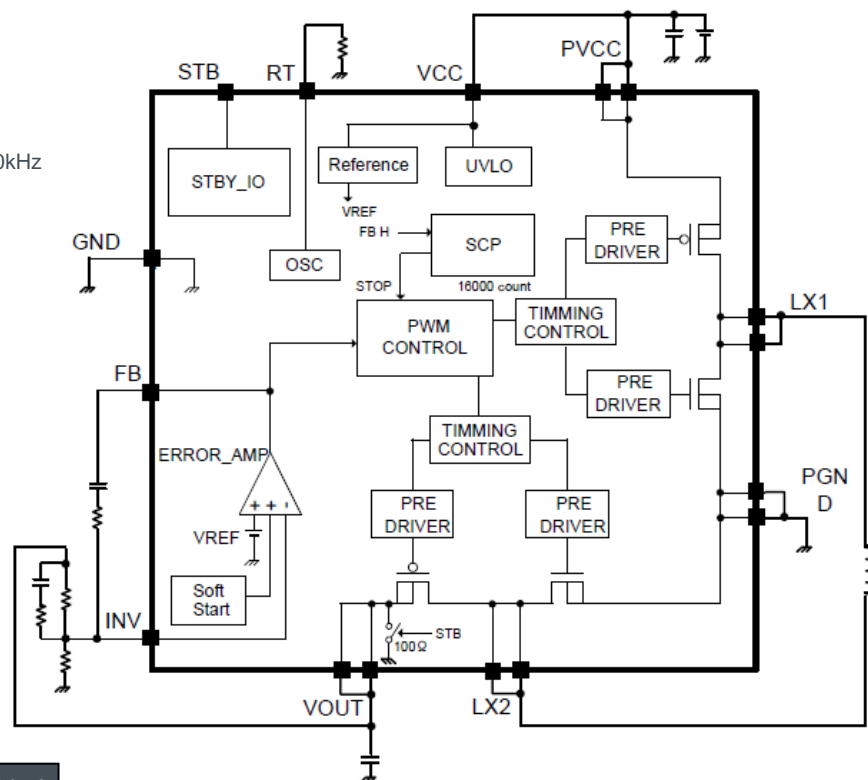
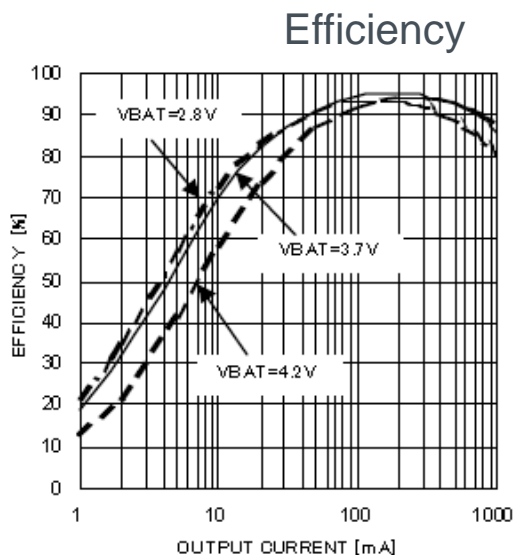


Audio Sound Human defect

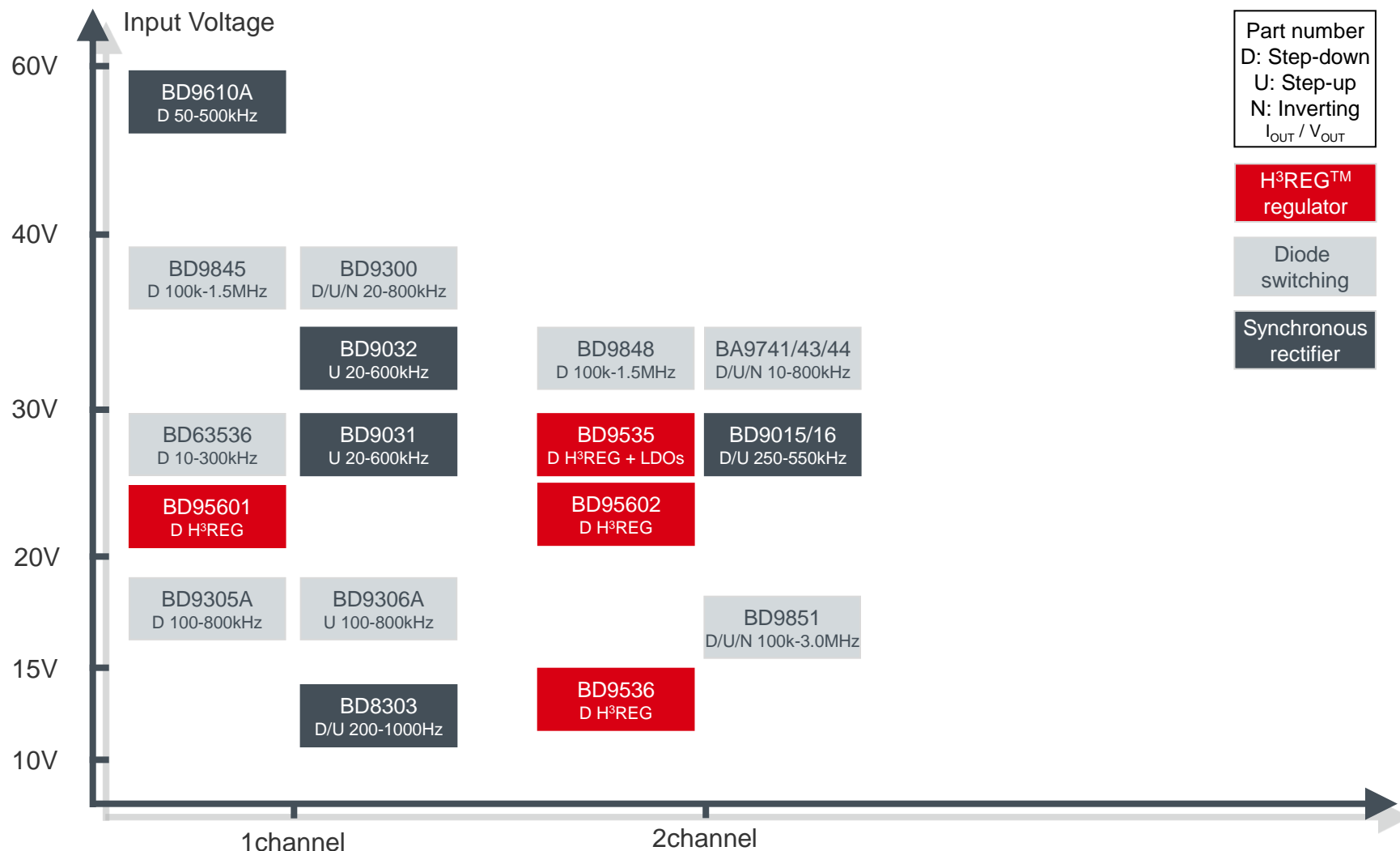
No SW pulse in audible range and noise can be heard by human



Step-up / -down DCDC with integrated MOSFET



Line-up: DCDC (Controller) with external MOSFET



Power Supply for MCUs

Intel® Atom™ Processor E600 Series System

Features

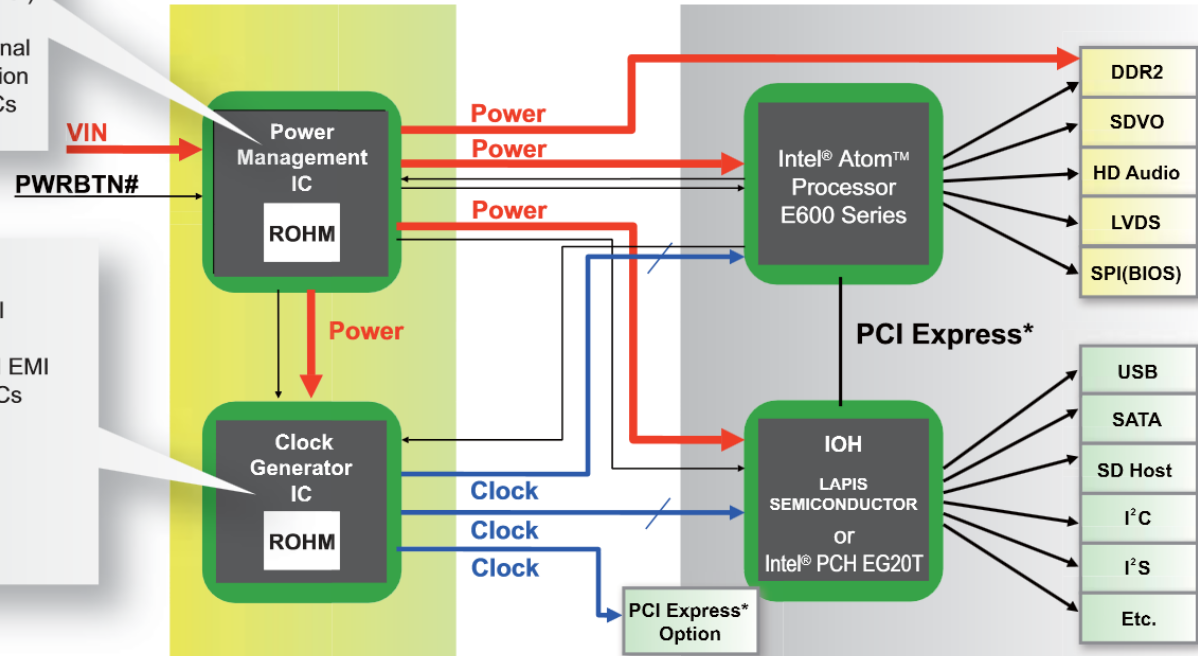
- Complicated power ON / OFF sequence control (that up to now was performed by a microcontroller) is built in, facilitating IA platform design
- System-optimized, high efficiency single external FET design contributes to greater miniaturization
- Ideal for use with ROHM BU733x series CGICs

Features

- 5 integrated PLLs enable the generation of all required clocks (Intel CK505-compliant)
- Spread Spectrum function built in for reduced EMI
- Ideal for use with ROHM BD959x series PMICs

Operating Conditions

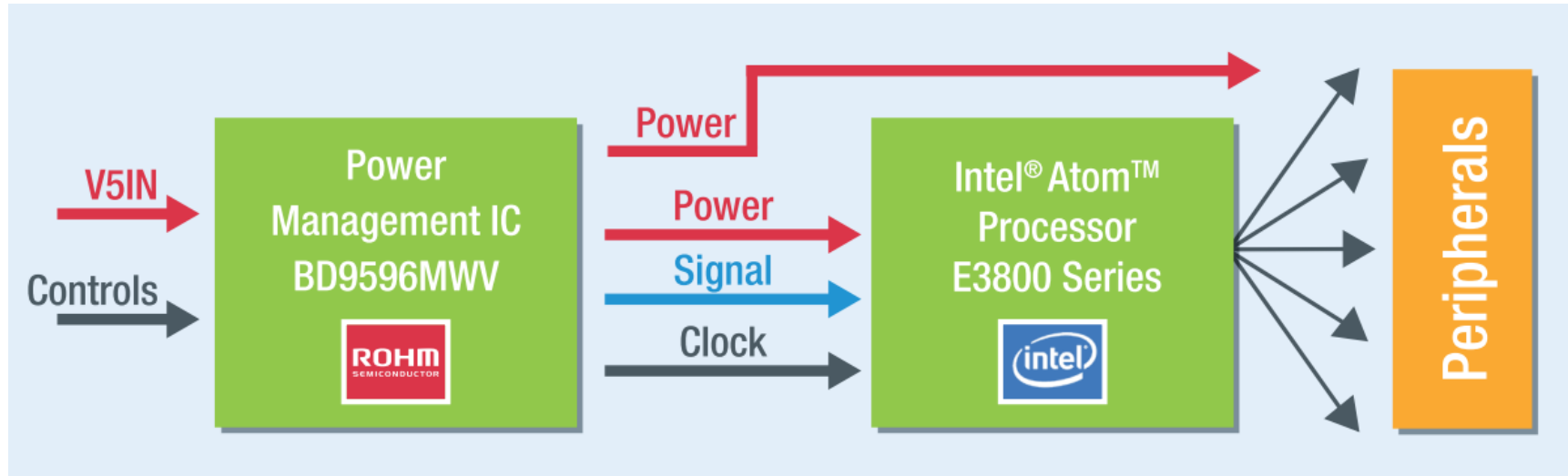
- Supply Voltage: $3.3V \pm 5\%$
- Operating Temp. Range: -40 to $+85^{\circ}\text{C}$
- Reference Clock: 25MHz



Support & Information (only with NDA):
Atom E600 Support <http://rohm.bz/itcp/>

Power Supply for MCUs

Intel® Atom™ Processor E3800 Series System



Advantages compared to discrete solution:

- -50% PCB space required
- -40% components on board

Support & Information (only with NDA):

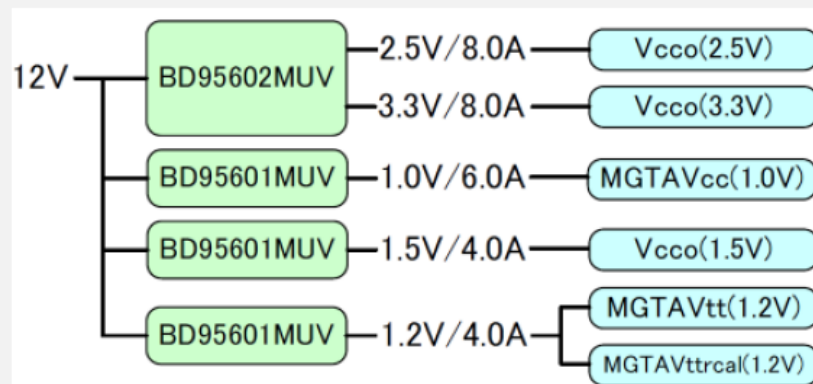
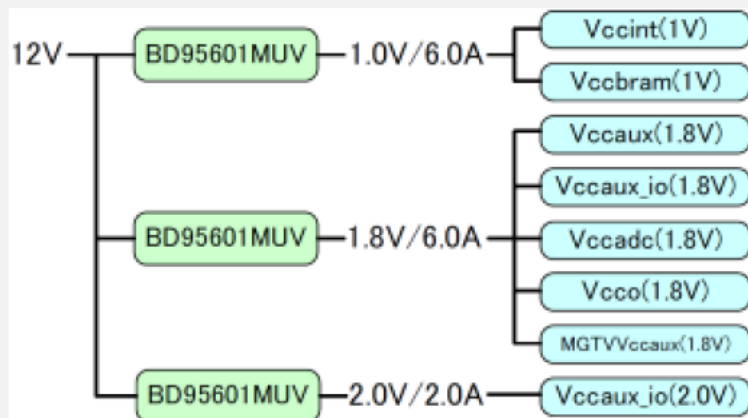
Atom E3800 Support <http://rohm.bz/ijrc/>

Power Solution XILINX FPGA 7series & ZYNQ-7000

<Power Supply SPEC of Xilinx FPGA7 series & ZYNQ-7000>

Xilinx power bank / FMC Voltage	Voltage (V)	Max Current (A)	Tolerance
Vccint/Vccbram	1	6	3.00%
Vcco	1.5 / 1.35	4	5.00%
Vccaux/Vccaux_io/Vccadc/Vcco/MGTAVccaux	1.8	6	5.00%
Vccaux_io	2	2	3.00%
Vcco	2.5	8	5.00%
Vcco	3.3	8	5.00%
MGTAVcc	1	6	3.00%
MGTAVtt/MGTAVTtrcal	1.2	4	2.50%

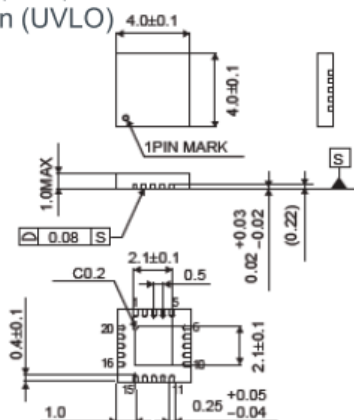
<ROHM Power IC Solution>



Power Solution XILINX FPGA 7series & ZYNQ-7000

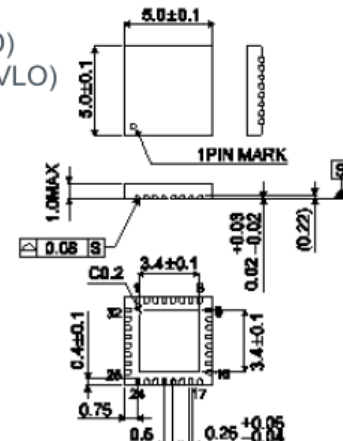
BD95601MUV

- H³Reg™ operation provides fast transient response
- Single DC/DC controller
- Selectable two operation modes
 - PWM mode
 - SLLM mode (Pulse skip)
- Adjustable soft start function avoiding inrush current when start-up
- Power good output
- Input voltage range : 4.5V to 25V
- Output voltage range : 0.75V to 2.0V
- Reference voltage : 0.75V ± 1.0%
- Switching frequency : 200kHz to 500kHz
- Multi-functional protection
 - Auto reset type over current protection (OCP)
 - Short circuit protection function (SCP)
 - Thermal shutdown protection (TSD)
 - Under voltage lock out function (UVLO)
- VQFN20V4040



BD95602MUV

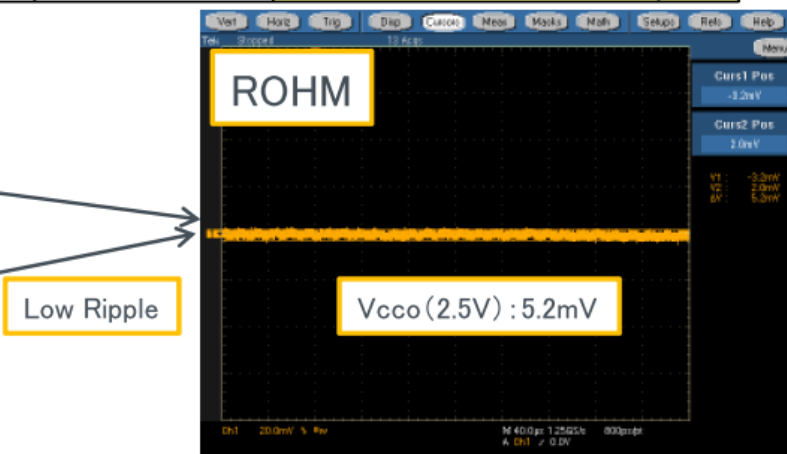
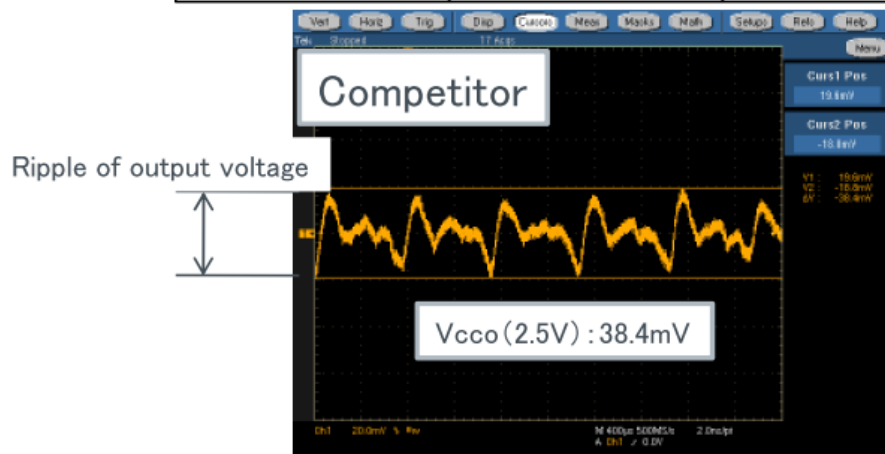
- H³Reg™ operation provides fast transient response
- Dual DC/DC controller
- Selectable two operation modes
 - PWM mode
 - SLLM mode (Pulse skip)
 - QLLM mode (Pulse skip and silent)
- Adjustable soft start function avoiding inrush current when start-up
- Power good output
- Input voltage range : 5.5V to 28V
- Output voltage range : 1.0V to 5.5V
- Reference voltage : 0.7V ± 1.0%
- Switching frequency : 150kHz to 500kHz
- Multi-functional protection
 - Auto reset type over current protection (OCP)
 - Over voltage protection (OVP)
 - Thermal shutdown protection (TSD)
 - Under voltage lock out function (UVLO)
- VQFN32V5050



Power Solution XILINX FPGA 7series & ZYNQ-7000

1:Ripple of output voltage

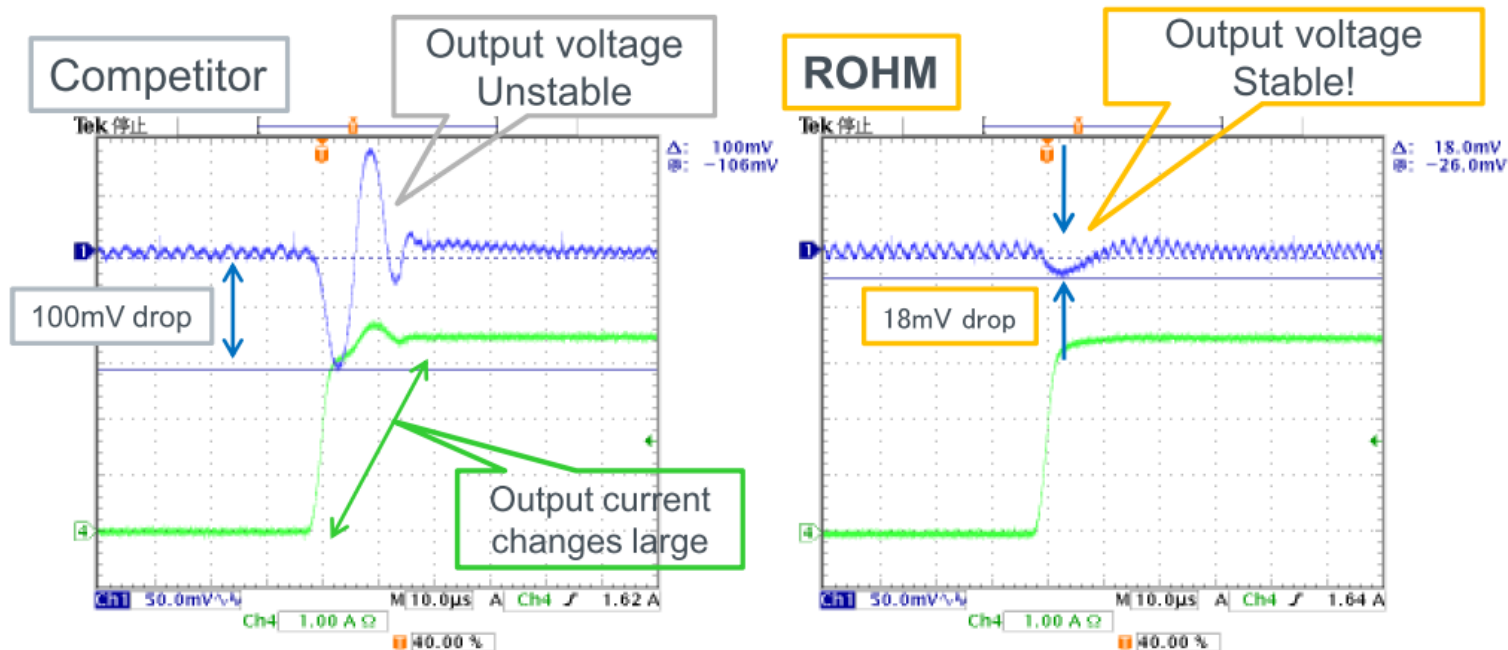
FPGA Voltage	Request Tolerance	A.Co	B.Co	ROHM's Board	
1.0V	3%(30mV)	43.6mV	13.6mV	5.6mV	OK
1.8V	5%(90mV)	25.6mV	16.8mV	5.6mV	OK
2.0V	3%(60mV)	75.8mV	16.8mV	8.8mV	OK
1.0VMGT	3%(30mV)	50.8mV	16.4mV	5.6mV	OK
1.2V	2.5%(30mV)	161mV	284mV	5.6mV	OK
1.35/1.5V	5%(67.5mV)	170mV	120.8mV	5.6mV	OK
2.5V	5%(125mV)	38.4mV	14.4mV	5.2mV	OK
3.3V	5%(165mV)	128mV	158mV	9.2mV	OK



Power Solution XILINX FPGA 7series & ZYNQ-7000

2:High Speed Response

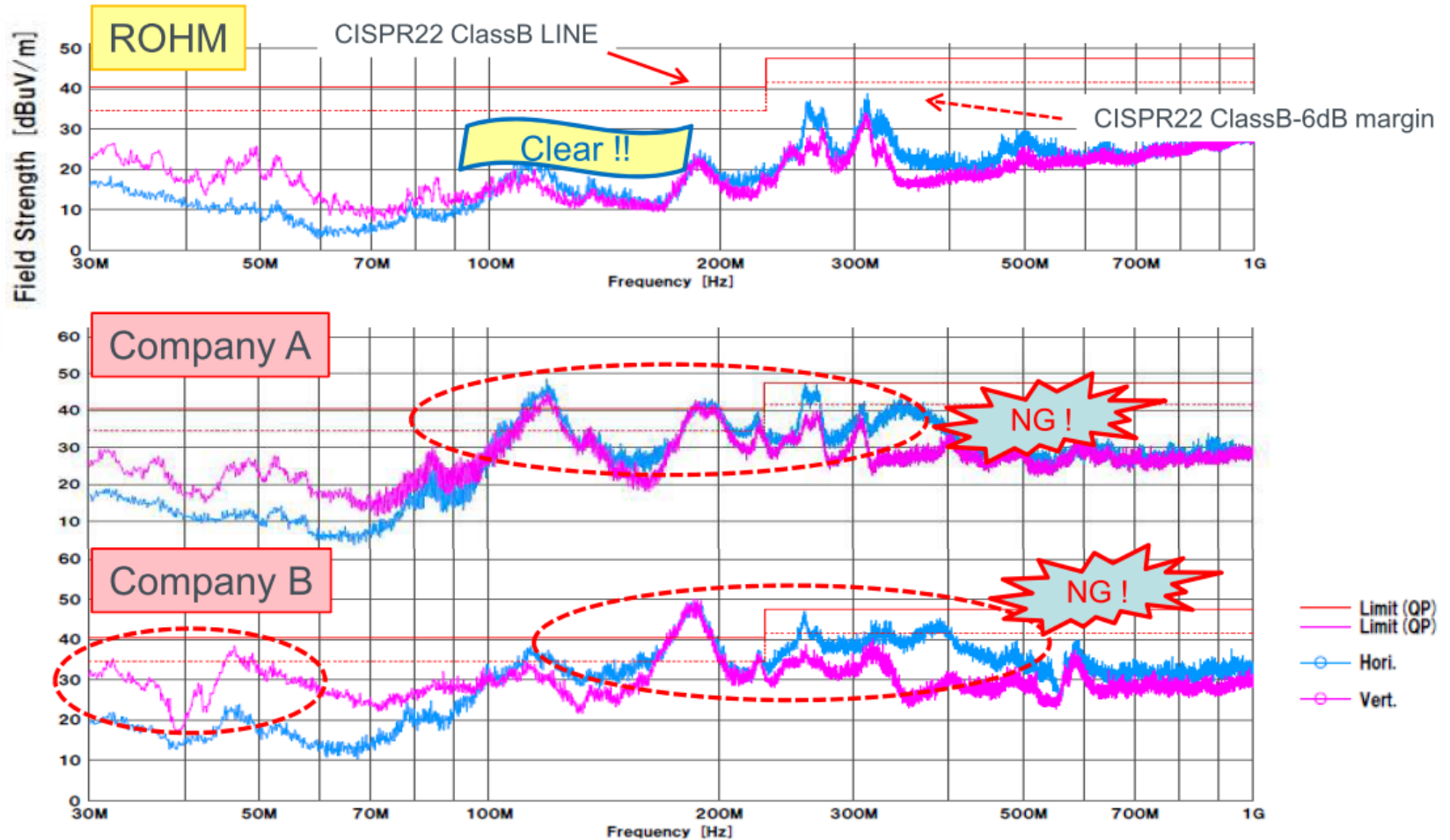
ROHM's original "H³Reg™" Technology!!
(Super High Speed Response Technology)



ROHM's power board can provide stable output voltage to FPGA.

Power Solution XILINX FPGA 7series & ZYNQ-7000

3:Low EMC

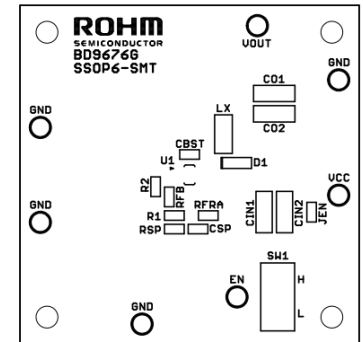


Evaluation Boards

Evaluation Boards for all our Switching Regulators can be provided on request.

Please let us know following items for preparation:

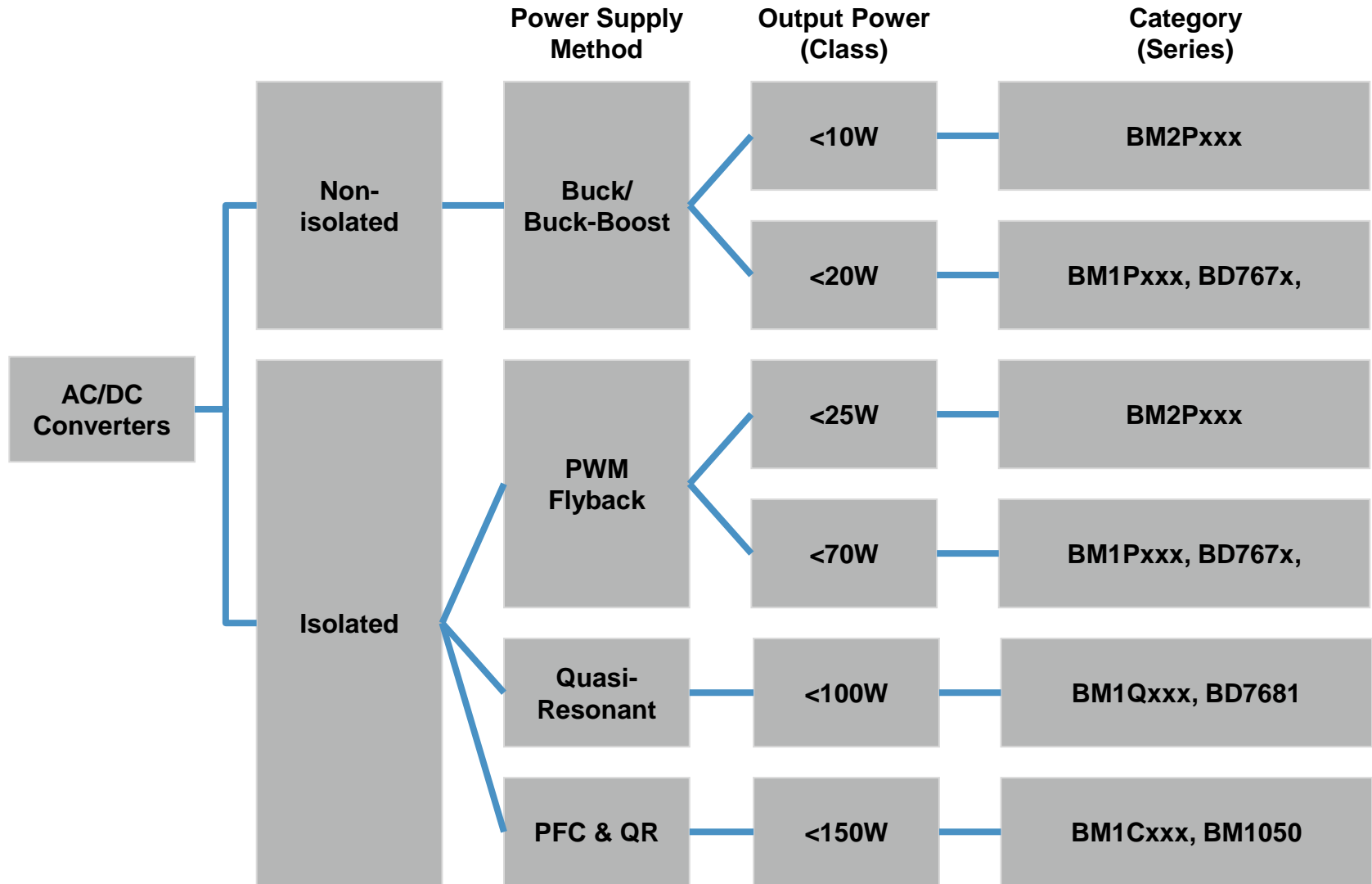
- V_{IN}
- V_{OUT}
- I_{OUT}
- Switching Frequency (in case it can be adjusted by external components)



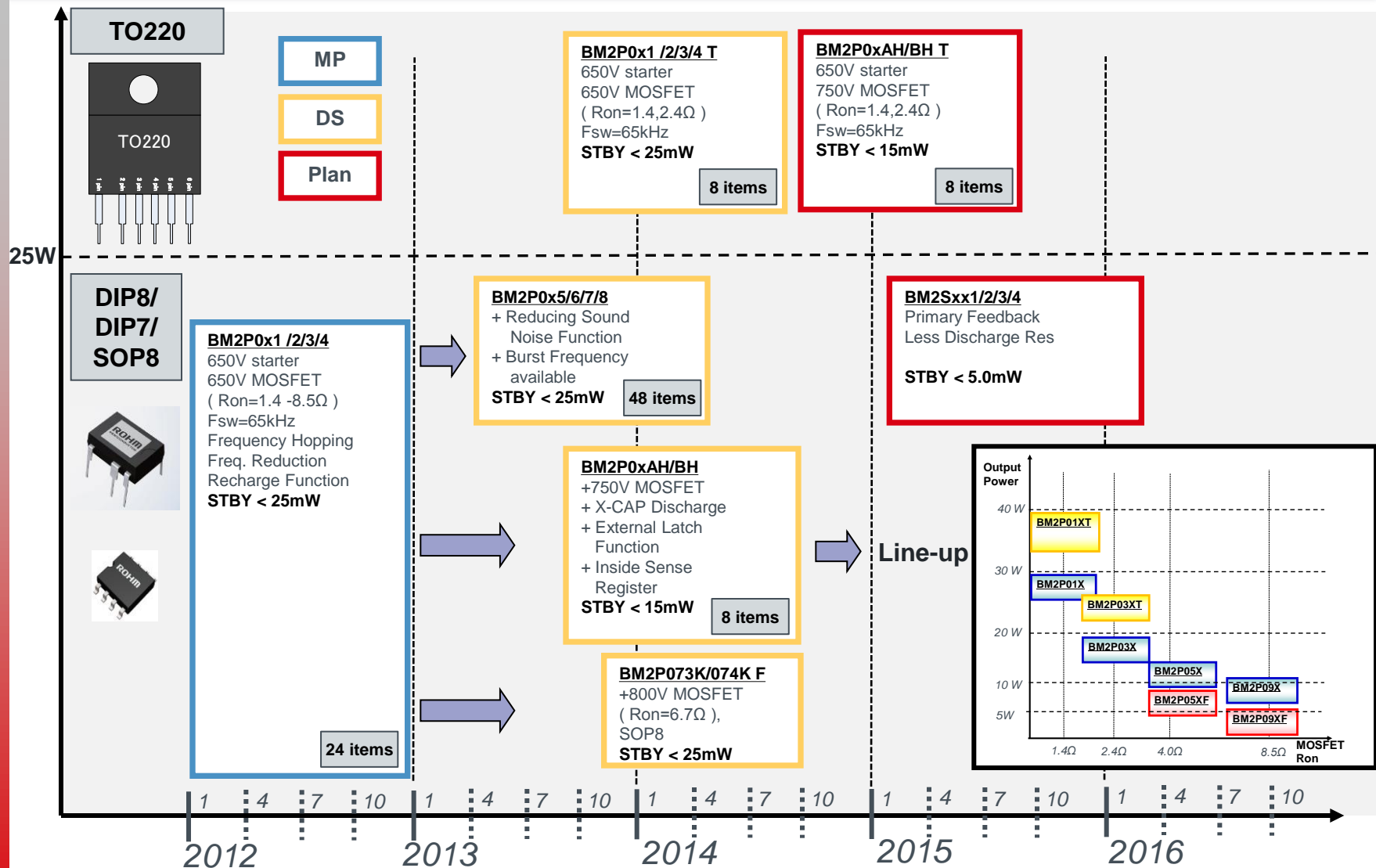
Isolated Converters

- AC/DC Converter with integrated MOSFET
- AC/DC Controller with external MOSFET
 - PWM Control
 - QR Control
 - QR Control & PFC integrated
- Flyback Controller

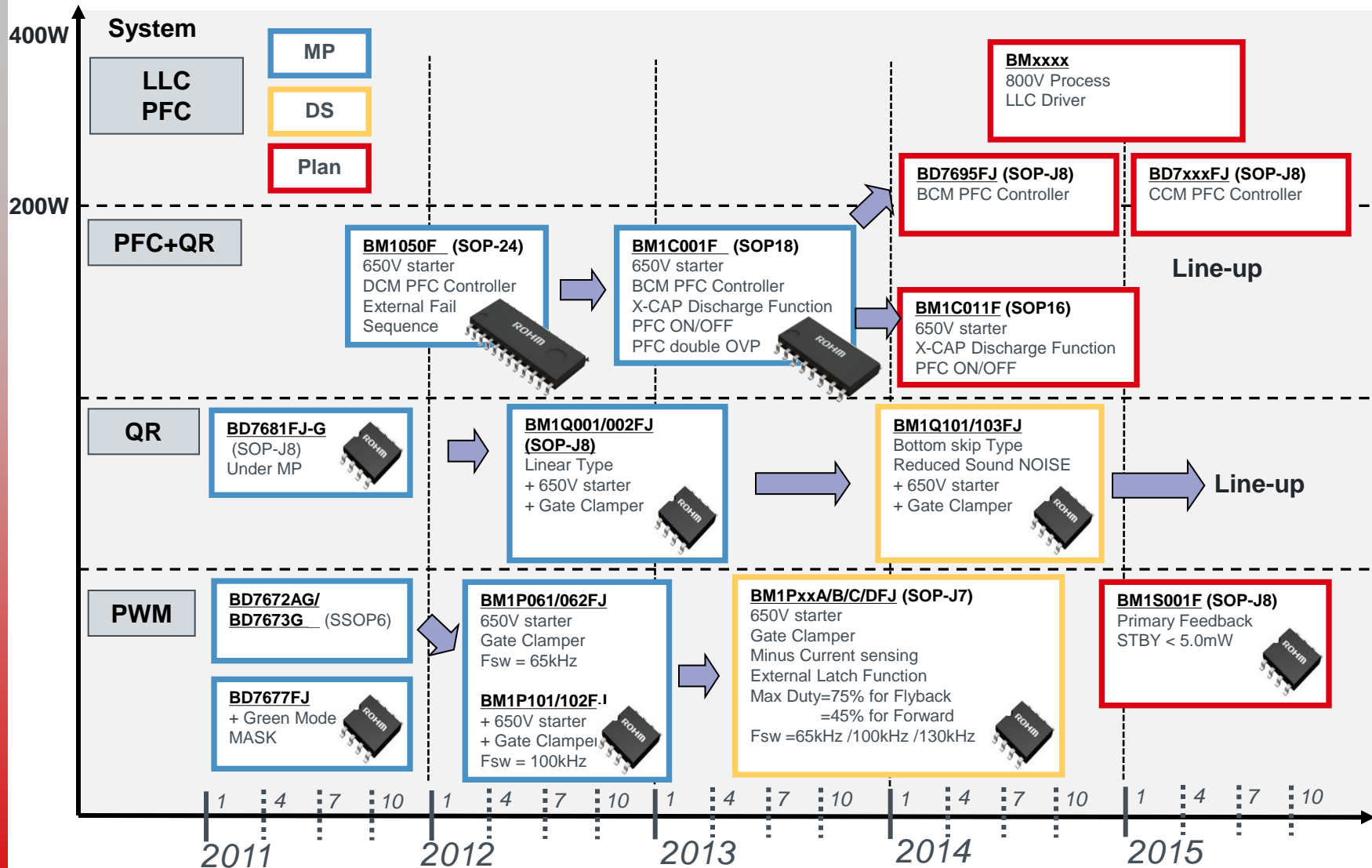
AC/DC Converter Overview



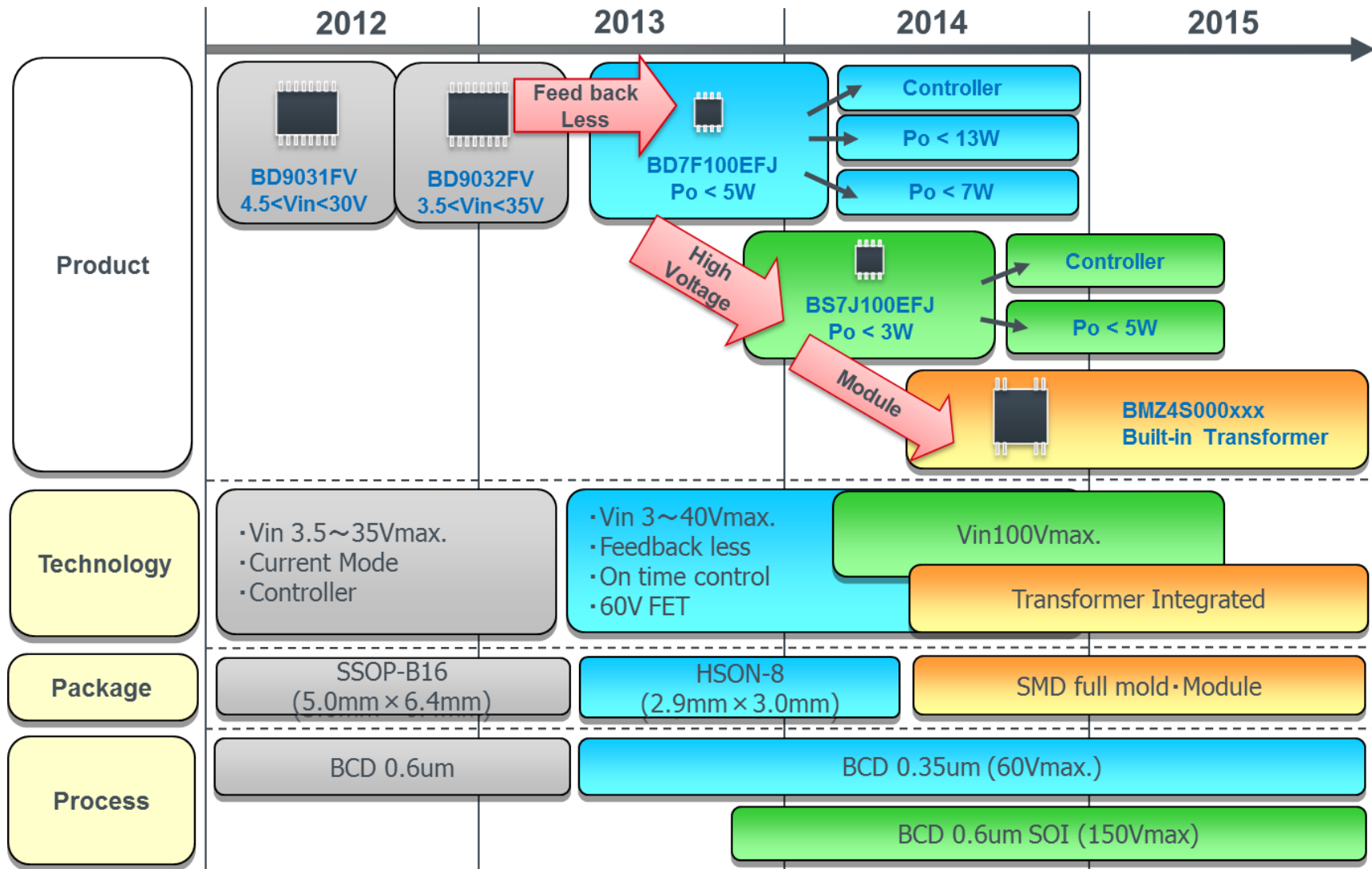
Product Roadmap (Internal MOSFET)



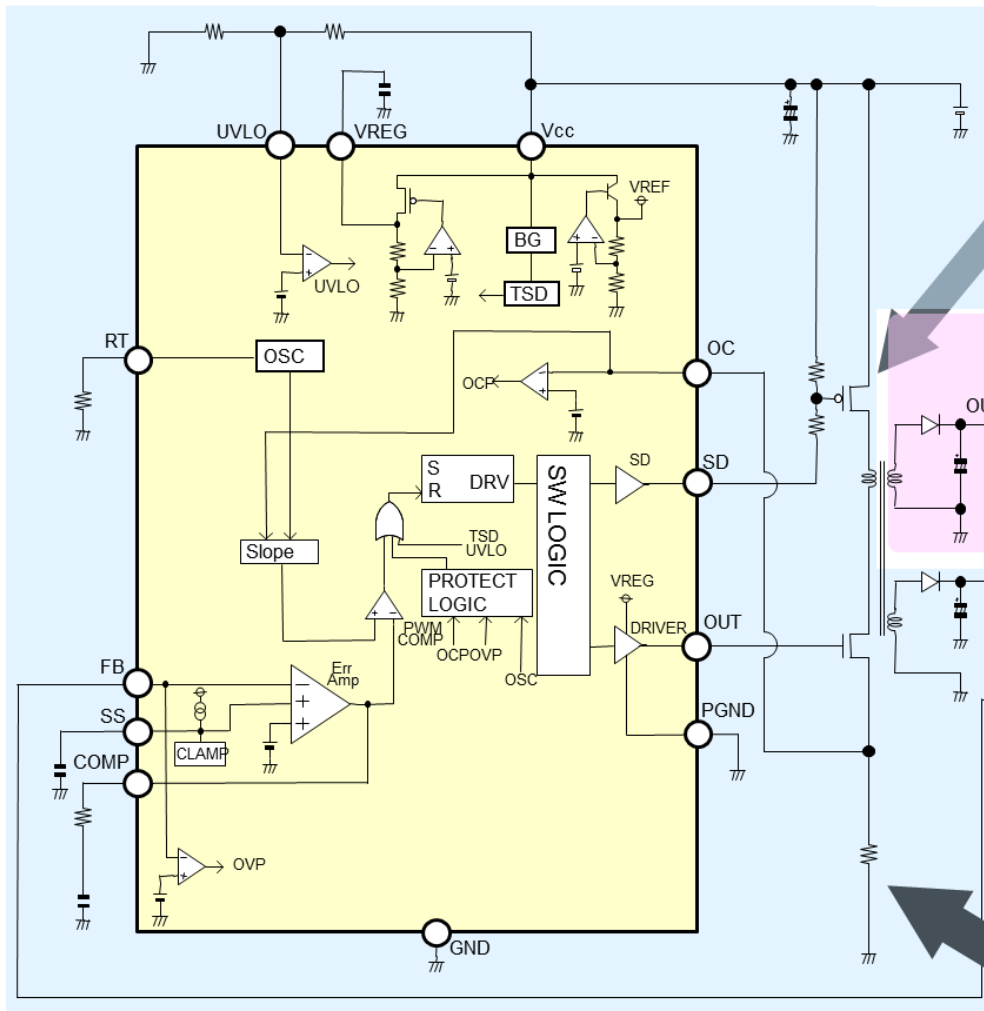
Product Roadmap (External MOSFET)



Isolated Flyback Controller



Flyback Controller: BD9031



Adopted application Inverter circuit of EV

This shut down switch protects transformer at short circuit.

Feature

1. Input voltage : 4.5~30V
2. Current Mode
3. Output voltage adjustable
Vref: 0.8V±1.5%
4. Soft start adjustable
5. Switching frequency : 20kHz~600kHz
6. Protection
(UVLO、OCP、OVP、OVLO、TSD)
7. SSOP-B16



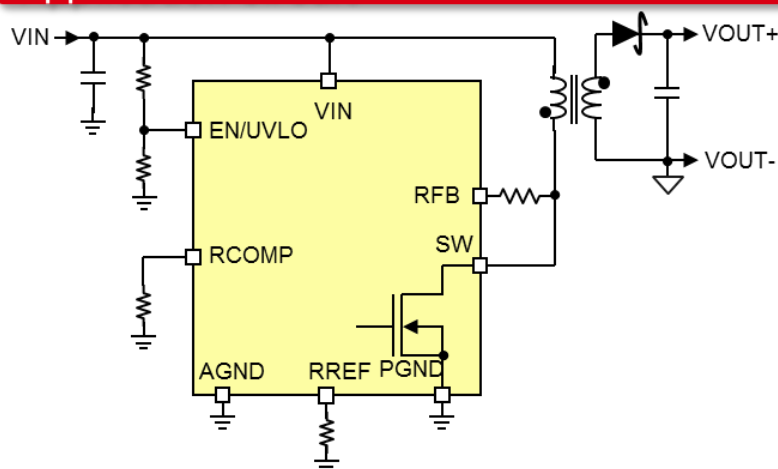
Pulse By Pulse
High precision current sense

Flyback Controller: BD7F100

Feature

- **Primary control without coupler and Auxiliary winding.**
- **Needless compensation with adaptive on-time control**
- Low ripple noise by fixed switching frequency
- High frequency by Light load mode
- Secondary diode load compensation function
- Input voltage 3V~40V
- **60V MOSFET switch integrated**
- Output voltage adjustable with external resistor and transformer winding ratio

Application circuit



Spec

- Input voltage : 3V~40V (Maximum 45V)
- Ambient temperature(T_a) : -40~85°C
- Switching frequency : 400kHz (Typ.)
- Current limit(MOS FET) : 1A (Typ.)
- Soft start
- Rich Protection
 - Over current protection Short circuit protection
 - Thermal protection Vin UVLO



HSON8
2.90mm x 3.00mm x 0.60mm
0.65mm pitch

Application

- Isolated power supply for industry application
 - Gate driver circuit 2ndary power supply
 - Power supply for photo couplers, digital isolators
 - Isolated interface driver's (RS-485/232,CAN) power supply

Flyback Controller Comparison

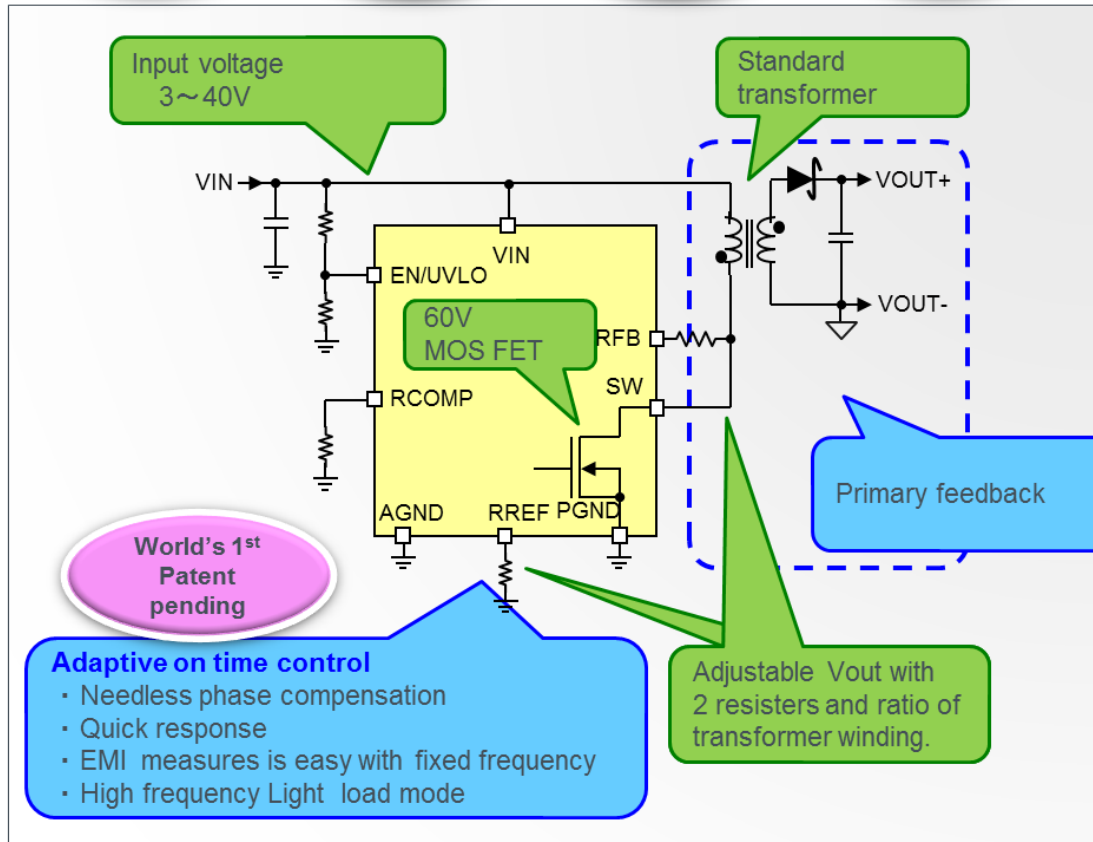
Comparison with conventional flyback

Simple design

Down sizing

Low power

Long term reliability



Auxiliary winding feedback type

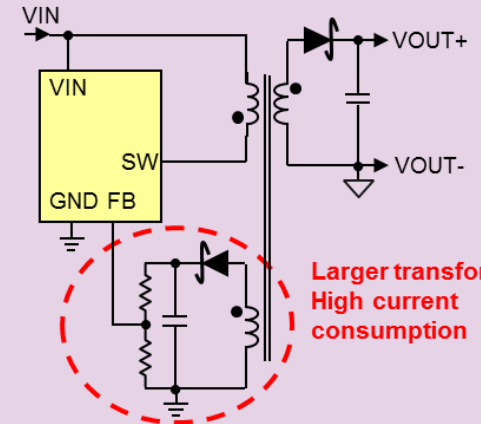
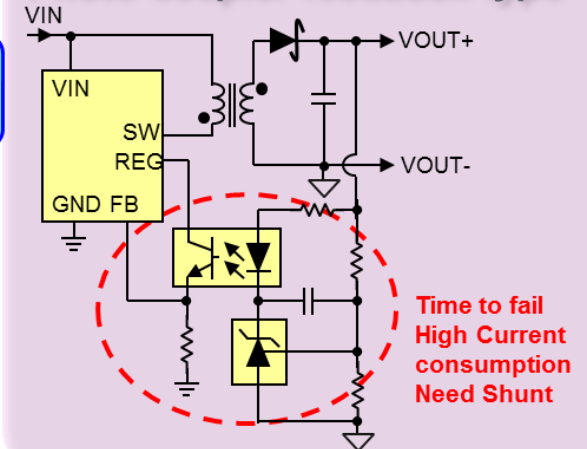
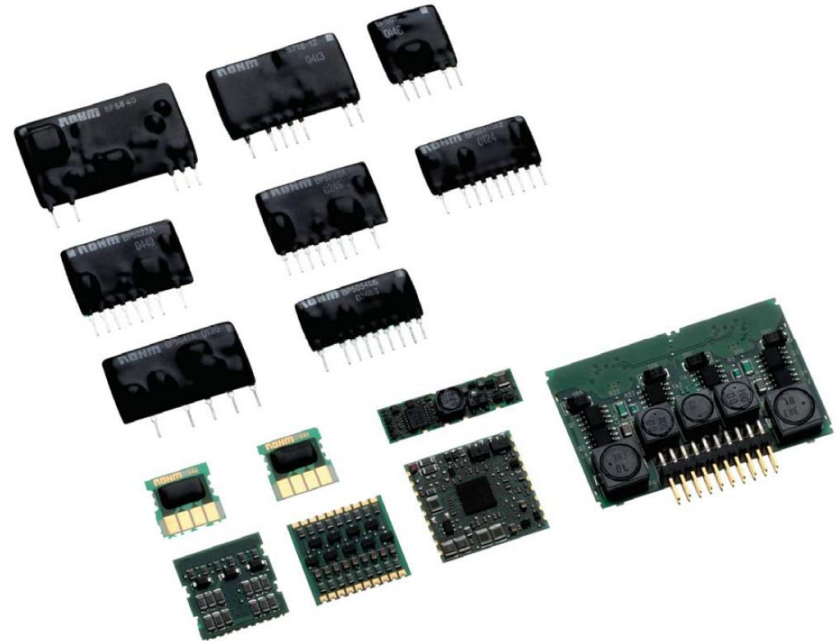


Photo coupler feedback type

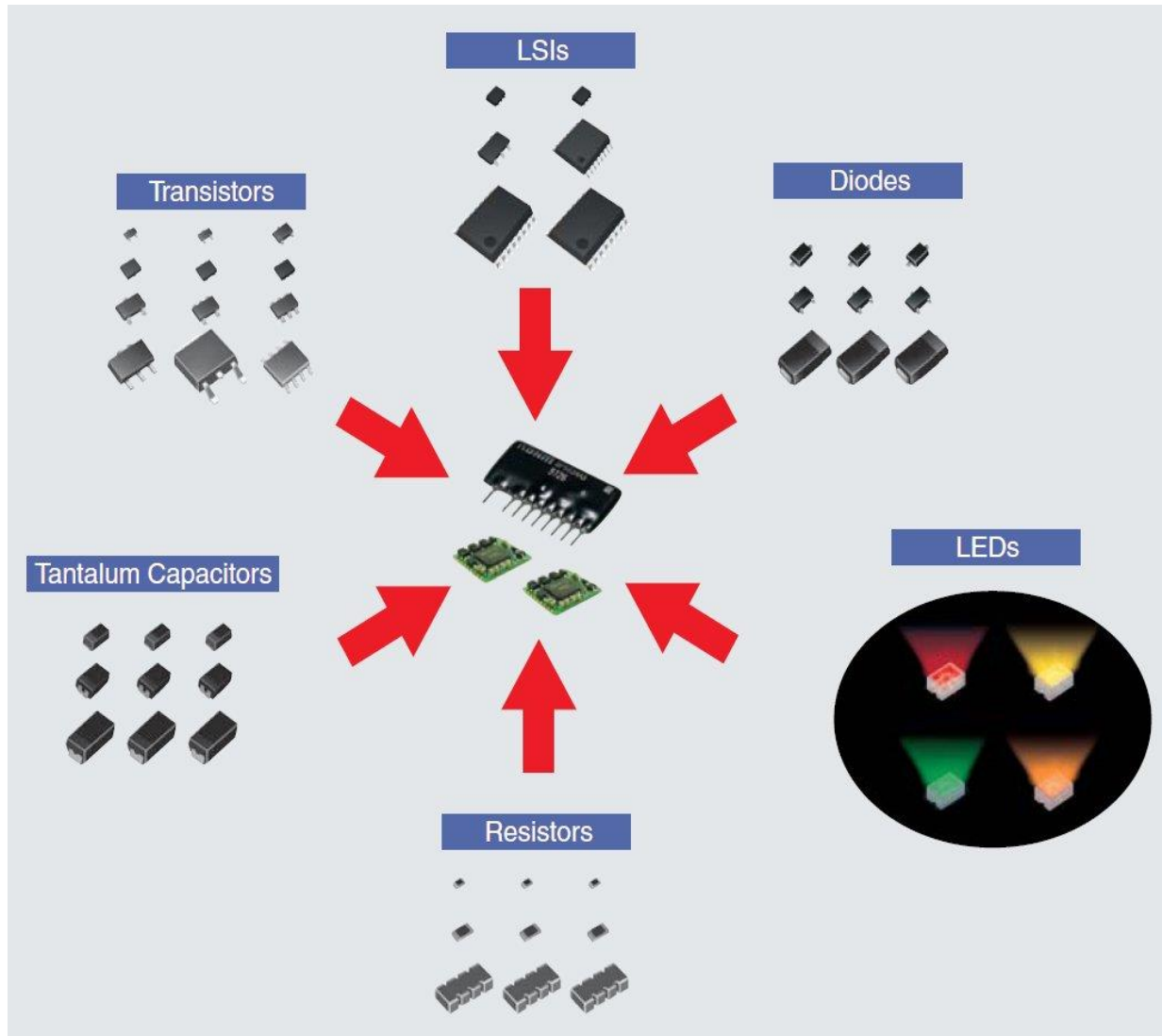


Power Modules

- Overview
- AC/DC Modules
 - Non-Isolated
 - Isolated
- DC/DC Modules
 - Non-Isolated
 - Isolated



Power Module – Overview



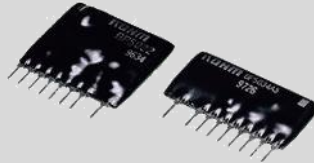
**Stable high
quality and
continuous
delivery by
Rohm, using
reliable
internal
components!**

Power Module – Overview

AC/DC Converter Module

• Applications:

- White Goods
- PC Peripherals
- Motor Control Circuit
- Automatic Door Sensor
- Smart Metering



- **Non-isolated** (Compact and light, no need for a transformer)
- **Isolated** (Primary and secondary side are isolated with a compact switching transformer)
- **Energy saving solution**
- For V_{IN} of 110V_{AC} and 230V_{AC} (max. up to 425V_{AC})
- Output power up to 24W

DC/DC Converter Module

• Applications:

- White Goods
- Air Conditioning
- LCD Display Power Supply
- Industrial Devices
- DC Motors



- **Step-down DCDC Converter Modules**
- **High efficiency**
- **No external components required**
- **Space saving design**
- For V_{IN} of 5V, 12V and 24V (max. up to 46V)
- Output power up to 9W



ACDC Power Module Line-up

NON-ISOLATED

Non-isolated AC/DC Converters

Part No.	Input voltage (V)	Output voltage (V)	Output current (mA)	Dimensions (mm)	Package
BP5041A5	226 to 358 (AC conversion 160 to 253Vac)	+5	100	32.5 × 19.3 × 11.5	SIP10
BP5041A		+12	100	32.5 × 19.3 × 11.5	SIP10
BP5048			300	35.0 × 22.0 × 9.2	SIP12
BP5041B15		+15	80	32.5 × 19.3 × 11.5	SIP10
BP5047B15	240 to 390 (AC conversion 170 to 300Vac)		150	32.5 × 19.1 × 10.1	SIP10
BP5048-15	226 to 358 (AC conversion 160 to 253Vac)		200	35.0 × 22.0 × 9.2	SIP12
BP5726-15	240 to 390 (AC conversion 170 to 300Vac)		800	22.5 × 27.1 × 7.8	SIP7
BP5047A24	180 to 390 (AC conversion 130 to 275Vac)	+24	150	34.5 × 19.1 × 9.2	SIP12
BP5048-24	226 to 358 (AC conversion 160 to 253Vac)		200	35.0 × 22.0 × 9.2	SIP12
BP5045A5	-113 to -390 (AC conversion 80 to 276Vac)	-5	200	28.2 × 17.9 × 10.1	SIP10
BP5045A		-12	200	28.2 × 17.9 × 10.1	SIP10
BP5053-12	-240 to -390 (AC conversion 170 to 300Vac)		200	28.2 × 17.9 × 10.1	SIP10
BP5055-12	-240 to -420 (AC conversion 170 to 276Vac)		250	28.2 × 21.5 × 9.9	SIP10
	-420 to -600 (AC conversion 300 to 425Vac)		130		

ISOLATED

Isolated AC/DC Converters

Part No.	Input voltage (V)	Output voltage (V)	Output current (mA)	Dimensions (mm)	Package
BP5722A12	217 to 405 (AC conversion 154 to 286Vac)	+12	1000	32.5 × 21.5 × 9.3	SIP11
BP5723-33	113 to 405 (AC conversion 80 to 286Vac)	+3.3	3000	38.5 × 21.5 × 10.9	SIP11
BP5720-5	113 to 374 (AC conversion 80 to 264Vac)	+5.0	500	35.5 × 20.5 × 10.0	SIP12
Part No.	Input voltage (V)	Output voltage (W)		Dimensions (mm)	Package
BP5725	119 to 405 (AC conversion 85 to 286Vac)	6		22.5 × 24.0 × 7.8	SIP7
BP5729	120 to 372 (AC conversion 85 to 264Vac)	12 / 24		37.4 × 24.3 × 9.3	SIP12
BP5728	113 to 405 (AC conversion 80 to 286Vac)	6 / 12		18.8 × 19.5 × 9.9	SIP6

DCDC Power Module Line-up

NON-ISOLATED

Step-down DC/DC Converters					
Part No.	Input voltage (V)	Output voltage (V)	Output current (A)	Dimensions (mm)	Package
BP5223	8 to 18	+5	0.15	17.0 × 16.8 × 10.4	SIP5
BP5224-33	7 to 18	+3.3	0.3	17.8 × 18.1 × 9.7	SIP6
BP5225	10 to 26.4	+5	0.15	17.0 × 16.8 × 9.7	SIP5
BP5220A	8 to 38	+5	1	28.0 × 19.5 × 12.0	SIP9
BP5221A	8 to 38	+5	0.5	28.0 × 19.5 × 12.0	SIP9
BP5222A	15 to 38	+12	0.5	28.0 × 19.5 × 12.0	SIP9
BP5226-18	20 to 46	+18	0.5	34.0 × 17.4 × 8.1	SIP12
BP5275-xx	4/4.5/6 to 14	+1.8, 2.5, 3.3, 5	0.5 / 0.8	23.0 × 13.8 × 5.2	SIP3
BP5277-xx	8/12/15/16.5/19 to 36	+3.3, 5, 9, 12, 13, 15	0.5 / 0.8	16.3 × 26.4 × 6.2	SIP3
BP5290-xx *	8/18 to 40	+1.8, 3.3, 5, 12	1.0	17.8 × 10.0 × 4.5	TO-220
BP5291-xx *	8/9 to 30	+1.8, 3.3, 5	1.0	17.8 × 10.0 × 4.5	TO-220

*under development

ISO-LATED

Isolated DC/DC Converters					
Part No.	Input voltage (V)	Output voltage (V)	Output current (mA)	Dimensions (mm)	Package
BP5324A	4.5 to 5.5	+12	250	38.5 × 27.0 × 13.6	SIP12
BP5512A	4.5 to 6.5	+5	200	28.2 × 19.9 × 17.2	SIP7
BP5510-24	10.8 to 13.2	+24	200	32.6 × 24.2 × 13.6	SIP11

DCDC Power Module – BP527x details

Elegant power supply solution

Board design, necessary characteristics
Complex circuit design
IC/coil selection
FET voltage resistance
Thermal design
Energy-saving countermeasures
Phase compensation
External component selection

ROHM's BP5275

Mounting Area
Approx. **80% smaller**

BP5275
6.0mm
13.6mm
81.6mm²

20.0mm
30.0mm
600mm²

Energy Saving
Pb Free
RoHS

A New 36V Max. Converter Module debuts in the extremely popular 3-pin DC/DC converter module Series.

Just **One** BP5277 provides
an **elegant** solution
for power supply design.

15V Max.
Improved
BP5275
BP5277

Withstand voltage
36V
Max.

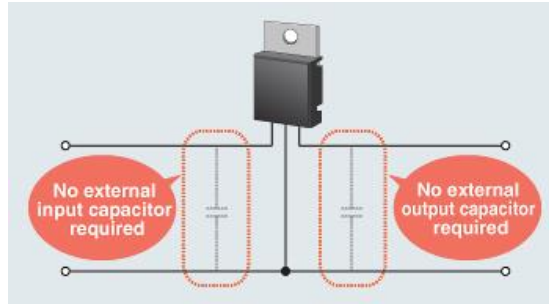
All integrated into a single package!
No external components required.

Energy Saving
Pb Free
RoHS

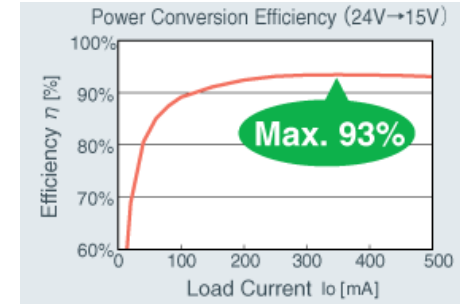
Part No.	Input Voltage (V)			Output Voltage (V)	Output Current (mA)	Operating Frequency (MHz)	Output ripple voltage (mV)	Operating Temperature Range (°C)	Efficiency (%)
	Min.	Typ.	Max.						
BP5277-15	19.0	24.0	32.0	15.0	500 (800 with heat sink)	1.5	max. 100	-30 to 85	93
BP5277-13	16.5			13.0					91
BP5277-12	15.0			12.0					90
BP5277-90	12.0			9.0					88
BP5277-50	8.0			5.0					83
BP5277-33	8.0			3.3					76
BP5275-50	6.0	12.0	14.0	5.0		1.5	max. 50	-20 to 80	88
BP5275-33	4.5			3.3					83
BP5275-25	4.0			2.5					78
BP5275-18	4.0			1.8					73

DCDC Power Module – BP527x features

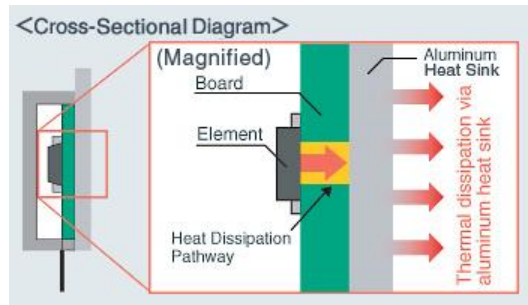
1. No external components required



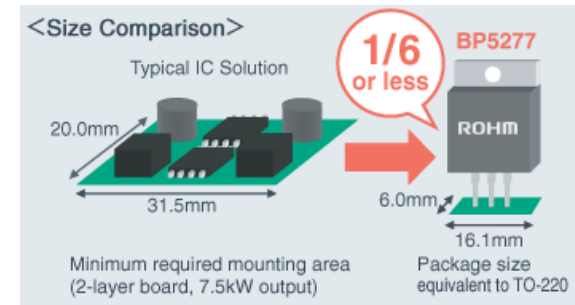
2. High efficiency results in great energy saving



3. No thermal design required



4. Space saving design





■ Easy Design ■ High Precision ■ High Reliability

- Standard LDO Regulators
- Secondary LDO Regulators
- CMOS LDO Regulators

[illegible]

- Variable and fixed output voltages
- High output voltage accuracy (up to $\pm 1\%$)
- Optional QuA shutdown switch
- Compatible with compact ceramic capacitors
- Multiple integrated protection circuits
- Compact high power packages
- Automotive Series with very low Iq (BD357X Series)

Ideal to use in electronic devices requiring different voltages in consumer, industrial and automotive applications.

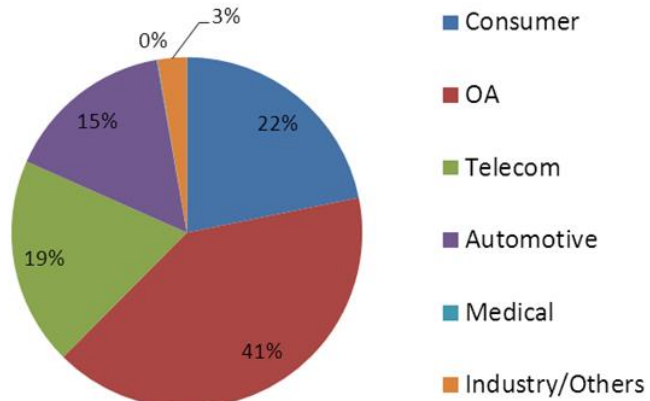


www.rohm.com/eu

- Overview
- Standard Line-up (V_{IN} from 5V to 35V)
 - Standard Regulators
 - Low-drop Regulators
 - CMOS Low-drop Regulators
- Automotive Line-up (V_{IN} from 5V to 50V)
 - Low-drop Regulators (low I_Q)
 - CMOS Low-drop Regulators (low I_Q)

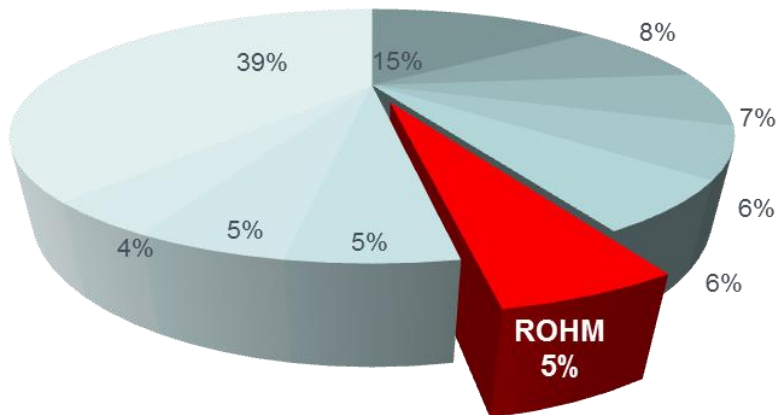
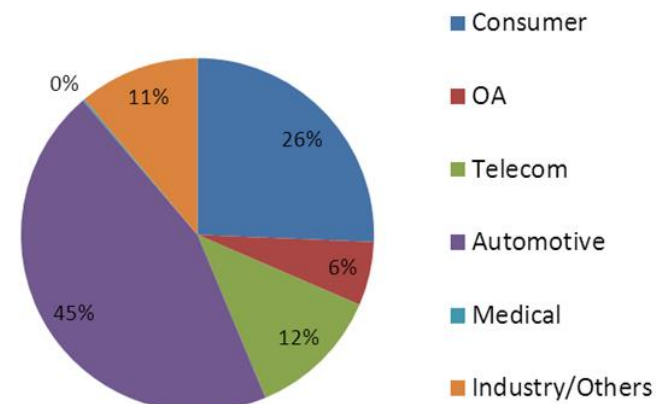
Overview

WW 2010 Linear Regulators



Source: Marketing Eye 2010

ROHM FT53 Sales result



WW 2010 Standard Linear regulators share

Source: Marketing Eye 2010 with replaced ROHM result 2010



Low power CMOLDO
in Wafer Level CSP



Standard LDOs
in SMD package

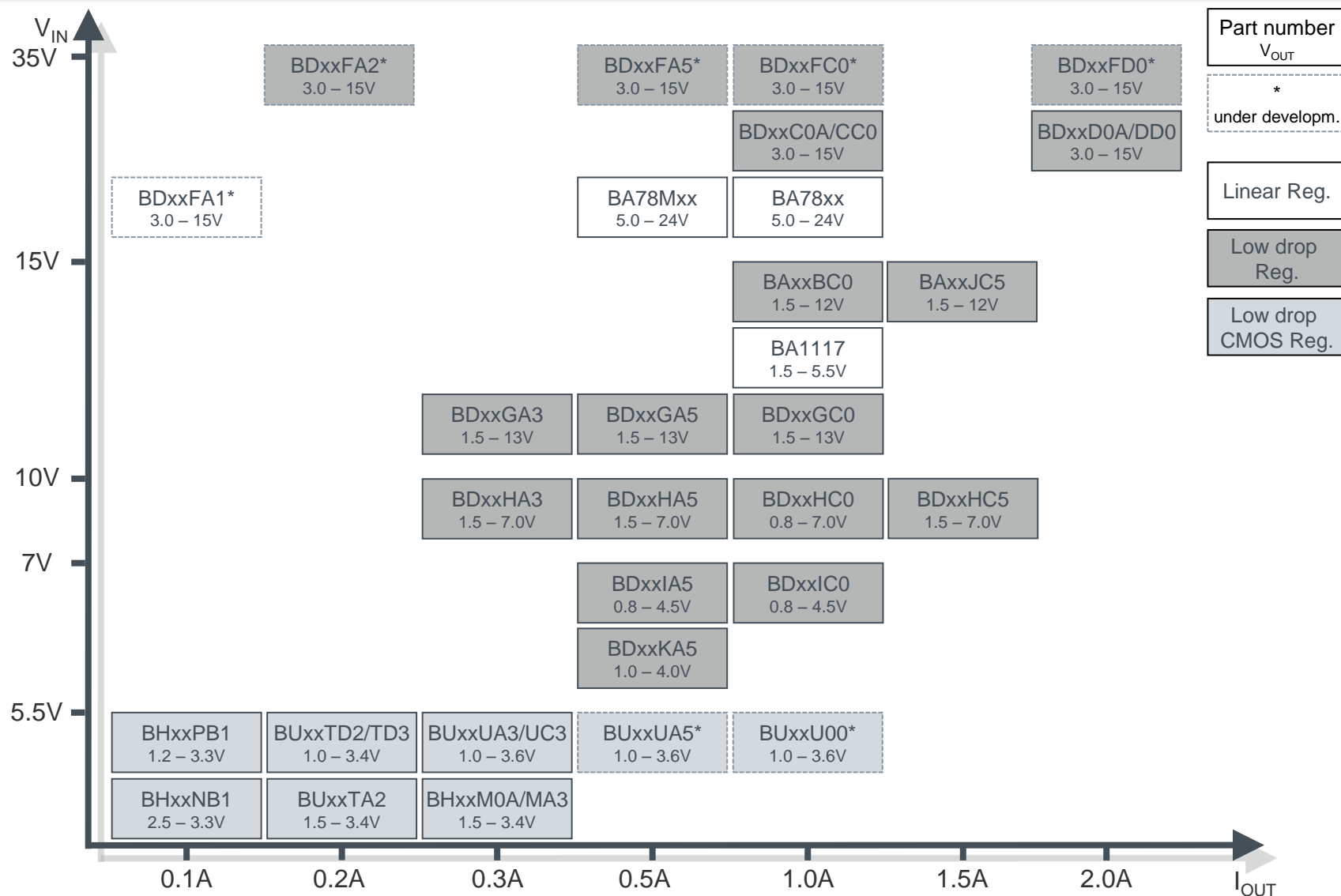


Automotive grade



78 Standard Positive Regulators/LDO
in TO220

Standard Regulators 5-35V_{IN} – Line-up

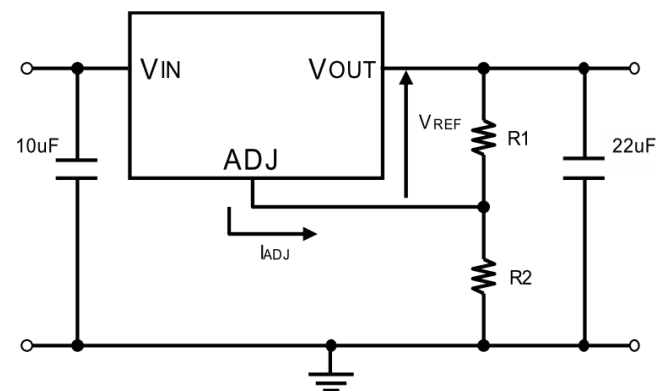


BA1117 Series – Overview

Features

- Input Voltage Range: 2.75 to 15V
- Output Voltage Range: 1.5V to 5.5V
- Reference Voltage: $1.25V \pm 2.0\%$
- Output Current: max. 1.0A
- Drop-out Voltage: typ. 1.2V (@1A)
- Ripple rejection: 75dB
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

Application

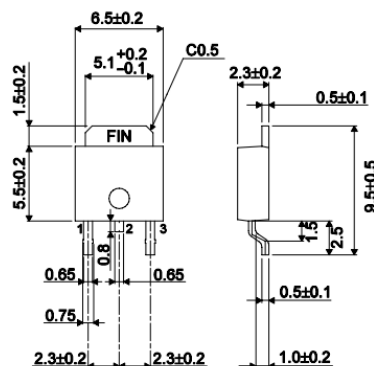


Package

TO252-3 (DPAK)



6.5 x 9.5 x 2.3



(Unit : mm)

Line-up

PN	V_{IN} [V]	V_{OUT} [V]	I_{OUT} [A]	V_{DROP} [V]	Package
BA1117FP	2.75-15	1.5-5.5	1.0	max. 1.4	TO252-3 (DPAK)
Extending line-up from 2015 with other packages (SOT223, SOT89-3) and fixed output voltages.					

BDxxFA1 Series – Overview

Features

- Input Voltage Range: 6.0 to 25V
- Output Voltage Range: 3.0V to 15V
- Reference Voltage: $\pm 1.0\%$
- Output Current: max. 0.1A
- Drop-out Voltage: typ. 3.0V (@0.1A)
- Ripple rejection: tbd
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD, Soft start

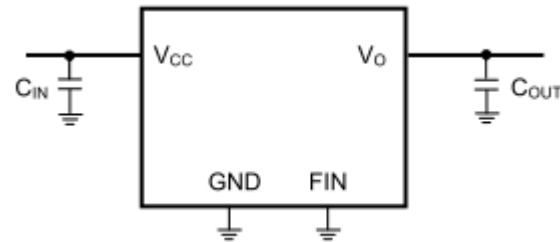
Package

SOT89-3F



4.5 x 4.15 x 1.5

Application



Line-up

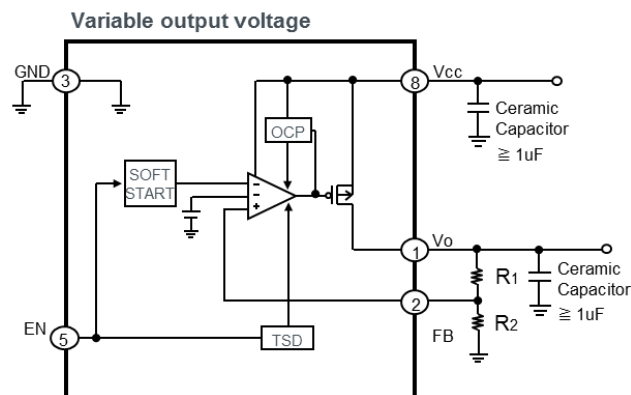
PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	V _{DROP} [V]	Package
BD54FA1FP3	8.4-25	5.4	0.1	typ. 3.0	SOT89-3
Extending line-up from 2014 with other packages (HTSOP-J8, SSOP5), other fixed output voltages and enable pin.					

BDxxI/H/G Series – Overview

Features

- Input Voltage Range: max. 7V (I), 10V (H), 15V (G)
- Output Voltage Range: 1.0V to 12V
- Reference Voltage: $\pm 1.0\%$ (@25°C)
- Output Current: max. 0.3A / 0.5A / 1.0A / 1.5A
- Drop-out Voltage: max. 0.6 to 0.93V (@max. I_{OUT})
- Circuit Current: typ. 250 μ A (I), 600 μ A (H,G)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD, Soft start, Pin-to-Pin Matrix short

Application



Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	V _{DROP} [V]	Package
BDxxIA5	2.4-7.0	0.8-4.5	0.5	max. 0.60	HTSOP
BDxxIC0	2.4-7.0	0.8-4.5	1.0	max. 0.60	HTSOP, HVSOF
BDxxHA3	4.5-10	1.5-7.0	0.3	max. 0.90	HTSOP
BDxxHA5	4.5-10	1.5-7.0	0.5	max. 0.90	HTSOP
BDxxHC0	4.5-10	1.5-7.0	1.0	max. 0.92	HTSOP
BDxxHC5	4.5-10	1.5-7.0	1.5	max. 0.93	HTSOP
BDxxGA3	4.5-15	1.5-13	0.3	max. 0.90	HTSOP
BDxxGA5	4.5-15	1.5-13	0.5	max. 0.90	HTSOP
BDxxGC0	4.5-15	1.5-13	1.0	max. 0.92	HTSOP

Package

HTSOP-J8



4.9 x 6.0 x 1.0

HVSOF6



1.6 x 3.0 x 0.75

VSON008 in development for BDxxGA3 Series

BHxxPB1 Series – Overview

Features

- Input Voltage Range: 1.7 to 6.5V
- Output Voltage Range: 1.2V to 3.3V (fixed only)
- Reference Voltage: $\pm 1.0\%$ min. 25mV (@25°C)
- Output Current: max. 150mA
- Drop-out Voltage: max. 0.6V (@150mA)
- Ripple Rejection 60dB
- Circuit Current: typ. 20 μ A (@0mA)
- Automatic Power Save Mode (circuit current 2 μ A)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

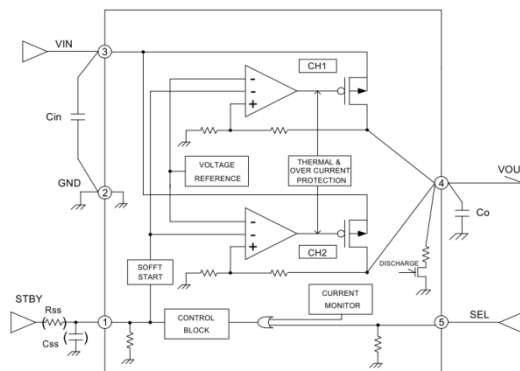
Package

HVSOF5



1.6 x 1.6 x 0.6

Application



Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [mA]	V _{DROP} [V]	Package
BH12PB1	1.7-6.5	1.2	150	max. 0.6	HVSOF
BH15PB1	1.7-6.5	1.5	150	max. 0.6	HVSOF
BH18PB1	1.7-6.5	1.8	150	max. 0.6	HVSOF
BH25PB1	1.7-6.5	2.5	150	max. 0.6	HVSOF
BH28PB1	1.7-6.5	2.8	150	max. 0.6	HVSOF
BH29PB1	1.7-6.5	2.9	150	max. 0.6	HVSOF
BH30PB1	1.7-6.5	3.0	150	max. 0.6	HVSOF
BH31PB1	1.7-6.5	3.1	150	max. 0.6	HVSOF
BH33PB1	1.7-6.5	3.3	150	max. 0.6	HVSOF

BUxxTD2/TD3 Series – Overview

Features

- Input Voltage Range: 1.7 to 6.5V
- Output Voltage Range: 1.0V to 3.4V (fixed only)
- Reference Voltage: $\pm 1.0\%$ min. 25mV (@25°C)
- Output Current: max. 200mA
- Drop-out Voltage: max. 0.54V (@200mA)
- Ripple Rejection: 70dB
- Circuit Current: typ. 35 μ A (@0mA)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

Package

SSON004



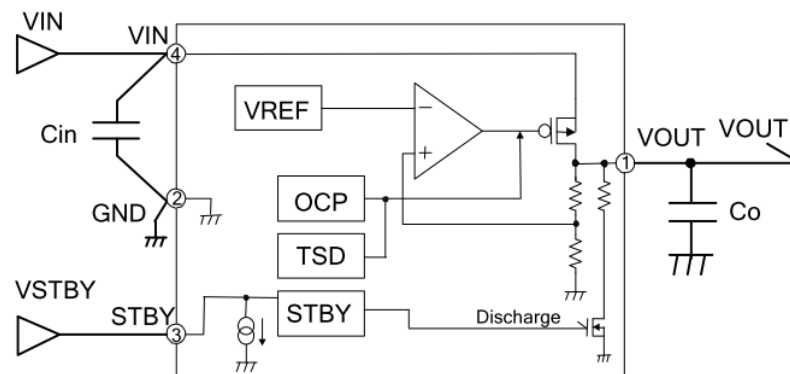
1.0 x 1.0 x 0.6

SSOP5
(SOT23-5)



2.9 x 2.8 x 1.25

Application



Line-up

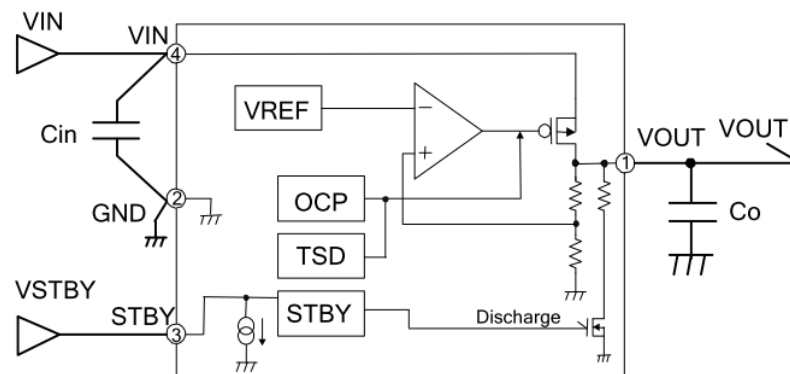
PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [mA]	V _{DROP} [V]	Package
BUxxTD2W	1.7-6.5	1.0-3.4	200	typ. 0.25	SSON004
BUxxTD3W	1.7-6.5	1.0-3.4	200	typ. 0.25	SSOP5

BUxxUA3/UC3 Series – Overview

Features

- Input Voltage Range: 1.7 to 6.0V
- Output Voltage Range: 1.0V to 4.0V (fixed only)
- Reference Voltage: $\pm 1.0\%$ min. 25mV (@25°C)
- Output Current: max. 300mA
- Drop-out Voltage: max. 0.54V (@200mA)
- Ripple Rejection 70dB
- Circuit Current: typ. 50 μ A (@0mA)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

Application



Package

SSON004



1.0 x 1.0 x 0.6

SSOP5
(SOT23-5)

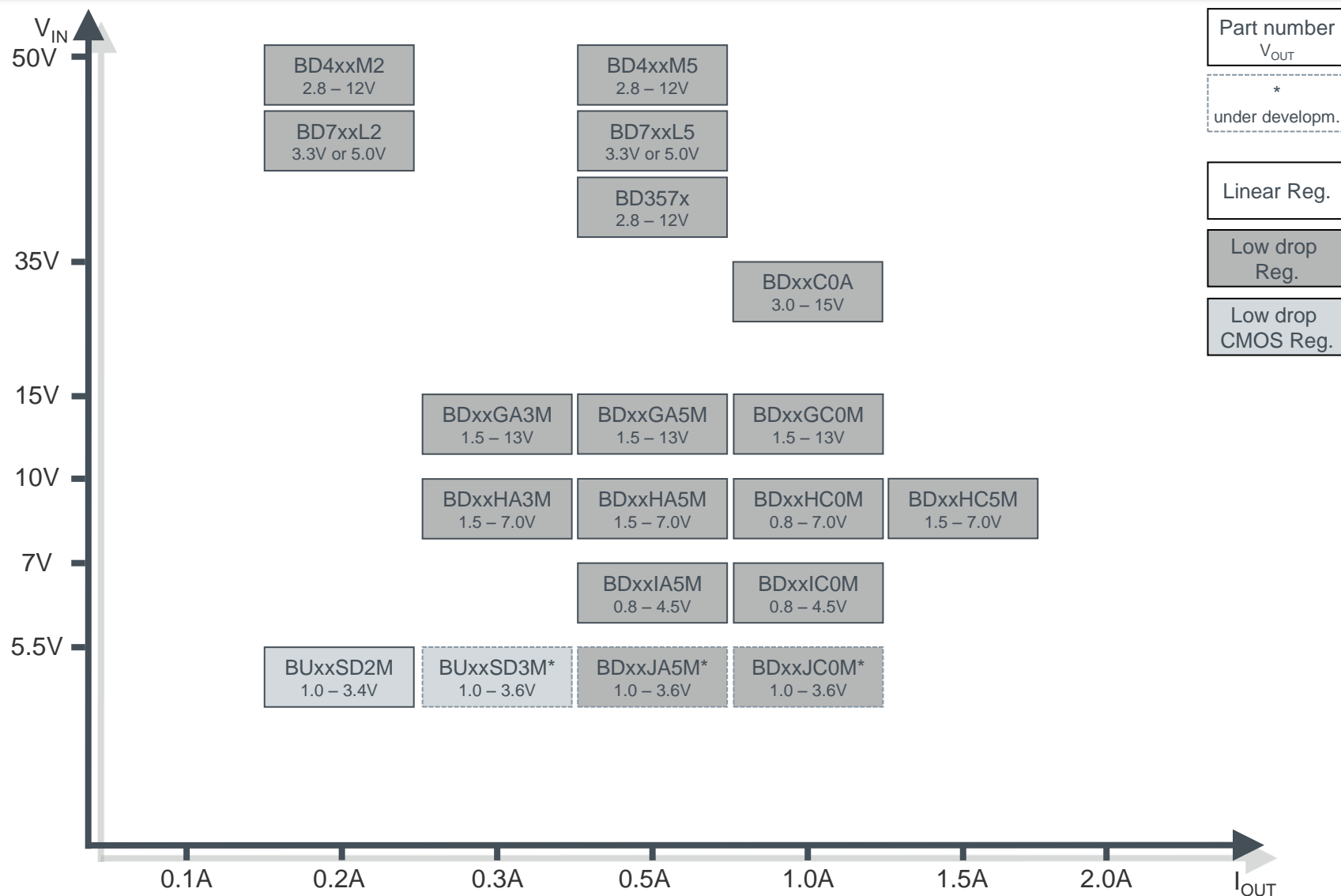


2.9 x 2.8 x 1.25

Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [mA]	V _{DROP} [V]	Package
BUxxUA3W	1.7-6.0	1.0-3.7	300	typ. 0.25	SSON004
BUxxUC3W	1.7-6.0	1.0-4.0	300	typ. 0.25	SSOP5

Automotive Regulators 5-50V_{IN} – Line-up

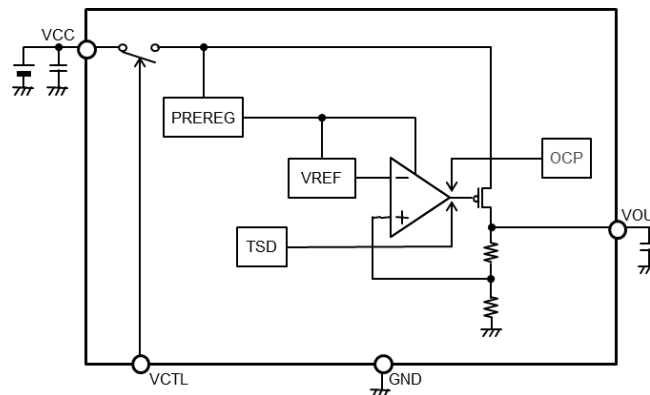


BD4xxMx/BD7xxLx Series – Overview

Features

- Input Voltage Range: 3.0 to 50V
- Output Voltage Range: 2.8V to 12V
- Reference Voltage: $\pm 1.0\%$ (@25°C)
- Output Current: max. 0.2A or 0.5A
- Drop-out Voltage: max. 0.35 to 1V
- Circuit Current: typ. 40 μ A (BD4), 6 μ A (BD7)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

Application



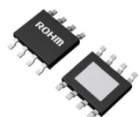
Line-up

*under development

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	V _{DROP} [V]	Package
BD400M2*	3.0-50	2.8-12	0.2	tbd	HTSOP, SOT223
BD433M2	3.0-50	3.3	0.2	max. 0.45	HTSOP, SOT223
BD450M2	3.0-50	5.0	0.2	max. 0.35	HTSOP, SOT223
BD400M5*	3.0-50	2.8-12	0.5	tbd	TO252, TO263
BD433M5	3.0-50	3.3	0.5	max. 0.75	TO252, TO263
BD450M5	3.0-50	5.0	0.5	max. 0.50	TO252, TO263
BD733L2	3.0-50	3.3	0.2	max. 1.00	HTSOP, TO252, SOT223, TO263
BD750L2	3.0-50	5.0	0.2	max. 0.70	
BD733L5	3.0-50	3.3	0.5	max. 0.80	TO252, TO263
BD750L5	3.0-50	5.0	0.5	max. 0.50	TO252, TO263

Package

HTSOP-J8



4.9 x 6.0 x 1.0

SOT223-4



6.5 x 7.0 x 1.8

TO252-3 (DPAK)



6.5 x 9.5 x 2.5

TO263-3F (D2PAK)



10.2 x 15.1 x 4.7

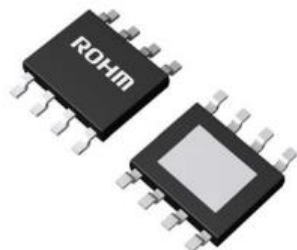
BDxxI/H/G-M Series – Overview

Features

- Input Voltage Range: max. 7V (I), 10V (H), 15V (G)
- Output Voltage Range: 1.0V to 12V
- Reference Voltage: $0.8V \pm 3.0\%$ (@ -40 to +105°C)
- Output Current: max. 0.3A / 0.5A / 1.0A / 1.5A
- Drop-out Voltage: max. 0.6 to 0.93V (@ max. I_{OUT})
- Circuit Current: typ. 250 μ A (I), 600 μ A (H,G)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD, Soft start, Pin-to-Pin Matrix short

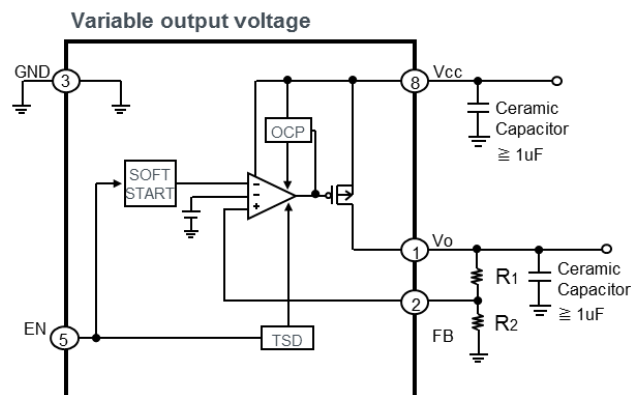
Package

HTSOP-J8



4.9 x 6.0 x 1.0

Application



Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [A]	V _{DROP} [V]	Package
BDxxIA5M	2.4-7.0	0.8-4.5	0.5	max. 0.60	HTSOP
BDxxIC0M	2.4-7.0	0.8-4.5	1.0	max. 0.60	HTSOP
BDxxHA3M	4.5-10	1.5-7.0	0.3	max. 0.90	HTSOP
BDxxHA5M	4.5-10	1.5-7.0	0.5	max. 0.90	HTSOP
BDxxHC0M	4.5-10	1.5-7.0	1.0	max. 0.92	HTSOP
BDxxHC5M	4.5-10	1.5-7.0	1.5	max. 0.93	HTSOP
BDxxGA3M	4.5-15	1.5-13	0.3	max. 0.90	HTSOP
BDxxGA5M	4.5-15	1.5-13	0.5	max. 0.90	HTSOP
BDxxGC0M	4.5-15	1.5-13	1.0	max. 0.92	HTSOP

BUxxSD2 Series – Overview

Features

- Input Voltage Range: 1.7 to 6.5V
- Output Voltage Range: 1.2V to 3.3V (fixed only)
- Reference Voltage: $\pm 2.0\%$ (@-40 to +105°C)
- Output Current: max. 200mA
- Drop-out Voltage: max. 0.7V (@100mA)
- Ripple Rejection: 68dB
- Circuit Current: typ. 33 μ A (@0mA)
- Compatible with ceramic capacitors
- Int. Protection Function: OCP, TSD

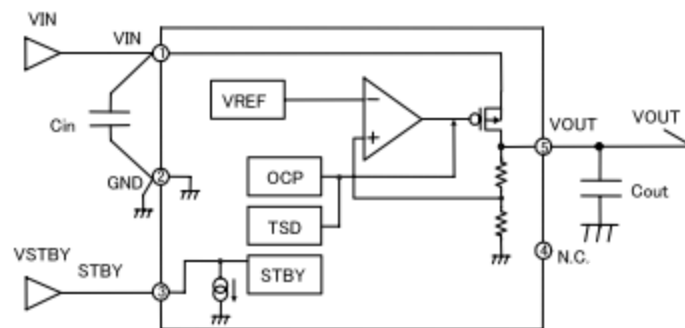
Package

SSOP5
(SOT23-5)



2.9 x 2.8 x 1.25

Application

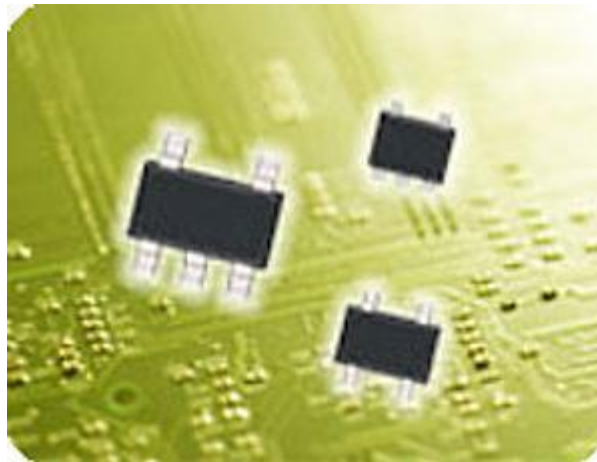


Line-up

PN	V _{IN} [V]	V _{OUT} [V]	I _{OUT} [mA]	V _{DROP} [V]	Package
BD12SD2	1.7-6.5	1.2	200	max. 0.70	SSOP5
BD15SD2	1.7-6.5	1.5	200	max. 0.37	SSOP5
BD18SD2	1.7-6.5	1.8	200	max. 0.29	SSOP5
BD25SD2	1.7-6.5	2.5	200	max. 0.18	SSOP5
BD28SD2	1.7-6.5	2.8	200	max. 0.15	SSOP5
BD30SD2	1.7-6.5	3.0	200	max. 0.15	SSOP5
BD33SD2	1.7-6.5	3.3	200	max. 0.15	SSOP5

Voltage Detectors

- Line-up
- Details
- Roadmap



Voltage Detectors – Line-up

Detection Voltage [V]	Standard				With Adjustable Delay Time				With Fixed Delay Time								Bipolar Open Collector																																																																																																																																																																																																																																																																																																																																
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6.0	BD48xxG BD48xxFVE BD48KxxG BD48LxxG BD48ExxG-M	BD49xxG BD49xxFVE BD49KxxG BD49LxxG BD49ExxG-M	BD49xxG BD49xxFVE BD49KxxG BD49LxxG BD49ExxG-M	BD49xxG BD49xxFVE BD49KxxG BD49LxxG BD49ExxG-M	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG BD52xxFVE	BD52xxG 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Package Line-up

G: SSOP5 (SOT23-5)



G: SSOP3 (SOT23-3)



FVE: VSOF5



F: SOP4 (SC82)



☆: Under Development

-M: High reliability grade
Operating temp: +105°C
AEC-Q100 qualified

Voltage Detectors – Details

Standard CMOS Voltage Detector IC	BD48□□Series Open Drain Output BD49□□Series CMOS Push Pull Output
--------------------------------------	--

Detection Voltage: 2.3 - 6.0 V
Circuit Current (on/off): 0.60 / 0.85 μ A
Output Current (1.2/2.4V): 1 / 4 mA

Free Delay Time Setting CMOS Voltage Detector IC	BD52□□Series Open Drain Output BD53□□Series CMOS Push Pull Output
---	--

Detection Voltage: 2.3 - 6.0 V
Circuit Current (on/off): 0.85 / 0.85 μ A
Output Current (1.2/2.4V): 1.2 / 5 mA

Counter Timer Built-in CMOS Voltage Detector IC	BD45□□Series Open Drain Output BD46□□Series CMOS Push Pull Output
--	--

Detection Voltage: 2.3 - 4.8 V
Circuit Current (on/off): 0.80 / 0.85 μ A
Output Current (1.2/2.4V): 1.2 / 5 mA

Low Voltage Standard CMOS Voltage Detector IC	BU48□□Series Open Drain Output BU49□□Series CMOS Push Pull Output
--	--

Detection Voltage: 0.9 - 4.8 V
Circuit Current (on/off): 0.40 / 0.55 μ A
Output Current (1.2/2.4V): 3.3 / 6.5 mA

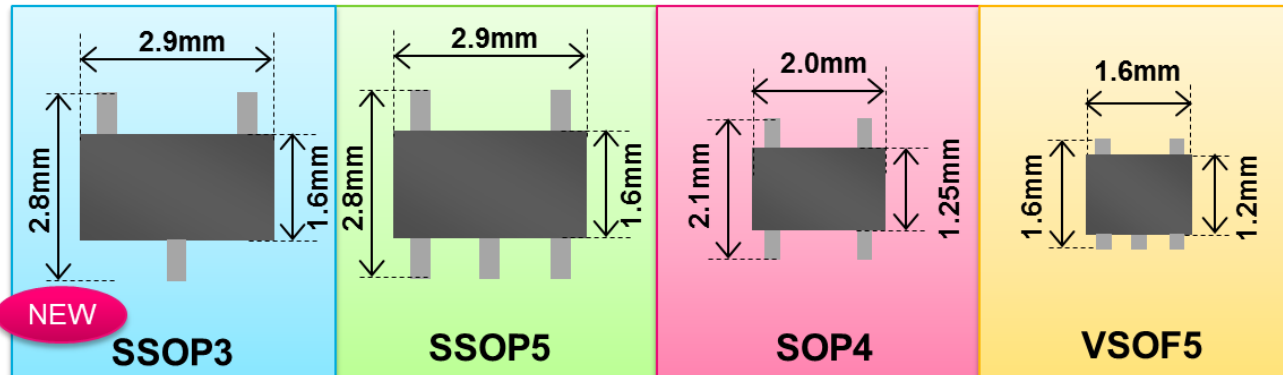
Low Voltage Free Delay Time Setting CMOS Voltage Detector IC	BU42□□Series Open Drain Output BU43□□Series CMOS Push Pull Output
--	--

Detection Voltage: 0.9 - 4.8 V
Circuit Current (on/off): 0.40 / 0.55 μ A
Output Current (1.2/2.4V): 3.3 / 6.5 mA



Voltage Detectors – Details

Miniaturization and Low profile



Easy to mount because of common package

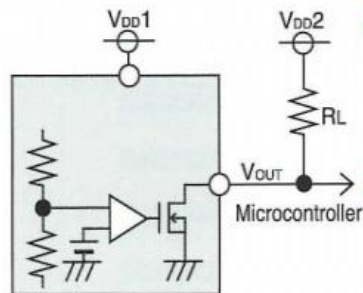
Wide pin pitch

No soldering problem

Small and thin package

Easiness of mounting capability

Open Drain Type



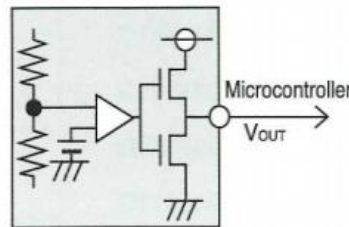
Advantage 1

Can be used even when the power supply voltages on the detection and output sides differ.

Advantage 2

Operation possible when several resets are output to a single microcontroller.

CMOS Type



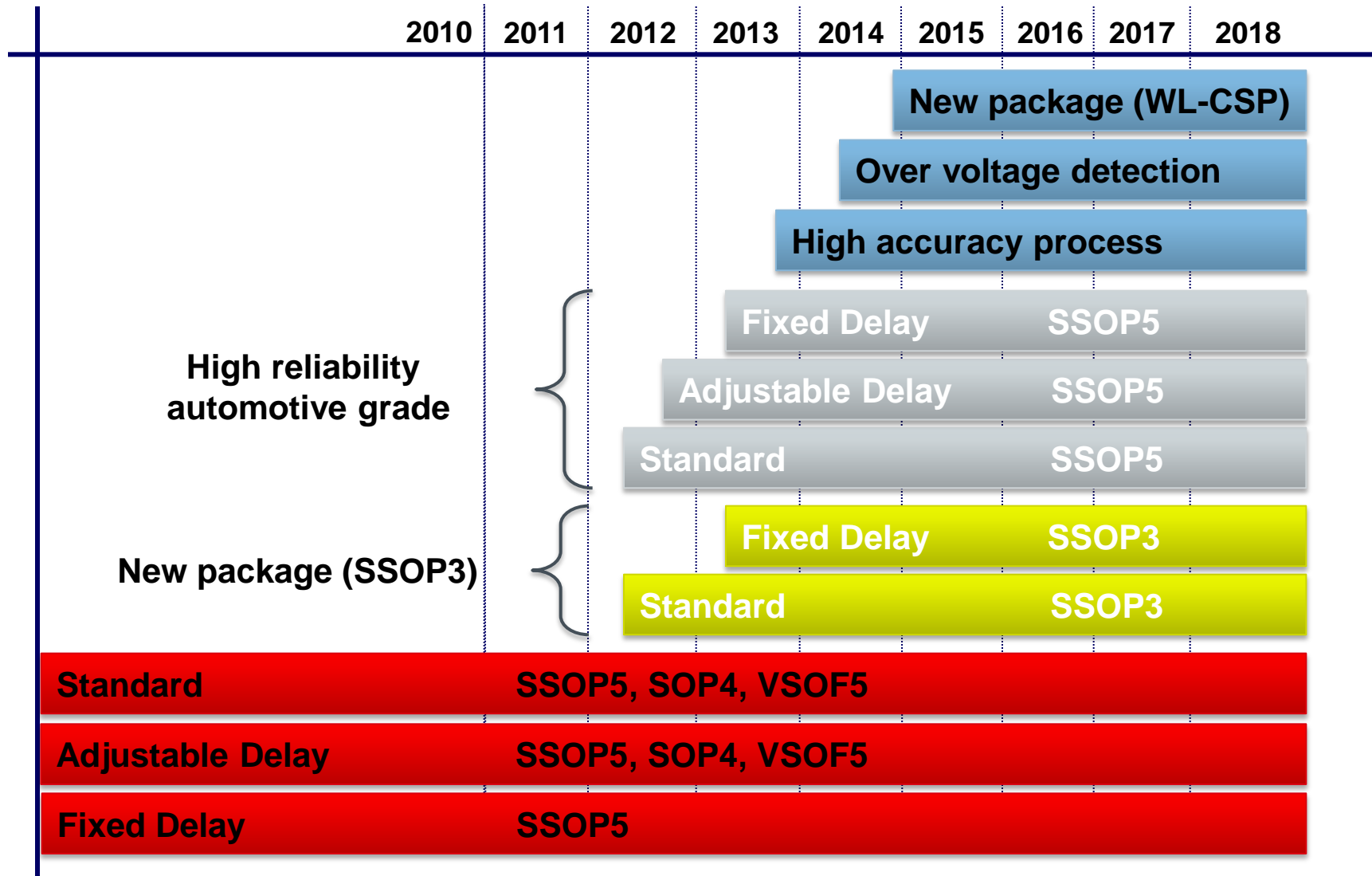
Advantage 1

Requires no external resistor.

Advantage 2

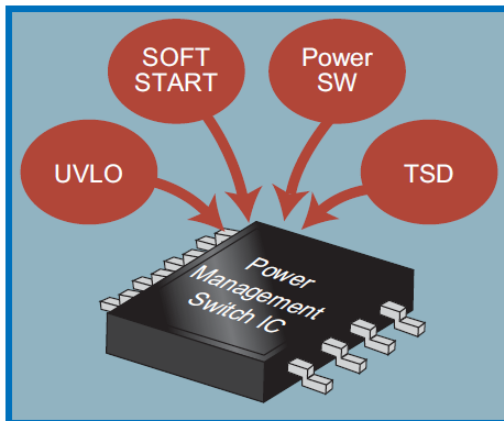
The rise time during recovery is shorter than with an open drain type.

Voltage Detectors – Roadmap



Power Management Switch ICs

- Overview
- 1-channel Switches
 - Accurate threshold current
 - Standard threshold current
- 2-channel Switches
 - Standard threshold current



New Line-up

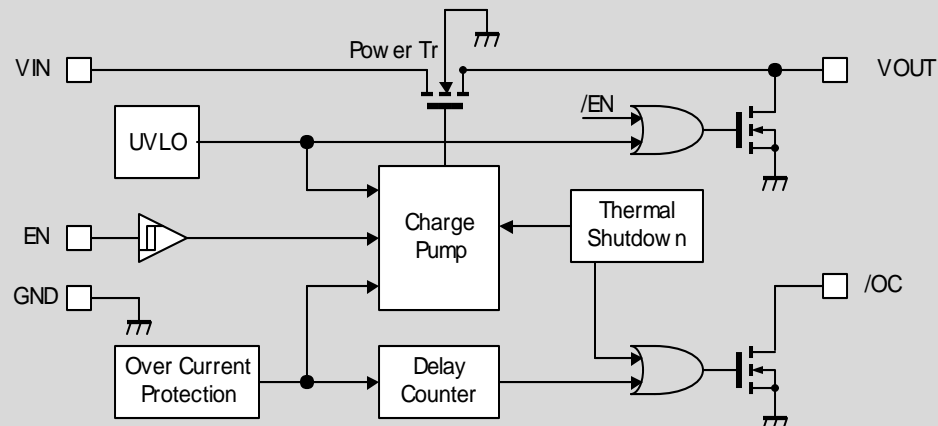
Part No.	Supply Voltage	EN Logic	Current Threshold(A)			ON-R (mΩ)	Output Discharge	Over Current Protection	AEC-Q100 (-M)	Package
BD2248G	2.7~5.5	H	0.2	0.3	0.4	110	yes	Limiting	yes	SSOP5
BD2220/21G	2.7~5.5	H / L	0.5	0.75	1.0	160	yes	Switch-off	no	SSOP5
BD2246/47G	2.7~5.5	H / L	0.63	0.77	0.9	110	yes	Limiting	on request	SSOP5
BD2240/41G	2.7~5.5	H / L	0.82	0.97	1.12	110	yes	Limiting	on request	SSOP5
BD2232/33G	2.7~5.5	H / L	1.15	1.28	1.40	100	yes	Limiting	yes / on request	SSOP5
BD2242/43G	2.8~5.5	H / L	Typ. 0.2 to 1.7 (adjustable)			89	yes	Limiting	no	SSOP6
BD8010/11FVJ	2.7~5.5	H / L	1.0	1.5	2.0	70	no	Limiting	yes	TSSOP-B8J
BD8012/13FVJ	2.7~5.5	H / L	1.5	2.4	3.0	70	no	Limiting	yes	TSSOP-B8J
BD82020/21FVJ	2.8~5.5	H / L	1.1	1.5	2.0	90	yes	Limiting	no	TSSOP-B8J
BD82022/23FVJ	2.8~5.5	H / L	1.5	2.0	2.6	90	yes	Limiting	no	TSSOP-B8J
BD82024/25FVJ	2.8~5.5	H / L	2.1	2.5	3.3	90	yes	Limiting	no	TSSOP-B8J
BD82028/29FVJ	4.5~5.5	H / L	0.6	1.0	1.2	75	yes	Limiting	no	TSSOP-B8J
BD82030/31FVJ	4.5~5.5	H / L	1.05	1.5	1.8	75	yes	Limiting	no	TSSOP-B8J
BD82032/33FVJ	4.5~5.5	H / L	1.55	2.0	2.3	75	yes	Limiting	no	TSSOP-B8J
BD82034/35FVJ	4.5~5.5	H / L	2.05	2.5	2.8	75	yes	Limiting	no	TSSOP-B8J

1ch Power Management Switch IC (Small Package)

Function

- 1ch Low ON-Resistance High-Side Switch
- Error Protection Circuit, Error Flag Output
Over-Current Detection Circuit
Thermal Shutdown Circuit
Built-in Flag Delay Filter
- Slow-Start
Under Voltage Lock Out
- Small Package SSOP

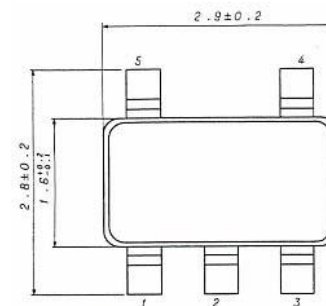
Block Diagram



Line-up

Part No.	EN Logic Type	Current Threshold (min.)	ON-Resistance	Over-Current Protection	Flag Delay Filter	Reverse-Current Protection	Package
BD2248G	H	0.2A	110mΩ	Limiting	15ms	Yes	SSOP5
BD2220/21G	H / L	0.5A	160mΩ	Switch-off	15ms	Yes	SSOP5
BD2246/47G	H / L	0.63A	110mΩ	Limiting	15ms	Yes	SSOP5
BD2240/41G	H / L	0.82A	110mΩ	Limiting	15ms	Yes	SSOP5
BD2232/33G	H / L	1.15A	100mΩ	Limiting	15ms	—	SSOP5
BD2242/43G	H / L	Adjustable 0.112A (R=100kΩ) 1.566A (R=12kΩ)	89mΩ	Limiting	7ms	Yes	SSOP6

Package



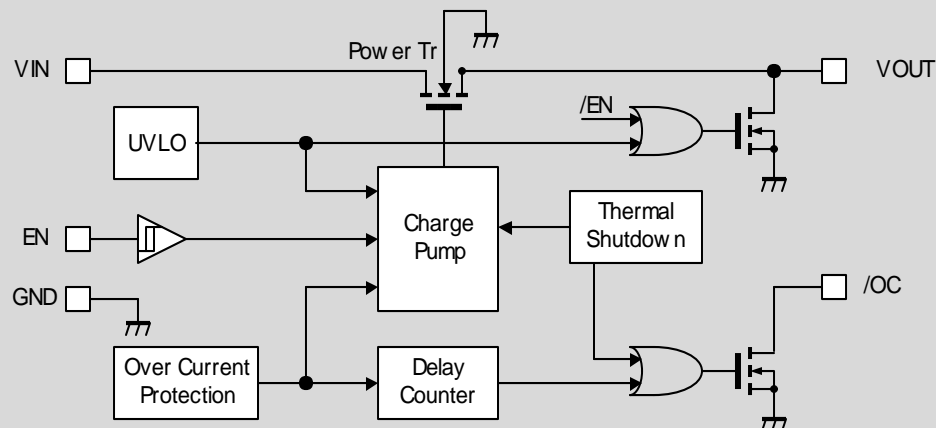
SSOP5
2.8 x 2.9 x 1.25 mm

1ch Power Management Switch IC

Function

- 1ch Low ON-Resistance High-Side Switch
- Error Protection Circuit, Error Flag Output
Over-Current Detection Circuit
Thermal Shutdown Circuit
Built-in Flag Delay Filter
Safety standard (UL/CB scheme approved)
- Slow-Start
Under Voltage Lock Out
- USB heavy load (up to 2A)

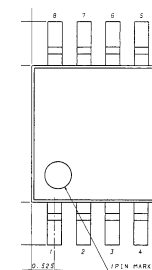
Block Diagram



Line-up

Part No.	Supply Voltage (V)	EN Logic Type	Current Threshold (min.)	ON-Resistance	Flag Delay Filter	Output Discharge	Reverse-Current Protection	Package
BD82020/21FVJ	2.8 ~ 5.5V	H / L	1.1A	90mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82022/23FVJ	2.8 ~ 5.5V	H / L	1.5A	90mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82024/25FVJ	2.8 ~ 5.5V	H / L	2.1A	90mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82028/29FVJ	4.5 ~ 5.5V	H / L	0.6A	75mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82030/31FVJ	4.5 ~ 5.5V	H / L	1.05A	75mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82032/33FVJ	4.5 ~ 5.5V	H / L	1.55A	75mΩ	12ms	Yes	Yes	TSSOP-B8J
BD82034/35FVJ	4.5 ~ 5.5V	H / L	2.05A	75mΩ	12ms	Yes	Yes	TSSOP-B8J

Package



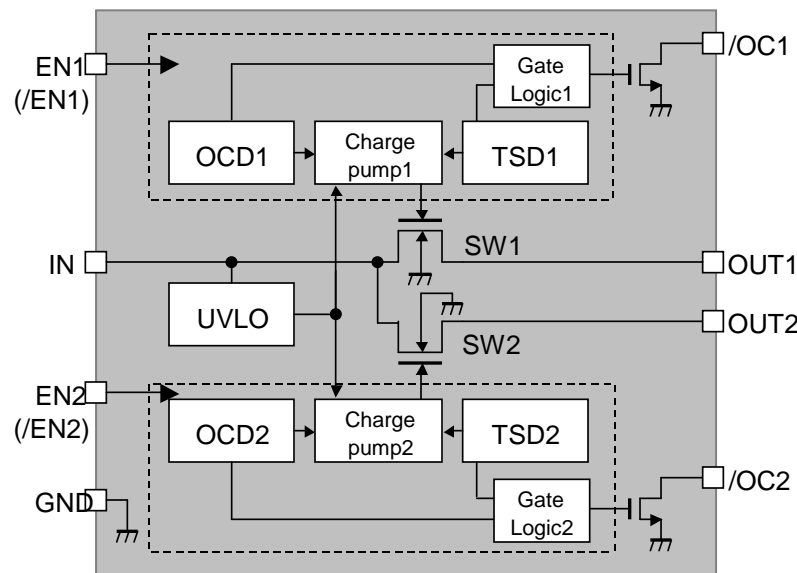
TSSOP-B8J (MSOP-8)
3.0 x 4.9 x 1.1 mm

Power Management Switch ICs: 2ch (SO8)

■ Function

- 2ch Low ON-Resistance (80mΩ) High-Side Switch
- Error Protection Circuit, Error Flag Output
 - Over-Current Detection Circuit
 - Thermal Shutdown Circuit
 - Built-in Delay Flag Filter
 - Slow-Start
 - Under Voltage Lock Out
- Cancel the parasitic diode of power transistor
Prevent the reverse current from OUT1 (OUT2) to IN

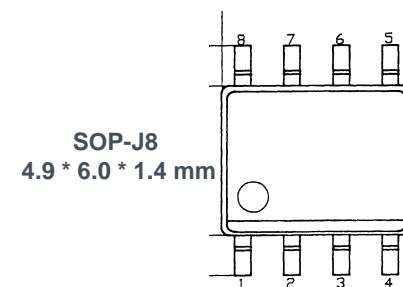
■ Block diagram



■ Line-up

Part No.	EN Logic Type	Current Threshold (Min-Typ-Max) A	ON-Resistance	Flag Delay Filter	Reverse-Current Protection	Package
BD2056/46AFJ	H / L	0.3 - 0.5 - 0.9	100mΩ	1.3ms	Yes	SOP-J8
BD2052/42AFJ	H / L	0.7 - 1.0 - 1.8	100mΩ	1.3ms	Yes	SOP-J8
BD6512/13F	H / L	1.25 - 1.65 - 2.2	100mΩ	—	---	SOP8
BD6516/17F	H / L	1.2-1.65-2.5	110mΩ	1.0ms	Yes	SOP8
BD2066/62FJ	H / L	1.5-2.4-3.0	80mΩ	15ms	Yes	SOP-J8

■ Package



Parts for Industrial (10 years – 24h running)

Part Number	Suffix -LB	Function	PKG	Process	wire-bonding
BD2202G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2206G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD6538G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2224G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2225G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2226G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2227G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2220G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD2221G	yes	1ch Switch	SSOP5	BD0.6	Au-wire
BD82000FVJ	yes	1ch Switch	MSOP8	BD0.6	Au-wire
BD82001FVJ	yes	1ch Switch	MSOP8	BD0.6	Au-wire
BD82061FVJ	yes	1ch Switch	MSOP8	BD0.6	Au-wire
BD82065FVJ	yes	1ch Switch	MSOP8	BD0.6	Au-wire
BD2062FJ	yes	2ch Switch	SOP8	BD0.6	Au-wire
BD2066FJ	yes	2ch Switch	SOP8	BD0.6	Au-wire



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Single-Output LDO Regulators



ROHM offers a wide lineup of general-purpose 3-pin regulators featuring low power consumption, high current capability, and high voltage resistance, making them ideal for mobile phones, automotive systems, consumer electronics, and commercial/industrial equipment.

Reset	Datasheet Link	Grade	Breakdown Voltage (Max.)[V]	Vin (Min.)[V]	Vin (Max.)[V]	Vout (Min.)[V]	Vout (Max.)[V]	Iout (Max.)[A]	Circuit Current [mA]	Package	Shutdown Function	Distribution Inventory
Show/Hide												
Total Parts: 505 Matching Parts: 505 Compare Differences		<input type="checkbox"/> Automotive <input type="checkbox"/> Standard	50 6	10 1.7	45 5.5	16 0.65	16 1	4 -4	2.5 0.006	<input type="checkbox"/> HRP5 <input type="checkbox"/> HSON8 <input type="checkbox"/> HTSOP-J8 <input type="checkbox"/> HTSSOP-B20 <input type="checkbox"/> HVSOF5 <input type="checkbox"/> HVSOF6 <input type="checkbox"/> MSOP8		
<input type="checkbox"/> BD00IA5WEFJ		Standard	7	2.3	5.5	1.5	13	0.5	0.3	HTSOP-J8	Yes	Buy or Sample
<input type="checkbox"/> BD00IC0WEFJ		Standard	7	2.3	5.5	0.8	4.5	1	0.3	HTSOP-J8	Yes	Buy or Sample
<input type="checkbox"/> BD00IC0WHFV (New *)		Standard	7	2.3	5.5	0.8	4.5	1	0.3	HVSOF6	Yes	Buy or Sample
<input type="checkbox"/> BD00KA5WE		Standard	7	2.3	5.5	1.5	13	0.5	0.35	SOP8	Yes	Buy or Sample
<input type="checkbox"/> BD00KA5WFP		Standard	7	2.3	5.5	1.5	7	0.5	0.35	TQ252-5	Yes	Buy or Sample

ROHM Cross Reference on www.rohm.com

The screenshot shows the ROHM Semiconductor website. The top navigation bar includes links for Company, News, myROHM Login, Careers, Contact Us, and Global/US - English. A secondary navigation bar highlights ROHM.com, ROHM Products, Cross-Reference (circled), and Dist. Inventory. Below this, there are tabs for Products, Applications, and Sales & Support. The Products tab is active, showing categories like ICs (Memory, Amplifiers & Linear, Power Management) and Opto Electronics (LED, LED Displays, Laser Diodes). A search bar labeled 'Cross-Reference' is visible, and a banner for POWERMODULES is on the right.

Cross Reference Search

Enter a partial or full competitor part number

Search Results For : TLE4

Showing 1 - 10 of 50 results.

Items per Page 10 Page 1 of 5 First Previous Next Last

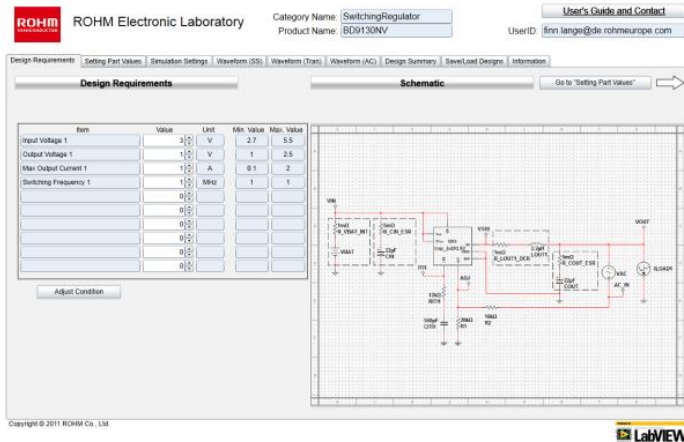
PartNumber	Competitor	ROHM Equivalent	Cross Type	Data Sheet	Package	Buy/Sample	Comment
TLE42744DV33	Infineon Technologies AG	BD3570FP-E2	Different Package-		TO252-3	Buy or Sample	Difference in: Iout, Line Regulation, Load Regulation, Vin

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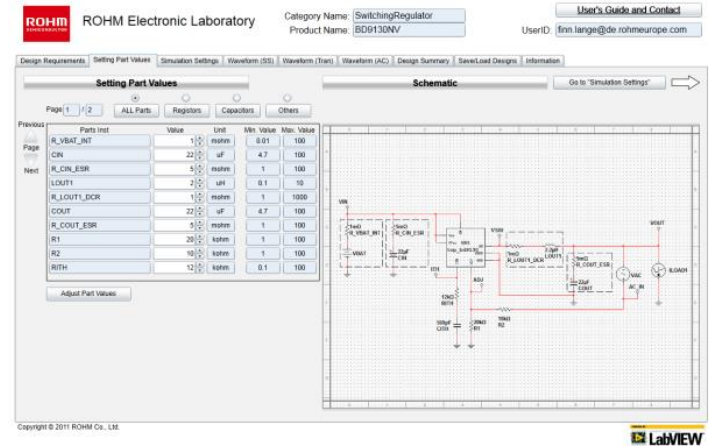
Browse Products		Send Email	Download	Save Settings	Search										
Reset		Datasheet Link	Grade	ch	Integrated FET / Controller	Buck / Boost / Buck-Boost / Inverting	Synchronous / Asynchronous	Vin1 (Min.)[V]	Vin1 (Max.)[V]	Vout1 (Min.)[V]	Vout1 (Max.)[V]	Iout1 (Max.)[A]	SW frequency (Max.)[MHz]	Distribution Inventory	
Show/Hide															
▲ ▼			▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼	▲ ▼		
Total Parts: 103 Matching Parts: 16 Compare Differences			<input type="checkbox"/> automotive <input type="checkbox"/> standard	<input type="checkbox"/> 1 <input type="checkbox"/> 2	<input type="checkbox"/> all in one <input type="checkbox"/> controller <input type="checkbox"/> integrated fet	<input type="checkbox"/> boost <input type="checkbox"/> boost / inverting <input type="checkbox"/> buck <input type="checkbox"/> buck / boost / inverting <input type="checkbox"/> buck-boost	<input type="checkbox"/> asynchronous <input type="checkbox"/> synchronous	10 1.8	56 4.5	4.5 0.7	48 1.2	6 0.3	<input type="checkbox"/> 0.1 <input type="checkbox"/> 0.11 <input type="checkbox"/> 0.3 <input type="checkbox"/> 0.38 <input type="checkbox"/> 0.46 <input type="checkbox"/> 0.5 <input type="checkbox"/> 0.6		
<input checked="" type="checkbox"/> BD9001F	e-Labs	BD9001F	Automotive	1	Integrated FET	Buck	Asynchronous	7	48	1	48	2	0.3	Buy or Sample	
<input checked="" type="checkbox"/> BD9006F	e-Labs	BD9006F	Automotive	1	Integrated FET	Buck	Synchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9006HFP	e-Labs	BD9006HFP	Automotive	1	Integrated FET	Buck	Synchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9007F	e-Labs	BD9007F	Automotive	1	Integrated FET	Buck	Synchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9007HFP	e-Labs	BD9007HFP	Automotive	1	Integrated FET	Buck	Synchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9106FVM	e-Labs	BD9106FVM	Standard	1	Integrated FET	Buck	Synchronous	4	5.5	1	2.5	0.8	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9107FVM	e-Labs	BD9107FVM	Standard	1	Integrated FET	Buck	Synchronous	4.5	5.5	1	1.8	1.2	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9109FVM	e-Labs	BD9109FVM	Standard	1	Integrated FET	Buck	Synchronous	4.5	5.5	3.3	3.3	0.8	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9120HFN	e-Labs	BD9120HFN	Standard	1	Integrated FET	Buck	Synchronous	2.7	4.5	1	1.5	0.8	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9130NV	e-Labs	BD9130NV	Standard	1	Integrated FET	Buck	Synchronous	2.7	5.5	1	2.5	2	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9132MUV	e-Labs	BD9132MUV	Standard	1	Integrated FET	Buck	Synchronous	2.7	5.5	0.8	3.3	3	1	Buy or Sample	
<input checked="" type="checkbox"/> BD9535MUV	e-Labs	BD9535MUV	Standard	2	Controller	Buck	Synchronous	3	28	0.7	2	-	0.6	Buy or Sample	
<input checked="" type="checkbox"/> BD95513MUV	e-Labs	BD95513MUV	Standard	1	Integrated FET	Buck	Synchronous	4.5	28	0.7	5	3	0.6	Buy or Sample	
<input checked="" type="checkbox"/> BD9778F	e-Labs	BD9778F	Automotive	1	Integrated FET	Buck	Asynchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9778HFP	e-Labs	BD9778HFP	Automotive	1	Integrated FET	Buck	Asynchronous	7	35	1	35	2	0.5	Buy or Sample	
<input checked="" type="checkbox"/> BD9781HFP	e-Labs	BD9781HFP	Automotive	1	Integrated FET	Buck	Synchronous	7	35	1	35	4	0.5	Buy or Sample	

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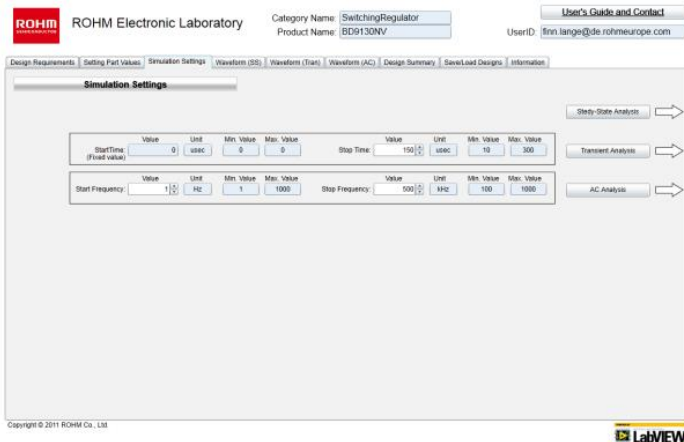
1. Setting the operation conditions



2. Setting the external constants



3. Setting analysis condition



4. Confirming results

