

## ●Design Support Tools

Online tools to support device selection and purchasing

### Power Device Simulator



The Power Device Simulator (free) is a web-based simulation tool for our DC-DC regulator ICs\* and switching MOSFETs. This tool allows you to verify the product specifications, to analyze the characteristics, to make a BOM list, and to purchase desired products, thus reducing your time for product selection.

\*Currently, DC-DC regulator IC with built-in power MOS only is available.

#### IC Designer

--- Power circuit simulation for DC-DC regulator IC

#### Active Datasheet

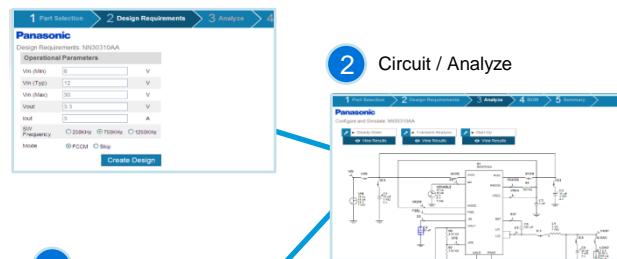
--- Performance simulation for switching MOSFET

#### Buck Analyzer

--- Power circuit simulation for switching MOSFET

### 1 Requirement

#### Operation procedure



### 2 Circuit / Analyze

NN30195A evaluation board  
NN30195A-EVB-R2

NN30196A evaluation board  
NN30196A-EVB-R2

NN30295A evaluation board  
NN30295A-EVB-0

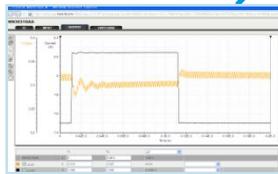
NN30310AA evaluation board  
NN30310AA-EVB-R2

NN30312A evaluation board  
NN30312A-EVB-R2

NN30320A evaluation board  
NN30320A-EVB-R2

NN30321A evaluation board  
NN30321A-EVB-R2

### 3 Result



### 4 BOM list

A	B	Part Number	Manufacturer	Description
1	Ref Qty			
2	U1	NN30195A	Panasonic	3A Sync
3	C1	ECJ-EE91A105M	Panasonic	MLCC
4	L1	ETO-P1H1R0BFA	Panasonic	COIL PC
5	R1	ERJ-SEK1030V	Panasonic	Res Thic
6	R2	ERJ-SEK1453V	Panasonic	Res Thic
7	R7	ERJ-SEK1001V	Panasonic	Res Thic
8				
9				
10				
11				

### DC-DC Circuit Calculator



The DC-DC Circuit Calculator (free) is a web-based tool that calculates the recommended peripheral circuit constants for our DC-DC regulator IC\* to meet your power system design specifications. Use this calculator together with the "Power Device Simulator" to make the simulation more effective.

\*Currently, DC-DC regulator IC with built-in power MOS only is available.

Panasonic offers a variety of devices as "Total Power simulations." Please visit the URL below to learn more about coil, capacitor, components for suppressing noise or surge, etc.

[http://industrial.panasonic.com/ww/index\\_e.html](http://industrial.panasonic.com/ww/index_e.html)

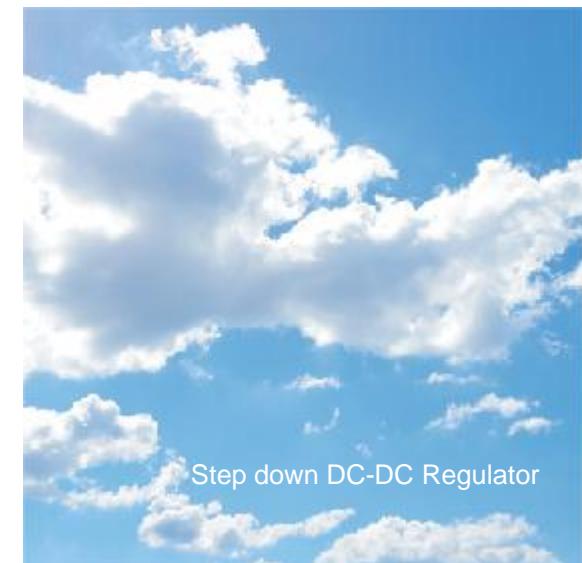
## ●Evaluation Board

- We have prepared the DC-DC evaluation boards



# Panasonic

Step down DC-DC Regulator  
(with built-in power MOS)



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## Power device solution, ENELEAD



Panasonic provides ENELEAD, the "Total solution of power devices," which supports from power system design to purchasing of components, allowing you to select a suitable small, high-efficiency power device, to easily perform a design and evaluation of power systems by using web-based tools, and to purchase peripheral components.



Panasonic will continue to offer the power solutions that satisfy our customers along with the "ENELEAD."

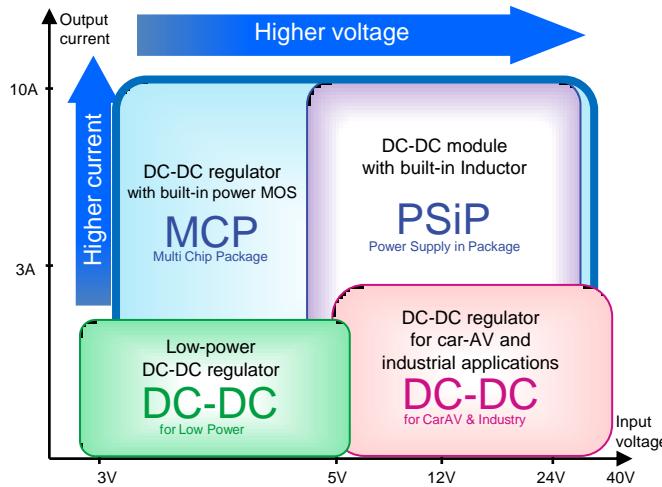
[www.semicon.panasonic.co.jp/en/applications/power/](http://www.semicon.panasonic.co.jp/en/applications/power/)

or [Panasonic power device simulator global](http://www.semicon.panasonic.co.jp/en/power-device-simulator-global/)

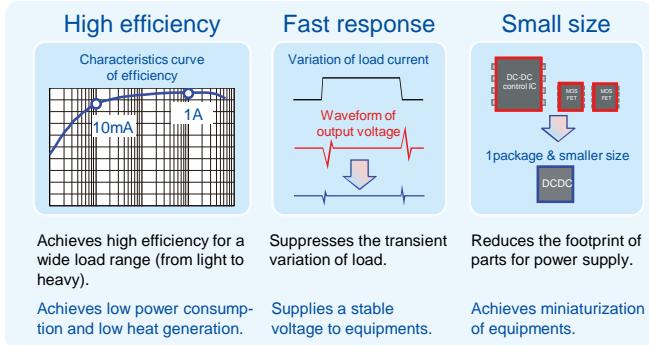
Click

Thank you for your interest in Panasonic Step down DC-DC Regulator. We provide a variety of regulators with wide ranges of input voltage and output current, based on the low power technologies that have been cultivated through the development of customized power supplies for mobile phones. In the next generation, we are going to expand its application for industrial and infrastructure such as server, network and so on with a view to high current not just low power of several hundred mA degree.

Wide product lineup for various applications



Provides DC-DC solutions with high efficiency, fast response, and small size.



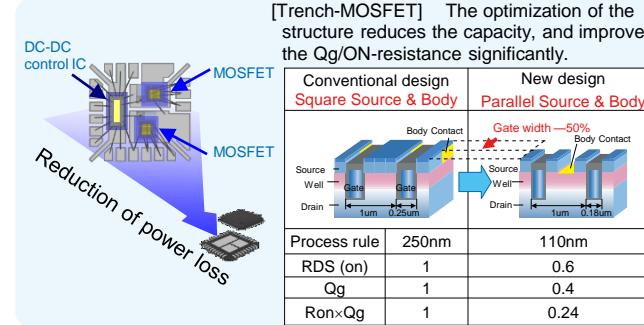
## ●DC-DC Regulator with Built-in Power MOS

DC-DC regulators including both Fast-response control IC with hysteretic control and MOSFET with low ON-resistance in a single package (MCP).

### ●Feature 1 ~High efficiency~

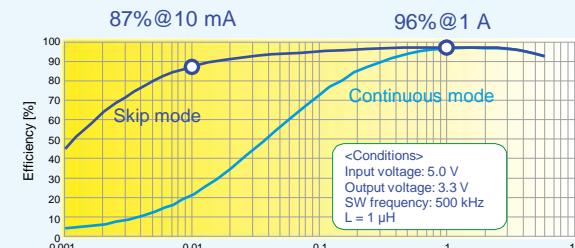
Core Technology

#### (1) Built-in MOSFET with low ON-resistance



Core Technology

#### (2) Skip mode (Set at light load)



Improves the efficiency at light load.

→ Achieves low power consumption and low heat generation.

Line-up

	NN30195A	NN30295A	NN30297A	NN30196A	NN30310AA	NN30320A	NN30321A	NN30421A	NN30331A	NN30332A	NN30312A
Input voltage 1	4.5 to 5.6V	4.5 to 5.6V	4.0 to 5.6V	4.5 to 5.6V	6.0 to 30V	4.5 to 28V	4.5 to 28V	4.75 to 24V	4.5 to 24V	4.5 to 30V	4.5 to 30V
Input voltage 2 (*1)	—	—	—	—	—	—	—	4.5 to 5.5V	4.5 to 5.5V	—	—
Absolute maximum rating	6V				33V				30V		
Output voltage	0.6 to 3.5V	0.6 to 3.5V	0.6 to 3.5V	0.6 to 3.5V	0.75 to 5.5V				0.75 to 3.6V	0.75 to 3.6V	0.75 to 5.5V
Output current (max)	6A		9A		3A	6A	8A		10A		
Control method	Hysteretic				Hysteretic				Hysteretic		
Ron (Q)	25m/25m	25m/25m	28m/25m	9m/9m	25m/25m	20m/20m	20m/10m	20m/10m	20m/6m	20m/6m	9m/9m
I2C control (*2)	—	Yes	Yes	—	—	—	—	—	—	—	—
Synchronous rectification	Yes				Yes				Yes		
Skip mode (*3)	—	—	—	—	—	—	—	—	—	—	—
Package	Type	HQFN24	HQFN24	HQFN24	HQFN40	HQFN24	HQFN24	HQFN24	HQFN24	HQFN24	HQFN40
	Size	4.0x4.0mm	4.0x4.0mm	4.0x4.0mm	6.0x6.0mm	4.0x4.0mm	4.0x4.0mm	4.0x4.0mm	4.0x4.0mm	4.0x4.0mm	6.0x6.0mm
	Pin-pitch	0.5mm				0.5mm				0.5mm	
Selectable frequency	0.5/1.0 /2.0 MHz	0.5 to 2.0 MHz (*2)	0.5 to 2.0 MHz (*2)	0.5/1.0 /2.0 MHz	0.25/0.75 /1.25 MHz	0.21/0.43 /0.65 MHz	0.21/0.43 /0.65 MHz	0.22/0.41 /0.58 MHz	0.43/0.63 /0.63 MHz	0.43/0.63 /0.63 MHz	0.25/0.75 /1.25 MHz
Function	OCP, OVD, SCP, UVLO, TSD				OCP, OVD, SCP, UVLO, TSD				MP		
Product life cycle stage	MP										

(\*1) Ultra-high efficiency at light load achieved by a 5-V input voltage

(\*2) For NN30295 & NN30297, the I2C interface can be used to select from among seven frequency values and change the output voltage.

(\*3) Skip mode: High efficiency mode at light load

### ●Feature 2 ~Fast response~

Core Technology

#### Hysteretic control method

Load current

10  $\mu$ A  $\Rightarrow$  1 A

1 A  $\Rightarrow$  10  $\mu$ A

Load transient

10  $\mu$ A  $\Rightarrow$  1 A

1 A  $\Rightarrow$  10  $\mu$ A

V<sub>IN</sub> = 5.0 V, V<sub>OUT</sub> = 1.2 V

V<sub>IN</sub> = 5.0 V, V<sub>OUT</sub> = 1.2 V

V<sub>IN</sub> = 5.0 V, V<sub>OUT</sub> = 1.2 V

Cou: 44  $\mu$ F

Cou: 44  $\mu$ F

Cou: 44  $\mu$ F

L: 1.0  $\mu$ H

L: 1.0  $\mu$ H

L: 1.0  $\mu$ H

10  $\mu$ s/div

10  $\mu$ s/div

10  $\mu$ s/div

20.60 °C

20.60 °C

20.60 °C

Reduces the overshoot/undershoot due to load current transient to  $\pm 10$  mVpp.

→ Ensures stable operation of equipments.

### ●Feature 3 ~Small size~

Core Technology

#### MCP (Multi-Chip Package)

Circuit diagram

Internal connection diagram

1 package

DC-DC control IC

MOSFET

MOSFET

MOSFET

MOSFET

MOSFET

Footprint: 48 mm<sup>2</sup>

Footprint: 16 mm<sup>2</sup>

Footprint: 16 mm<sup>2</sup>

Both DC-DC control IC and MOSFET are included in a single package.

→ Small footprint, achieving miniaturization of equipments