



# CQB150W14 SERIES 150 WATT 14:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency up to 90.5%
- Fixed Switching Frequency
- 14:1 Input Range
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully protected (OTP/OCP/OVP/UVLO)
- 3000Vac I/O Isolation
- Operating Case Temperature -40 to +105°C
- Quarter Brick Size Meet Industrial Standard 2.28"x1.45"x0.5"
- CB Test Certificate IEC 62368-1
- EN 55032/EN 55035/EN 50155 Compliant with External Circuits
- UL 62368-1 3<sup>rd</sup> (Reinforce Insulation) Approval
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 5000m Operating Altitude
- Option Model with Bus & External UVLO Function



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
CQB150W14-72S05	12-160 VDC	5 VDC	0 mA	25000 mA	25 mA	1929 mA	90	90	25000uF
CQB150W14-72S12	12-160 VDC	12 VDC	0 mA	12500 mA	25 mA	2315 mA	90	89	12500uF
CQB150W14-72S15	12-160 VDC	15 VDC	0 mA	10000 mA	25 mA	2302 mA	90.5	90	10000uF
CQB150W14-72S24	12-160 VDC	24 VDC	0 mA	6300 mA	22 mA	2360 mA	89	88	6300µF
CQB150W14-72S28	12-160 VDC	28 VDC	0 mA	5400 mA	22 mA	2334 mA	90	89	5400µF
CQB150W14-72S54	12-160 VDC	54 VDC	0 mA	2800 mA	22 mA	2321 mA	90.5	89.5	1500µF

**NOTE:**

1. Nominal Input Voltage 72 VDC.
2. Measured at Input Voltage 110VDC.
3. An External Input Capacitor 470uF for All Models are Recommended to Reduce Input Ripple Voltage.

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts
CQB150W14-	II	O	XX	L	-Y (Option)
CQB150W14	72 : 72 VDC	S : Single	05 : 05VDC 12 : 12VDC 15 : 15VDC 24 : 24VDC 28 : 28VDC 54 : 54VDC	None : Positive N : Negative	None : M3x0.5 Mounting Inserts -C : Clear Mounting Insert (3.2mm DIA.) -B : With Bus & External UVLO Function -C-B : Clear Mounting Insert (3.2mm DIA.) and with Bus & External UVLO Function

**Part Number Example:**

**CQB150W14-72S12N-C:** Quarter Brick, 150W, 14:1 12-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert



# CQB150W14 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	1000ms max.	All			185	V <sub>dc</sub>
Operating Case Temperature	At the center part of case plate	All	-40		105	°C
Storage Temperature		All	-55		125	°C

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units	
Operating Input Voltage		All	12	72	160	V <sub>dc</sub>	
Input Under Voltage Lockout							
Turn-On Voltage Threshold	80% Load	All	10.7	11	11.7	V <sub>dc</sub>	
Turn-Off Voltage Threshold	80% Load	All	9.7	10	10.7	V <sub>dc</sub>	
Lockout Hysteresis Voltage	80% Load	All		1.0		V <sub>dc</sub>	
BUS pin Output Voltage	V <sub>in</sub> = 24 to 160V	-B Only		24	26	V <sub>dc</sub>	
Maximum Input Current	V <sub>in</sub> =16V to 160V, Full load V <sub>in</sub> =12V to 16V, 80% Load	All			12.5	A	
No-Load Input Current	V <sub>in</sub> =72V, 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> =72V, Full load, T <sub>c</sub> =25°C	All	-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 105°C	All			±0.02	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF polymer tantalum and 1uF ceramic capacitors	5V <sub>o</sub>			150	mV
		12V <sub>o</sub>			150	
		15V <sub>o</sub>			150	
		24V <sub>o</sub>			240	
		28V <sub>o</sub>			240	
		54V <sub>o</sub>			480	
RMS.		5V <sub>o</sub>			80	mV
		12V <sub>o</sub>			80	
		15V <sub>o</sub>			80	
		24V <sub>o</sub>			120	
		28V <sub>o</sub>			120	
		54V <sub>o</sub>			220	
Output Current Range	V <sub>in</sub> = 12 to 16V V <sub>in</sub> = 16 to 160V	See Power Derating Curve See Model Number Table				A
Over Current Protection	Hiccup Mode. Auto recovery	All	110	150	180	%
Short Circuit Protection		All	Continuous, Auto Recovery.			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF



# CQB150W14 Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Trim Range	$P_o \leq \text{max. rated power, } I_o \leq I_{o\_max.}$	Others	-20		+15	%
		54Vo	-20		+10	
Output Voltage Remote Sense Range	$P_o \leq \text{max. rated power, } I_o \leq I_{o\_max.}$ % of nominal $V_o$	Others			+15	%
		54Vo			+10	
Over Voltage Protection	Limited Voltage, % of Nominal $V_o$	Others	117	125	140	%
		54Vo	112	117	140	

## EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	$V_{in}=72V, 110V$	See Model Number Table				%

## 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			$\pm 5$	%
Recovery Time		All				250
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		50		ms
Turn-On Delay Time, From Input	$V_{in\_min.}$ to 10% $V_{o\_set}$ , Power up	All		50		ms
Output Voltage Rise Time	10% $V_{o\_set}$ to 90% $V_{o\_set}$	All		50		ms

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Isolation Voltage (100% factory Hi-Pot tested @2 sec.)	1 Minute; input to output	All			3000 4200	$V_{ac}$ $V_{dc}$
	1 Minute; input to case (base plate)	All			2100 3000	$V_{ac}$ $V_{dc}$
	1 Minute; output to case (base plate)	All			1500 2100	$V_{ac}$ $V_{dc}$
Isolation Resistance	Input to output	All	100			M $\Omega$
Isolation Capacitance	Input to output	All		1100		pF

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Output ripple frequency	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		1.2	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0uA$ , Pin open=on	All	3.5 or Open Circuit		160	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 or Open Circuit		160	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}=1.0mA$	All	0		1.2	V
On/Off Current (for Both Remote On/Off Logic)	$I_{on/off}$ at $V_{on/off}=0V$	All		0.4	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	-B Others		6 4	12 10	mA
Over Temperature Shutdown	Temperature at the center part of case, non-latching	All		110		$^{\circ}C$
Over Temperature Recovery		All		100		$^{\circ}C$



# CQB150W14 Series

## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I <sub>o</sub> =100% of I <sub>o_max</sub> ; MIL-HDBK - 217F_Notice 1, GB, 25°C	05Vo		560		K hours
		12Vo		620		
		15Vo		765		
		24Vo		900		
		28Vo		845		
		54Vo		990		
Weight		All		66		grams
Potting Material	UL 94V-0					
Case Material	Plastic, DAP, UL 94V-0					
Base plate Material	Aluminum Base Plate					
Shock/Vibration	MIL-STD-810F/EN 61373 Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	5000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					
EMI	Meets EN 55032 & EN 50155 Compliant (with external filter)					Class A
ESD	EN 61000-4-2	Level 3: Air ±8kV, Contact ±6kV				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, ±2kV, external input capacitor required (EN 50155)				Perf. Criteria A
Surge	EN 61000-4-5	Level 4: Line to earth, ±4kV, Line to line, ±2kV (EN 50155)				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				Perf. Criteria A
Supply Change Over	EN 50155	Class C2: During a supply break of 30 ms				Perf. Criteria A
Application Note Link						<a href="#">CQB150W14 Series App Notes</a>
Packaging Information Link						<a href="#">Packaging Information</a>



# CQB150W14 Series

## Immunity to Environmental Conditions

Phenomenon	EN50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Test	13.4.4	EN 60068-2-1	Class OT6 Temperature: -40°C Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT6(Cycle A) Temperature: 85°C Duration: 6 hrs	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40°C Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: +25°C and +55°C Humidity: 90% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 25±10°C Humidity: 50% ±25% RH Frequency range: 5 ~ 150 Hz Vertical: 0.988 $m/s^2$ Transverse: 0.441 $m/s^2$ Longitudinal: 0.683 $m/s^2$ Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Temperature: 25°C±10°C Humidity: 50% +/-25% RH Frequency range: 5 ~ 150 Hz Vertical: 5.59 $m/s^2$ Transverse: 2.49 $m/s^2$ Longitudinal: 3.87 $m/s^2$ Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 25°C±10°C Humidity: 50% +/-25% RH Frequency range: 5 ~ 150 Hz ±Vertical: 30 $m/s^2$ ±Transverse: 30 $m/s^2$ ±Longitudinal: 50 $m/s^2$ Duration: 30ms x18 (Each axis 3 shocks)	Pass

## EN45545-2 Fire & Smoke Test Conditions

Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 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 EN 60695-2-11:2001	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013 EN 60695-11-10: 2013	HL1, HL2, HL3

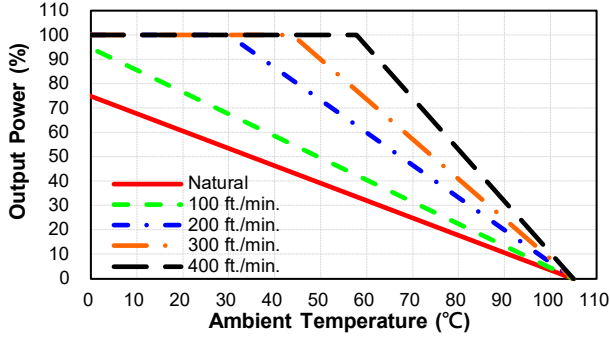


# CQB150W14 Series

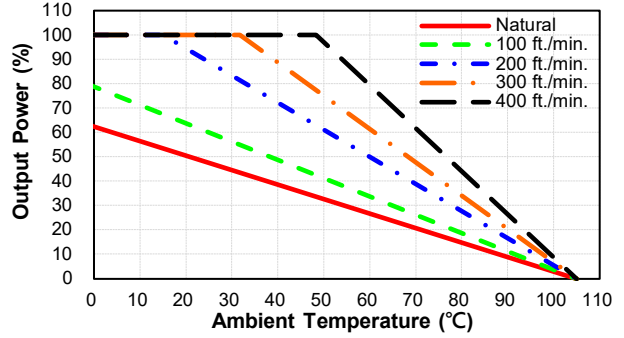
## CHARACTERISTIC CURVE

### Power Derating Curve

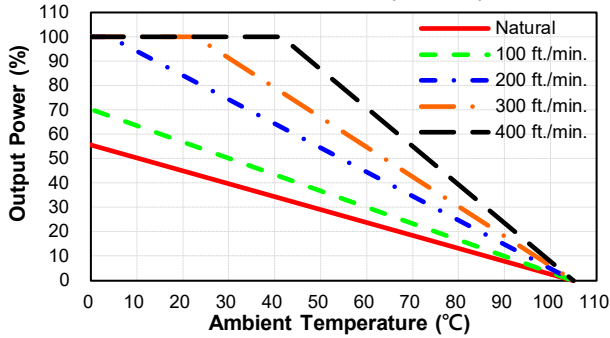
**CQB150W14-72S05 Derating Curve without Heatsink (Vin=72V)**



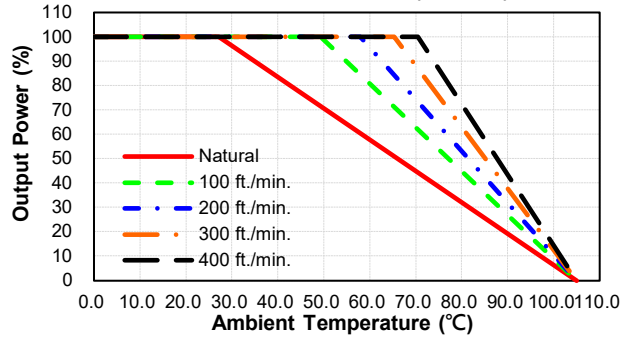
**CQB150W14-72S12, 15, 28, 54 Derating Curve without Heatsink (Vin=72V)**



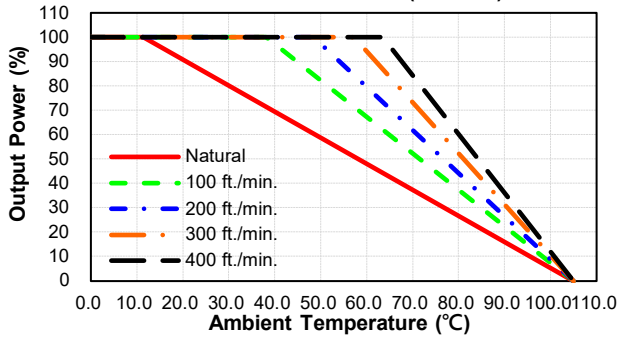
**CQB150W14-72S24 Derating Curve without Heatsink (Vin=72V)**



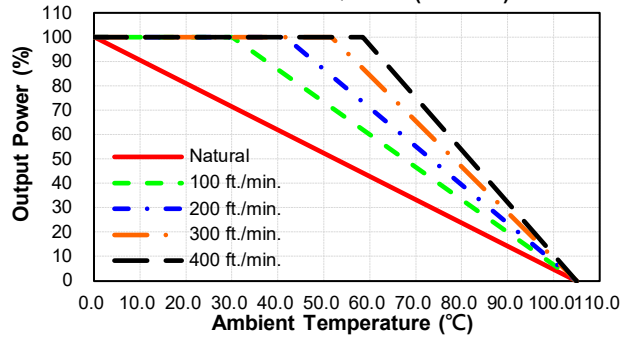
**CQB150W14-72S05 Derating Curve with Heatsink QBL127 (Vin=72V)**



**CQB150W14-72S12, 15, 28, 54 Derating Curve with Heatsink QBL127 (Vin=72V)**



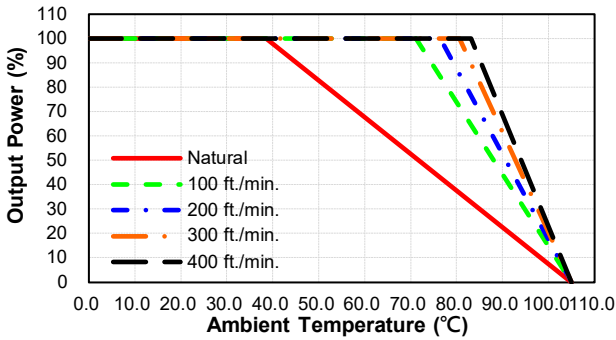
**CQB150W14-72S24 Derating Curve with Heatsink QBL127 (Vin=72V)**



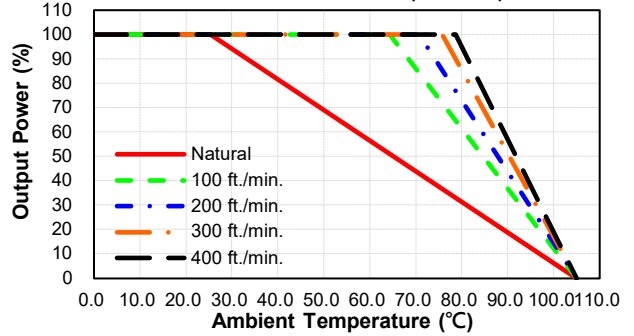


# CQB150W14 Series

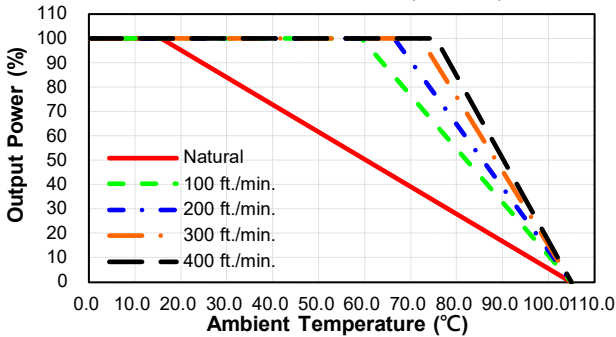
**CQB150W14-72S05 Derating Curve with Heatsink QBT210 (Vin=72V)**



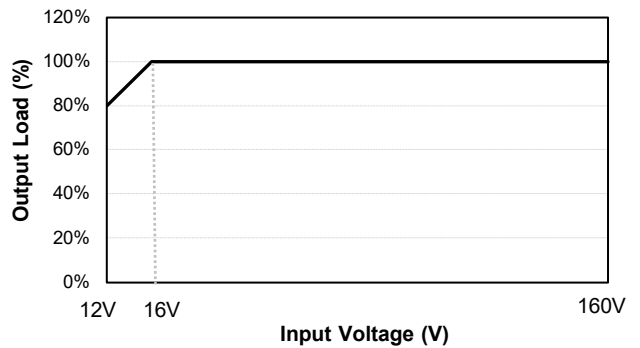
**CQB150W14-72S12, 15, 28, 54 Derating Curve with Heatsink QBT210 (Vin=72V)**



**CQB150W14-72S24 Derating Curve with Heatsink QBT210 (Vin=72V)**

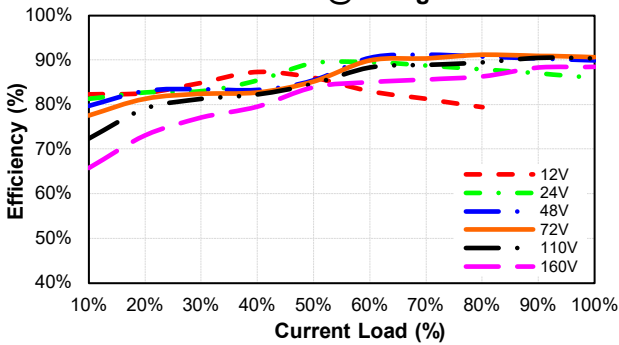


**Typical Derating Curve VS Input Voltage**

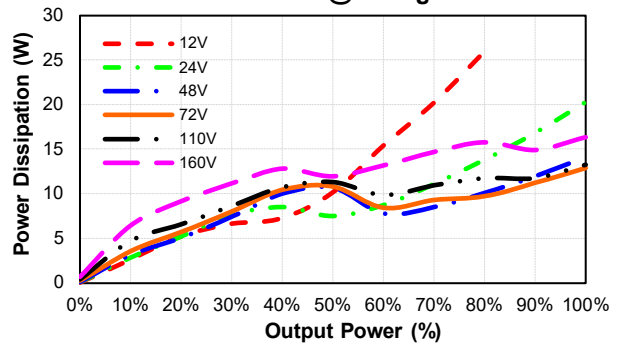


## Performance Data

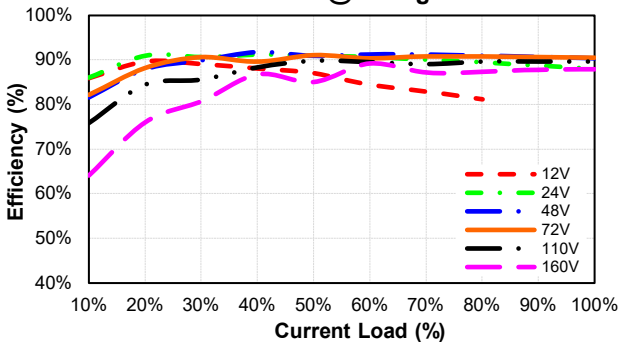
**CQB150W14-72S05 Eff Vs Io @25 Deg. C**



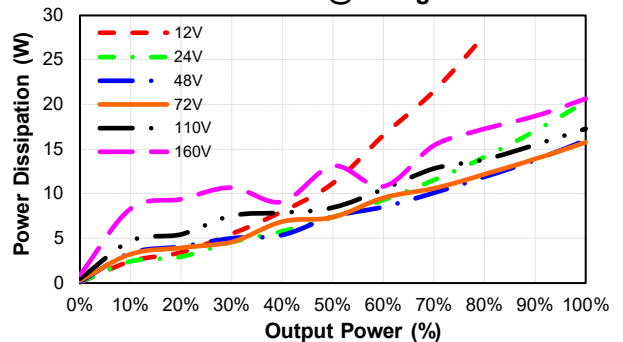
**CQB150W14-72S05 Pd Vs Po @25 Deg. C**



**CQB150W14-72S12 Eff Vs Io @25 Deg. C**



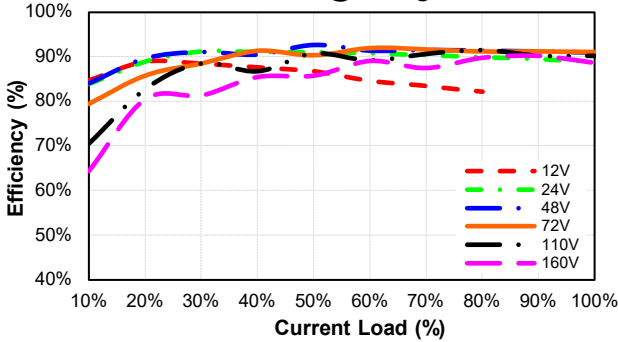
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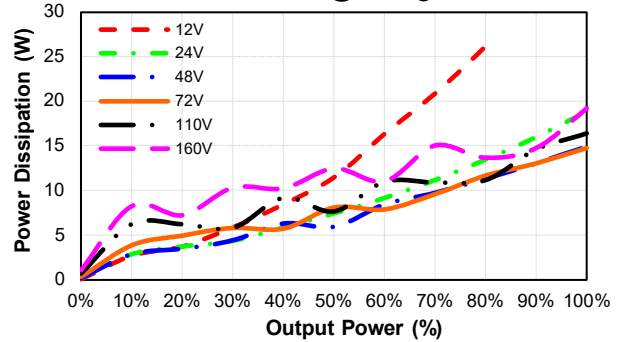


# CQB150W14 Series

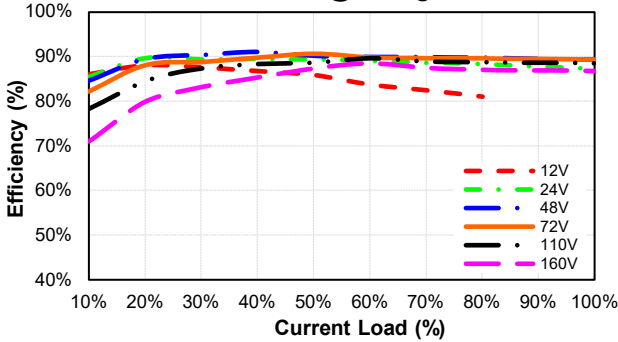
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Eff Vs Io @25 Deg. C



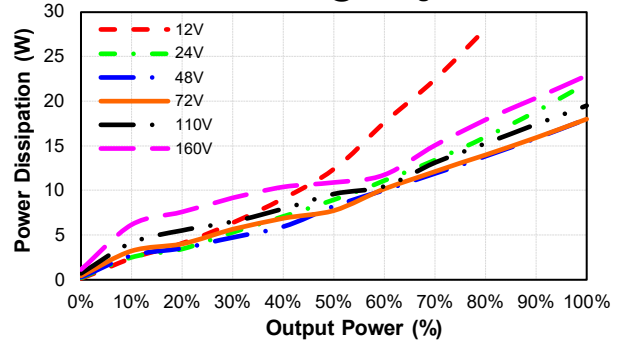
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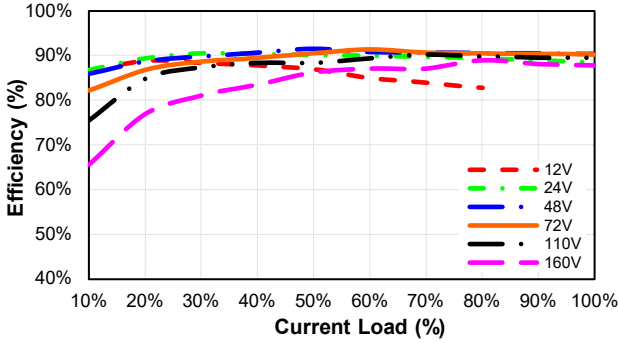
**CQB150W14-72S24**  
Eff Vs Io @25 Deg. C



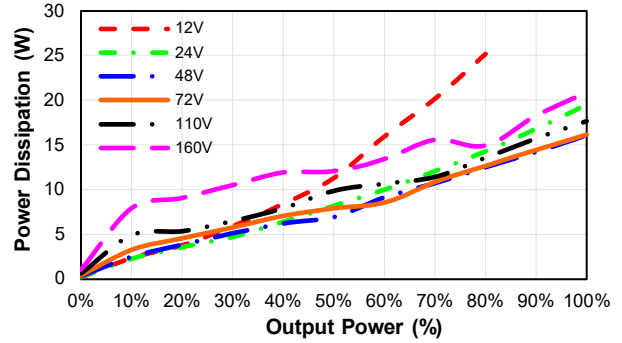
**CQB150W14-72S24**  
Pd Vs Po @25 Deg. C



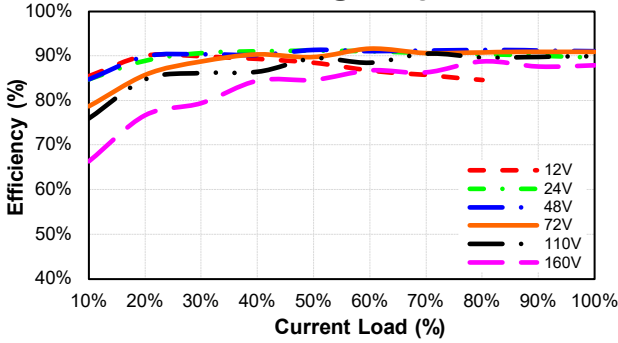
**CQB150W14-72S28**  
Eff Vs Io @25 Deg. C



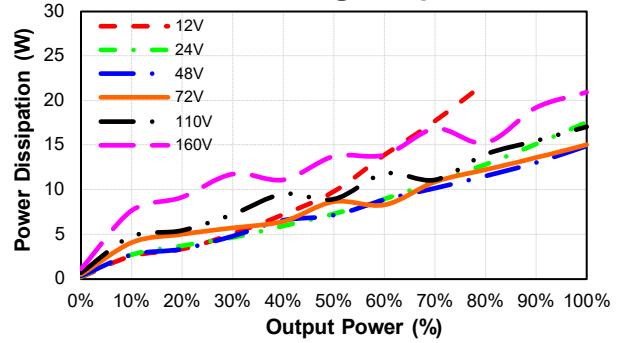
**CQB150W14-72S28**  
Pd Vs Po @25 Deg. C



**CQB150W14-72S54**  
Eff Vs Io @25 Deg. C



**CQB150W14-72S54**  
Pd Vs Po @25 Deg. C

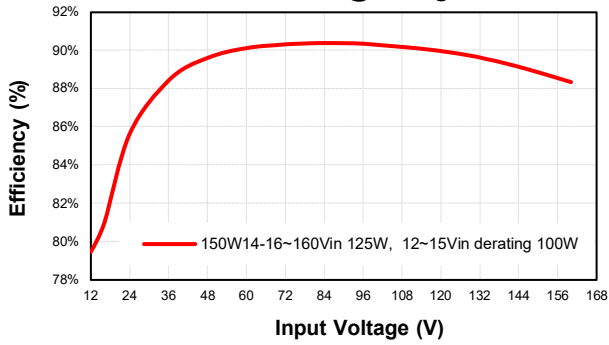




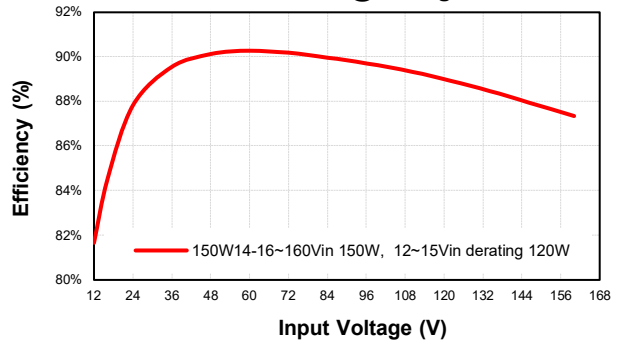


# CQB150W14 Series

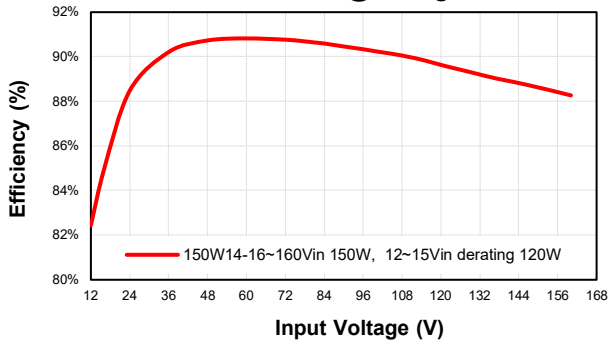
**CQB150W14-72S05**  
Eff Vs Vin @25 Deg. C



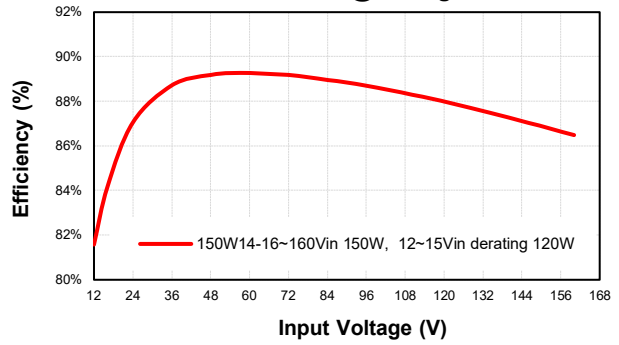
**CQB150W14-72S12**  
Eff Vs Vin @25 Deg. C



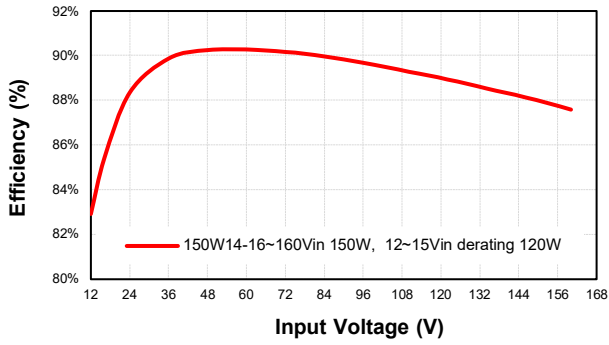
**CQB150W14-72S15**  
Eff Vs Vin @25 Deg. C



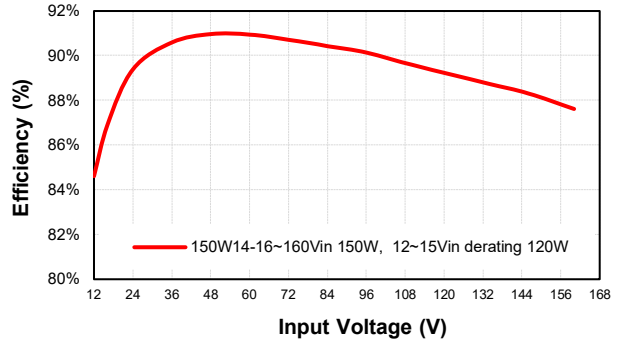
**CQB150W14-72S24**  
Eff Vs Vin @25 Deg. C



**CQB150W14-72S28**  
Eff Vs Vin @25 Deg. C



**CQB150W14-72S54**  
Eff Vs Vin @25 Deg. C

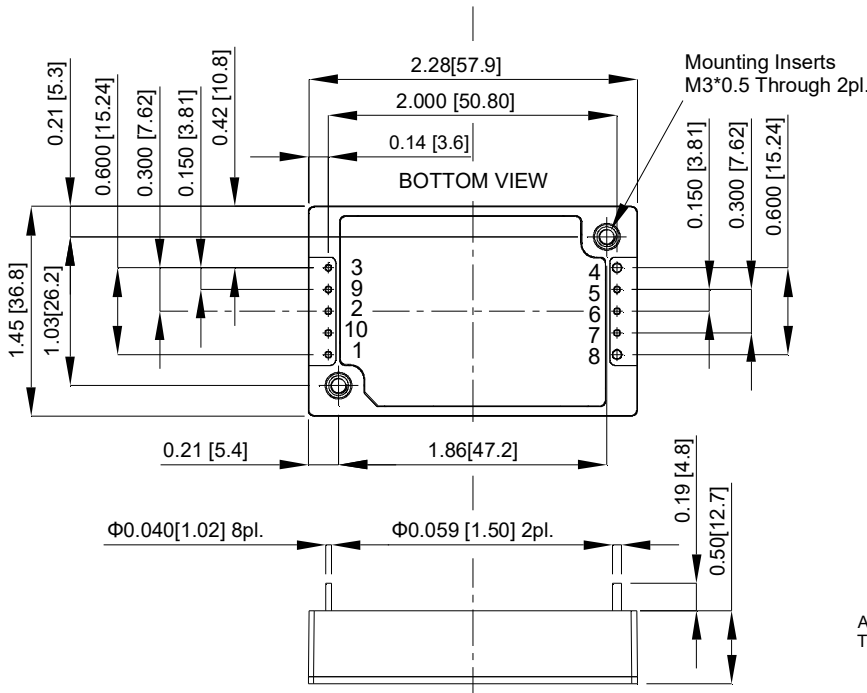


Note: 12Vin Efficiency at 80% Full Load



# CQB150W14 Series

## MECHANICAL SPECIFICATION



PIN	PIN CONNECTION	
	STANDARD	OPTION -B
1	+V Input	+V Input
2	On / Off	On / Off
3	-V Input	-V Input
4	-V Output	-V Output
5	-Sense	-Sense
6	Trim	Trim
7	+Sense	+Sense
8	+V Output	+V Output
9	NP	Bus(Option)
10	NP	UVLO(Option)

\*NP-NO PIN

All Dimensions In Inches[mm]  
 Tolerances Inches: X.XX=  $\pm 0.02$ , X.XXX=  $\pm 0.010$   
 Millimeters: X.X=  $\pm 0.5$ , X.XX=  $\pm 0.25$

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