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

BP5277-33 / BP5277-50 / BP5277-90 / BP5277-12 / BP5277-13 / BP5277-15

●Description

The BP5275 series of DC/DC converters utilize high rated voltage.
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).

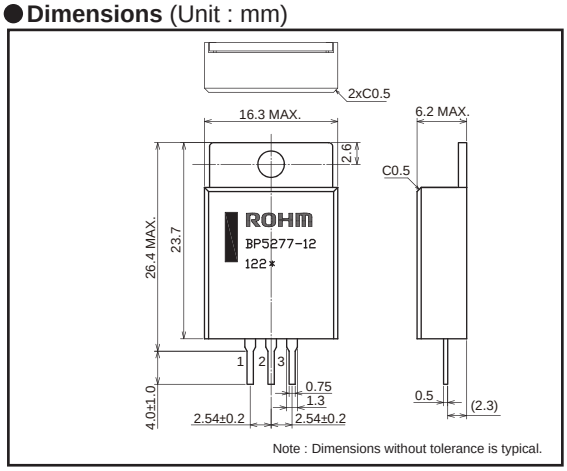
●Applications

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

●Features

1) High rated voltage
2) No external parts required
3) High power conversion efficiency.
4) Heat sink unnecessary.
5) Low output ripple voltage
6) High output voltage accuracy
7) Pin-compatible with conventional 3-pin LDOs
8) Compact package.
   BP5277-33 / BP5277-50 / BP5277-90 / BP5277-12 / BP5277-13 / BP5277-15 : SIP3

●Dimensions (Unit : mm)



Note : Dimensions without tolerance is typical.

●Pin function

Pin No.	Pin Name	Function
1	Vi	Input terminal
2	GND	GND
3	Vo	Output termial

●List of the series

	BP5277–33	BP5277–50	BP5277–90	BP5277–12	BP5277–13	BP5277–15	Unit
Input voltage	36	36	36	36	36	36	V
Output voltage	3.3	5	9	12	13	15	V
Maximum output current (no heat sink / include heat sink)	500 / 800	500 / 800	500 / 800	500 / 800	500 / 800	500 / 800	mA
Power conversion efficiency (Vi=24V)	76	83	88	90	91	93	%

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits						Unit
		BP5277–33	BP5277–50	BP5277–90	BP5277–12	BP5277–13	BP5277–15	
Input voltage	Vi	36	36	36	36	36	36	V
Operating temperature range	Topr	–30 to 85	–30 to 85	–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	–40 to 105	–40 to 105	°C
Allowable maximum surface temperature	Tcmax	100	100	100	100	100	100	°C
Maximum output current 1	I_O1max	500	500	500	500	500	500	mA
Maximum output current 2 (with Heat Sink)	I_O2max	800	800	800	800	800	800	mA

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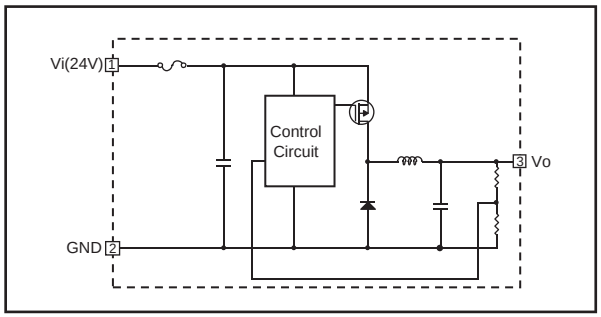
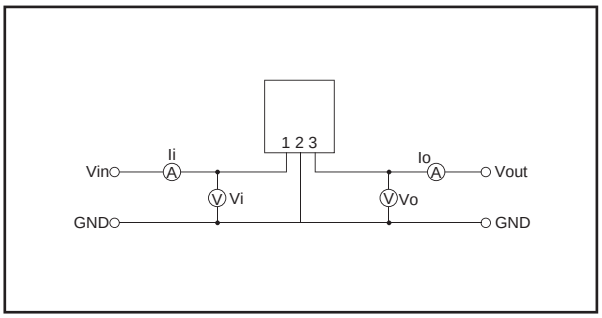
● Block diagram



● Measurement circuit



● Electrical characteristics

BP5277−33 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	8.0	24.0	32.0	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	Vi=8 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	71	76	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

BP5277−50 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	8.0	24.0	32.0	V	DC
Output voltage	V_O	4.90	5.00	5.10	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	Vi=8 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	78	83	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

BP5277−90 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	12.0	24.0	32.0	V	DC
Output voltage	V_O	8.80	9.00	9.20	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	Vi=12 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	83	88	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

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● Electrical characteristics

BP5277-12 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	15.0	24.0	32.0	V	DC
Output voltage	V_O	11.75	12.00	12.25	V	$I_{O}1$=0mA
Output current 1	$I_{O}1$	0	−	500	mA	∗1
Output current 2	$I_{O}2$	0	−	800	mA	With heat sink ∗1
Line regulation	Vr	−	5	50	mV	Vi=15 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	85	90	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

BP5277−13 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	16.5	24.0	32.0	V	DC
Output voltage	V_O	12.70	13.00	13.30	V	$I_{O}1$=0mA
Output current 1	$I_{O}1$	0	−	500	mA	∗1
Output current 2	$I_{O}2$	0	−	800	mA	With heat sink ∗1
Line regulation	Vr	−	5	50	mV	Vi=16.5 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	86	91	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

BP5277−15 (Unless otherwise noted, Vi=24.0V, Io1=500mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	Vi	19.0	24.0	32.0	V	DC
Output voltage	V_O	14.70	15.00	15.30	V	$I_{O}1$=0mA
Output current 1	$I_{O}1$	0	−	500	mA	∗1
Output current 2	$I_{O}2$	0	−	800	mA	With heat sink ∗1
Line regulation	Vr	−	5	50	mV	Vi=19 to 32V
Load regulation	Vl	−	5	50	mV	I_O=0 to 500mA
Output ripple voltage	Vp	−	40	100	mV_{P-P}	
Conversion efficiency	η	88	93	−	%	
Operation frequency	f	−	900	−	kHz	

∗1 Max output current should be reduced according to the surrounding temperature.

● OPERATION NOTES

- There is fear of destruction of the internal circuit in case that input voltage exceeds the absolute maximum ratings (36V) by such as a surge occurred because of rapid start-up of power voltage. Be sure not to exceed absolute maximum ratings even momentarily.
- This product has a protection element for safety. The protection element is fused for safety when the current which the protection element will fuse. Please evaluate sufficiently at using environment about the action when the output circuit shorts.
- There are some case that the module generates heat exceeding allowable maximum surface temperature when the load current which exceeds the maximum output current is flowed. Please make design keeping enough margins not to exceed allowable maximum surface temperature at any time under any application or any test conditions.
- The aluminum board at back part of the product is connected to GND.
  Please mind the arrangement not to contact surrounding parts.
- When using the module with bent lead pin, it might be destroyed with an extreme stress for the PCB or the aluminum board. Please use the module without bending the lead pin.
- The aluminum board in the back might come off when an excessive stress is put in the direction of the thickness. When fixing to the heat sink etc. to use this product, please mount to PCB after fixing to the heat sink and both the heat sink and this hold to PCB.

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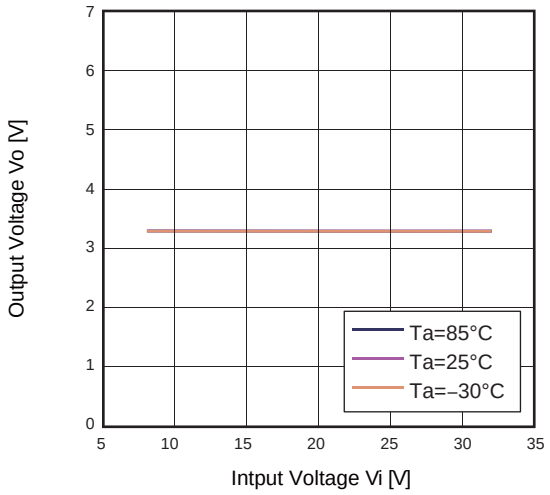
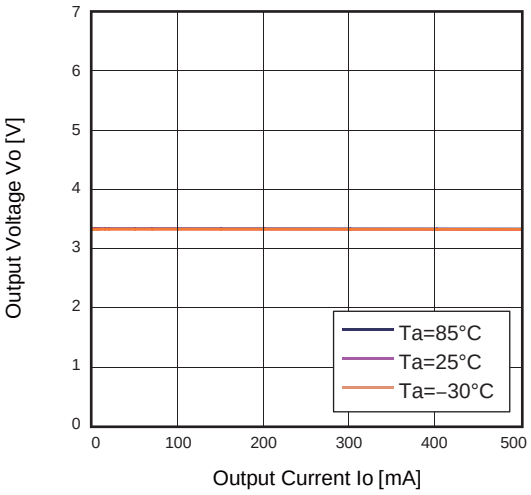
● BP5277-33

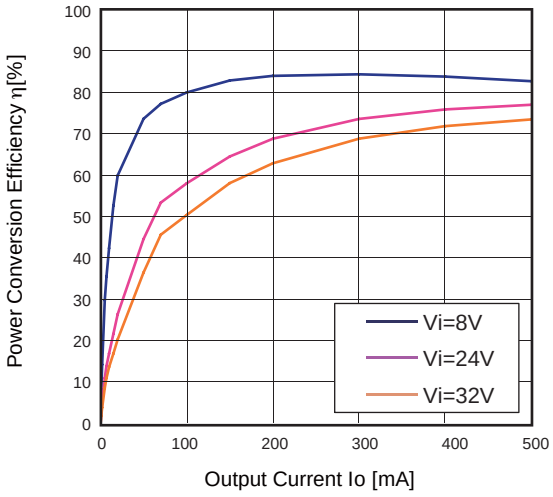
Line Regulation (Io=500mA)



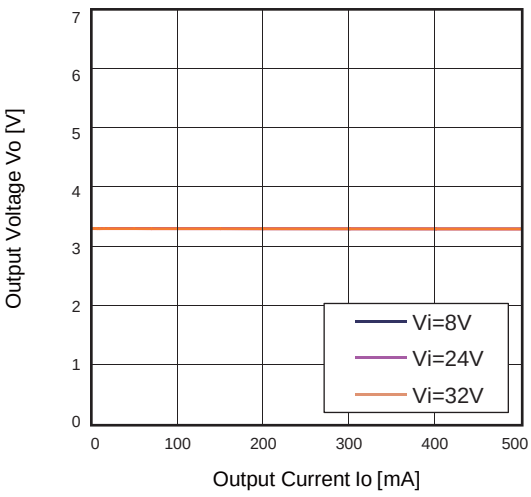
Output Voltage vs. Temperature Fluctuation (Vi=24V)



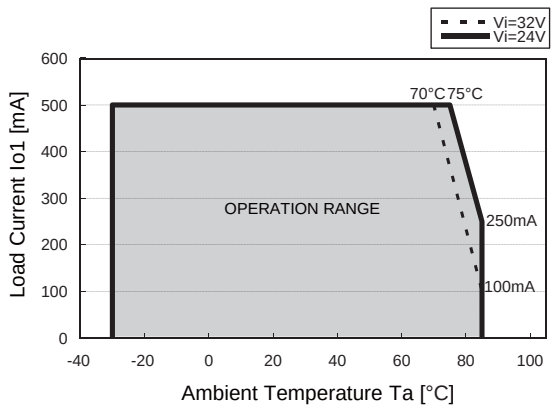
Power Conversion Efficiency Fluctuation (Ta=25°C)



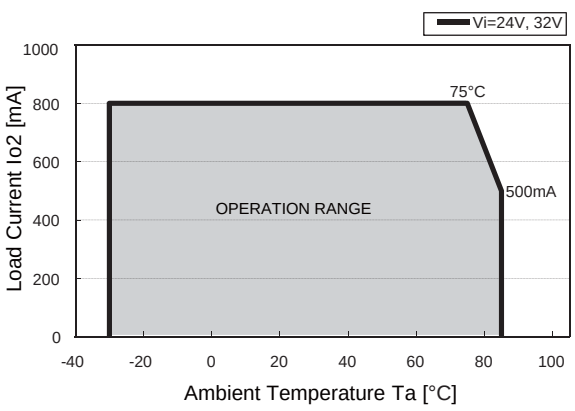
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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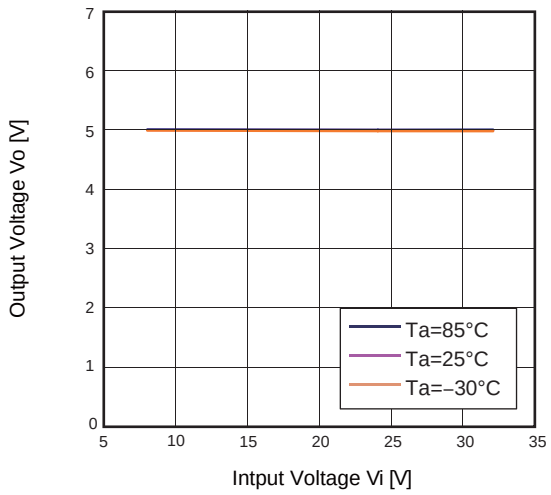
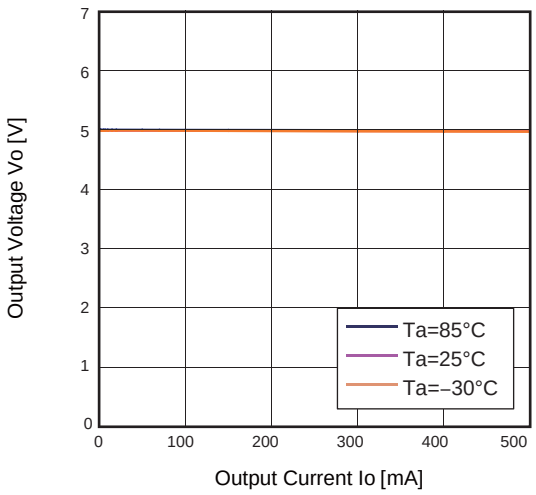
● BP5277-50

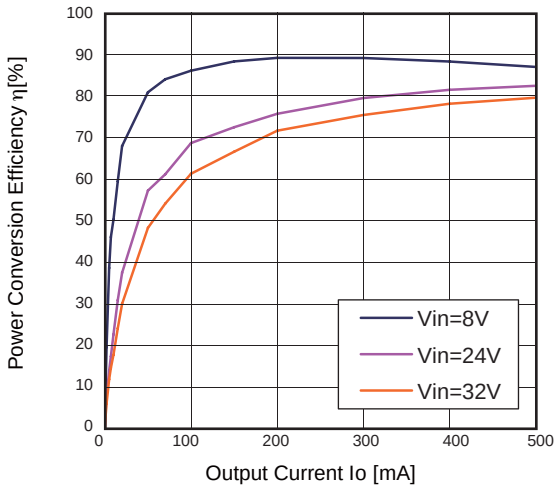
Line Regulation (Io=500mA)



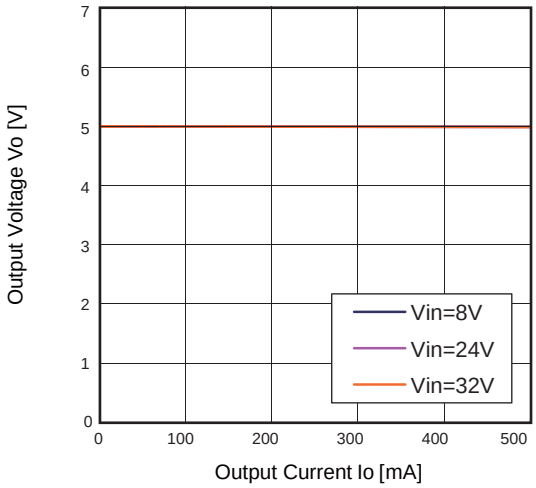
Output Voltage vs. Temperature Fluctuation (Vi=24V)



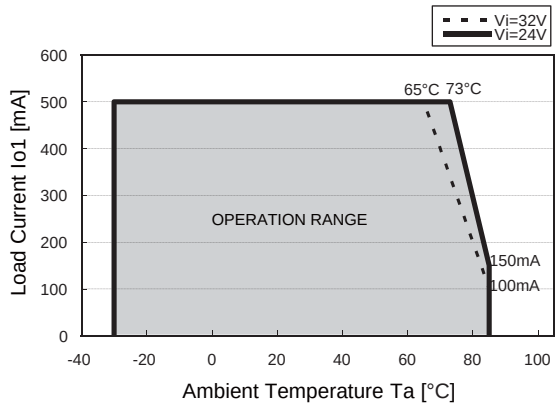
Power Conversion Efficiency Fluctuation (Ta=25°C)



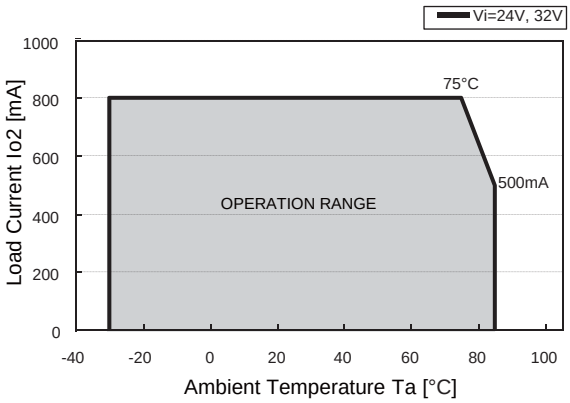
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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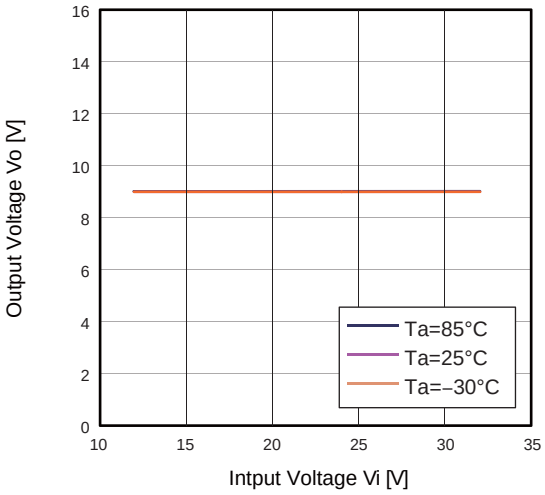
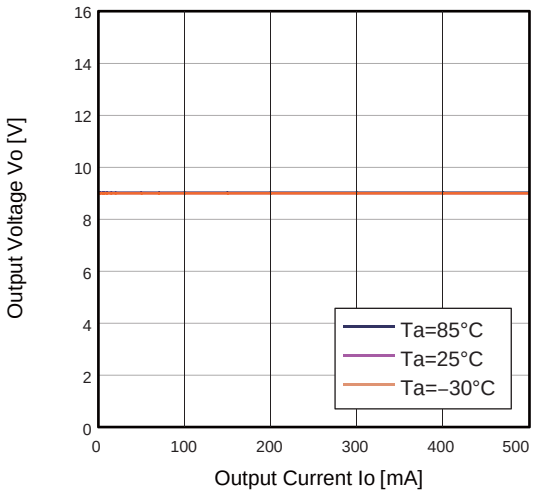
● BP5277-90

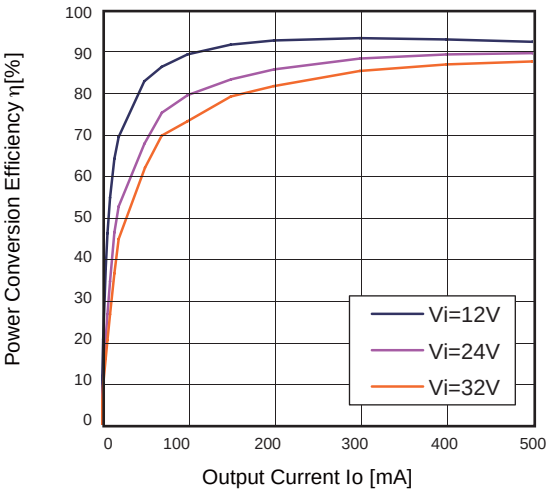
Line Regulation (Io=500mA)



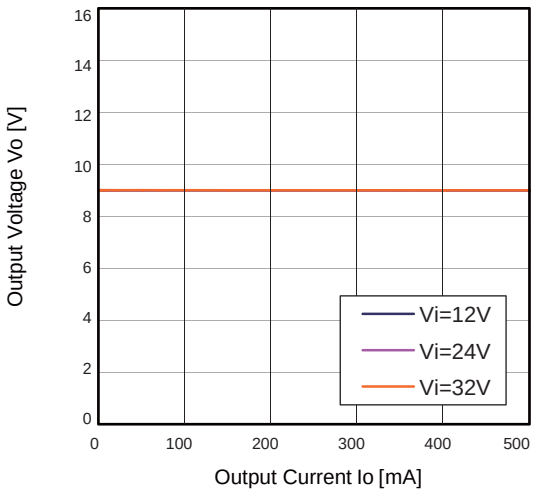
Output Voltage vs. Temperature Fluctuation (Vi=24V)



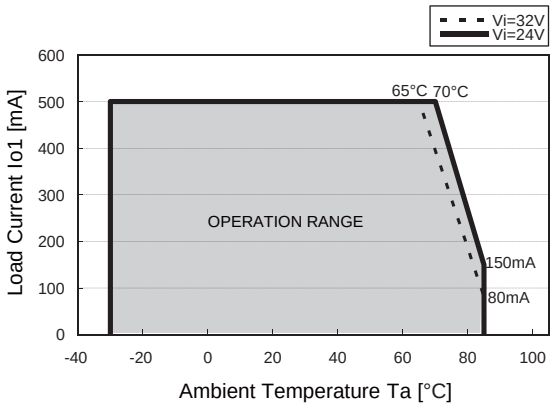
Power Conversion Efficiency Fluctuation (Ta=25°C)



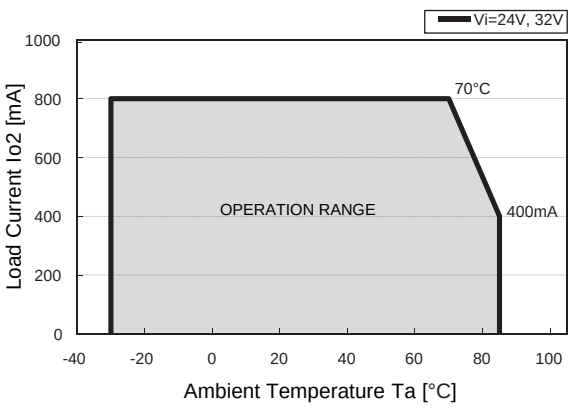
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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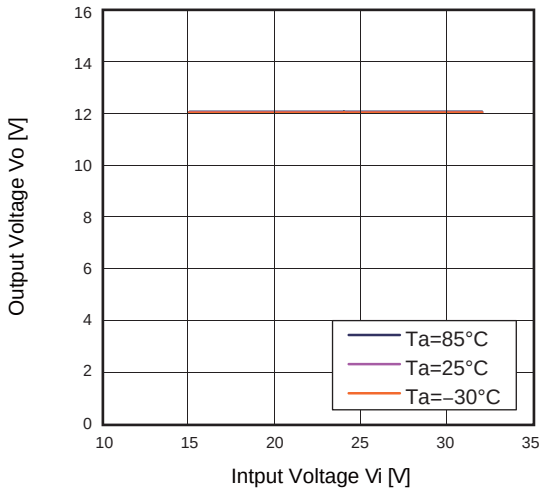
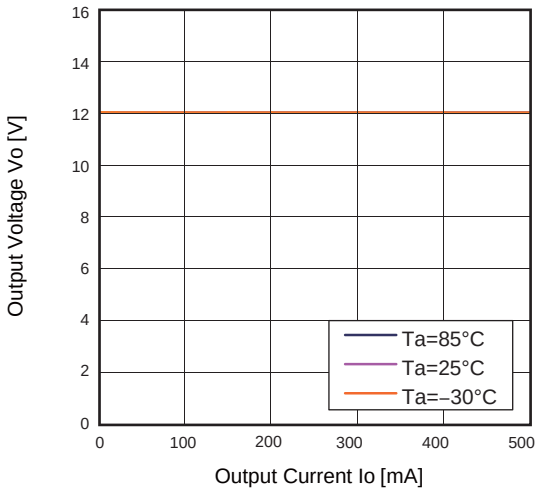
● BP5277-12

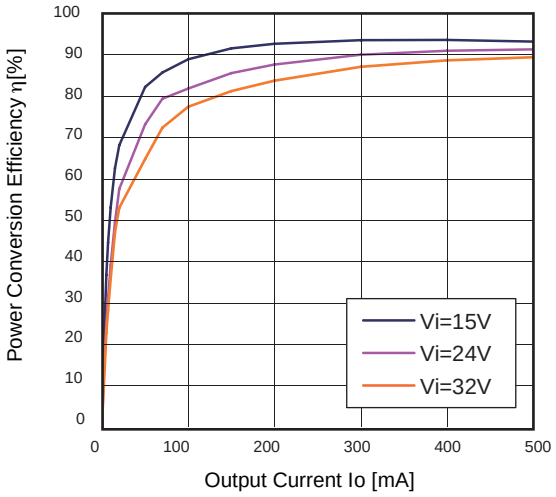
Line Regulation (Io=500mA)



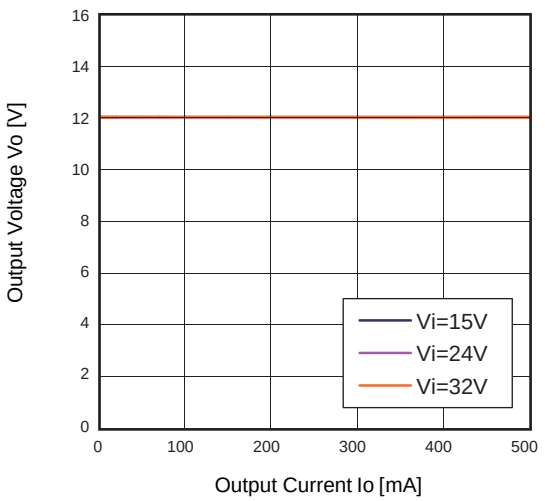
Output Voltage vs. Temperature Fluctuation (Vi=24V)



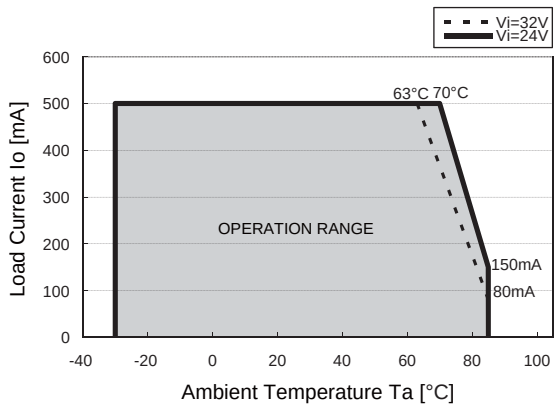
Power Conversion Efficiency Fluctuation (Ta=25°C)



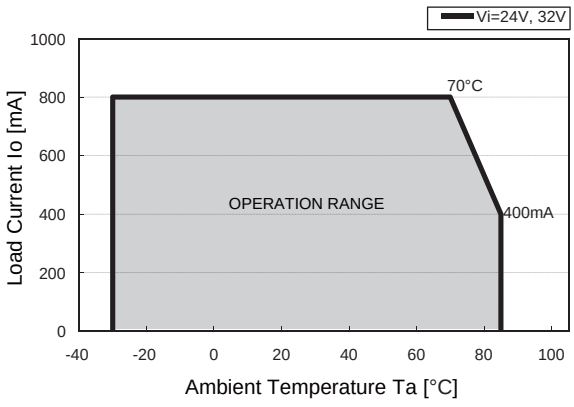
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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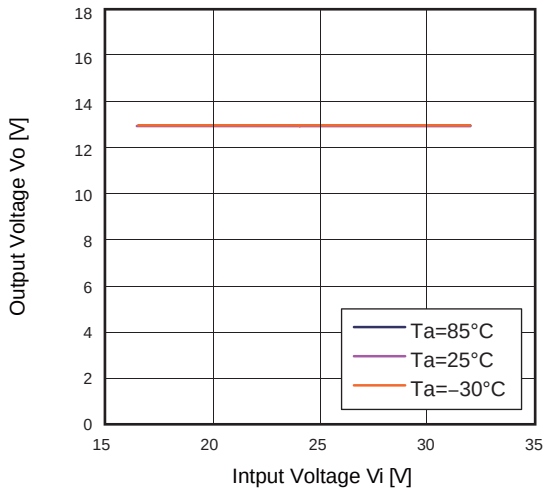
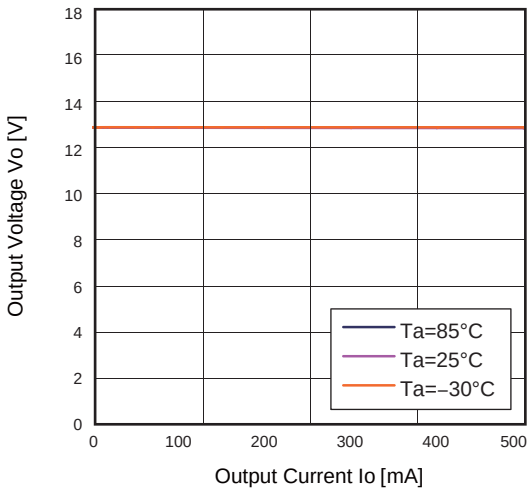
● BP5277-13

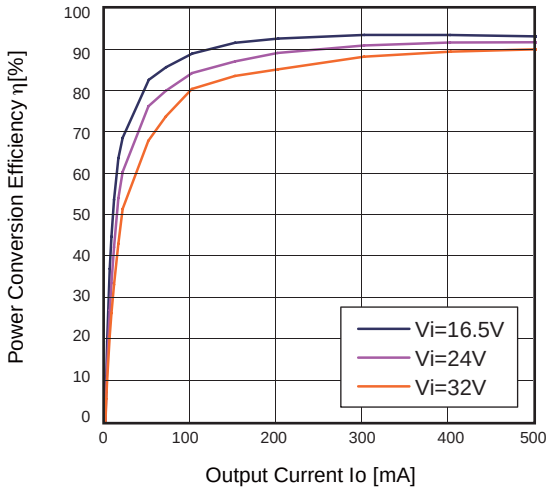
Line Regulation (Io=500mA)



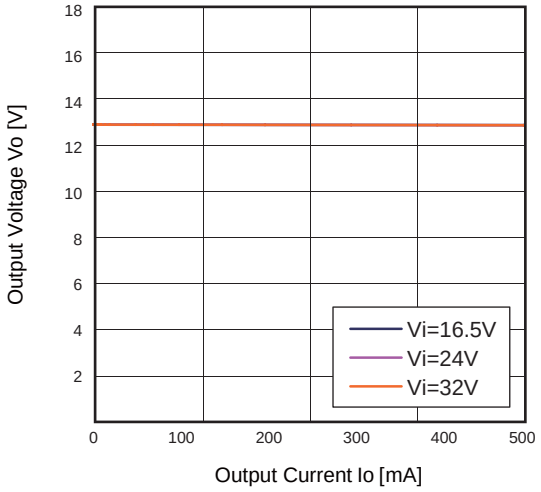
Output Voltage vs. Temperature Fluctuation (Vi=24V)



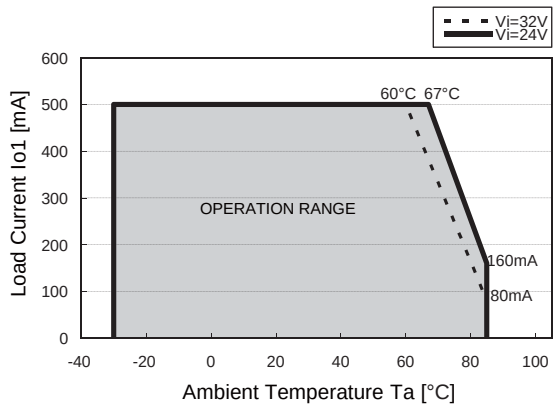
Power Conversion Efficiency Fluctuation (Ta=25°C)



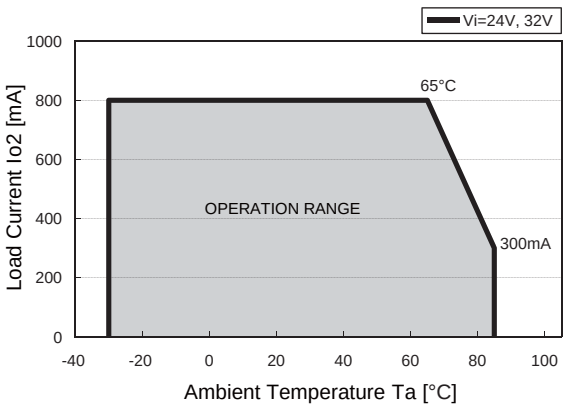
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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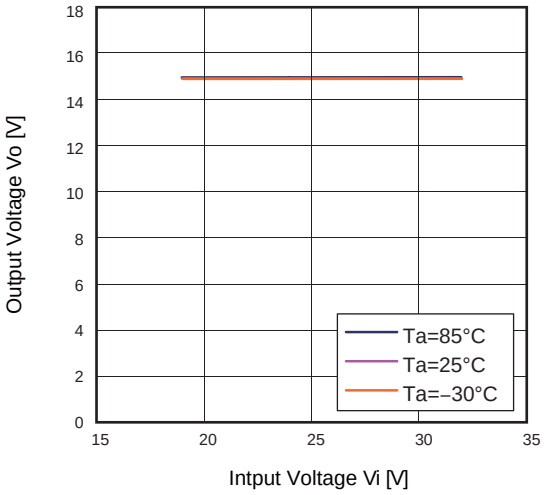
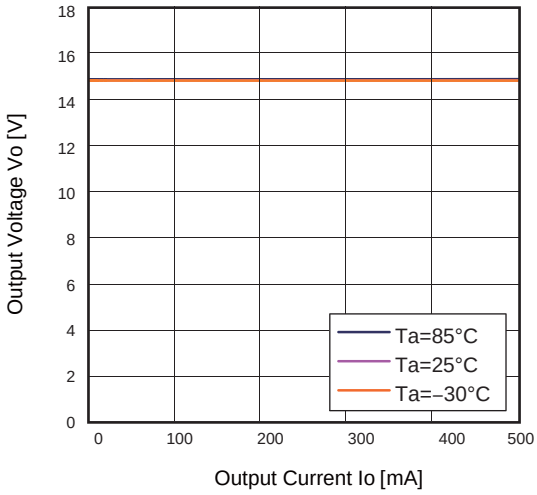
●BP5277-15

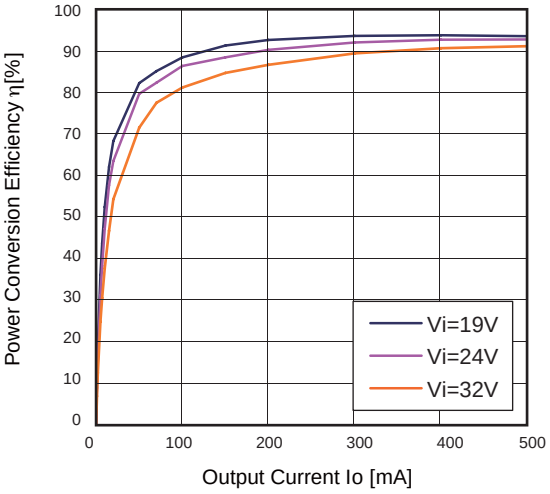
Line Regulation (Io=500mA)



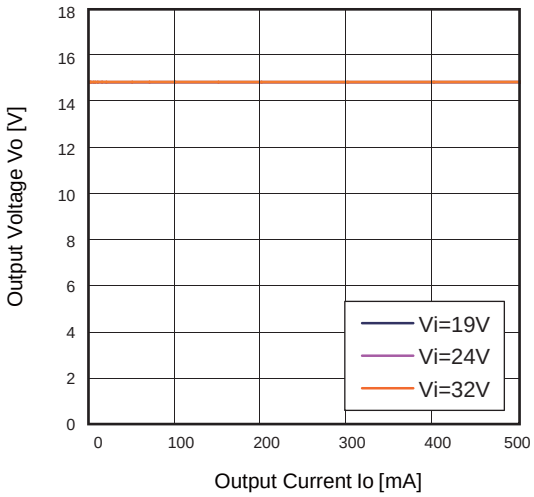
Output Voltage vs. Temperature Fluctuation (Vi=24V)



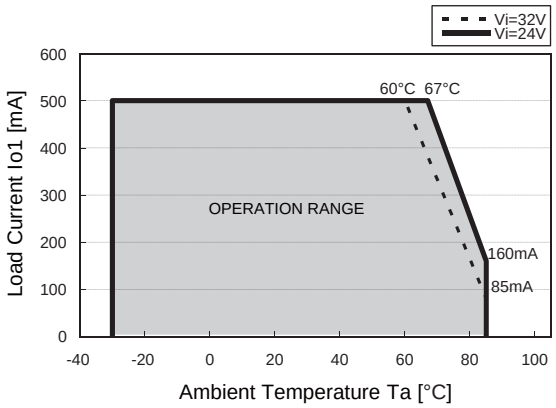
Power Conversion Efficiency Fluctuation (Ta=25°C)



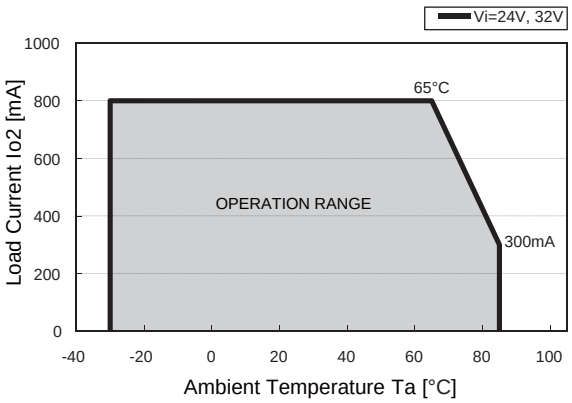
Output Voltage vs. Input Voltage Fluctuation (Ta=25°C)



Derating Curve (No heat sink)



Derating Curve (With heat sink)



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