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Typical unit

FEATURES

- Five-sided shielded metal package reduces radiated emissions
- Industry standard 1" x 1" x 0.40" encapsulated package and pinout
- Wide range input voltages 9-36 and 18-75 Vdc
- Bipolar $\pm 5V$, $\pm 12V$ and $\pm 15V$ outputs
- Up to 15 Watts or greater total output power with overtemperature shutdown
- Isolation up to 1600 VDC (basic)
- High efficiency flyback topology
- Usable -40 to 85°C temperature range (with derating)
- Assembly and attachment for RoHS standards
- Extensive self-protection shut down features
- Meets UL 60950-1, CAN/CSA-C22.2 No. 60950-1, IEC60950-1, EN60950-1 safety approvals (2nd Edition)

PRODUCT OVERVIEW

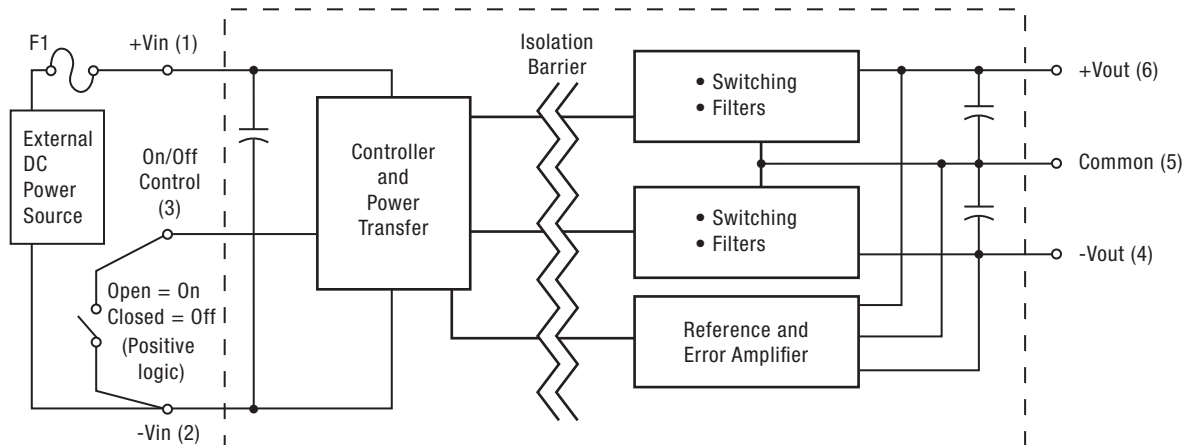
Featuring a full 15 Watt output in one square inch of board area, the BPM15 series isolated DC-DC converter family offers efficient regulated DC power for printed circuit board mounting. The wide range 4:1 inputs on the 1" x 1" x 0.40" (25.4 x 25.4 x 10.16mm) converter are either 9 to 36 Volts DC (Q12 models) or 18 to 75 Volts DC (Q48 models), ideal for battery-powered and telecom equipment. The industry-standard pinout fits larger 1" x 2" converters. Fixed output voltages of ± 5 , ± 12 or ± 15 VDC are regulated to within $\pm 0.25\%$. Applications include small instruments, area-limited microcontrollers, data communications equipment, remote sensor systems, vehicle and portable electronics.

The rugged mechanical, thermal, and electrical design of this product is intended for high reliability and harsh environments.

The BPM15 series includes full magnetic and optical isolation with Basic protection up to 1600 Volts DC. For powering digital systems, the outputs offer fast settling to step transients and will accept higher capacitive loads. Excellent ripple and noise specifications assure compatibility to noise-susceptible circuits. For systems requiring controlled startup/shutdown, an external remote On/Off control may use a switch, transistor or digital logic.

A wealth of self-protection features avoid both converter and external circuit faults. These include input undervoltage lockout and overtemperature shutdown. The outputs current limit using the "hiccup" autorestart technique and the outputs are short-circuit protected. Additional features include output overvoltage and reverse conduction elimination. The high efficiency offers minimal heat buildup and "no fan" operation.

CONNECTION DIAGRAM



Typical topology is shown.

Murata Power Solutions recommends a fuse at F1.



PERFORMANCE SPECIFICATIONS SUMMARY AND ORDERING GUIDE ①															
Root Models ①	Output						Input				Efficiency		Encapsulated Package		
	V _{OUT} (V)	I _{OUT} (mA, max.) ②	Total Power (W)	R/N (mVp-p)		Regulation (Max.)		V _{IN} Nom. (V)	Range (V)	I _{IN} = minimum load (mA)	I _{IN} = full load (mA)	Min.	Typ.	(inches)	(mm)
				Typ.	Max.	Line	Load ⑤								
BPM15-050-Q12	±5	±1500	15	60	100	±0.25%	±0.25%	24	9-36	90	740	82.5%	84%	1 x 1 x 0.40	25.4 x 25.4 x 10.16
BPM15-050-Q48	±5	±1500	15	60	100	±0.25%	±0.25%	48	18-75	50	384	80%	81.4%		
BPM15-120-Q12	±12	±625	15	80	120	±0.25%	±0.25%	24	9-36	95	740	82%	84%		
BPM15-120-Q48	±12	±625	15	80	120	±0.25%	±0.25%	48	18-75	50	368	83%	85%		
BPM15-150-Q12	±15	±500	15	60	100	±0.25%	±0.25%	24	9-36	100	740	82.5%	84.5%		
BPM15-150-Q48	±15	±500	15	80	120	±0.25%	±0.275%	48	18-75	50	360	83%	86%		

- ① Please refer to the part number structure for additional options and complete ordering part numbers.
- ② The minimum output load for the BPM15 series is 10% of maximum current to meet published specifications. The converter will not be damaged by less than 10% load but some specs may degrade slightly.
- ③ All specifications are at nominal line voltage and full load, +25 °C. unless otherwise noted. See detailed specifications and notes for full conditions.

Output capacitors are 1 µF ceramic in parallel with 10 µF. The input cap is 100 µF, low ESR electrolytic.

I/O caps are necessary for our test equipment and may not be needed for your application.

- ④ RoHS-6 compliance does not claim EU RoHS exemption 7b (lead in solder).
- ⑤ Balanced loads, 10% to 100% loads.

PART NUMBER STRUCTURE

BPM15 - 050 - Q48 P Lx - C

- Bipolar Wide Input 15-Watt Series**
- Nominal Output Voltage in Tenths of a Volt**
- Input Voltage Range**
Q12 = 9-36V
Q48 = 18-75V
- On/Off Control Logic**
P = Positive
N = Negative
Blank = Control pin omitted ‡
- Pin Length Option**
Blank = Std. pin length 0.25" (6.3mm)
L1 = 0.110" (2.79mm)★
L2 = 0.145" (3.68mm)★
- RoHS-6 Hazardous Substance Compliance (note 4)**

*Minimum order quantity is required. Samples available with standard pin length only.

‡Some model number combinations may not be available. See website or contact your local Murata sales representative.

FUNCTIONAL SPECIFICATIONS, BPM15-050-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.15	W
Output Current	Current-limited, no damage, short-circuit protected	0.15		1.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C

Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.

INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.5	9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	7.7	8.2	8.7	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.74	0.77	A
Low Line Input Current	Vin = minimum		2.03	2.09	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
Minimum Load Input Current	Iout = minimum, unit = ON		90	150	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		25		mA, p-p

GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	82.5	84		%
	Vin = min., full load	80.5	82		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1000		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Approved		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		5.8		Hours x 10 ⁶

DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		330	360	390	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		250	300	μSec
Dynamic Load Peak Deviation	same as above		±100	±150	mV

FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.8	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-050-Q12 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.15	W
Voltage					
Nominal Output Voltage	No trim	±4.95	±5	±5.05	Vdc
Setting Accuracy	At 50% load, no trim		±1		% of Vnom
Overvoltage Protection	Via magnetic feedback	5.6	6.5	7	Vdc
Current					
Output Current Range		±0.15	±1.5	±1.5	A
Current Limit Inception	98% of Vnom., after warmup	±1.65	±2.8	±3.3	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.25	% of Vout
Ripple and Noise	5 Hz - 20 MHz BW, Vin = 24V		60	100	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 Ω max			520	μF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		μ-inches
	Gold overplate		5		μ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		93	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

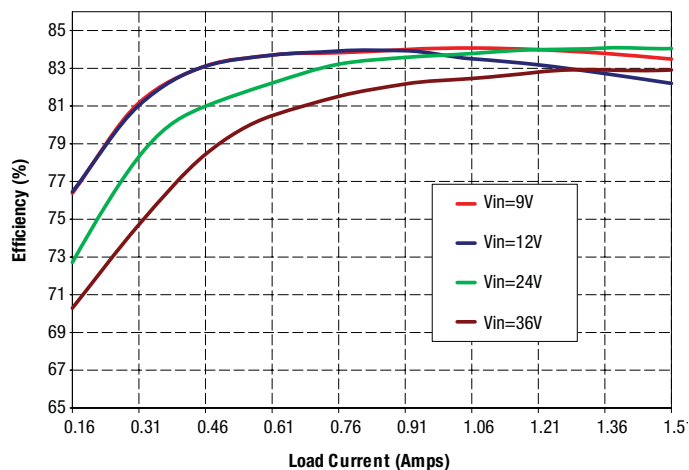
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 μF and 10 μF output capacitors. The external input capacitor is 100 μF, electrolytic.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 μF, Cin = 33 μF and Lbus = 12 μH.

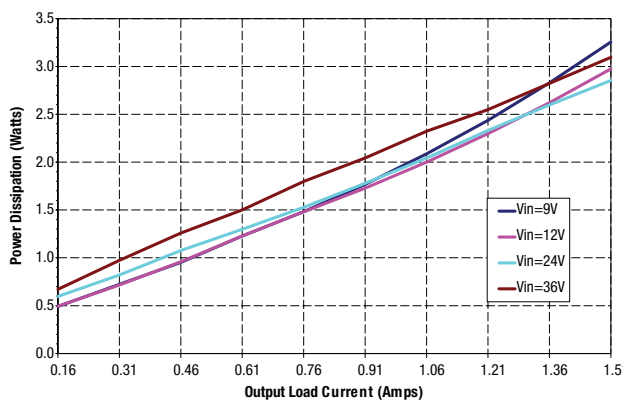
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-050-Q12

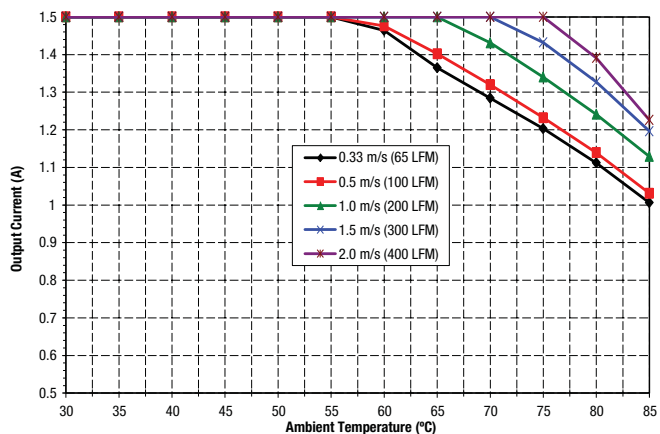
Efficiency vs. Line Voltage and Load Current @ +25°C



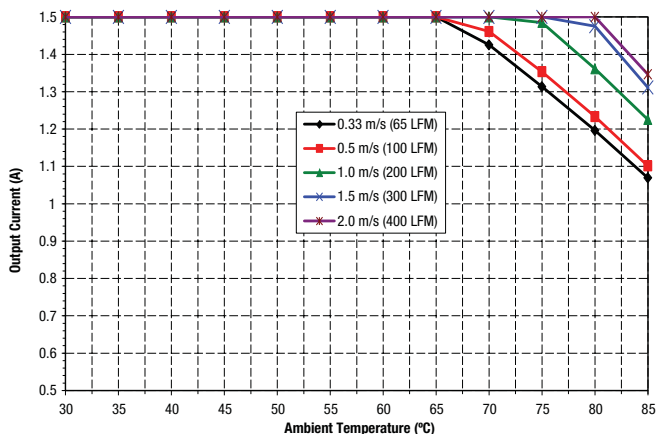
Power Dissipation vs. Line Voltage and Load Current @ +25°C



Maximum Current Temperature Derating at Sea Level (VIN = 9V, airflow is from pin 1 to pin 4)

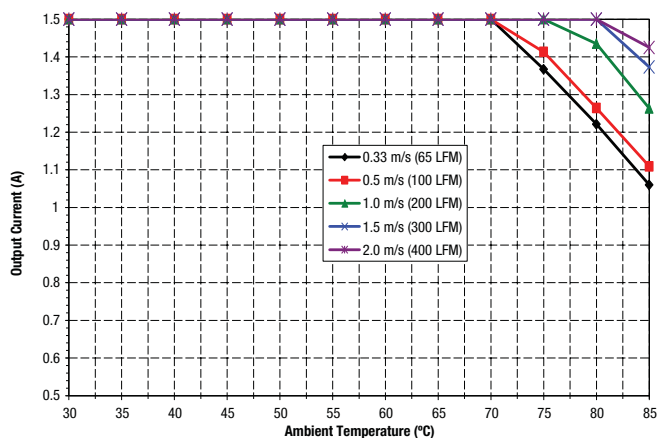


Maximum Current Temperature Derating at Sea Level (VIN = 12V, airflow is from pin 1 to pin 4)

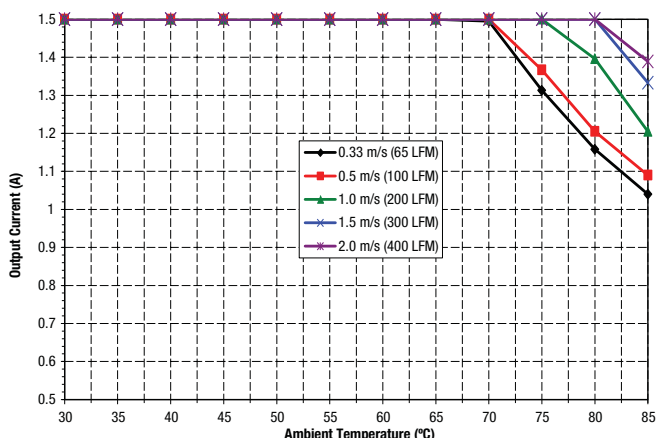


PERFORMANCE DATA, BPM15-050-Q12

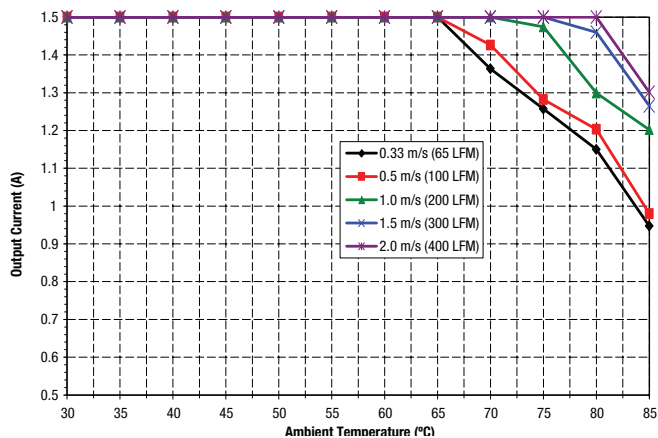
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 18V$, airflow is from pin 1 to pin 24)



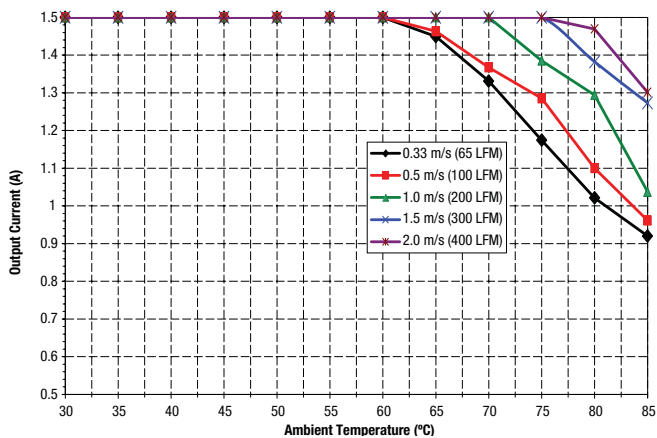
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 24V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 30V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 36V$, airflow is from pin 1 to pin 4)



FUNCTIONAL SPECIFICATIONS, BPM15-120-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.15	W
Output Current	Current-limited, no damage, short-circuit protected	0.0625		0.625	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.5	9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	7.7	8.2	8.7	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.74	0.77	A
Low Line Input Current	Vin = minimum		1.98	2.05	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
No Load Input Current	Iout = minimum, unit=ON		95	125	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	82	84.3		%
	Vin = min., full load	82	84		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance		10			MΩ
Isolation Capacitance			600		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1 Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		Approved		
Calculated MTBF			7		Hours x 10 ⁶
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		295	325	355	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			60	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		250	300	μSec
Dynamic Load Peak Deviation	same as above		±150	±250	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.8	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-120-Q12 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.15	W
Voltage					
Nominal Output Voltage	No trim	±11.88	±12	±12.12	Vdc
Setting Accuracy	At 50% load, no trim		±1		% of Vnom
Overvoltage Protection	Via magnetic feedback	15	16	16.5	Vdc
Current					
Output Current Range		±0.0625	±0.625	±0.625	A
Current Limit Inception	98% of Vnom., after warmup	±0.75	±1.025	±1.30	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.25	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin = 24V		80	120	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 ohms max			520	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		108	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

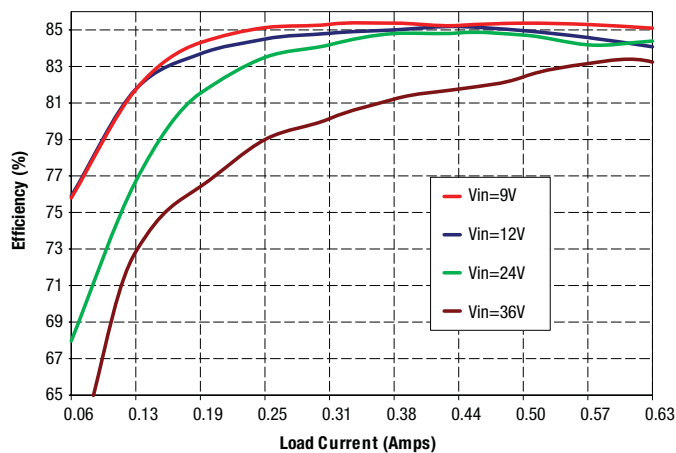
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 µF, Cin = 33 µF and Lbus = 12 µH.

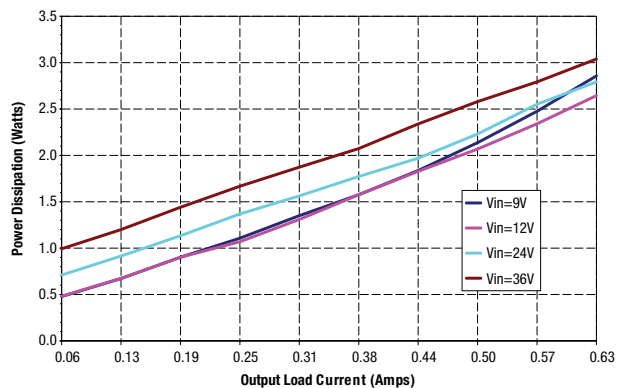
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-120-Q12

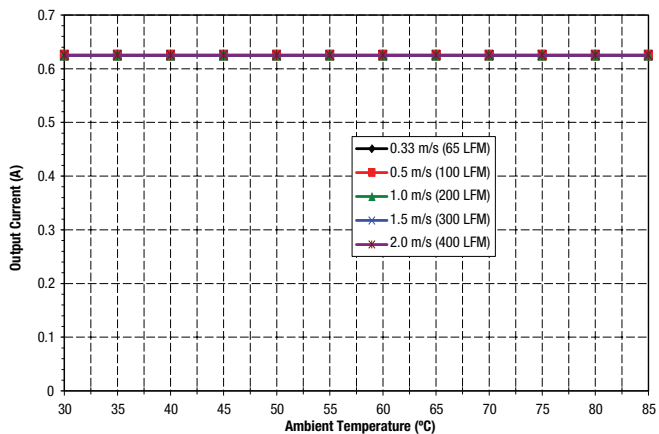
Efficiency vs. Line Voltage and Load Current @ +25°C



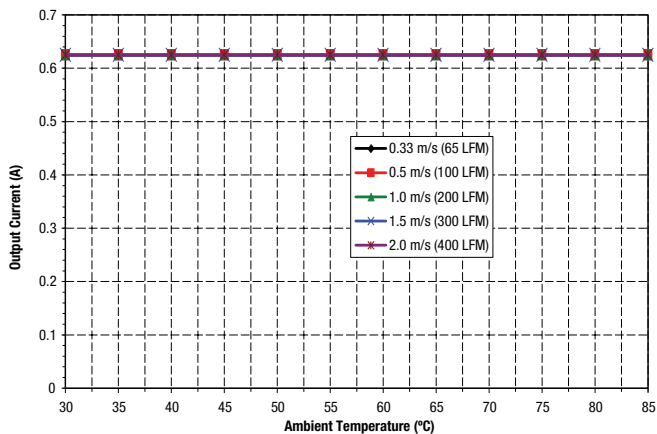
Power Dissipation vs. Line Voltage and Load Current @ +25°C



**Maximum Current Temperature Derating at Sea Level
(VIN = 9V, airflow is from pin 1 to pin 4)**

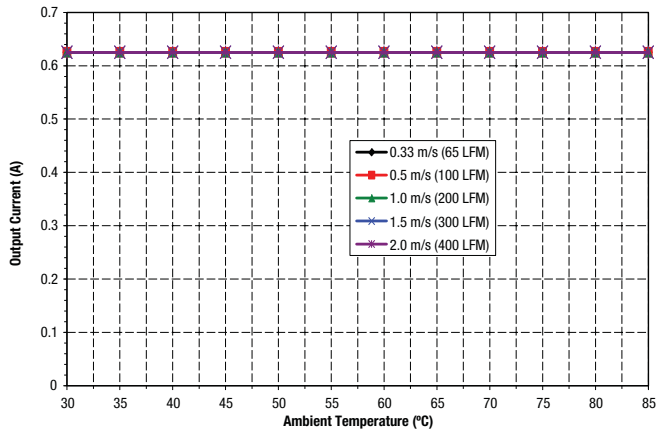


**Maximum Current Temperature Derating at Sea Level
(VIN = 12V, airflow is from pin 1 to pin 4)**

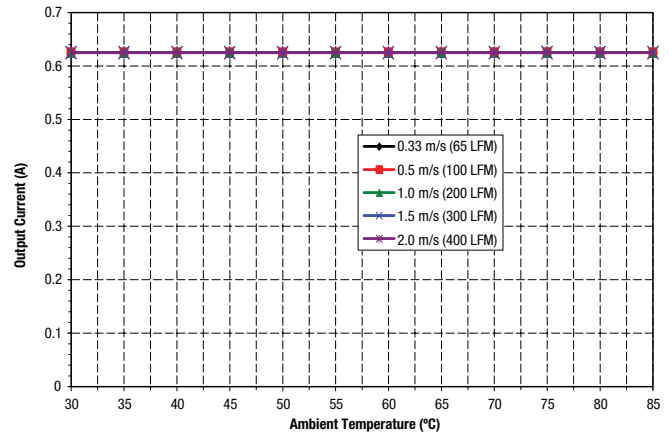


PERFORMANCE DATA, BPM15-120-Q12

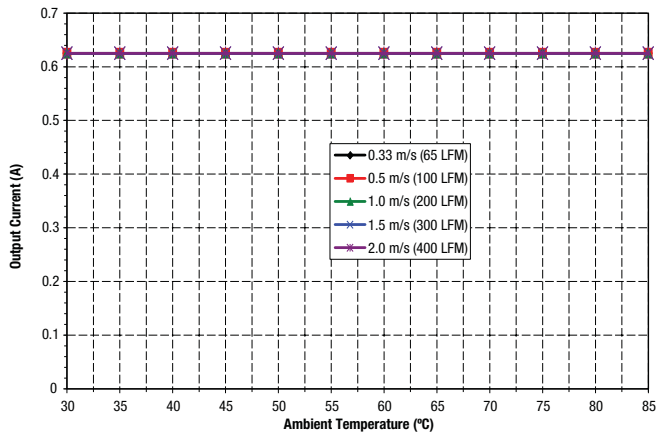
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 18V$, airflow is from pin 1 to pin 4)



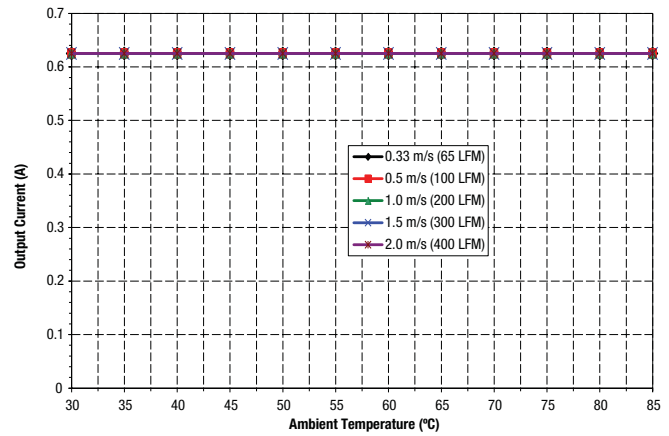
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 24V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 30V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 36V$, airflow is from pin 1 to pin 4)



FUNCTIONAL SPECIFICATIONS, BPM15-150-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.485		15.15	W
Output Current	Current-limited, no damage, short-circuit protected	0.05		0.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.5	9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	7.7	8.2	8.7	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		74	0.77	A
Low Line Input Current	Vin = minimum		1.96	2.03	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
No Load Input Current	Iout = minimum, unit=ON		100	130	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		10		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	82.5	84.5		%
	Vin = min., full load	83.0	85.0		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance		10			MΩ
Isolation Capacitance			1000		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1 Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		Approved		
Calculated MTBF			6.7		Hours x 10 ⁶
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		300	330	360	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		250	300	μSec
Dynamic Load Peak Deviation	same as above		±100	±200	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.8	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-150-Q12 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.485	15.00	15.15	W
Voltage					
Nominal Output Voltage	No trim	14.850	15.00	15.150	Vdc
Setting Accuracy	At 50% load, no trim		1		% of Vnom
Overvoltage Protection	Via magnetic feedback	16.8	18	20.5	Vdc
Current					
Output Current Range		±0.05	±0.5	±0.5	A
Current Limit Inception	98% of Vnom., after warmup	±0.7	±0.95	±1.2	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.		±0.05	±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V		±0.05	±0.25	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=24V		60	100	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 ohms max			520	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	W x L x H		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		91	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

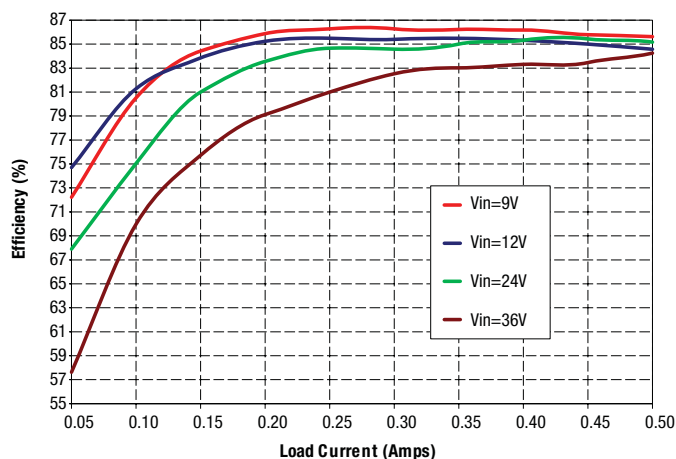
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 µF, Cin = 33 µF and Lbus = 12 µH.

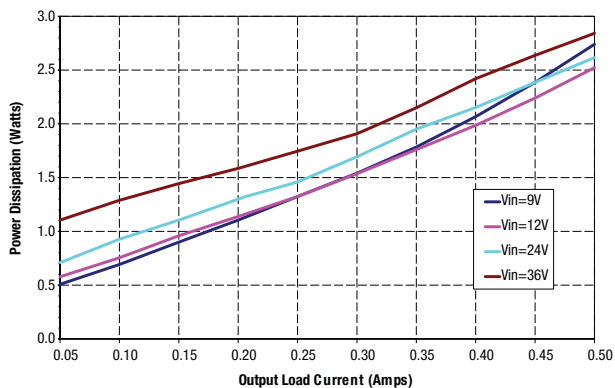
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-150-Q12

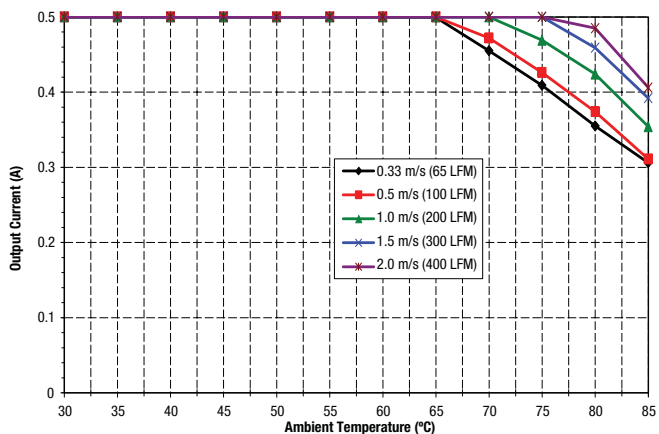
Efficiency vs. Line Voltage and Load Current @ +25°C



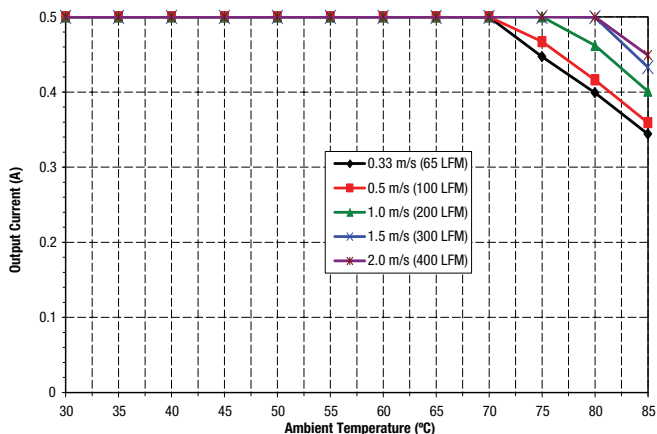
Power Dissipation vs. Line Voltage and Load Current @ +25°C



**Maximum Current Temperature Derating at Sea Level
(VIN = 9V, airflow is from pin 1 to pin 4)**

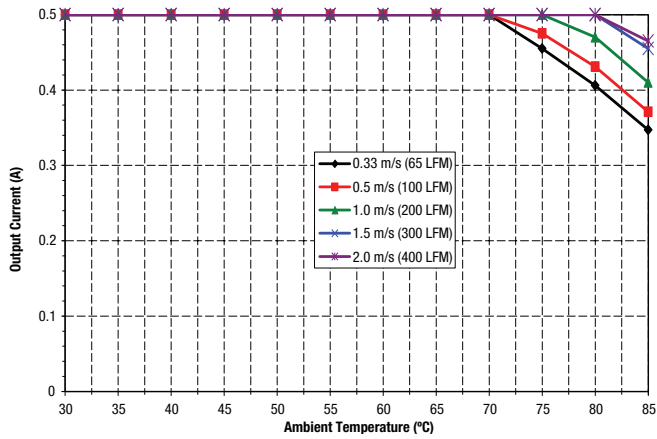


**Maximum Current Temperature Derating at Sea Level
(VIN = 12V, airflow is from pin 1 to pin 4)**

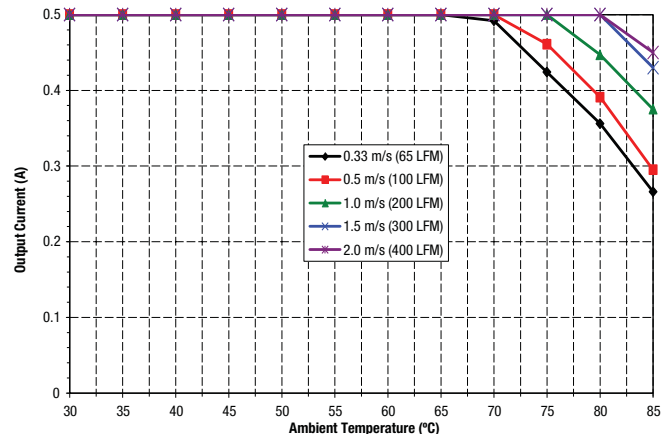


PERFORMANCE DATA, BPM15-150-Q12

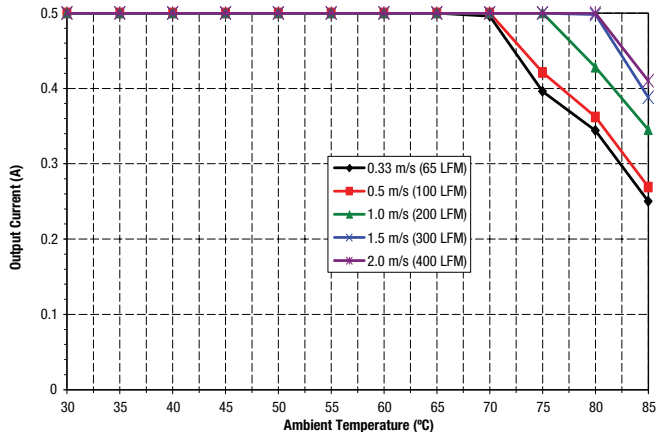
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 18V$, airflow is from pin 1 to pin 4)



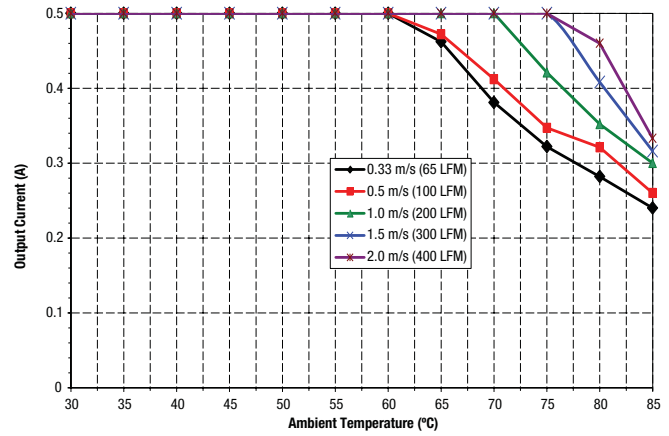
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 24V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 30V$, airflow is from pin 1 to pin 4)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 36V$, airflow is from pin 1 to pin 4)



FUNCTIONAL SPECIFICATIONS, BPM15-050-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		75	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.23	W
Output Current	Current-limited, no damage, short-circuit protected	0.15		1.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C

Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.

INPUT					
Operating Voltage Range		18	48	75	Vdc
Recommended External Fuse	Fast blow			2	A
Start-up Threshold	Rising input voltage	15.5	16.5	17.5	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	15	16	17	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.384	0.396	A
Low Line Input Current	Vin = minimum		1.019	1.057	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
Minimum Load Input Current	Iout = minimum, unit = ON		50	100	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		50		mA, p-p

GENERAL and SAFETY					
Efficiency	Vin = 48V, full load	80	81.4		%
	Vin = min., full load	80	81.8		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Approved		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		5		Hours x 10 ⁶

DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		275	305	335	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		100	200	μSec
Dynamic Load Peak Deviation	same as above		±100	±150	mV

FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.8	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-050-Q48 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.23	W
Voltage					
Nominal Output Voltage	No trim	±4.925	±5	±5.075	Vdc
Setting Accuracy	At 50% load, no trim		±1.5		% of Vnom
Overvoltage Protection	Via magnetic feedback	5.6	7	8	Vdc
Current					
Output Current Range		±0.15	±1.5	±1.5	A
Current Limit Inception	98% of Vnom., after warmup	±1.7	±2.7	±3.0	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V			±0.25	% of Vout
Ripple and Noise	5 Hz - 20 MHz BW, Vin = 48V		60	100	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 Ω max			1000	μF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		μ-inches
	Gold overplate		5		μ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		93	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

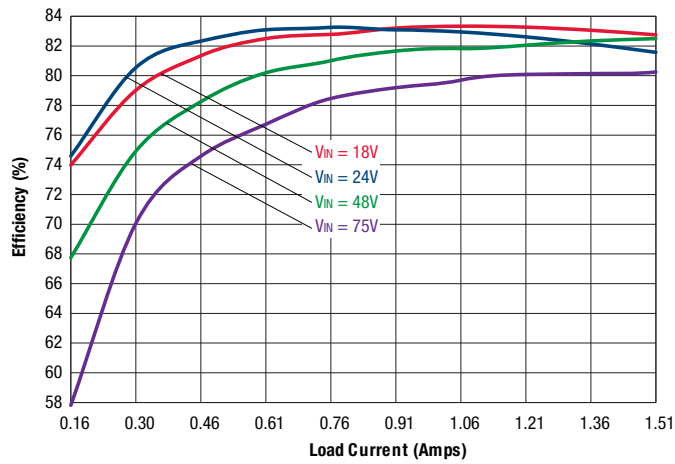
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 μF and 10 μF output capacitors. The external input capacitor is 100 μF.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 μF, Cin = 33 μF and Lbus = 12 μH.

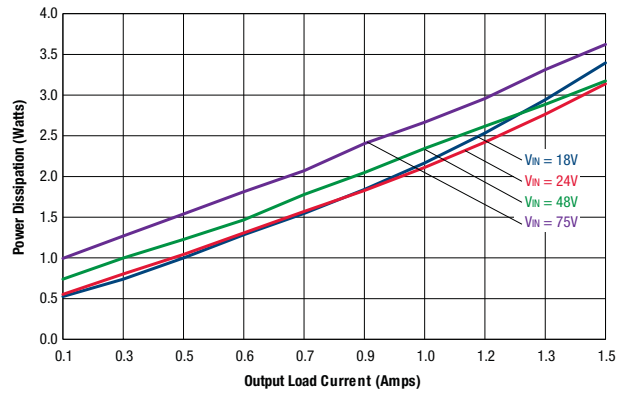
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-050-Q48

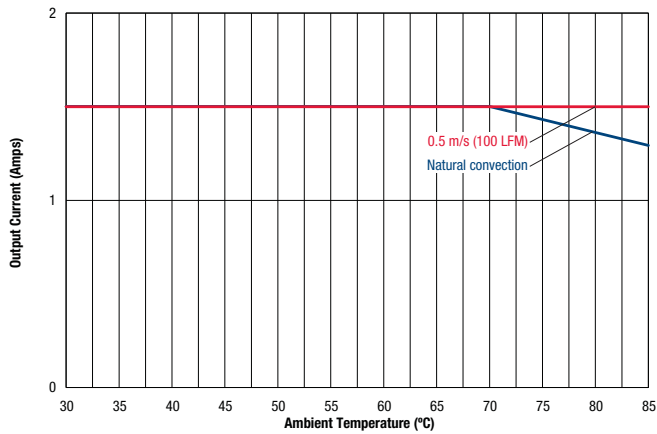
Efficiency vs. Line Voltage and Load Current @ +25°C



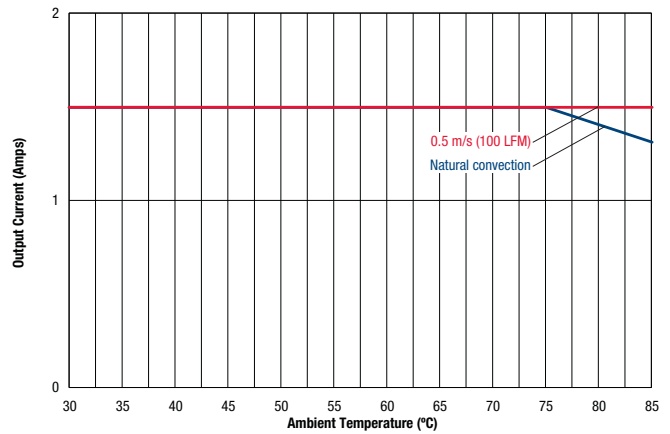
Power Dissipation vs. Line Voltage and Load Current @ +25°C



**Maximum Current Temperature Derating at Sea Level
(V_{IN} = 18V, airflow is from pin 1 to pin 2)**

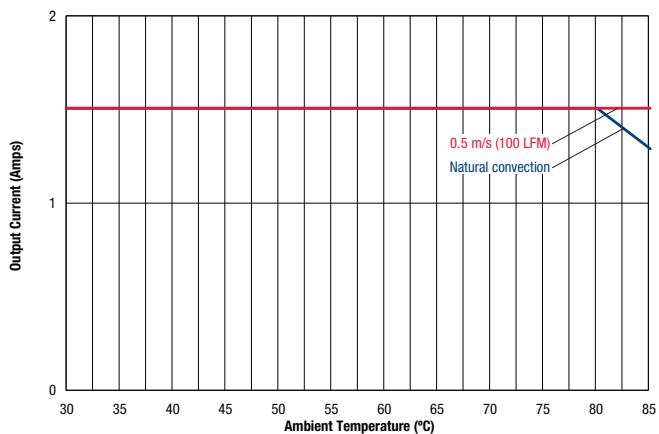


**Maximum Current Temperature Derating at Sea Level
(V_{IN} = 24V, airflow is from pin 1 to pin 2)**

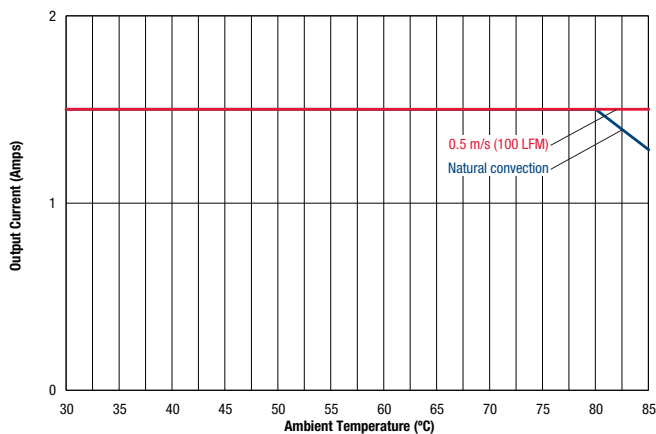


PERFORMANCE DATA, BPM15-050-Q48

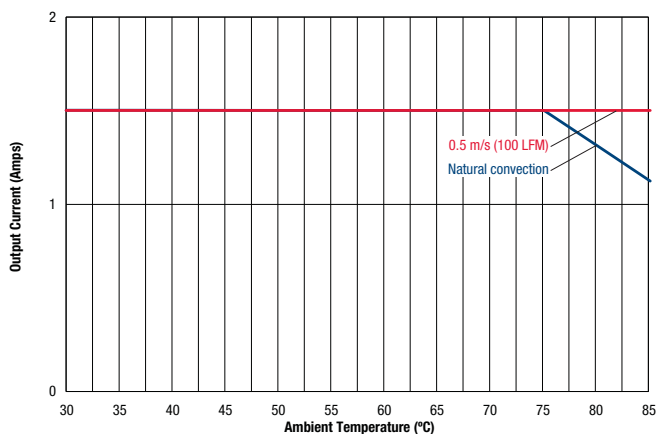
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 36V$, airflow is from pin 1 to pin 2)



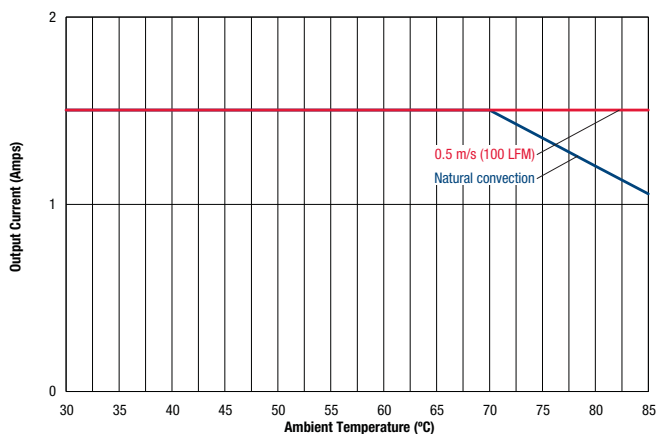
Maximum Current Temperature Derating at Sea Level
($V_{IN} = 48V$, airflow is from pin 1 to pin 2)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 60V$, airflow is from pin 1 to pin 2)



Maximum Current Temperature Derating at Sea Level
($V_{IN} = 75V$, airflow is from pin 1 to pin 2)



FUNCTIONAL SPECIFICATIONS, BPM15-120-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		75	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.15	W
Output Current	Current-limited, no damage, short-circuit protected	0.0625		0.625	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		18	48	75	Vdc
Recommended External Fuse	Fast blow			2	A
Start-up Threshold	Rising input voltage	15.5	17	17.9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	15	16.2	17.5	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.368	0.38	A
Low Line Input Current	Vin = minimum		0.99	1.01	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
No Load Input Current	Iout = minimum, unit=ON		50	100	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		40		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 48V, full load	83	85		%
	Vin = min., full load	83	84.5		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance		10			MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1 Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		Approved		
Calculated MTBF			5		Hours x 10 ⁶
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		290	320	350	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			60	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		150	250	μSec
Dynamic Load Peak Deviation	same as above		±100	±200	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.8	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-120-Q48 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.15	W
Voltage					
Nominal Output Voltage	No trim	±11.88	±12	±12.12	Vdc
Setting Accuracy	At 50% load, no trim		±1		% of Vnom
Overvoltage Protection	Via magnetic feedback	14.9	16	18	Vdc
Current					
Output Current Range		±0.0625	±0.625	±0.625	A
Current Limit Inception	98% of Vnom., after warmup	±0.75	±1.2	±1.45	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V			±0.25	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=48V		80	120	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 ohms max			150	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		108	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

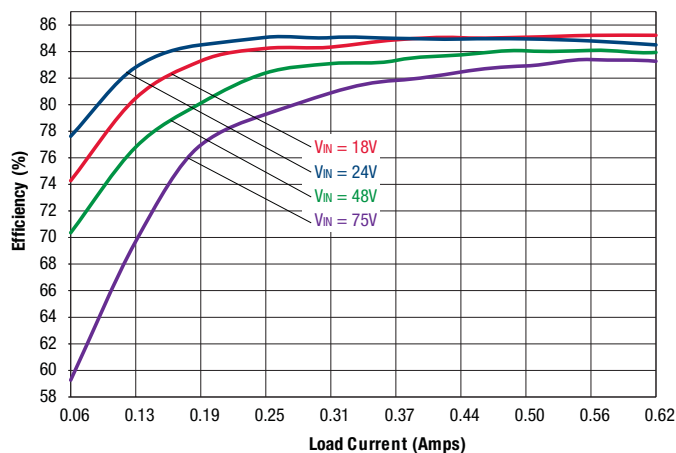
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 µF, Cin = 33 µF and Lbus = 12 µH.

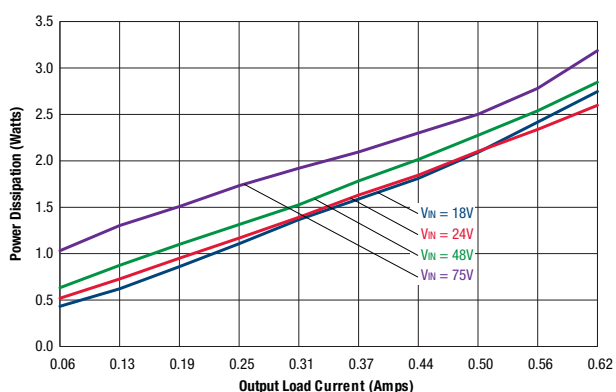
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-120-Q48

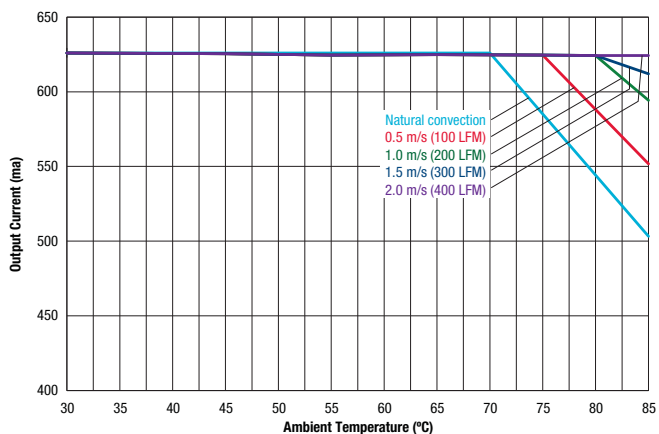
Efficiency vs. Line Voltage and Load Current @ +25°C



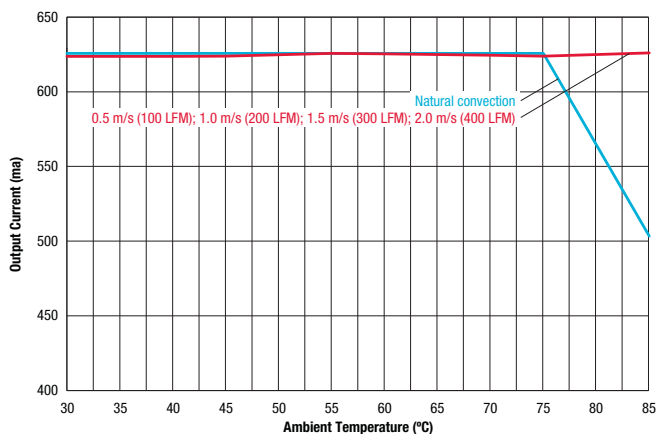
Power Dissipation vs. Line Voltage and Load Current @ +25°C



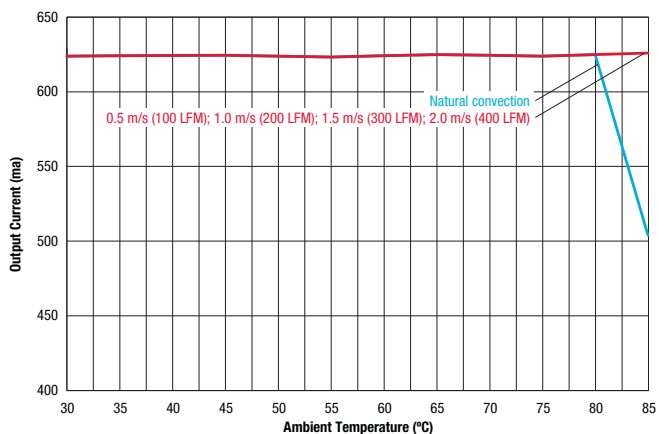
Maximum Current Temperature Derating at Sea Level (V_{IN} = 18V, airflow is from pin 1 to pin 3)



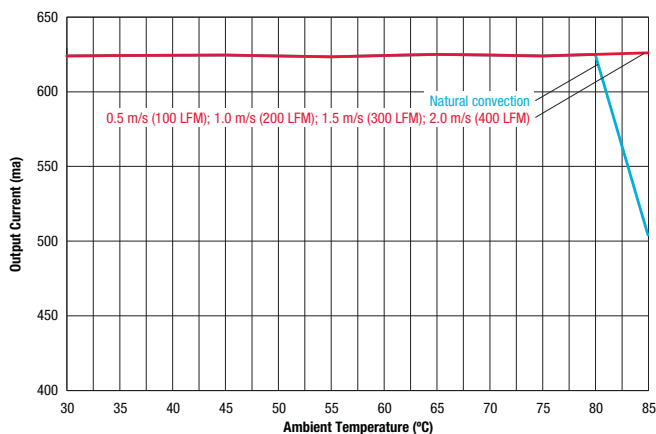
Maximum Current Temperature Derating at Sea Level (V_{IN} = 24V, airflow is from pin 1 to pin 3)



Maximum Current Temperature Derating at Sea Level (V_{IN} = 48V, airflow is from pin 1 to pin 3)



Maximum Current Temperature Derating at Sea Level (V_{IN} = 75V, airflow is from pin 1 to pin 3)



FUNCTIONAL SPECIFICATIONS, BPM15-150-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		75	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.485		15.15	W
Output Current	Current-limited, no damage, short-circuit protected	0.05		0.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	°C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		18	48	75	Vdc
Recommended External Fuse	Fast blow			2	A
Start-up Threshold	Rising input voltage	16.25	16.8	17.5	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	15	16	17	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.36	0.38	A
Low Line Input Current	Vin = minimum		0.97	1.01	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
No Load Input Current	Iout = minimum, unit=ON		50	100	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		35		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 48V, full load	83.0	86.0		%
	Vin = min., full load	83.0	85.5		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance		10			MΩ
Isolation Capacitance			700		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1 Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		Approved		
Calculated MTBF			5		Hours x 10 ⁶
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		290	320	350	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			60	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		250	300	μSec
Dynamic Load Peak Deviation	same as above		±150	±250	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS, BPM15-150-Q48 (CONT.)

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.485	15.00	15.15	W
Voltage					
Nominal Output Voltage	No trim	14.850	15.00	15.150	Vdc
Setting Accuracy	At 50% load, no trim		1		% of Vnom
Overvoltage Protection	Via magnetic feedback	16	19	22	Vdc
Current					
Output Current Range		±0.05	±0.5	±0.5	A
Current Limit Inception	98% of Vnom., after warmup	±0.6	±1.1	±1.5	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.		±0.05	±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V		±0.075	±0.275	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=48V		80	120	mV pk-pk
Maximum Capacitive Loading	Low ESR, 0.02 ohms max			150	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.40		Inches
(Please refer to outline drawing)	W x L x H		25.4 x 25.4 x 10.16		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		91	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

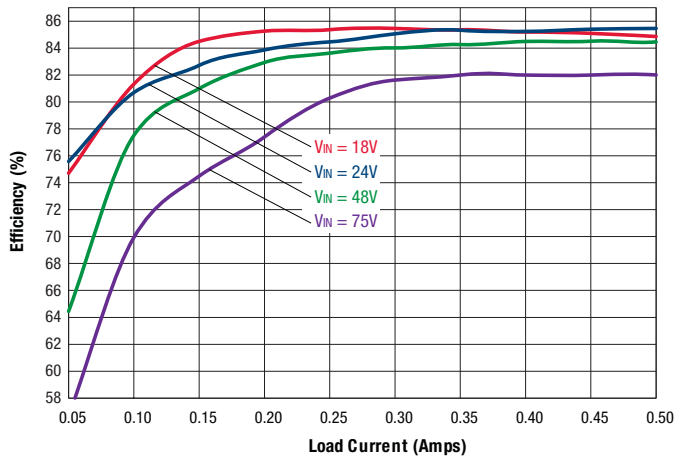
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus = 220 µF, Cin = 33 µF and Lbus = 12 µH.

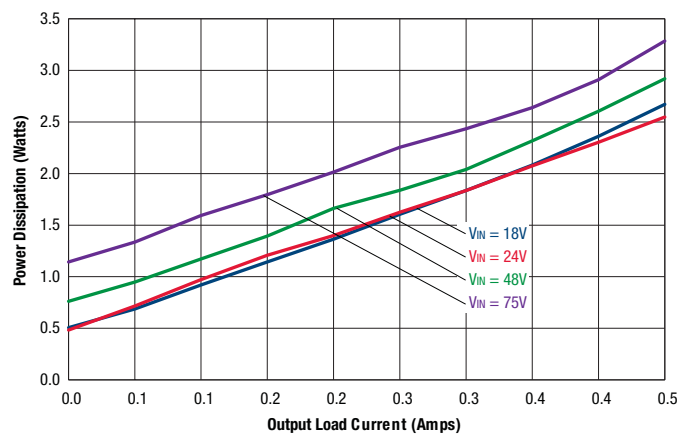
③ The Remote On/Off Control is referred to -Vin.

PERFORMANCE DATA, BPM15-150-Q48

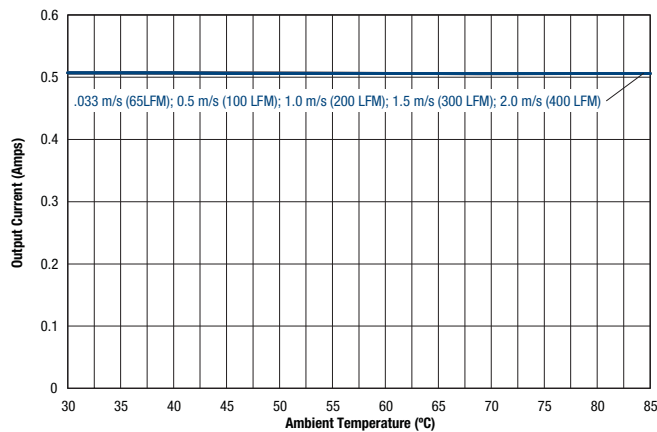
Efficiency vs. Line Voltage and Load Current @ +25°C



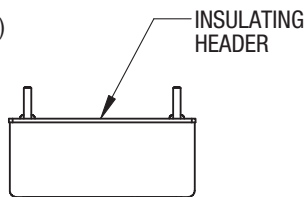
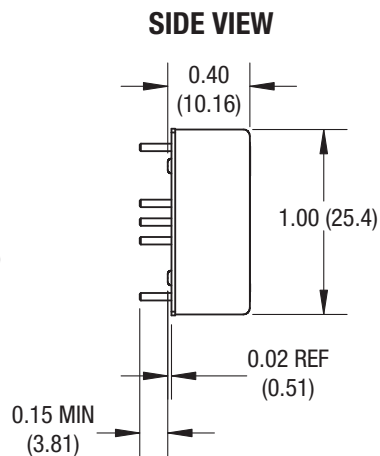
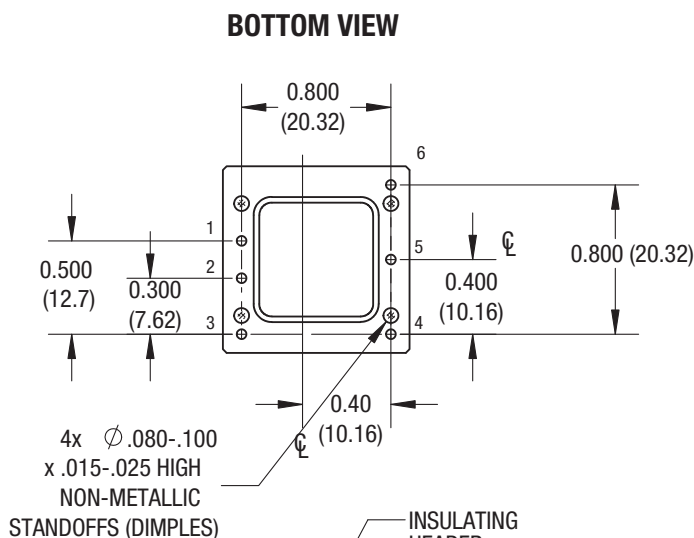
Power Dissipation vs. Line Voltage and Load Current @ +25°C



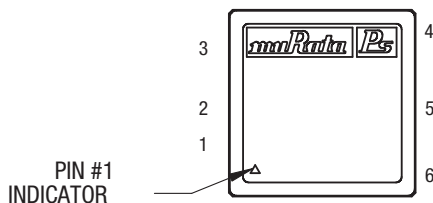
Maximum Current Temperature Derating at Sea Level
 (V_{IN} = 18V, 24V, 36V, 48V, 60V, 75V airflow is from pin 1 to pin 4)



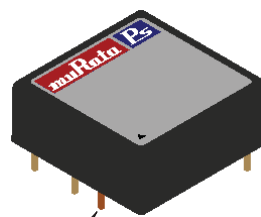
MECHANICAL SPECIFICATIONS



END VIEW



TOP VIEW



PIN #1

ISOMETRIC VIEW
(FOR REF ONLY)

MATERIAL:
Ø.040 PINS: COPPER ALLOY

FINISH: (ALL PINS)
GOLD (5µ"MIN) OVER NICKEL (50µ" MIN)

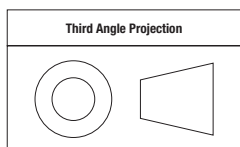
Standard pin length is shown. Please refer to the Part Number Structure for alternate pin lengths.

INPUT/OUTPUT CONNECTIONS

Pin	Function
1	+Vin
2	-Vin
3	On/Off Control*
4	-Vout
5	Common
6	+Vout

*The Remote On/Off pin is optional. It can be provided with positive logic (P suffix) or negative logic (N suffix). Please see the Part Number Structure on page 2.

Dimensions are in inches (mm shown for ref. only).



Tolerances (unless otherwise specified):
.XX ± 0.02 (0.5)
.XXX ± 0.010 (0.25)
Angles ± 1°

Components are shown for reference only.