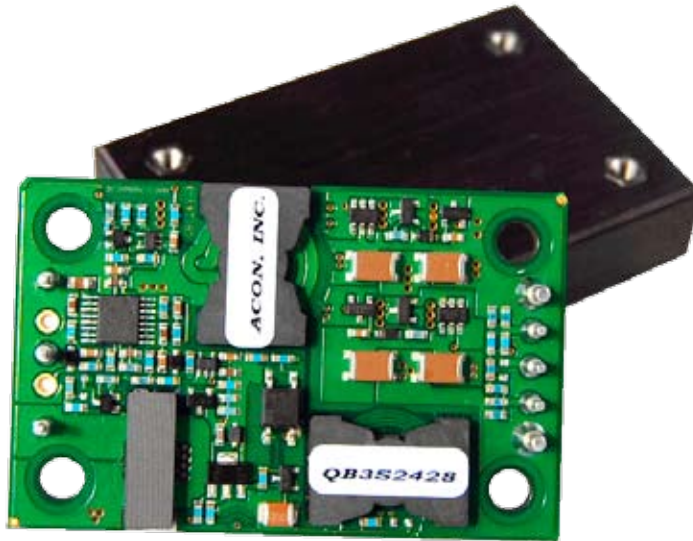


Input Ranges :
10-75 VDC
Output Voltage:
Single Output
1.2V - 28V
Bipolar Output
±12V, ±15V
Output Power:
75 to 150 W



FEATURES

General:

- Small footprint : 1.45" x 2.28"
- High output power : to 150 watts
- High output current : to 50 amps
- Wide input range : 10-75Vdc
- Open frame or Encapsulated
- Integral PCB transformer
- High conversion efficiency to 90%
- Line & load regulation to ±0.1%
- Fixed operating frequency

Protection:

- Output over-voltage protection
- Output over-load protection
- Hiccup mode short circuit protection
- Over-temperature protection
- Input under-voltage lock-out

Control:

- Enable (On/Off) Control
- Remote Sense
- Output Voltage Trim

Isolation:

- Isolation Voltage > 1500V

APPLICATIONS

- Distributed Power Systems
- Workstations
- Computer Equipment
- Communications Equipment

QB series is a family of 36W to 150W DC-DC converters with high power density, high efficiency, and high reliability. The wide input range (2:1 & 3:1) is ideal for battery or unregulated input applications. Integral PCB transformer / inductor is used for all models in this series. This new design technique has greatly improved the magnetic coupling, reduced switching spike and provided performance consistency. It also streamlines the production process by completely eliminating the hand-wind magnetic assembly process from production lines.

QB series provides the most extensive protection to safeguard both the power converter and the load. It includes output over-voltage protection, over-current protection, hiccup mode indefinite short circuit protection, under-voltage lockout and over-temperature protection. Over-current inception point is set at about 115% of rated load. Hiccup mode cycles for 28mSec periods with 3mSec on and 25mSec off. Over-temperature shutdown, activated at +115°C of board temperature, will recover when the temperature falls below +95°C.

QB series features low output noise, very tight line and load regulation, and high efficiency. There is no external capacitor requirement for normal operation. Output trim pin is standard. Sense pins are provided on low output voltage models for line drop compensation.

TABLE OF CONTENTS :

General Specifications 2
 Single Output 4
 Bipolar Output 8

1. Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause performance degradation, adversely effect longterm reliability, and cause permanent damage to the device.

Parameter	Input Designator / Description	Min	Max	Units
Input Voltage				
Continuous	12	-0.3	22	Vdc
	24	-0.3	38	Vdc
	48	-0.3	78	Vdc
	30	-0.3	32	Vdc
	60	-0.3	62	Vdc
Transient (100mSec.)	12	-0.3	24	Vdc
	24	-0.3	40	Vdc
	48	-0.3	80	Vdc
	30	-0.3	34	Vdc
	60	-0.3	64	Vdc
Operating Temperature	All models, base plate temperature	-55	+105	°C
Storage Temperature	Ambient	-55	+125	°C
Isolation Voltage	Input to Output		+2000	Vdc

2. Input Specifications

Parameter	Conditions / Description	Min	Nom	Max	Units
Input Voltage					
Voltage Range (Continuous)	12	10	12	20	Vdc
	24	18	24	36	Vdc
	48	36	48	75	Vdc
	30	10	24	30	Vdc
	60	20	48	60	Vdc
Under-Voltage Lockout (UVLO)					
Turn-On Threshold (Ramping Up)	12		9.7		Vdc
	24		17		Vdc
	48		35		Vdc
	30		9.7		Vdc
	60		17		Vdc
Turn-Off Threshold (Ramping Down)	12		9.5		Vdc
	24		16		Vdc
	48		33		Vdc
	30		9.5		Vdc
	60		16		Vdc

3. Enable (On-Off Control)

Parameter	Conditions / Description	Min	Nom	Max	Units
Enable Pin					
Open Circuit Voltage	Enable pin floating		10		Vdc
Source Current				1	mA
Negative Logic	Standard				
On-Control		-0.5		1.8	Vdc
Off-Control	Logic high or floating	2.5		10	Vdc
Positive Logic	Optional (Please add Suffix P)				
On-Control	Logic high or floating	2.5		10	Vdc
Off-Control		-0.5		1.8	Vdc

4. Isolation Specifications

Parameter	Conditions / Description	Min	Nom	Max	Units
Isolation Voltage					
Input to Output		1500			Vdc
I/O to Case		500			Vdc
Isolation Resistance	Input to Output	10			MΩ
Isolation Capacitance	Input to Output		3		nF

5. Output Specifications

Parameter	Conditions / Description	Min	Nom	Max	Units
Voltage Accuracy	Please see table				%
Output Current	Please see table				A _{dc}
Output Trim	Available for single output only			±10	%V _{out}
Over Voltage Protection	Please see table			120	%V _{dc}
Line Regulation				±0.1	%V _{out}
Load Regulation				±0.1	%V _{out}
Transient Response	50% ± 25% step load change		300		µSec.
Ripple & Noise	Please see table				mVp-p
Switching Frequency			300		KHz

6. Output Trim

Parameter	Conditions / Description	Min	Nom	Max	Units
Positive Trim	Standard				
Trim Up	Trim Pin to (+)Sense			10	%V _{dc}
Trim Down	Trim Pin to (-)Sense	10			%V _{dc}
Negative Trim	Optional - (Please Add Suffix N)				
Trim Up	Trim Pin to (-)Sense			10	%V _{dc}
Trim Down	Trim Pin to (+)sense	10			%V _{dc}

* Trim pin can be left floating if not used.

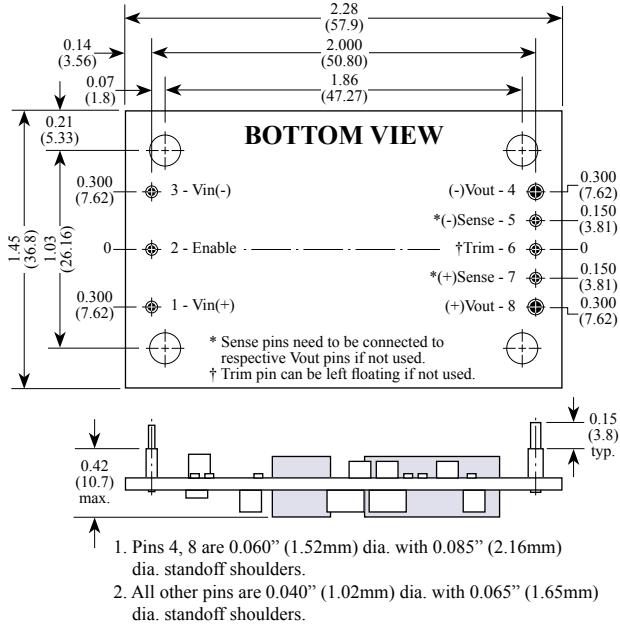
7. Environmental and Mechanical Specifications

Parameter	Conditions / Description	Min	Nom	Max	Units
Operating Temperature	PCB Temperature				
Standard		-25		+105	°C
Extended	Optional - (Please add Suffix C)	-55		+105	°C
Storage Temperature		-55		+125	°C
Temperature Coefficient				±0.02	%/°C
Shock	Halfsine wave, 3 axes	50			g
Sinusoidal Vibration	GR-63-CORE, Section 5.4.2	1			g
Humidity	Relative Humidity, Non-Condensing			95	%R.H.
Weight					
Open Frame			1.4(40)		Oz(g)
Encapsulated			2.5(72)		Oz(g)
MTBF (calculated)	Bellcore TR-NWT-000332 method 1 - parts count	1			MHrs

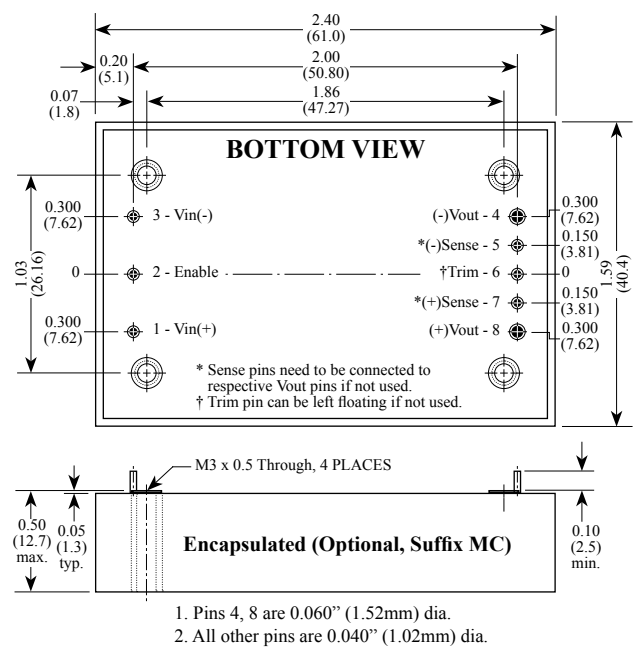
8. Protections

Parameter	Conditions / Description	Min	Nom	Max	Units
Over-Load Protection					
Type	Current-Mode, Pulse by Pulse Current Limit				
Threshold	% Rated Load		120		%
Short-Circuit Protection					
Type	Hiccup Mode, Non-Latching, Auto-Recovery				
Threshold	Short-Circuit Resistance			65	mΩ
Over-Temperature Protection					
Type	Non-Latching, Auto-Recovery				
Threshold	PCB Temperature		115		°C
Hysteresis			15		°C
Over-Voltage Protection					
Type	Auxiliary Feedback Loop Control				
Set-Point				120	%V _{out}

Open Frame (Standard)



Encapsulated (Optional, MC Suffix)



INPUT			OUTPUT									Over Temp. Shutdown /Recover	EFF. (typ.)	MODEL NO.	
Range Designator (Range)	Under Voltage Lockout (typ.)		Max. Power (Watt)	Voltage (V)			Current (A)		Ripple & Noise (typ.)		OVP (max.)				Short Circuit Protection
	On	Off		Set Point	Min.	Max.	Min.	Max.	Peak-Peak	RMS					
12 (10-20)	9.7	9.5	36W	1.20	1.18	1.22	0	30	50mV	10mV	1.5V	Hiccup Mode Indefinite	+115°C /+95°C	85%	QB30S12012
			48W		1.18	1.22	0	40	50mV	10mV	1.5V			85%	QB40S12012
			45W	1.50	1.48	1.52	0	30	50mV	10mV	1.8V			85%	QB30S12015
			60W		1.48	1.52	0	40	50mV	10mV	1.8V			85%	QB40S12015
			54W	1.80	1.78	1.82	0	30	50mV	10mV	2.2V			85%	QB30S12018
			72W		1.78	1.82	0	40	50mV	10mV	2.2V			85%	QB40S12018
			75W	2.50	2.47	2.53	0	30	50mV	10mV	3.0V			86%	QB30S12025
			100W		2.47	2.53	0	40	50mV	10mV	3.0V			86%	QB40S12025
			66W	3.30	3.26	3.40	0	20	60mV	15mV	4.0V			88%	QB20S12033
			100W		3.26	3.40	0	30	60mV	15mV	4.0V			88%	QB30S12033
			75W	5.00	4.90	5.10	0	15	75mV	15mV	5.9V			88%	QB15S1205
			100W		4.90	5.10	0	20	75mV	15mV	5.9V			88%	QB20S1205
			75W	7.50	7.40	7.60	1.0	10	75mV	15mV	9.0V			88%	QB15S12075
			100W		7.40	7.60	1.3	13.4	75mV	15mV	9.0V			88%	QB20S12075
			75W	12.00	11.88	12.12	0.6	6.3	80mV	20mV	14V			88%	QB6S1212
			100W		11.88	12.12	0.8	8.4	80mV	20mV	14V			88%	QB8S1212
			75W	15.00	14.85	15.15	0.5	5.0	100mV	25mV	18V			88%	QB5S1215
			100W		14.85	15.15	0.6	6.7	100mV	25mV	18V			88%	QB6S1215
			75W	24.00	23.76	24.24	0.3	3.2	160mV	35mV	28V			90%	QB3S1224
			100W		23.76	24.24	0.4	4.2	160mV	35mV	28V			90%	QB4S1224
75W	28.00	27.72	28.28	0.2	2.7	200mV	40mV	32V	90%	QB2S1228					
100W		27.72	28.28	0.3	3.6	200mV	40mV	32V	90%	QB3S1228					
24 (18-36)	17.8	17.0	42W	1.20	1.18	1.22	0	35	50mV	10mV	1.5V	Hiccup Mode Indefinite	+115°C /+95°C	86%	QB35S24012
			60W		1.18	1.22	0	50	50mV	10mV	1.5V			86%	QB50S24012
			52W	1.50	1.48	1.52	0	35	50mV	10mV	1.8V			86%	QB35S24015
			75W		1.48	1.52	0	50	50mV	10mV	1.8V			86%	QB50S24015
			63W	1.80	1.78	1.82	0	35	50mV	10mV	2.2V			86%	QB35S24018
			90W		1.78	1.82	0	50	50mV	10mV	2.2V			86%	QB50S24018
			87W	2.50	2.47	2.53	0	35	50mV	10mV	3.0V			86%	QB35S24025
			125W		2.47	2.53	0	50	50mV	10mV	3.0V			86%	QB50S24025
			82W	3.30	3.26	3.40	0	25	60mV	15mV	4.0V			89%	QB25S24033
			132W		3.26	3.40	0	40	60mV	15mV	4.0V			89%	QB40S24033
			100W	5.00	4.90	5.10	0	20	75mV	15mV	5.9V			89%	QB20S2405
			150W		4.90	5.10	0	30	75mV	15mV	5.9V			89%	QB30S2405
			100W	7.50	7.40	7.60	1.3	13.4	75mV	15mV	9.0V			89%	QB13S24075
			150W		7.40	7.60	2.0	20	75mV	15mV	9.0V			89%	QB20S24075
			100W	12.00	11.88	12.12	0	8.4	80mV	20mV	14V			88%	QB8S2412
			150W		11.88	12.12	0	12.5	80mV	20mV	14V			88%	QB12S2412
			100W	15.00	14.85	15.15	0	6.7	100mV	25mV	18V			88%	QB6S2415
			150W		14.85	15.15	0	10.0	100mV	25mV	18V			88%	QB10S2415
			100W	24.00	23.76	24.24	0	4.2	160mV	35mV	28V			91%	QB4S2424
			150W		23.76	24.24	0	6.3	160mV	35mV	28V			91%	QB6S2424
100W	28.00	27.72	28.28	0	3.6	200mV	40mV	32V	91%	QB3S2428					
150W		27.72	28.28	0	5.4	200mV	40mV	32V	91%	QB5S2428					

(Continued on Next Page)

Product Numbering System & Selection Guide

QB	40	S	24	033	MC
Series No.	Output Current	No Output	Input Voltage	Output Voltage	Options
QB	20 : 20A 30 : 30A 40 : 40A	S : Single	12 : 10-20V 24 : 18-36V 48 : 36-75V 30 : 10-32V 60 : 20-60V	033 : 3.3V 05 : 5.0V 12 : 12V 15 : 15V 24 : 24V	C : Extended Temp. MC : Encapsulated N : Negative Trim P : Positive Enable

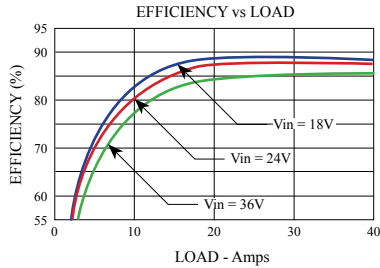
(Continued from Previous Page)

INPUT			OUTPUT									Over Temp. Shutdown /Recover	EFF. (typ.)	MODEL NO.	
Range Designator (Range)	Under Voltage Lockout (typ.)		Max. Power (Watt)	Voltage (V)			Current (A)		Ripple & Noise (typ.)		OVP (max.)				Short Circuit Protection
	On	Off		Set Point	Min.	Max.	Min.	Max.	Peak-Peak	RMS					
48 (36-75)	34.5	33.0	42W	1.20	1.18	1.22	0	35	50mV	10mV	1.5V	Hiccup Mode Indefinite	+115°C /+95°C	86%	QB35S48012
			60W		1.18	1.22	0	50	50mV	10mV	1.5V			86%	QB50S48012
			52W	1.50	1.48	1.52	0	35	50mV	10mV	1.8V			86%	QB35S48015
			75W		1.48	1.52	0	50	50mV	10mV	1.8V			86%	QB50S48015
			63W	1.80	1.78	1.82	0	35	50mV	10mV	2.2V			86%	QB35S48018
			90W		1.78	1.82	0	50	50mV	10mV	2.2V			86%	QB50S48018
			87W	2.50	2.47	2.53	0	35	50mV	10mV	3.0V			88%	QB35S48025
			125W		2.47	2.53	0	50	50mV	10mV	3.0V			88%	QB50S48025
			82W	3.30	3.26	3.40	0	25	60mV	15mV	4.0V			90%	QB25S48033
			132W		3.26	3.40	0	40	60mV	15mV	4.0V			90%	QB40S48033
			100W	5.00	4.90	5.10	0	20	75mV	15mV	5.9V			90%	QB20S4805
			150W		4.90	5.10	0	30	75mV	15mV	5.9V			90%	QB30S4805
			100W	7.50	7.40	7.60	1.3	13.4	75mV	15mV	9.0V			90%	QB13S48075
			150W		7.40	7.60	2.0	20	75mV	15mV	9.0V			90%	QB20S48075
			100W	12.00	11.88	12.12	0	8.4	80mV	20mV	14V			90%	QB8S4812
			150W		11.88	12.12	0	12.5	80mV	20mV	14V			90%	QB12S4812
			100W	15.00	14.85	15.15	0	6.7	100mV	25mV	18V			90%	QB6S4815
			150W		14.85	15.15	0	10.0	100mV	25mV	18V			90%	QB10S4815
			100W	24.00	23.76	24.24	0	4.2	160mV	35mV	28V			90%	QB4S4824
			150W		23.76	24.24	0	6.3	160mV	35mV	28V			90%	QB6S4824
100W	28.00	27.72	28.28	0	3.6	200mV	40mV	32V	90%	QB3S4828					
150W		27.72	28.28	0	5.4	200mV	40mV	32V	90%	QB5S4828					
30 (10-32)	9.7	9.5	36W	1.20	1.18	1.22	0	30	50mV	10mV	1.5V	Hiccup Mode Indefinite	+115°C /+95°C	84%	QB30S30012
			45W	1.50	1.48	1.52	0	30	50mV	10mV	1.8V			84%	QB30S30015
			54W	1.80	1.78	1.82	0	30	50mV	10mV	2.2V			84%	QB30S30018
			75W	2.50	2.47	2.53	0	30	50mV	10mV	3.0V			84%	QB30S30025
			66W	3.30	3.26	3.40	0	20	60mV	15mV	4.0V			88%	QB20S30033
			75W	5.00	4.90	5.10	0	15	75mV	15mV	5.9V			88%	QB15S3005
			75W	7.50	7.40	7.60	1.0	10	75mV	15mV	9.0V			88%	QB10S30075
			75W	12.00	11.88	12.12	0	6.3	80mV	20mV	14V			88%	QB6S3012
			75W	15.00	14.85	15.15	0	5.0	100mV	25mV	18V			88%	QB5S3015
			75W	24.00	23.76	24.24	0	3.2	160mV	35mV	28V			88%	QB3S3024
			75W	28.00	27.72	28.28	0	2.7	200mV	40mV	32V			88%	QB2S3028
			60 (18-60)	17.8	17.0	42W	1.20	1.18	1.22	0	35			50mV	10mV
52W	1.50	1.48				1.52	0	35	50mV	10mV	1.8V	85%	QB35S60015		
63W	1.80	1.78				1.82	0	35	50mV	10mV	2.2V	85%	QB35S60018		
87W	2.50	2.47				2.53	0	35	50mV	10mV	3.0V	86%	QB35S60025		
82W	3.30	3.26				3.40	0	25	60mV	15mV	4.0V	88%	QB25S60033		
100W	7.50	7.40				7.60	1.3	13.4	75mV	15mV	9.0V	88%	QB13S60075		
100W	5.00	4.90				5.10	0	20	75mV	15mV	5.9V	88%	QB20S6005		
100W	12.00	11.88				12.12	0	8.4	80mV	20mV	14V	88%	QB8S6012		
100W	15.00	14.85				15.15	0	6.7	100mV	25mV	18V	88%	QB6S6015		
100W	24.00	23.76				24.24	0	4.2	160mV	35mV	28V	88%	QB4S6024		
100W	28.00	27.72				28.28	0	3.6	200mV	40mV	32V	88%	QB3S6028		

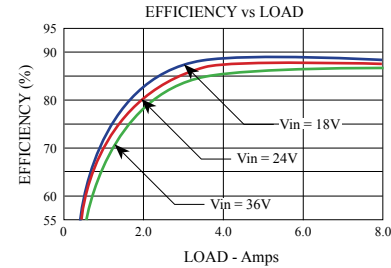
Product Numbering System & Selection Guide

QB	40	S	24	033	MC
Series No.	Output Current	No Output	Input Voltage	Output Voltage	Options
QB	20 : 20A	S : Single	12 : 10-20V	033 : 3.3V	C : -55°C Operation
	30 : 30A		24 : 18-36V	05 : 5.0V	MC : Metal Case
	40 : 40A		48 : 36-75V	12 : 12V	N : Negative Trim
			30 : 10-32V	15 : 15V	P : Positive Enable
			60 : 20-60V	24 : 24V	

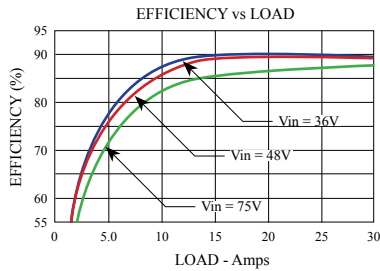
Efficiency Curves



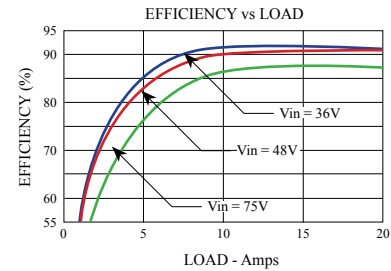
QB40S60015



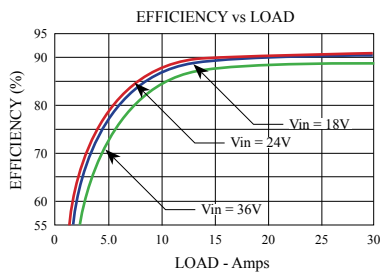
QB8S6012



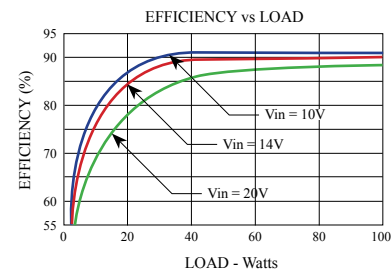
QB30S48033



QB20S4805

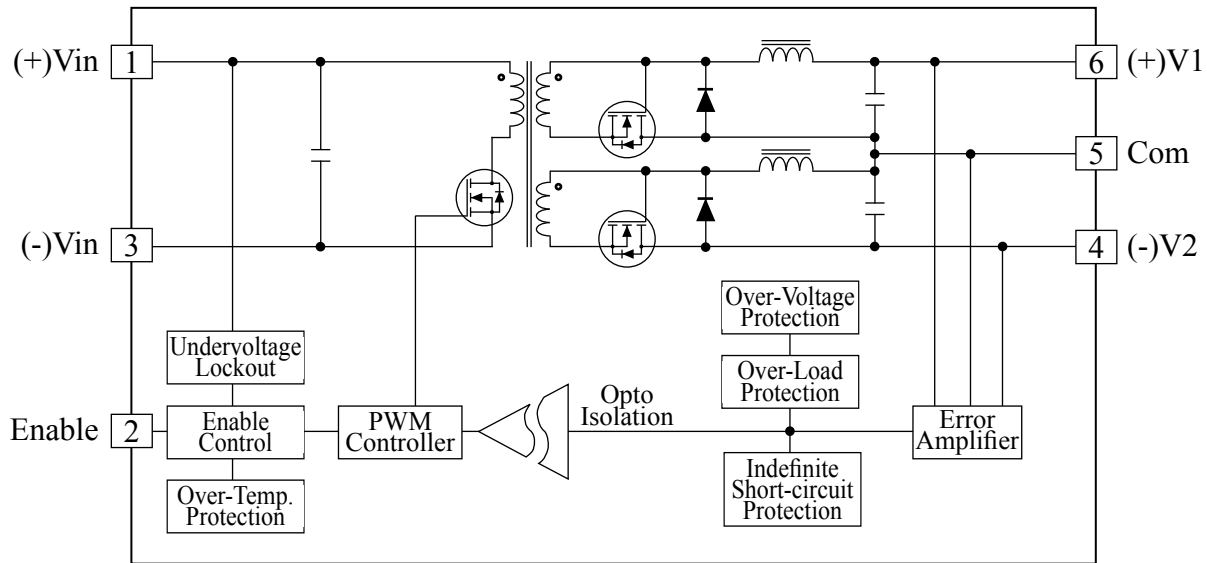


QB30S60033

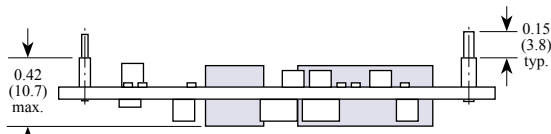
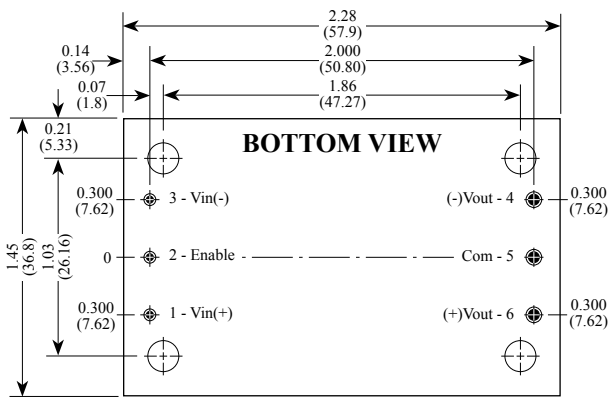


QB3D1215

BLOCK DIAGRAM

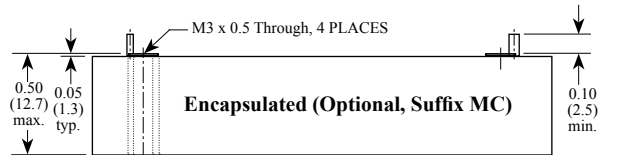
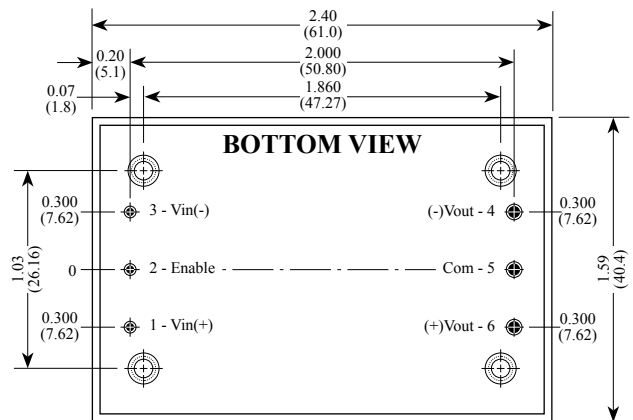


Open Frame (Standard)



1. Pins 4, 5, 6 are 0.060" (1.52mm) dia. with 0.085" (2.16mm) dia. standoff shoulders.
2. All other pins are 0.040" (1.02mm) dia. with 0.065" (1.65mm) dia. standoff shoulders.

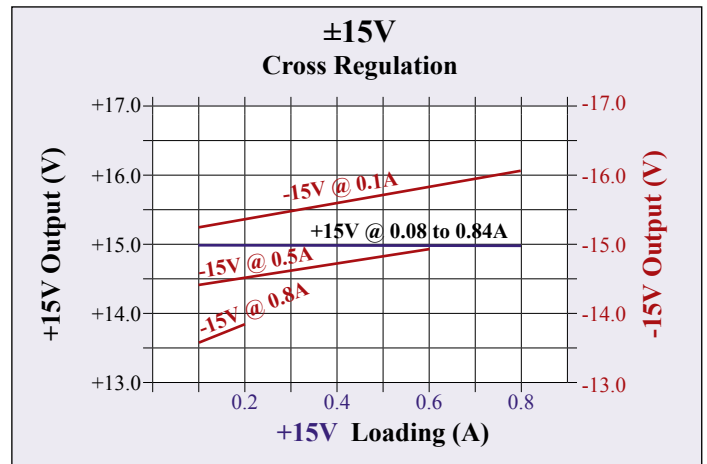
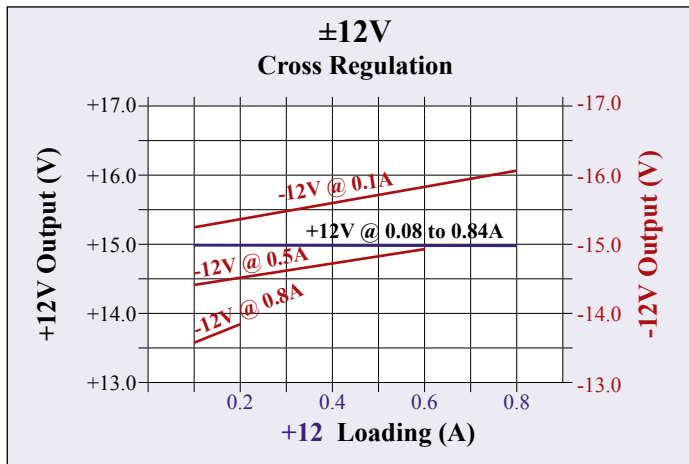
Encapsulated (Optional, MC Suffix)



1. Pins 4, 5, 6 are 0.060" (1.52mm) dia.
2. All other pins are 0.040" (1.02mm) dia.

INPUT			OUTPUT										Over Temp. Shutdown /Recover	EFF. (typ.)	MODEL NO		
Nominal (Range)	Under Voltage Lockout (typ.)		Power (Watt)	Voltage (V)				Current (A)			Ripple & Noise					Short Circuit Protection	
	On	Off		#	Set Point	Min.*	Max.*	#	Min.	Max.	Peak-Peak	R.M.S.					
12 (10 - 20)	9.7	9.2	75W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+3.2	80mV	25mV	Hiccup Mode Indefinite	+115°C /+95°C	88%	QB3D1212
					-V2	-12.0	-11.76	-12.24	-12	-0.3	-3.2	80mV	25mV				
			100W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+4.2	80mV	25mV			88%	QB4D1212
					-V2	-12.0	-11.76	-12.24	-12	-0.4	-4.2	80mV	25mV				
			75W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+2.5	100mV	30mV			88%	QB2D1215
					-V2	-15.0	-14.70	-15.30	-12	-0.2	-2.5	100mV	30mV				
			100W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+3.4	100mV	30mV			88%	QB3D1215
					-V2	-15.0	-14.70	-15.30	-12	-0.3	-3.4	100mV	30mV				
24 (18 - 36)	17	16	100W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+4.2	80mV	25mV	Hiccup Mode Indefinite	+115°C /+95°C	90%	QB4D2412
					-V2	-12.0	-11.76	-12.24	-12	-0.4	-4.2	80mV	25mV				
			150W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+6.3	80mV	25mV			90%	QB6D2412
					-V2	-12.0	-11.76	-12.24	-12	-0.6	-6.3	80mV	25mV				
			100W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+3.4	100mV	30mV			90%	QB3D2415
					-V2	-15.0	-14.70	-15.30	-12	-0.3	-3.4	100mV	30mV				
			150W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+5.0	100mV	30mV			90%	QB5D2415
					-V2	-15.0	-14.70	-15.30	-12	-0.5	-5.0	100mV	30mV				
48 (36 - 75)	34	33	100W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+4.2	80mV	25mV	Hiccup Mode Indefinite	+115°C /+95°C	90%	QB4D4812
					-V2	-12.0	-11.76	-12.24	-12	-0.4	-4.2	80mV	25mV				
			150W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+6.3	80mV	25mV			90%	QB6D4812
					-V2	-12.0	-11.76	-12.24	-12	-0.6	-6.3	80mV	25mV				
			100W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+4.2	100mV	30mV			90%	QB4D4815
					-V2	-15.0	-14.70	-15.30	-12	-0.4	-4.2	100mV	30mV				
			150W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+5.0	100mV	30mV			90%	QB5D4815
					-V2	-15.0	-14.70	-15.30	-12	-0.5	-5.0	100mV	30mV				
30 (10 - 32)	9.7	9.2	75W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+3.2	80mV	25mV	Hiccup Mode Indefinite	+115°C /+95°C	86%	QB3D3012
					-V2	-12.0	-11.76	-12.24	-12	-0.3	-3.2	80mV	25mV				
			75W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+2.5	100mV	30mV			86%	QB2D3015
					-V2	-15.0	-14.70	-15.30	-12	-0.2	-2.5	100mV	30mV				
60 (18 - 60)	17	16	100W	±12V	+V1	+12.0	+11.88	+12.12	+11	0	+4.2	80mV	25mV	Hiccup Mode Indefinite	+115°C /+95°C	88%	QB4D6012
					-V2	-12.0	-11.76	-12.24	-12	-0.4	-4.2	80mV	25mV				
			100W	±15V	+V1	+15.0	+14.85	+15.15	+11	0	+3.4	100mV	30mV			88%	QB3D6015
					-V2	-15.0	-14.70	-15.30	-12	-0.3	-3.4	100mV	30mV				

* Combined line, load and cross regulation



Product Numbering System & Selection Guide

QB	3	D	24	12	MC
Series No.	Output Current	No Output	Input Voltage	Output Voltage	Options
QB	3 : ±3A 4 : ±4A	D : Dual	12 : 10-20V 24 : 18-36V 48 : 36-75V 30 : 10-30V 60 : 18-60V	±12 : ±12V ±15 : ±15V	C : Extended Temp. MC : Metal Case P : Positive Enable