



# CQB100-110S SERIES 100 WATT 3:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency Up to 93%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Fully Protected (OTP/OCP/OVP/UVLO)
- 2250Vdc I/O Isolation
- Operating Case Temperature -40 to +100°C
- Quarter Brick Size Meet Industrial Standard 2.28"x1.45"x0.5"
- UL 60950-1 2nd (Basic Insulation) Approval (Except 3.3 Vout)
- EN 50155 Compliant with External Circuits
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 2000m Operating Altitude
- Safety Meets IEC/EN/UL 62368-1



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB100-110S3V3	66-160 VDC	3.3 VDC	0 mA	25 A	40 mA	833 mA	90	10000µF
CQB100-110S05	66-160 VDC	5 VDC	0 mA	20 A	30 mA	983 mA	92.5	10000µF
CQB100-110S12	66-160 VDC	12 VDC	0 mA	8.4 A	40 mA	985 mA	93	8800µF
CQB100-110S24	66-160 VDC	24 VDC	0 mA	4.2 A	60 mA	996 mA	92	1500µF

NOTE:

1. Nominal Input Voltage 110VDC
2. An External Input Capacitor 120uF for All Models Are Recommended To Reduce Input Ripple Voltage.
3. To Meet EN50155 and RIA12 refer to Application Note.

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts
CQB100-	II	O	XX	L	-Y (Option)
CQB100	110 : 110 Volts	S : Single	3V3 : 3.3VDC 05 : 5VDC 12 : 12VDC 24 : 24VDC	None : Positive N : Negative	None : M3x0.5 Mounting Inserts -C : Clear Mounting Insert (3.2mm DIA.)

Part Number Example:

**CQB100-110S12N-C:** Quarter Brick, 82.5-100W, 3:1 66-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert



# CQB100-110S Series

## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	All	-0.3		160	V <sub>dc</sub>
Input Surge Voltage	100ms max.	All			180	V <sub>dc</sub>
Operating Case Temperature	At the center part of base plate (with derating)	All	-40		100	°C
Storage Temperature		All	-55		105	°C

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	66	110	160	V <sub>dc</sub>
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All	60	62	64	V <sub>dc</sub>
Turn-Off Voltage Threshold		All	54	56	58	V <sub>dc</sub>
Lockout Hysteresis Voltage		All		6		V <sub>dc</sub>
Maximum Input Current	V <sub>in</sub> =66V, Full load	All		1.7		A
No-Load Input Current	V <sub>in</sub> =110V, I <sub>o</sub> =0A	See Model Number Table				mA
Input Filter	Pi filter	All				
Inrush Current (I <sup>2</sup> t)	As per ETS300 132-2	All			0.1	A <sup>2</sup> s
Input Reflected Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		30		mA

### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V <sub>in</sub> =110V, Full load, T <sub>c</sub> =25°C	3.3Vo	-1.5		+1.5	%
		Others	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full load to no load	All			±0.2	%
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±0.2	%
Temperature Coefficient	T <sub>c</sub> =-40°C to 100°C	All			±0.03	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF solid tantalum and 1.0uF ceramic capacitors	3.3Vo			100	mV
		5Vo			100	
		12Vo			150	
		24Vo			240	
RMS		3.3Vo			40	
		5Vo			40	
		12Vo			60	
		24Vo			100	
Output Current Range	V <sub>in</sub> = 66 to 160V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	150	180	%
Over Voltage Protection	Limited voltage, % of nominal V <sub>o</sub>	All	115	125	140	%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	P <sub>o</sub> ≤ max. rated power, I <sub>o</sub> ≤ I <sub>o_max</sub>	All	-10		+10	%
Output Voltage Remote Sense Range	P <sub>o</sub> ≤ max. rated power, I <sub>o</sub> ≤ I <sub>o_max</sub> . % of nominal V <sub>o</sub>	All			+10	%

### EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V <sub>in</sub> =110V	See Model Number Table				%



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## DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Current Transient						
Error Band	75% to 100% of $I_{o\_max}$ . step load change $dI/dt=0.1A/us$ (within 1% $V_{out}$ nominal)	All			±5	%
Recovery Time		All			200	us
Turn-On Delay and Rise Time						
Full load (constant resistive load)						
Turn-On Delay Time, From On/Off Control	$V_{on/off}$ to 10% $V_{o\_set}$ , Remote on	All		15		ms
Turn-On Delay Time, From Input	$V_{in\_min.}$ to 10% $V_{o\_set}$ , Power up	All		25		ms
Output Voltage Rise Time	10% $V_{o\_set}$ to 90% $V_{o\_set}$	All		20		ms

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Isolation Voltage (100% factory Hi-Pot tested @2sec.)	1 Minute; input to output	All			2250	$V_{dc}$
	1 Minute; input to case (base plate)				2250	
	1 Minute; output to case (base plate)				1500	
Isolation Resistance	Input to output	All	10			MΩ
Isolation Capacitance	Input to output	All		1000		pF
	Input to case (base plate)			1000		
	Output to case (base plate)			None		

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse width modulation (PWM), fixed	All	180	200	220	KHz
On/Off Control, Positive Remote On/Off Logic, Refer to -Vin Pin						
Logic Low (Module Off)	$V_{on/off}$ at $I_{on/off}=1.0mA$	All	0		1.8	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0uA$ , Pin open=on	All	3.5		75	V
On/Off Control, Negative Remote On/Off Logic, Refer to -Vin Pin						
Logic High (Module Off)	$V_{on/off}$ at $I_{on/off}=0.0uA$ , Pin open=off	All	3.5		75	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}=1.0mA$	All	0		1.8	V
On/Off Current (for Both Remote On/Off Logic)	$I_{on/off}$ at $V_{on/off}=0V$	All		0.3	1	mA
Leakage Current (for Both Remote On/Off Logic)	Logic high, $V_{on/off}=15V$	All			30	uA
Off Converter Input Current	Shutdown input idle current	All		5	10	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All		105		°C
Over Temperature Recovery		All		85		

## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100%$ of $I_{o\_max.}$ ; MIL-HDBK - 217F_Notice 1, GB, 25°C	3.3Vo		400		K hours
		5Vo		240		
		Others		320		
Weight		All		61.5		grams
Case Material	Plastic, DAP, UL 94V-0					
Base Plate Material	Aluminum					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F/EN 61373 Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	2000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					



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## EMC SPECIFICATIONS (External components required, please refer to application note.)

EMI	EN 50155 Compliant (with external filter)	Class A
ESD	EN 61000-4-2 Level 3: Air $\pm 8$ kV, Contact $\pm 6$ kV	Perf. Criteria A
Radiated Immunity	EN 61000-4-3 Level 3: 80~1000MHz, 20V/m	Perf. Criteria A
Fast Transient	EN 61000-4-4 Level 3: On power input port, $\pm 2$ kV, external components required	Perf. Criteria A
Surge	EN 61000-4-5 Level 3: Line to line, $\pm 1$ kV, external components required	Perf. Criteria A
Conducted Immunity	EN 61000-4-6 Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Interruptions of Voltage Supply	EN 50155 Class S2: 10ms interruptions, with external hold up circuit and capacitor required	Perf. Criteria A
Supply Change Over	EN 50155 Class C1: at 0.6Un during 100ms (without interruptions)	Perf. Criteria A
Application Note Link	<a href="#">CQB100 Series App Notes</a>	
Packaging Information Link	<a href="#">Packaging Information</a>	

## Immunity to Environmental Conditions

Phenomenon	EN50155:2007 Reference Clause(s)	Reference Standard	Test Conditions	Result
Cooling test	12.2.3	EN 60068-2-1	Column 4, Class T2 Temperature: -40°C Duration: 2 hrs	Pass
Dry Heat Test	12.2.4	EN 60068-2-2	Column 4, Class T2 Temperature: 70°C Duration: 6 hrs	Pass
Cyclic Damp Heat Test	12.2.5	EN 60068-2-30	Temperature: 25°C~ 55°C Humidity: 90%~100% RH Duration: 48 hrs	Pass
Random Vibration Test	12.2.11	EN 61373	Temperature: 25°C $\pm$ 10°C Humidity: 50% $\pm$ 25% RH Frequency range: 5 ~ 150 Hz Vertical: 0.98 $m/s^2$ Transverse: 0.44 $m/s^2$ Longitudinal: 0.69 $m/s^2$ Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	12.2.11	EN 61373	Temperature: 25°C $\pm$ 10°C Humidity: 50% $\pm$ 25% RH Frequency range: 5 ~ 150 Hz Vertical: 5.72 $m/s^2$ Transverse: 2.5 $m/s^2$ Longitudinal: 3.96 $m/s^2$ Duration: 5 hrs / axis	Pass
Shock Test	12.2.11	EN 61373	Temperature: 25°C $\pm$ 10°C Humidity: 50% $\pm$ 25% RH Frequency range: 5 ~ 150 Hz $\pm$ Vertical: 30 $m/s^2$ $\pm$ Transverse: 30 $m/s^2$ $\pm$ Longitudinal: 50 $m/s^2$ Duration: 30ms x18 (Each axis 3 shocks)	Pass



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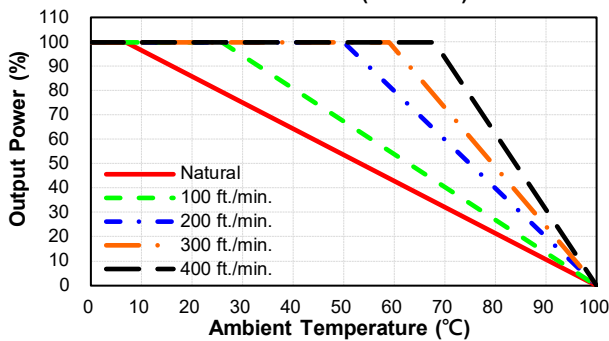
## EN45545-2 Fire & Smoke Test Conditions

Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1&2: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1&2: 2006	HL1, HL2, HL3
R24	Oxygen Index Test	EN45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2:2013+A1:2016 EN 60695-2-11:2014	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013+A1:2015 EN 60695-11-10: 2013	HL1, HL2, HL3

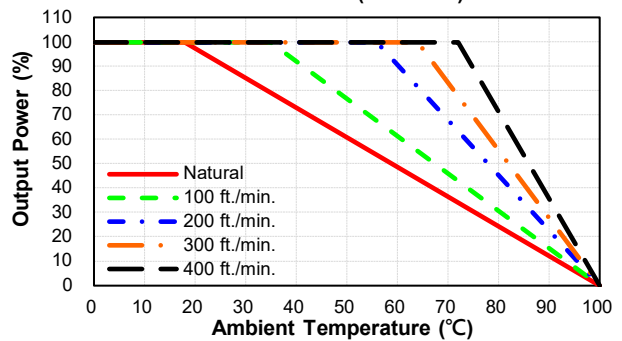
## CHARACTERISTIC CURVE

### Power Derating Curve

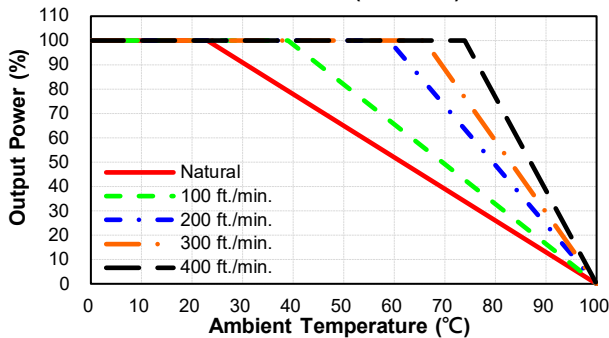
**CQB100-110S3V3 Derating Curve without Heatsink (Vin=110V)**



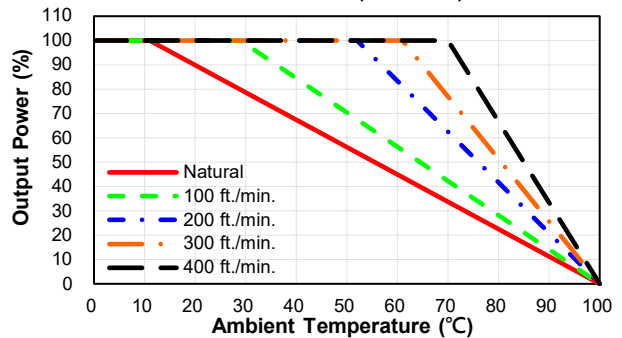
**CQB100-110S05 Derating Curve without Heatsink (Vin=110V)**



**CQB100-110S12 Derating Curve without Heatsink (Vin=110V)**



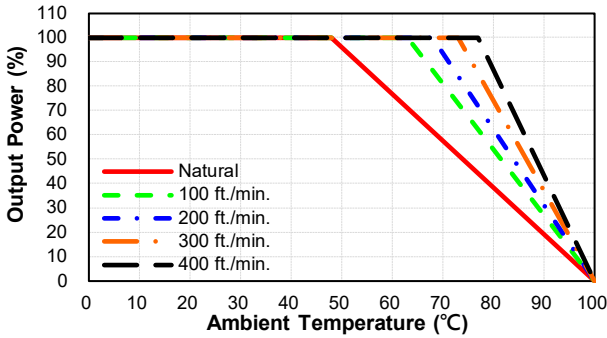
**CQB100-110S24 Derating Curve without Heatsink (Vin=110V)**



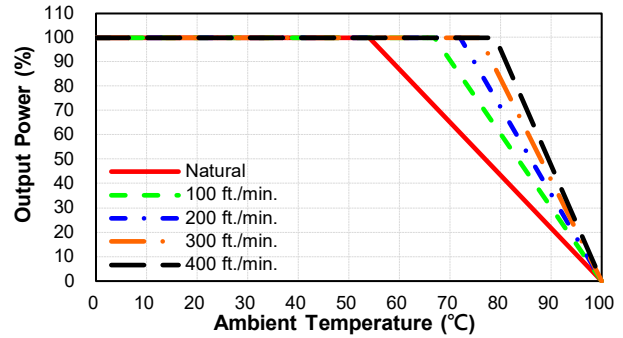


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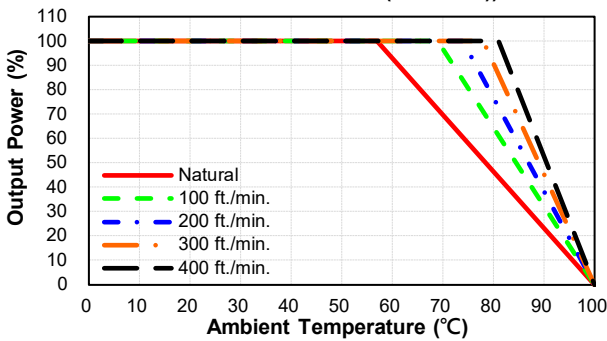
**CQB100-110S3V3 Derating Curve with Heatsink QBL127 (Vin=110V)**



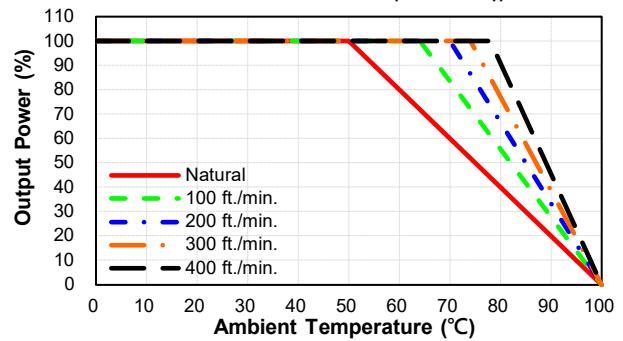
**CQB100-110S05 Derating Curve with Heatsink QBL127 (Vin=110V)**



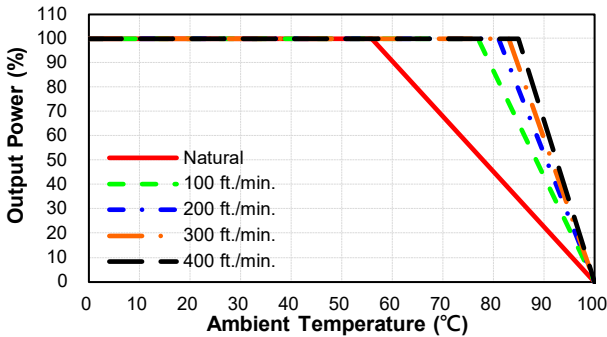
**CQB100-110S12 Derating Curve with Heatsink QBL127 (Vin=110V)**



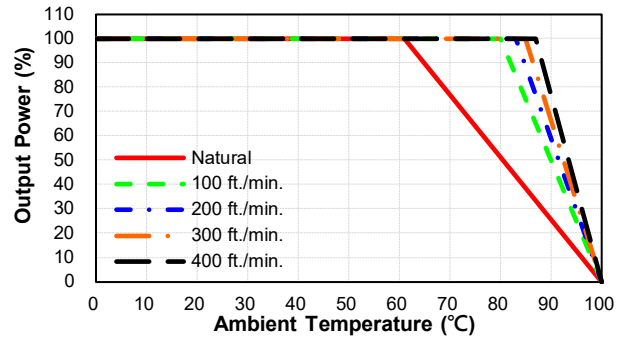
**CQB100-110S24 Derating Curve with Heatsink QBL127 (Vin=110V)**



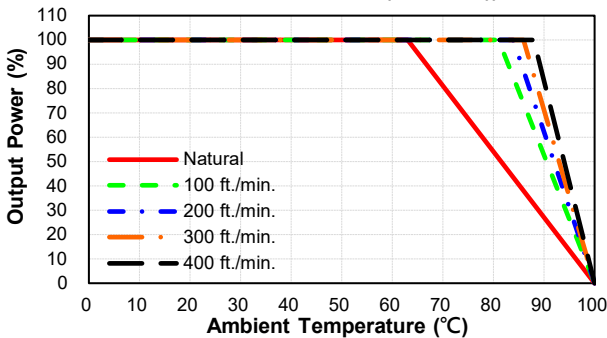
**CQB100-110S3V3 Derating Curve with Heatsink QBT210 (Vin=110V)**



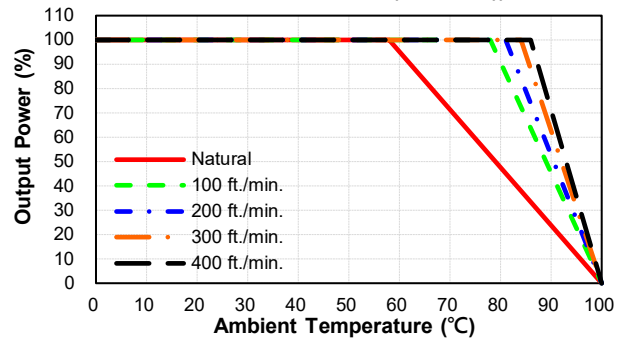
**CQB100-110S05 Derating Curve with Heatsink QBT210 (Vin=110V)**



**CQB100-110S12 Derating Curve with Heatsink QBT210 (Vin=110V)**



**CQB100-110S24 Derating Curve with Heatsink QBT210 (Vin=110V)**





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## Performance Data

