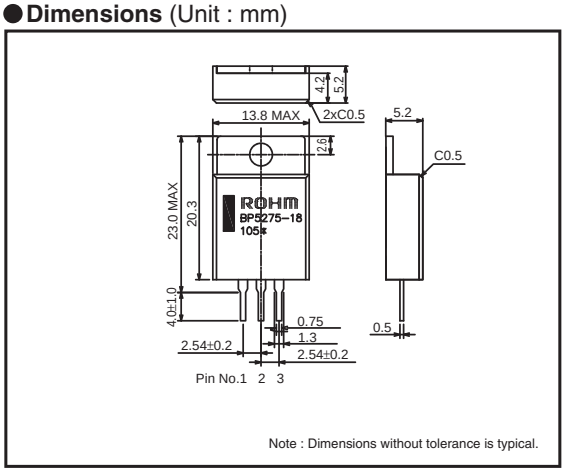
Non-Isolated Step-Down 3-Terminal DC/DC Converters

BP5275-18 / BP5275-25 / BP5275-33 / BP5275-50

●Description

The BP5275 series of DC/DC converters utilize a synchronous rectification system.
A control circuit, switching element, and coil are built in, along with input/output capacitors, resulting in stable operation with no external components required.
High conversion efficiency, combined with an original heat dissipation structure, enables configuration an ultra-compact switching power supplies.
500mA output is possible with no heat sink required (800mA with heat sink).
In addition, the ICs are pin-compatible with conventional TO-220 LDO regulators, making replacement easy.
Low ripple voltage with high precision output ensure stable operation against the fluctuating voltages from main power supplies, making them ideal for use as local power supplies (i.e. for microcontrollers).

●Dimensions (Unit : mm)



●Applications

Power supplies for copiers, personal computers, facsimiles, AV equipment, measuring instruments, vending machines, security device, registers, industrial equipment, and maintenance tools

●Features

1) No external parts required
2) High power conversion efficiency.
3) Heat sink unnecessary.
4) Low output ripple voltage
5) High output voltage accuracy
6) Pin-compatible with conventional 3-pin LDOs
7) Compact package.
   BP5275-18 / BP5275-25 / BP5275-33 / BP5275-50 : SIP3

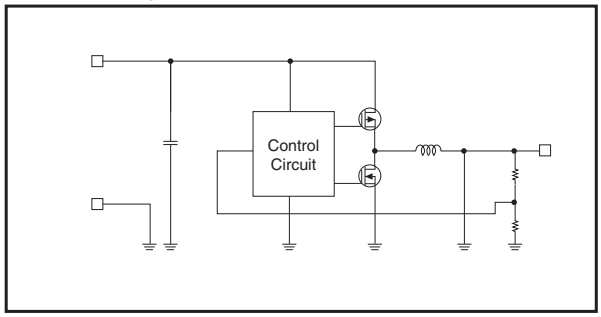
●List of the series

	BP5275–18	BP5275–25	BP5275–33	BP5275–50	Unit
Input voltage	4.5 to 14	4.5 to 14	5.0 to 14	6.0 to 14	V
Output voltage	1.8	2.5	3.3	5.0	V
Maximum output current (no heat sink / include heat sink)	500 / 800	500 / 800	500 / 800	500 / 800	mA
Power conversion efficiency (Vin=12V)	73	78	83	88	%

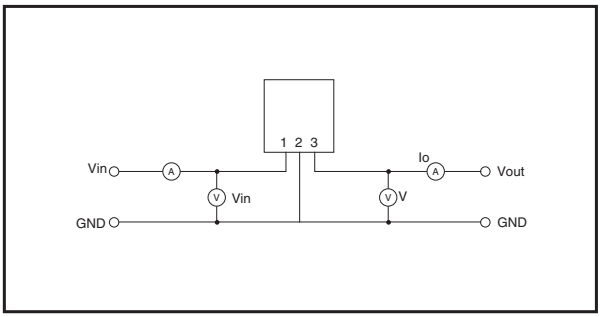
●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits				Unit
		BP5275–18	BP5275–25	BP5275–33	BP5275–50	
Input voltage	V_{In}	15	15	15	15	V
Operating temperature range	Topr	–30 to 85	–30 to 85	–30 to 85	–30 to 85	°C
Storage temperature range	Tstg	–40 to 105	–40 to 105	–40 to 105	–40 to 105	°C
Allowable maximum surface temperature	Tcmax	100	100	100	100	°C
Maximum output current 1	$I_{O}1max$	500	500	500	500	°C
Maximum output current 2 (with Heat Sink)	$I_{O}2max$	800	800	800	800	°C

● **Block diagram**



● **Measurement circuit**



● **Electrical characteristics**

BP5275−18 (Unless otherwise noted : Ta=25°C, Vin=12V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vin	4	12	14	V	DC
Output voltage	Vo	1.75	1.80	1.85	V	Io1=0mA
Output current 1	Io1	0	−	500	mA	∗1
Output current 2	Io2	0	−	800	mA	With heat sink ∗1
Line regulation	Vr	−	5	50	mV	Vin=4 to 14V
Load regulation	Vl	−	10	50	mV	Io=0 to 500mA
Output ripple voltage	Vp	−	5	80	mV_{P-P}	
Minimum start-up time	Ts	4	7	−	msec	Vin=0V→3V,Ro=3.6Ω
Conversion efficiency	η	65	73	−	%	
Operation frequency	f	−	1.5	−	MHz	

∗1 Derating required according to the input voltage and ambient temperature.

BP5275-25 (Unless otherwise noted : Ta=25°C, Vin=12V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vin	4	12	14	V	DC
Output voltage	Vo	2.45	2.50	2.55	V	Io1=0mA
Output current 1	Io1	0	−	500	mA	∗1
Output current 2	Io2	0	−	800	mA	With heat sink ∗1
Line regulation	Vr	−	5	50	mV	Vin=4 to 14V
Load regulation	Vl	−	10	50	mV	Io1=0 to 500mA
Output ripple voltage	Vp	−	5	50	mV_{P-P}	
Minimum start-up time	Ts	4	7	−	msec	Vin=3V→4V,Ro=5Ω
Conversion efficiency	η	73	78	−	%	
Operation frequency	f	−	1.5	−	MHz	

∗1 Derating required according to the input voltage and ambient temperature.

● Electrical characteristics

BP5275–33 (Unless otherwise noted :Ta=25°C, Vin=12V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vin	4.5	12	14	V	DC
Output voltage	V_O	3.23	3.30	3.37	V	I_{o1}=0mA
Output current 1	I_{o1}	0	–	500	mA	*1
Output current 2	I_{o2}	0	–	800	mA	With heat sink *1
Line regulation	Vr	–	5	50	mV	Vin=4.5 to 14V
Load regulation	Vl	–	10	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	–	5	50	mV_{P-P}	
Minimum start-up time	Ts	4	7	–	msec	Vin=3V →4.5V,Ro=6.6Ω
Conversion efficiency	η	78	83	–	%	
Operation frequency	f	–	1.5	–	MHz	

*1 Derating required according to the input voltage and ambient temperature.

BP5275-50 (Unless otherwise noted : Ta=25°C, Vin=12V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vin	6	12	14	V	DC
Output voltage	V_O	4.9	5.0	5.1	V	I_{o1}=0mA
Output current 1	I_{o1}	0	–	500	mA	*1
Output current 2	I_{o2}	0	–	800	mA	With heat sink *1
Line regulation	Vr	–	5	50	mV	Vin=6 to 14V
Load regulation	Vl	–	10	50	mV	I_{o1}=0 to 500mA
Output ripple voltage	Vp	–	5	50	mV_{P-P}	
Minimum start-up time	Ts	4	7	–	msec	Vin=3V →6V,Ro=10Ω
Conversion efficiency	η	83	88	–	%	
Operation frequency	f	–	1.5	–	MHz	

*1 Derating required according to the input voltage and ambient temperature.

●OPERATION NOTES

・This module will stop outputting because of protection circuit when the input voltage becomes maximum input voltage or less. Please note that the input voltage must not become maximum input voltage in any state of the load.

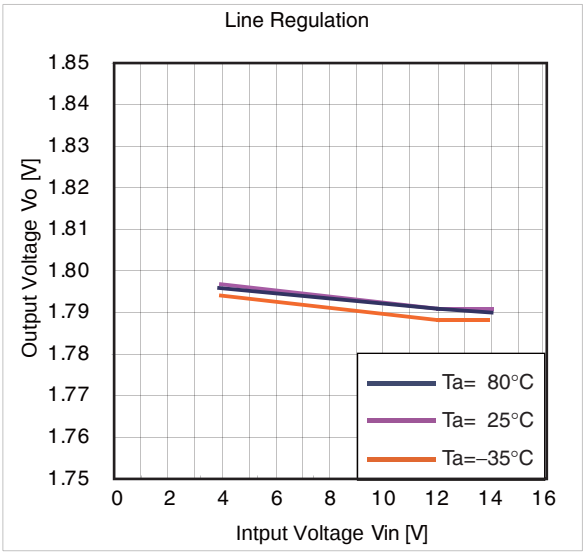
・After the circuit starts, the output voltage needs to become the fixed voltage within minimum activation time. If the output voltage is below the fixed voltage after the minimum activation time, it doesn't work because of the protection circuit. Please evaluate sufficiently about activation characteristics of input voltage and load characteristics when starting.

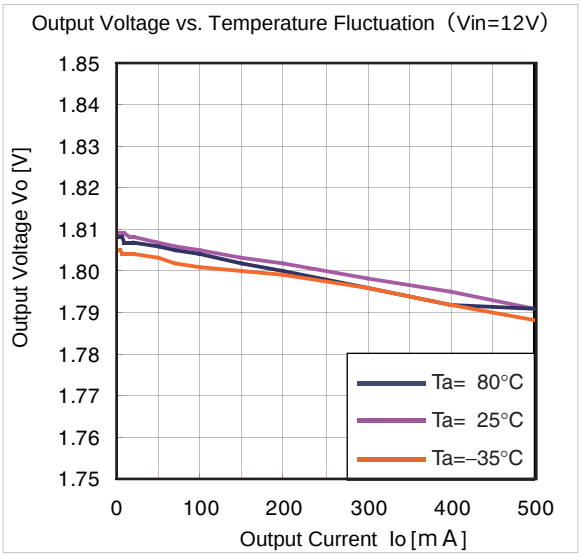
・When the output circuit shorts, short-circuit protection of timer-latch type will work and stop outputting. To release the protection, it is necessary to turn on the switch again. This product also has protection element for safety. The protection element is fused if the current, with which the protection element will fuse, will be input by the time the short-circuit protection of timer-latch hangs. Please evaluate sufficiently at using environment about the action when the output circuit shorts.

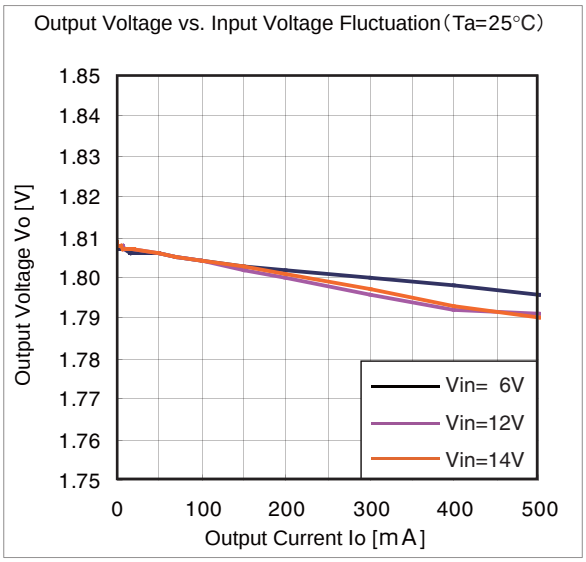
・There are some case that the heat generates at the module by exceeding allowable maximum surface temperature when the load current which exceeds the maximum output current is electrified. Please make design keeping enough margins not to exceed allowable maximum surface temperature at any time under any application or any test conditions.

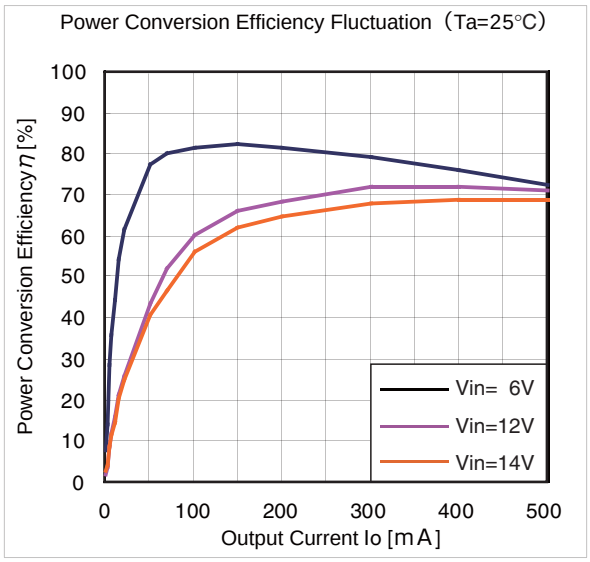
・The heat sink at back parts of the product is connected to GND. Please mind the arrangement not to contact with surrounding parts.

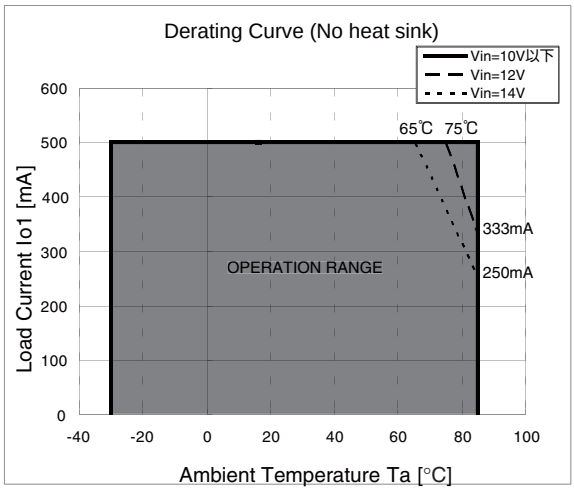
●BP5275-18

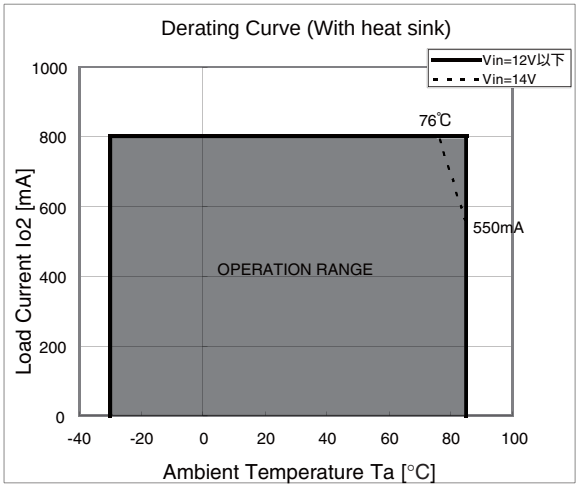












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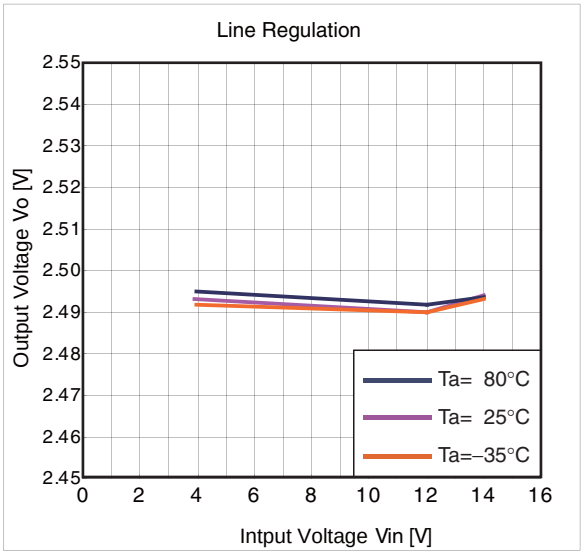

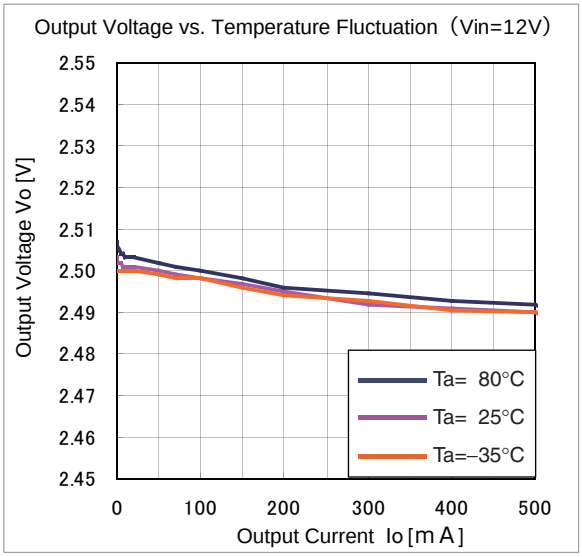

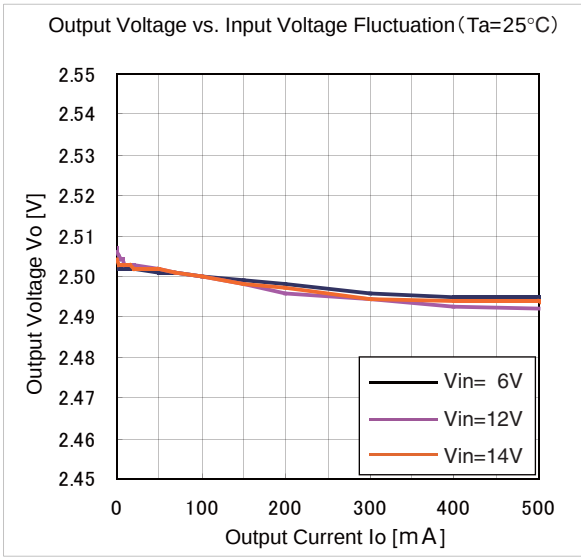

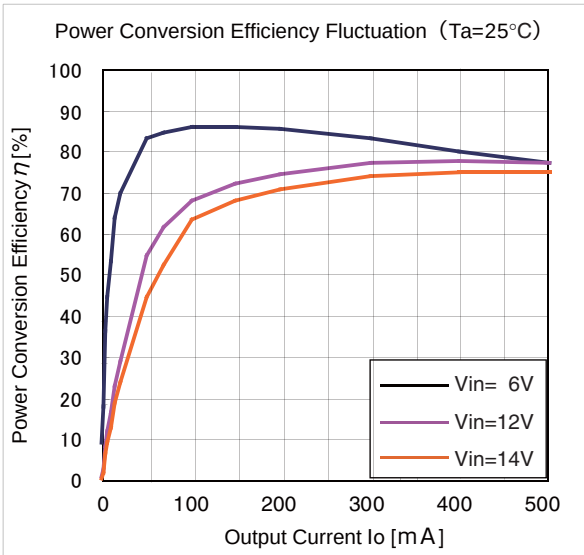

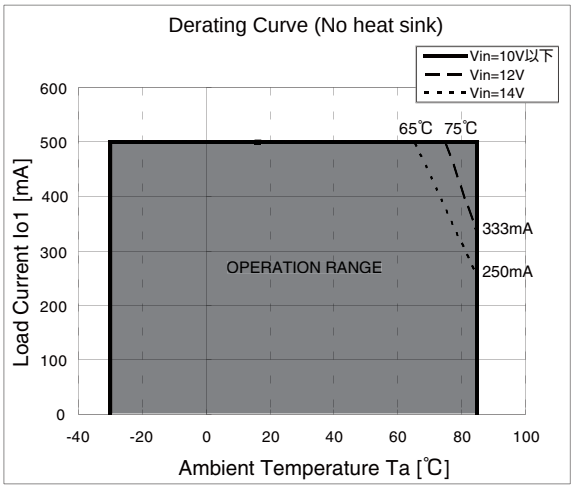

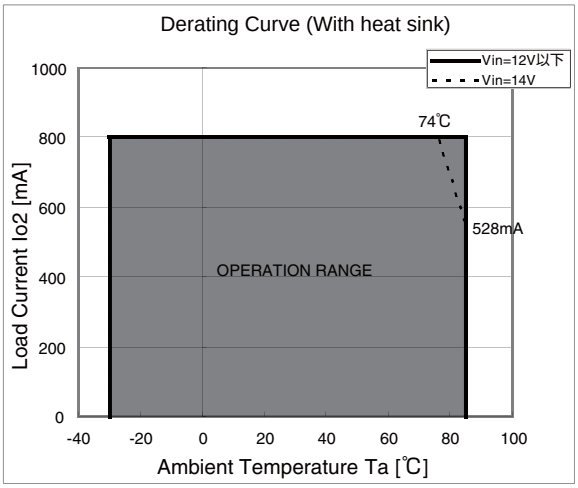

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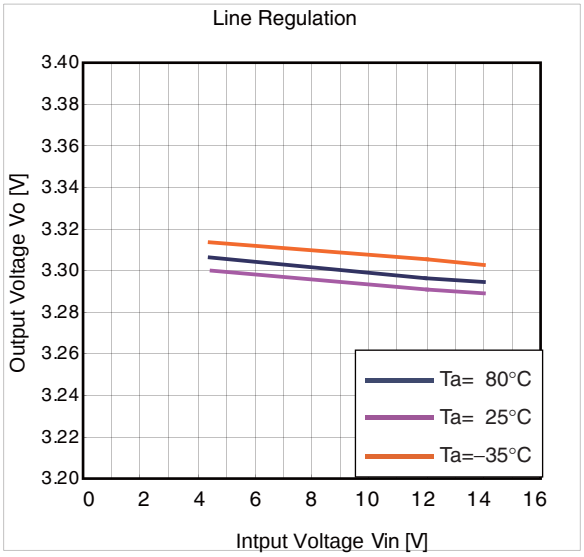

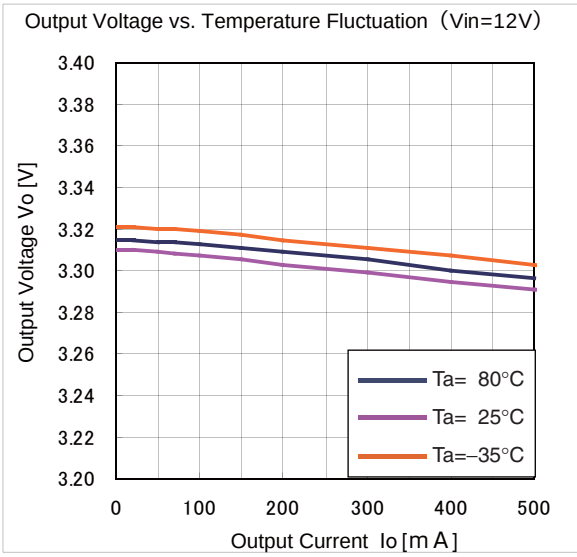

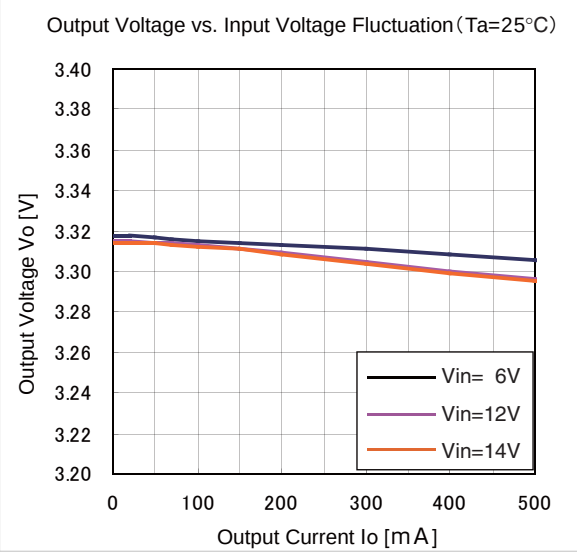

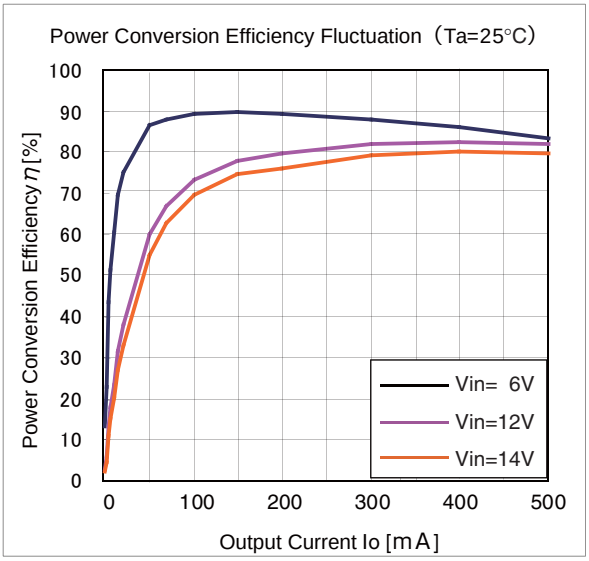

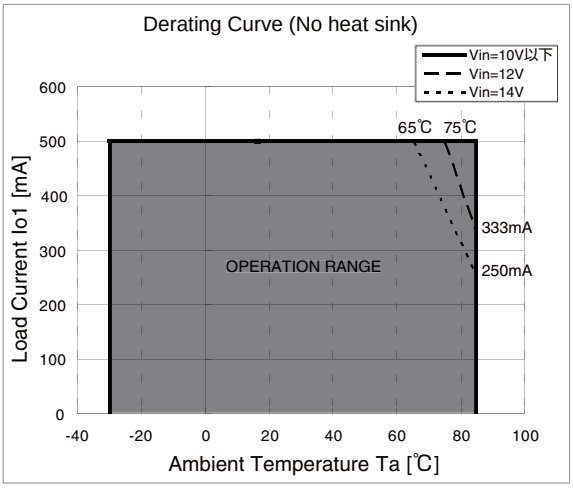

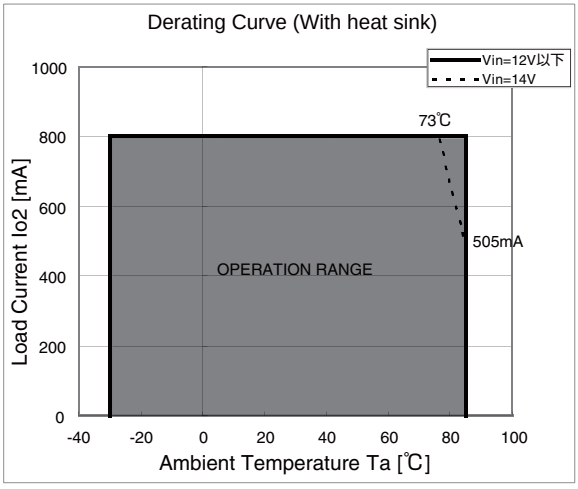

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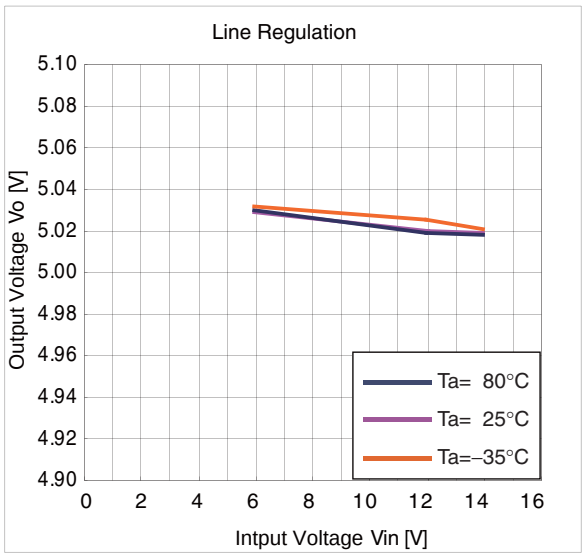

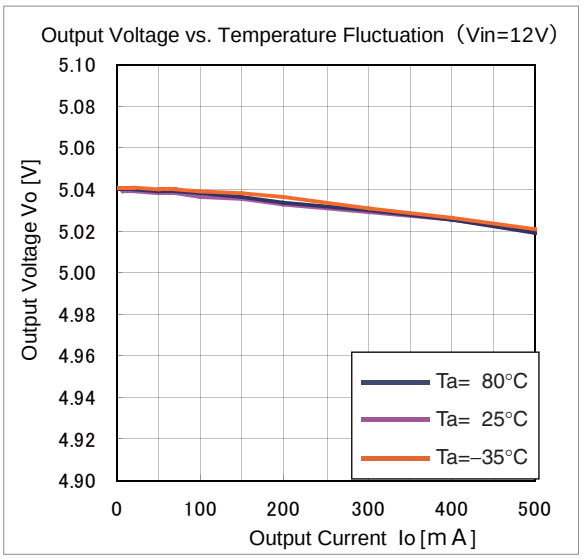

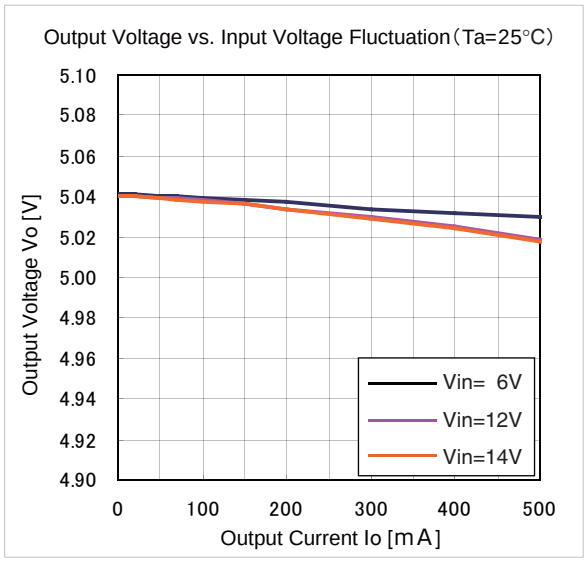

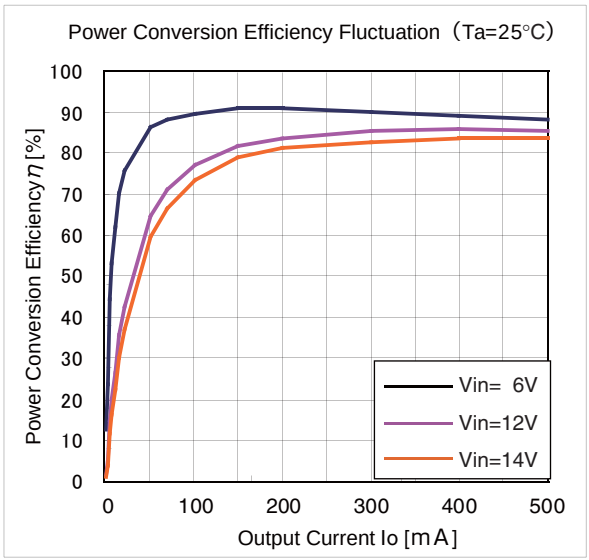

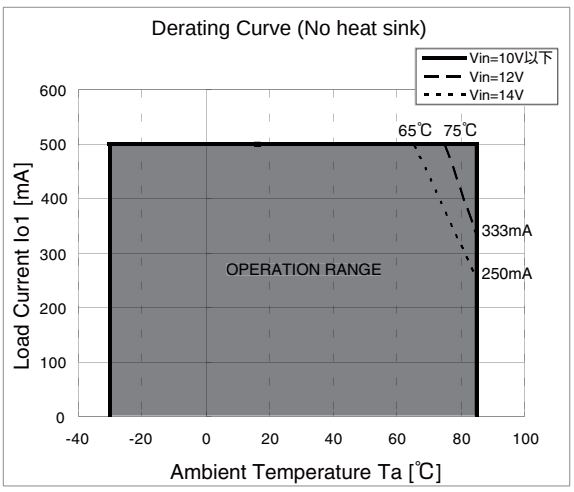

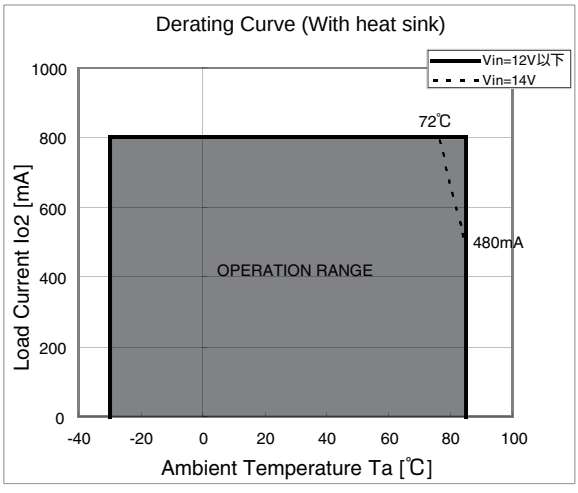

Power Module Usage Precautions

Safety Precautions

1) The products are designed and manufactured for use in ordinary electronic equipment (i.e. AV/OA/ telecommunication/amusement equipment, home appliances). Please consult with the Company's (ROHM) sales staff if intended for use in devices requiring high reliability (e.g. medical/transport/ aircraft/spacecraft equipment, nuclear power/fuel controllers, automotive/safety devices) and whose malfunction may result in injury or death. In this case, failsafe measures must be taken, including the following:
   [a] Installation of protection circuits in order to improve system safety
   [b] Incorporation of redundant circuits in the case of single-circuit failure
2) The products are designed for use under normal conditions. Application in special environments can cause a deterioration in product performance. Therefore, verification and confirmation of product performance, prior to use, is recommended. The following environments are considered to be 'special':
   [a] Outdoors, exposed to direct sunlight or dust
   [b] In contact with liquids, such as water, oils, chemicals, or organic solvents
   [c] In areas where exposure to the sea air or corrosive gases (i.e. Cl_2, H_2S, NH_3, SO_2, NO_2) can occur
   [d] In places where the products may be in contact with static electricity or electromagnetic waves
   [e] In proximity to heat-producing items, plastic cords, or flammable materials
   [f] In contact with sealing or coating products, such as resin
   [g] In contact with unclean solder or exposed to water or water-soluble cleaning agents used after soldering
   [h] In areas where dew condensation occurs
3) The products are not designed to be radiation resistant
4) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
5) The Company should be notified of any product safety issues. Moreover, product safety issues should be periodically monitored by the customer.

Application Notes

1) A sufficient margin must be allowed if changes are made to the peripheral circuit due to variations in the inherent tolerances of the external components as well as transient and static characteristics. In addition, please be aware that the Company has not conducted investigations on whether or not particular changes in the example application circuits would result in patent infringement.
2) The application examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods.
   Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

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   [a] Infringement of the intellectual property rights of a third party
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