CQB100W14 SERIES
100 WATT 14:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency up to 90%
- Fixed Switching Frequency
- 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℃
- 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 2nd (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



E176177

Railway System

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
CQB100W14-72S05	12-160 VDC	5 VDC	0 mA	20000 mA	20 mA	1587 mA	87.5	87	20000uF
CQB100W14-72S12	12-160 VDC	12 VDC	0 mA	8300 mA	20 mA	1572 mA	88	87	8300uF
CQB100W14-72S15	12-160 VDC	15 VDC	0 mA	6700 mA	20 mA	1568 mA	89	88.5	6700uF
CQB100W14-72S24	12-160 VDC	24 VDC	0 mA	4200 mA	15 mA	1573 mA	89	88.5	4200μF
CQB100W14-72S28	12-160 VDC	28 VDC	0 mA	3600 mA	15 mA	1555 mA	90	89	3600μF
CQB100W14-72S54	12-160 VDC	54 VDC	0 mA	1850 mA	20 mA	1542 mA	90	89	1000μF

NOTE:

1. Nominal input voltage 72VDC.
2. Measured at input voltage 110VDC.
3. An external input capacitor 220uF 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
CQB100W14-	II	O	XX	L	-Y (Option)
CQB100W14	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:

CQB100W14-72S12N-C: Quarter Brick, 100W, 14:1 12-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert

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TECHNICAL SPECIFICATIONS

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

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	All	-0.3		160	V_{dc}
Input Surge Voltage	100ms max.	All			185	V_{dc}
Operating Case Temperature	At the center part of case plate	All	-40		105	℃
Storage Temperature		All	-55		125	℃

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	12	72	160	V_{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold	80% Load	All	10.7	11	11.7	V_{dc}
Turn-Off Voltage Threshold	80% Load	All	9.7	10	10.7	V_{dc}
Lockout Hysteresis Voltage	80% Load	All		1.0		V_{dc}
Maximum Input Current	V_{in}=16V, Full load V_{in}=12V, 80% Load	All			8.0	A
No-Load Input Current	V_{in}=72V, I_o=0A	See Model Number Table				mA
Input Filter	Pi filter	All				
Inrush Current (I^2t)	As per ETS300 132-2	All			0.1	A^2s
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_{in}=72V, Full load, T_c=25℃	All	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full load to no load	All			±0.2	%
Line Regulation	V_{in}=High line to low line, full load	All			±0.2	%
Temperature Coefficient	T_c=-40℃ to 105℃	All			±0.02	%/℃
Output Voltage Ripple and Noise (5Hz to 20MHz Bandwidth)						
Peak-to-Peak	Full load, 10uF polymer tantalum and 1uF ceramic capacitors	5Vo			150	mV
		12Vo			150	
		15Vo			150	
		24Vo			240	
		28Vo			240	
		54Vo			480	
RMS.		5Vo			80	mV
		12Vo			80	
		15Vo			80	
		24Vo			120	
		28Vo			120	
		54Vo			220	
Output Current Range	V_{in}= 12 to 16V V_{in}= 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
Output Voltage Trim Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o_max.}$	Others	-20		+15	%
		54Vo	-20		+10	

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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Remote Sense Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o_max.}$ % of nominal Vo	Others 54Vo			+15 +10	%
Over Voltage Protection	Limited voltage, % of nominal V_o	Others 54Vo	117 112	125 117	140 140	%
Bus Pin Output Voltage	V_{in}= 24 to 160V, T_c=25℃	-B Only		24	26	V_{dc}

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 d_i/d_t=0.1A/us (within 1% V_{out} nominal)	All			±5	%
Recovery Time		All			250	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		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			MΩ
Isolation Capacitance	Input to output	All		1000		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		℃
Over Temperature Recovery		All		100		℃

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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℃	05Vo		570		K hours
		12Vo		690		
		15Vo		785		
		24Vo		840		
		28Vo		800		
		54Vo		850		
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					

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

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 S3: 20ms interruptions	Perf. Criteria A
Supply Change Over	EN 50155	Class C2: During a supply break of 30 ms	Perf. Criteria A
Application Note Link			CQB100W14-72S Series App Notes
Packaging Information Link			Packaging Information

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Immunity to Environmental Conditions

Phenomenon	EN 50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Start-up test	13.4.4	EN 60068-2-1	Class OT4 Temperature: -40℃ Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT4 & ST2 Temperature: 70℃ Duration: 6 hrs Extended temperature: 85℃ Extended Duration: 10min	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40℃ Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: 25℃ - 55℃ Humidity: 90% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50%±25% RH Frequency range: 5 ~ 150 Hz Vertical: 1.01 m/s^2 Transverse: 0.450 m/s^2 Longitudinal: 0.700 m/s^2 Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50%±25% RH Frequency range: 5 ~ 150 Hz Vertical: 5.72 m/s^2 Transverse: 2.55 m/s^2 Longitudinal: 3.96 m/s^2 Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 25℃±10℃ 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

EN 45545-2 Fire & Smoke Test Conditions

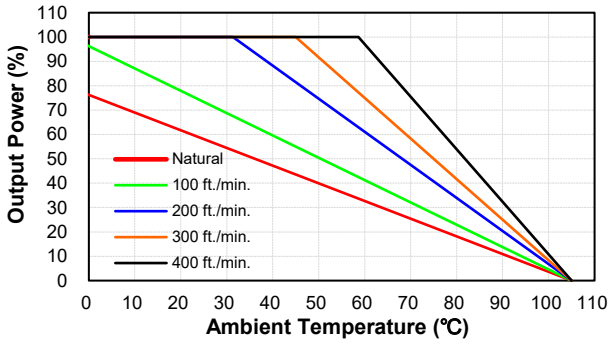
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1,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

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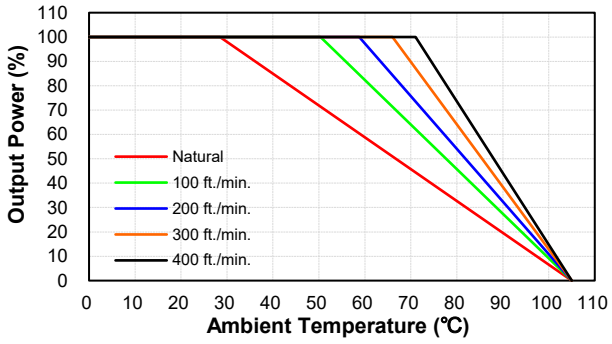
CHARACTERISTIC CURVE

Power Derating Curve

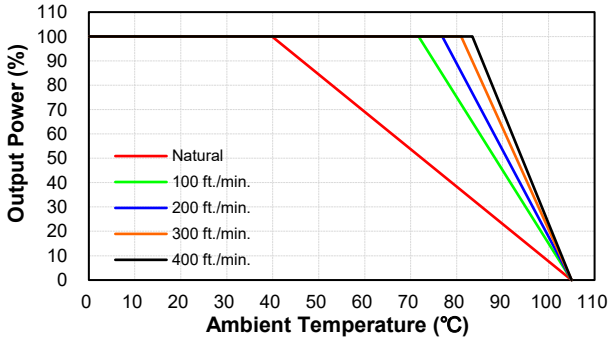
CQB100W14-72S05, 12 Derating Curve without Heatsink (Vin=72V)



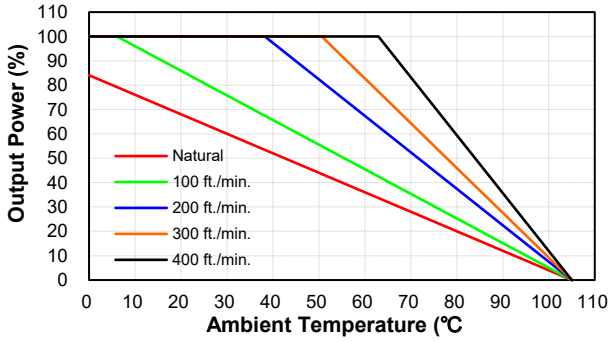
CQB100W14-72S05, 12 Derating Curve with Heatsink QBL127 (Vin=72V)



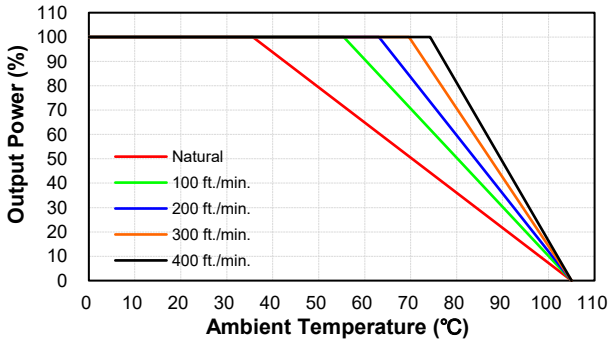
CQB100W14-72S05, 12 Derating Curve with Heatsink QBT210 (Vin=72V)



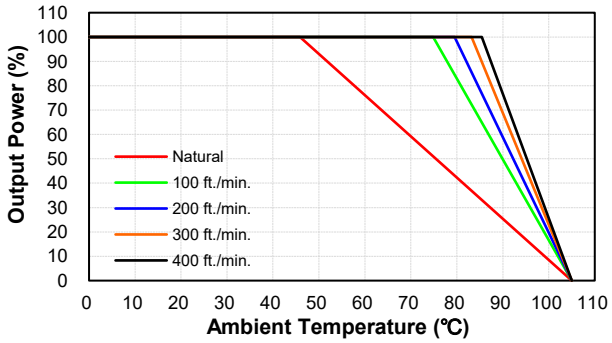
CQB100W14-72S15, 24, 28, 54 Derating Curve without Heatsink (Vin=72V)



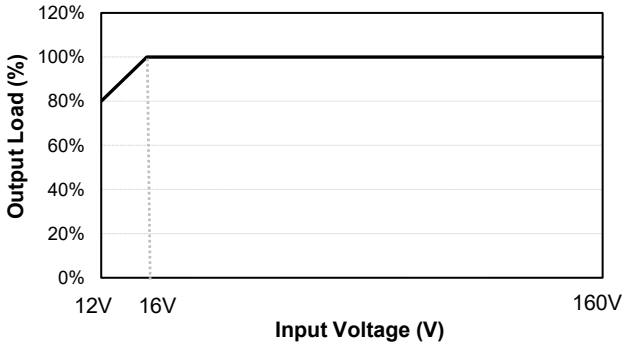
CQB100W14-72S15, 24, 28, 54 Derating Curve with Heatsink QBL127 (Vin=72V)



CQB100W14-72S15, 24, 28, 54 Derating Curve with Heatsink QBT210 (Vin=72V)



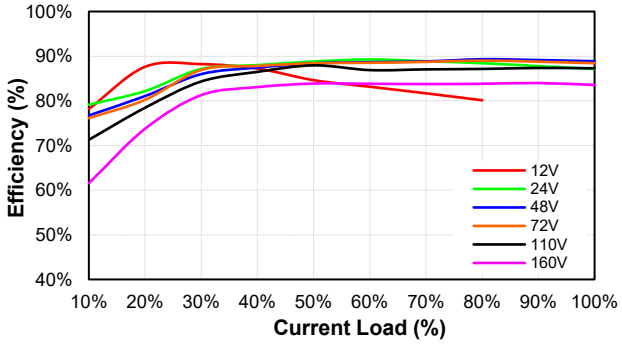
Typical Derating Curve VS Input Voltage



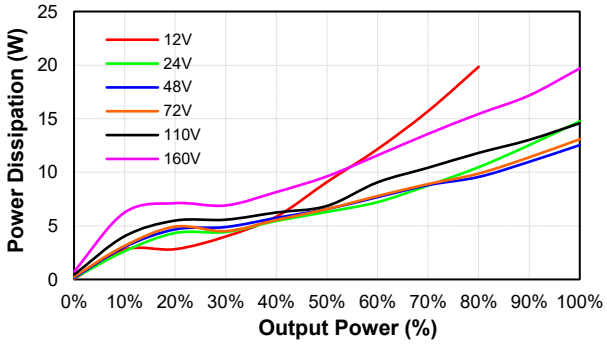
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Performance Data

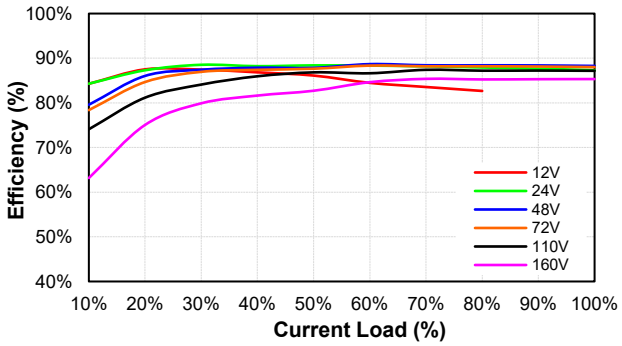
CQB100W14-72S05
Eff Vs Io @25 Deg. C



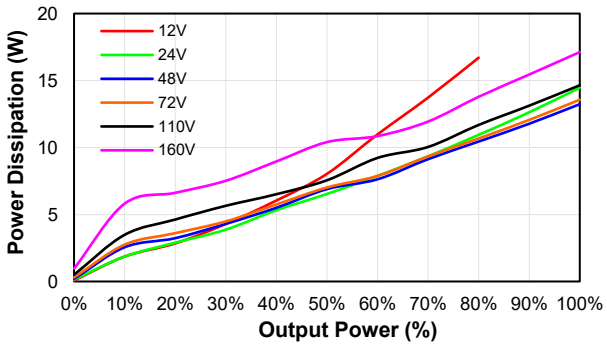
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Pd Vs Po @25 Deg. C



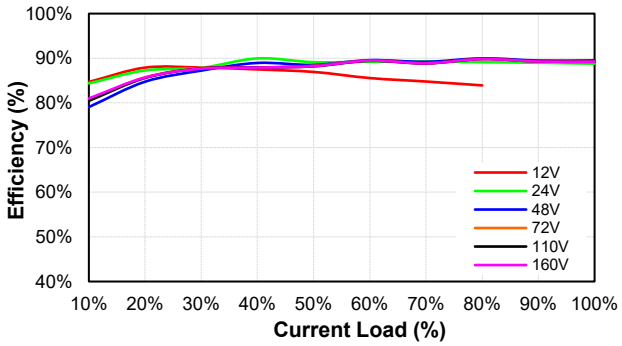
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Eff Vs Io @25 Deg. C



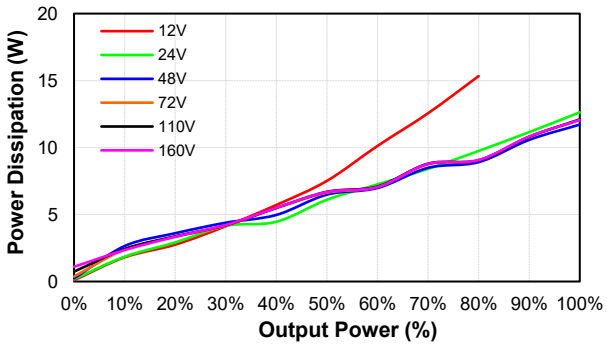
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Pd Vs Po @25 Deg. C



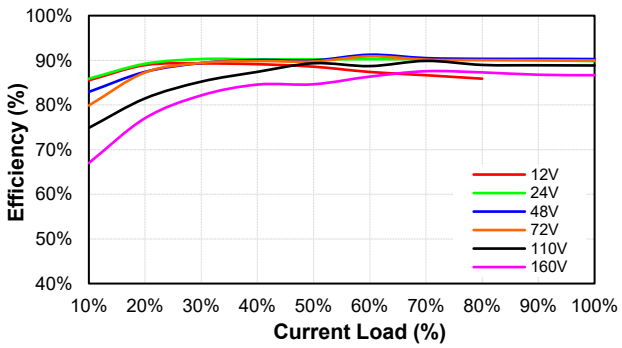
CQB100W14-72S15
Eff Vs Io @25 Deg. C



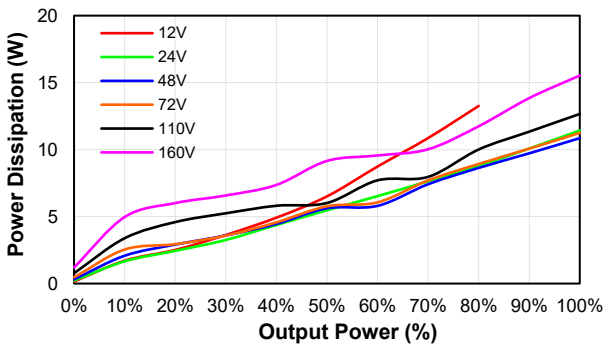
CQB100W14-72S15
Pd Vs Po @25 Deg. C



CQB100W14-72S24
Eff Vs Io @25 Deg. C

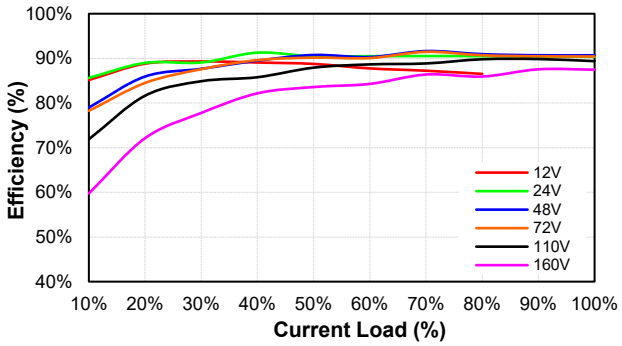


CQB100W14-72S24
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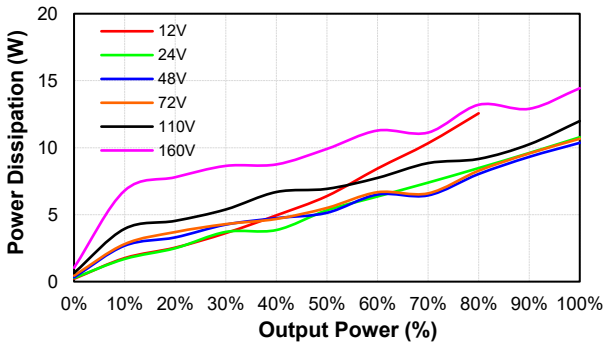


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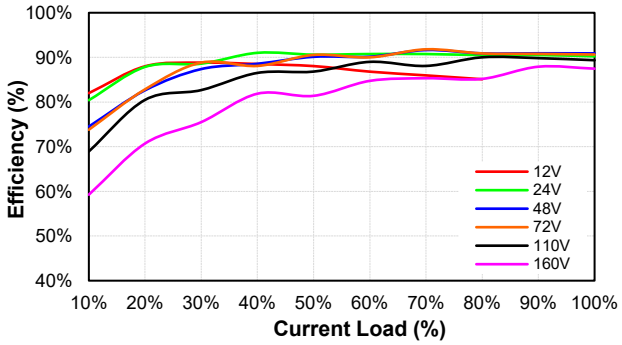
CQB100W14-72S28
Eff Vs Io @25 Deg. C



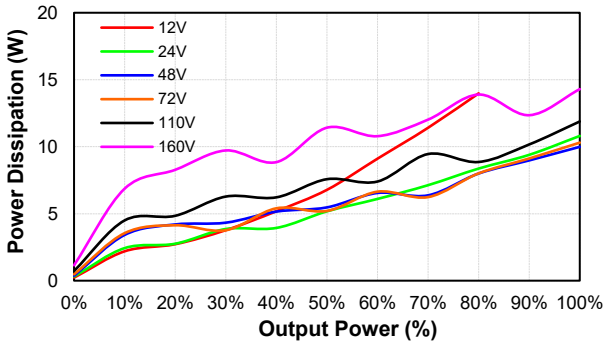
CQB100W14-72S28
Pd Vs Po @25 Deg. C



CQB100W14-72S54
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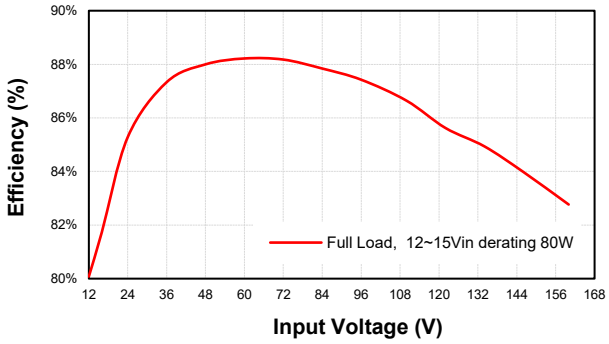


CQB100W14-72S54
Pd Vs Po @25 Deg. C

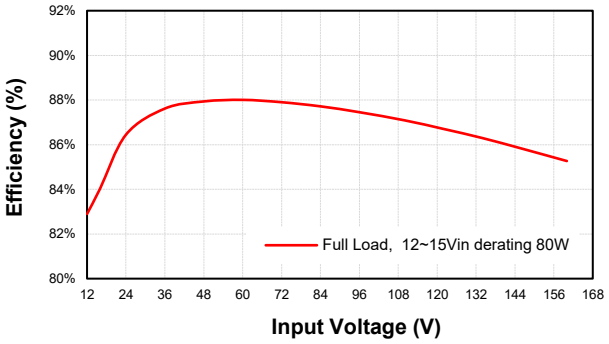


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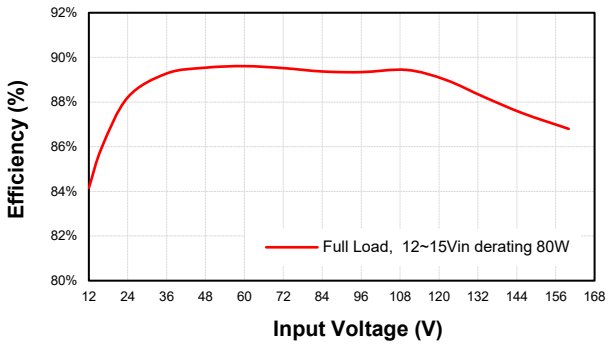
CQB100W14-72S05
Eff Vs Vin @25 Deg. C



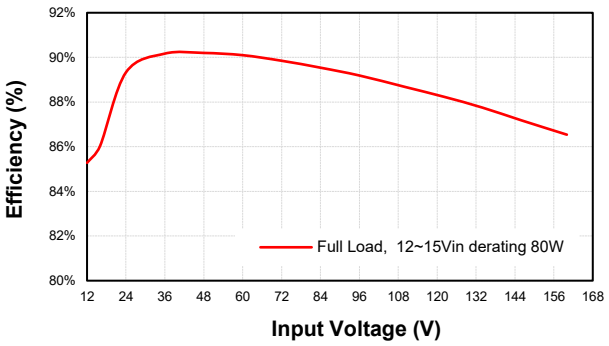
CQB100W14-72S12
Eff Vs Vin @25 Deg. C



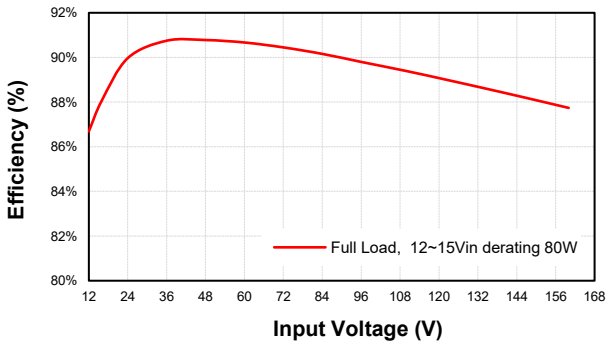
CQB100W14-72S15
Eff Vs Vin @25 Deg. C



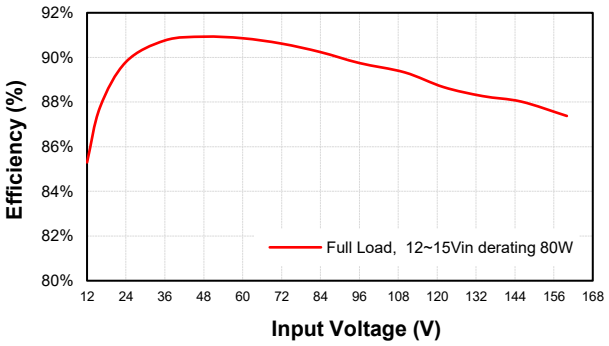
CQB100W14-72S24
Eff Vs Vin @25 Deg. C



CQB100W14-72S28
Eff Vs Vin @25 Deg. C



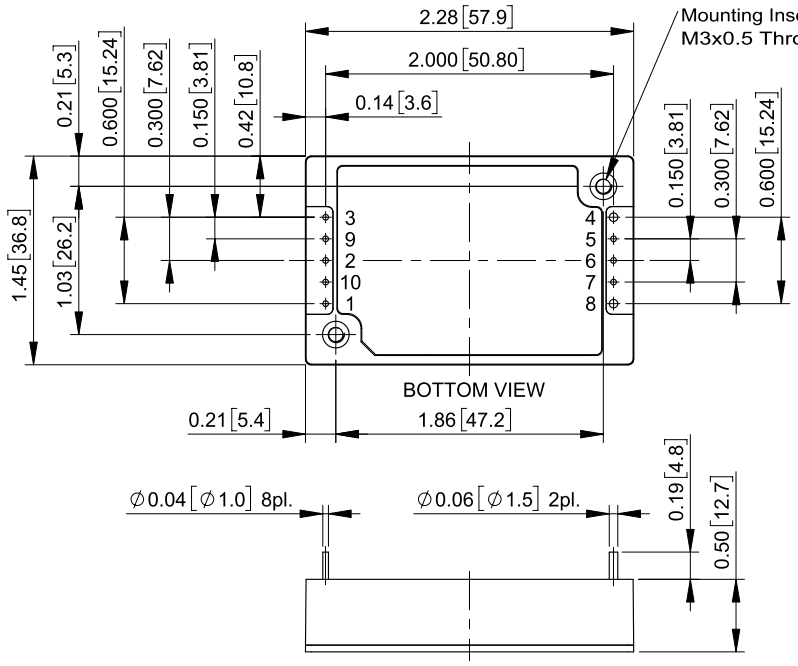
CQB100W14-72S54
Eff Vs Vin @25 Deg. C



Note: 12Vin Efficiency at 80% Full Load

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MECHANICAL SPECIFICATION



All Dimensions in Inches[mm]
Tolerance Inches: x.xx=±0.02, x.xxx=±0.010
Millimeters: x.x=±0.5, x.xx=±0.25

Pin Connection

	Standard	Option -B
Pin	Function	
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)

Note:Pin Size is ∅0.04±0.004 Inch [∅1.0±0.1 mm]
Pin Size is ∅0.06±0.004 Inch [∅1.5±0.1 mm]
NP-No Pin

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