



CQB150W SERIES

150 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 92%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully protected (OTP/OCP/OVP/UVLO)
- 2250Vdc 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 IEC62368-1
- UL62368-1 Approval
- Meets EN50155 with External Circuits
- Shock & Vibration EN50155 (EN61373) Compliant
- Fire & Smoke EN45545-2 Compliant
- 3000m Operating Altitude
- -55°C Operating Available (Suffix "-M2")



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(3)	(2)	
CQB150W-24S05	9-36 VDC	5 VDC	0 mA	30 A	10 mA	7.02 A	91	92	30000uF
CQB150W-24S12	9-36 VDC	12 VDC	0 mA	12.5 A	10 mA	7.02 A	91	92	12500µF
CQB150W-24S15	9-36 VDC	15 VDC	0 mA	10 A	10 mA	7.02 A	91.5	91	10000µF
CQB150W-24S24	9-36 VDC	24 VDC	0 mA	6.3 A	10 mA	7.08 A	89.5	89.5	6300uF
CQB150W-24S28	9-36 VDC	28 VDC	0 mA	5.4 A	10 mA	7.08 A	90	90	5400uF
CQB150W-24S48	9-36 VDC	48 VDC	0 mA	3.2 A	10 mA	7.19 A	90.5	90.5	1000uF
CQB150W-48S05	18-75 VDC	5 VDC	0 mA	30 A	8 mA	3.47 A	92	92	30000uF
CQB150W-48S12	18-75 VDC	12 VDC	0 mA	12.5 A	8 mA	3.47 A	92	91	12500µF
CQB150W-48S15	18-75 VDC	15 VDC	0 mA	10 A	8 mA	3.47 A	92	91	10000µF
CQB150W-48S24	18-75 VDC	24 VDC	0 mA	6.3 A	8 mA	3.50 A	91	90.5	6300uF
CQB150W-48S28	18-75 VDC	28 VDC	0 mA	5.4 A	8 mA	3.50 A	91.5	90.5	5400uF
CQB150W-48S48	18-75 VDC	48 VDC	0 mA	3.2 A	8 mA	3.56 A	92	91.5	1000uF

NOTE:

1. Nominal Input Voltage 24, 48VDC
2. Measured at Nominal Input Voltage
3. Measured at 12VDC for 24V_{in}, 24VDC for 48V_{in}
4. -55°C Start-up Screen per MIL-STD105E S1 Sampling Procedure for "-M2" Version

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts	Operating Case Temp. Range
CQB150W-	II	O	XX	L	-Y (Option)	-Z (Option)
CQB150W	24: 24 VDC 48: 48 VDC	S: Single	05: 5.0VDC 12: 12VDC 15: 15 VDC 24: 24VDC 28: 28VDC 48: 48VDC	None: Positive N: Negative	M3x0.5 Mounting None: Inserts -C: Clear Mounting Insert (3.2mm DIA.)	None: -40~105°C -M2: -55~105°C

Part Number Example:

CQB150W-48S12N: Quarter Brick, 150W, 4:1 18-75Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert



CQB150W 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	24Vin 48Vin	-0.3		36 75	V _{dc}
Input Surge Voltage	100ms max.	24Vin 48Vin			50 100	V _{dc}
Operating Ambient Temperature	At the Center Part of Case Plate (with Derating) Suffix "-M2" (with Derating)	All -M2	-40		105 105	°C
Maximum Case Temperature		All			110	°C
Storage Temperature		All	-55		125	°C

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		24Vin 48Vin	9 18	24 48	36 75	V _{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold		24Vin 48Vin	8 16.5	8.5 17	8.8 17.5	V _{dc}
Turn-Off Voltage Threshold		24Vin 48Vin	7.7 15.5	8 16	8.3 16.5	V _{dc}
Lockout Hysteresis Voltage		24Vin 48Vin		0.6 0.9		V _{dc}
Maximum Input Current	V _{in} =9V, Full load. V _{in} =18V, Full load	24Vin 48Vin		20 10		A
No-Load Input Current	V _{in} =24, 48V, I _o =0A		See Model Number Table			mA
Input Filter	Pi filter	All				
Inrush Current (I ² t)	As per ETS300 132-2.	All			0.1	A ² 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 _{in} =24, 48V, Full Load, T _c =25°C	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°C to 105°C	All			±0.02	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF tantalum and 1.0uF ceramic capacitors (for V _o : 48V: Full Load 10uF aluminum and 1uF ceramic)	5Vo 12Vo 15Vo 48Vo Others			100 150 150 480 280	mV
RMS		5Vo 12Vo 15Vo 48Vo Others			40 60 60 200 100	



CQB150W Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Current Range	$V_{in}= 9 \text{ to } 36\text{V}, 18 \text{ to } 75\text{V}$	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	125	160	%
Over Voltage Protection	Limited Voltage	All	110	125	140	%
Short Circuit Protection		All	Continuous, Auto Recovery.			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	$P_o \leq \text{max rated power}, I_o \leq I_{o_max}$	15Vo	-20		+10	
		Other	-10		+10	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	$V_{in}=24\text{V}, 48\text{V}$	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	All			±5	%
Recovery Time	$dI/dt=0.1\text{A/us}$ (within 1% V_{out} nominal)	All			250	us
Turn-On Delay and Rise Time						
Turn-On Delay Time, From On/Off Control	Full load (Constant resistive load)					
Turn-On Delay Time, From On/Off Control	$V_{on/off}$ to 10% V_{o_set} , Remote on	All		30		ms
Turn-On Delay Time, From Input	V_{in_min} to 10% V_{o_set} , Power up	All		30		ms
Output Voltage Rise Time	10% V_{o_set} to 90% V_{o_set}	All		30		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,				2250	V_{dc}
	1 minute; Input to case	All			2250	
	1 minute; Output to case				2250	
Isolation Resistance	Input to output	All	100			MΩ
Isolation Capacitance	Input to output			1500		pF
	Input to case	All		NC		
	Output to case			NC		

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse wide modulation (PWM), Fixed	48S12	260	285	320	KHz
		Others	270	300	330	
On/Off Control, Positive Remote On/Off logic, Refer to $-V_{in}$ pin.						
Logic Low (Module Off)	$V_{on/off}$ at $I_{on/off}=1.0\text{mA}$	-M2	0		1.0	V
		Other	0		1.2	
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0\mu\text{A}$, Pin open=On	All	3.5		75	V
On/Off Control, Negative Remote On/Off logic, Refer to $-V_{in}$ pin						
Logic High (Module Off)	$V_{on/off}$ at $I_{on/off}=0.0\mu\text{A}$, Pin open=Off	All	3.5		75	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}=1.0\text{mA}$	-M2	0		1.0	V
		Other	0		1.2	
On/Off Current (for both remote on/off logic)	$I_{on/off}$ at $V_{on/off}=0\text{V}$	All		0.3	1	mA
Leakage Current (for both remote on/off logic)	Logic High, $V_{on/off}=15\text{V}$	All			30	uA
Off Converter Input Current	Shutdown input idle current	All		5	10	mA
Over Temperature Shutdown	Temperature at the Center Part of Case,	All		110		°C
Over Temperature Recovery	Non-Latching	All		100		°C



CQB150W Series

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	05Vo		309		K hours
		12Vo		331		
		15Vo		354		
		24Vo		563		
		28Vo		560		
		48Vo		667		
Weight		All		68		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/EN61373 Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	5000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN45545-2 Compliant					
EMI	Meets EN55032 & EN50155 Compliant (with external filter)					Class A
ESD	EN61000-4-2 Level 3: Air ± 8 kV, Contact ± 6 kV					Perf. Criteria A
Radiated immunity	EN61000-4-3 Level 3: 80~1000MHz, 20V/m					Perf. Criteria A
Fast Transient	EN61000-4-4 Level 3: On power input port, ± 2 kV, external input capacitor required					Perf. Criteria A
Surge	EN61000-4-5 Level 4: Line to earth, ± 4 kV, Line to line, ± 2 kV					Perf. Criteria A
Conducted immunity	EN61000-4-6 Level 3: 0.15~80MHz, 10V					Perf. Criteria A
Interruptions of Voltage Supply	EN50155 Class S3: 20ms interruptions, external input capacitor required					Perf. Criteria A
Supply Change Over	EN50155 Class C2: During a supply break of 30 ms, external input capacitor required					Perf. Criteria A
Application Note Link			CQB150W Series App Notes			
Packaging Information Link			Packaging Information			

Immunity to Environmental Conditions.

Phenomenon	EN50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Start-up 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 & ST2 Temperature: 85°C Duration: 6 hrs Extended temperature: 100°C Extended Duration: 10min	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 - 55°C Humidity: 90% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 25°C +/- 10°C 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°C +/-10°C 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



CQB150W Series

Phenomenon	EN50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
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

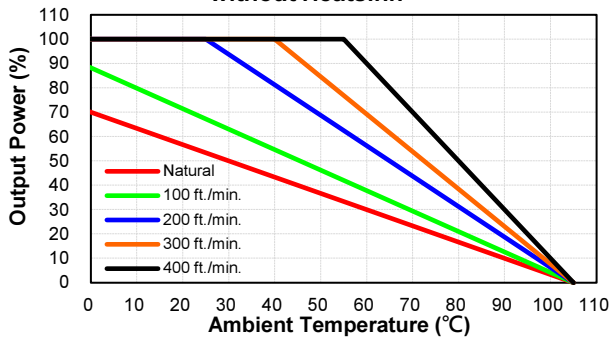
EN45545-2 Fire & Smoke Test Conditions.

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
	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

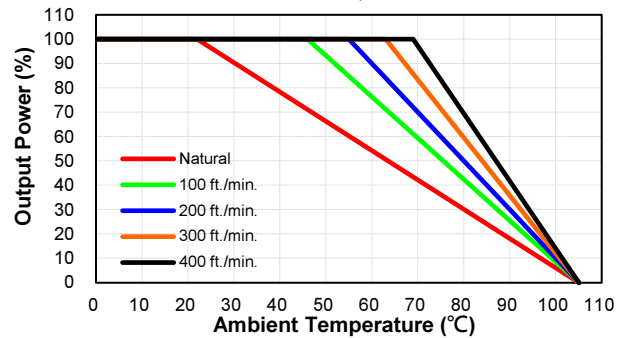
CHARACTERISTIC CURVE

Power Derating Curve

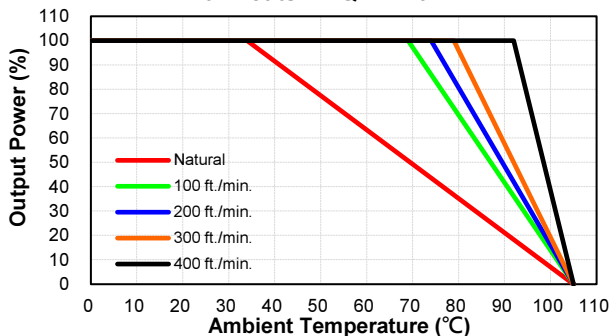
CQB150W Derating Curve without Heatsink



CQB150W Derating Curve with Heatsink QBL127



CQB150W Derating Curve with Heatsink QBT210

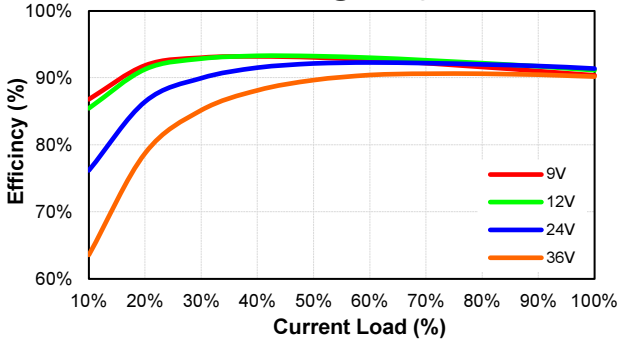




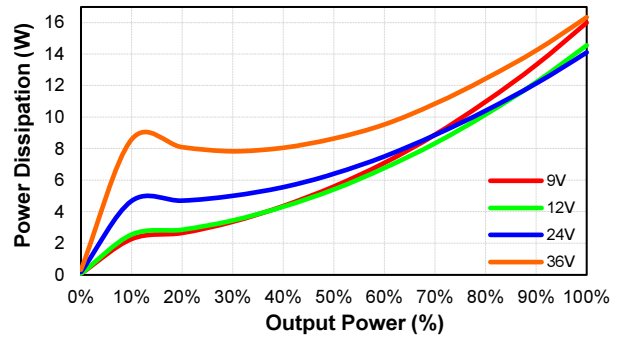
CQB150W Series

Performance Data

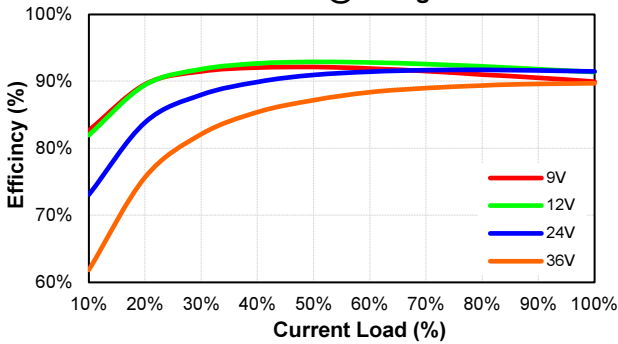
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Eff Vs Io @25 Deg. C



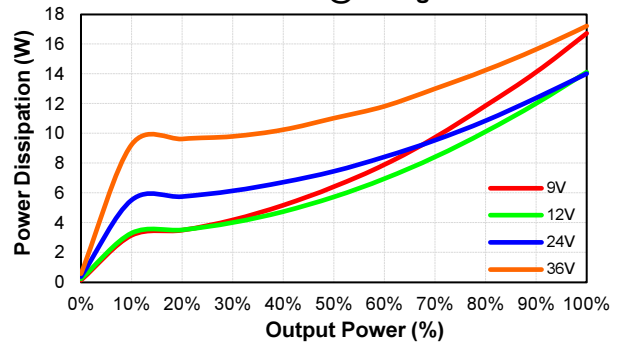
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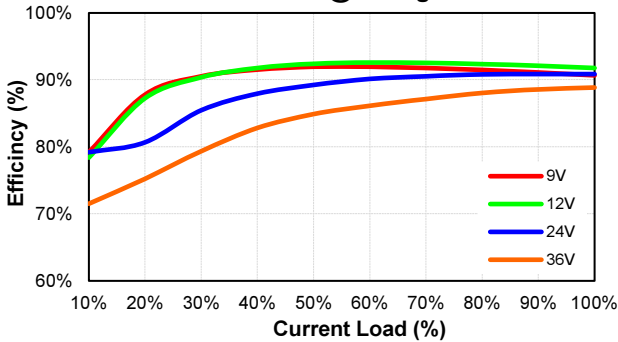
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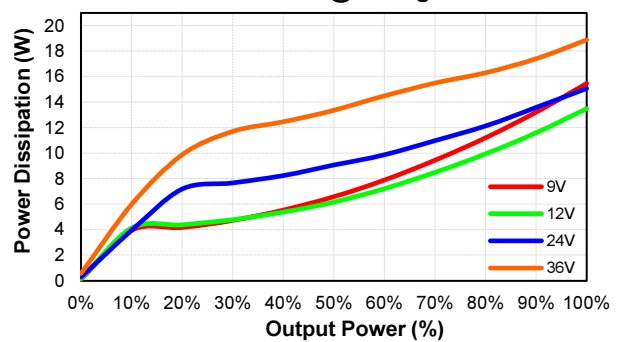
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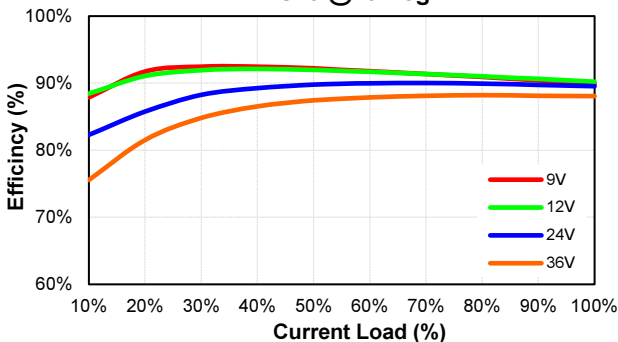
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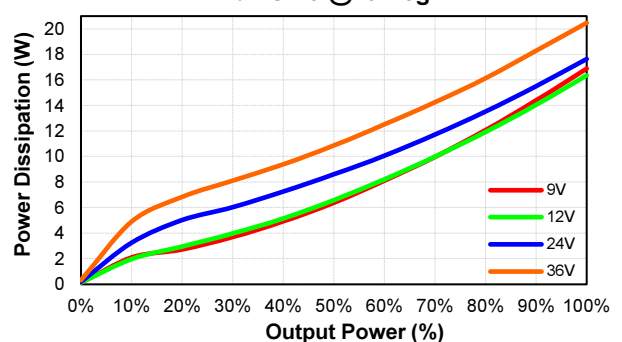
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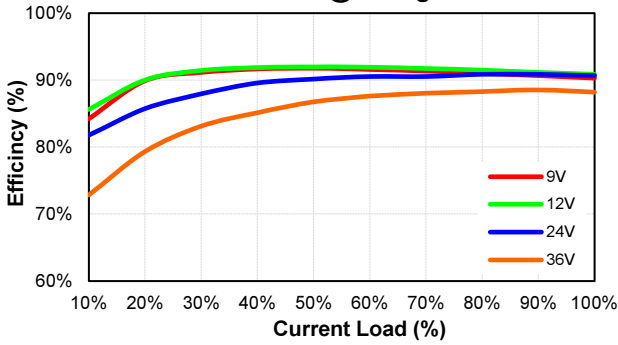
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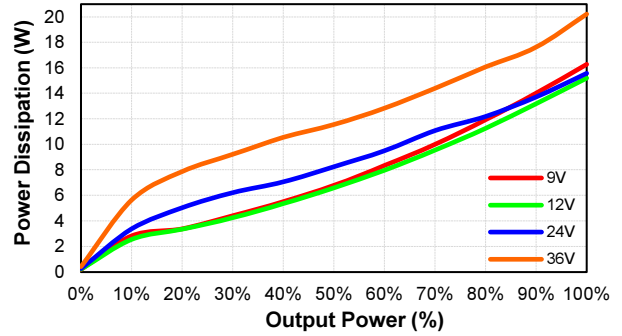


CQB150W Series

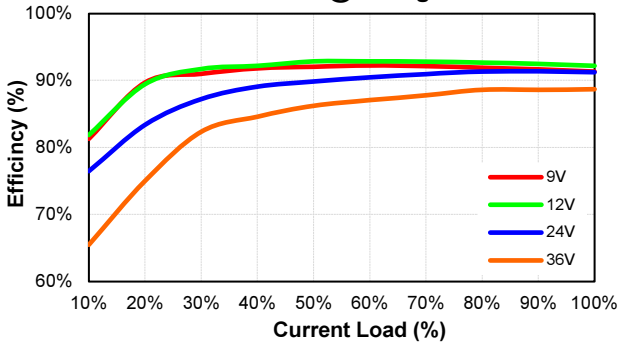
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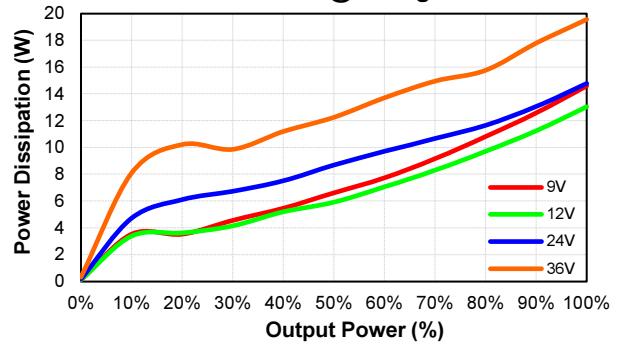
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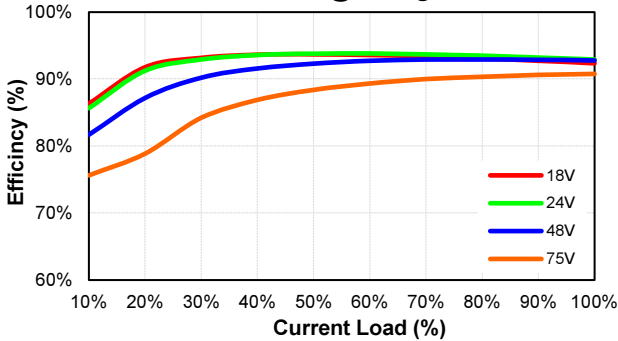
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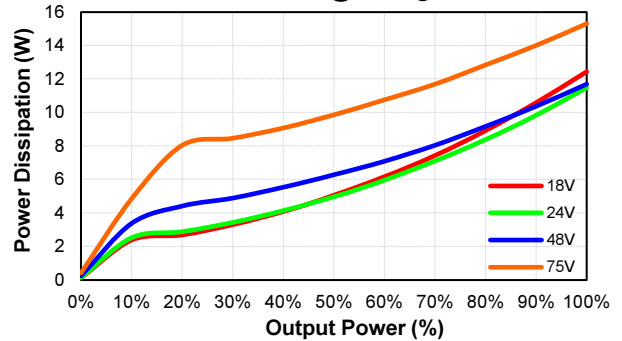
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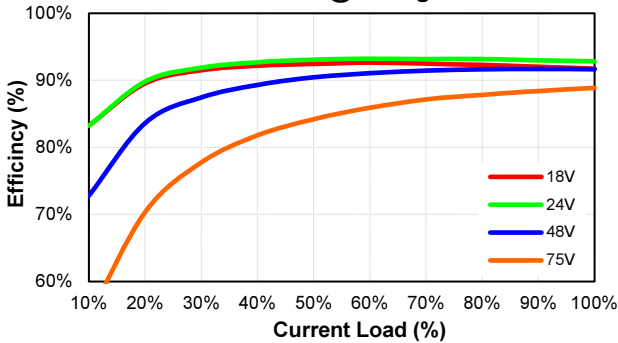
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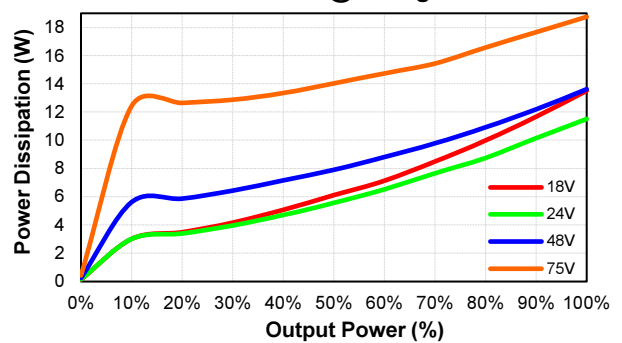
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CQB150W-48S12
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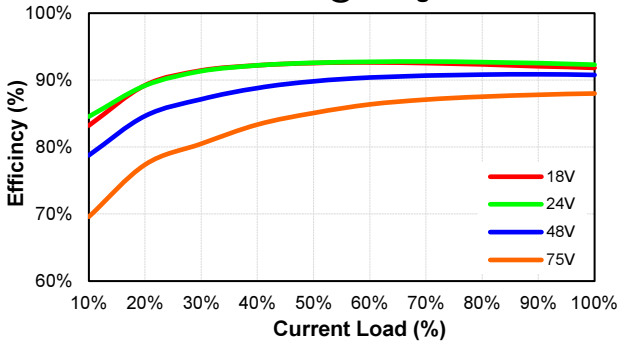
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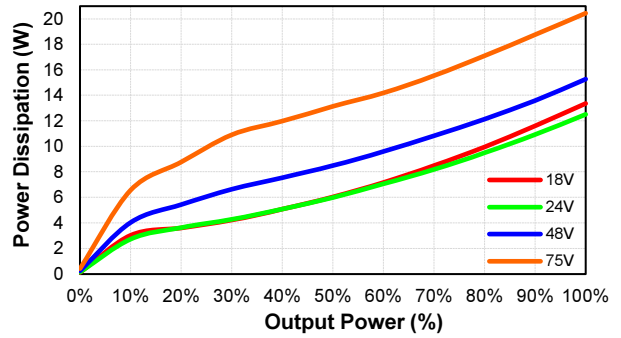


CQB150W Series

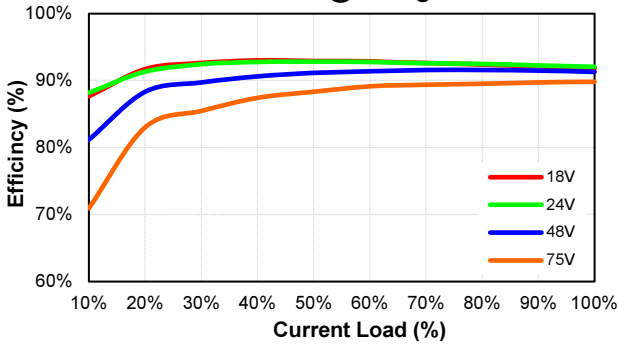
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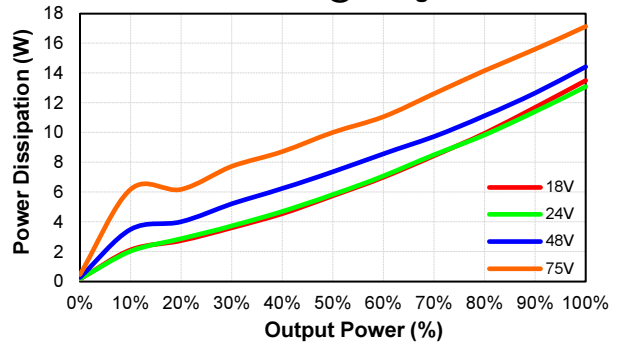
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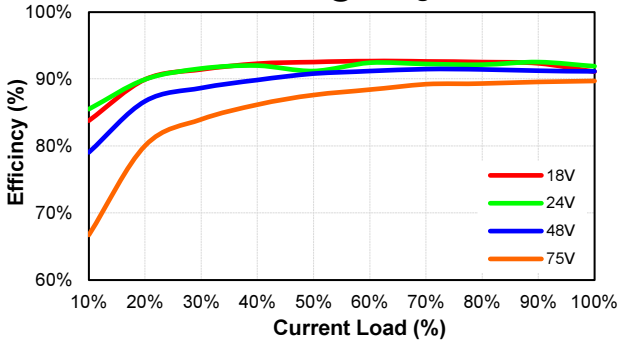
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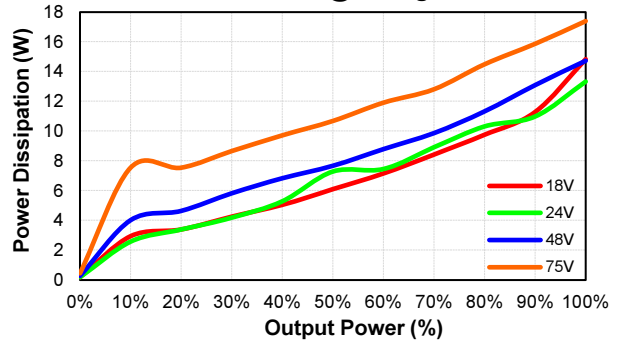
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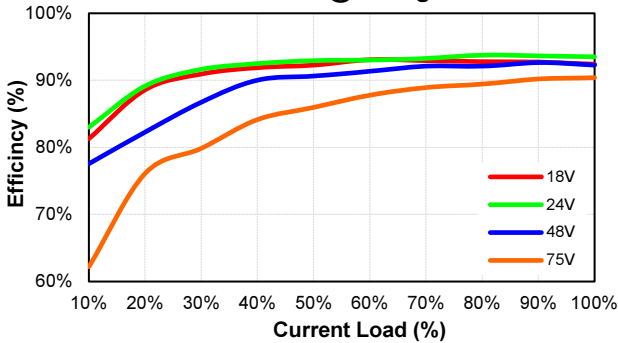
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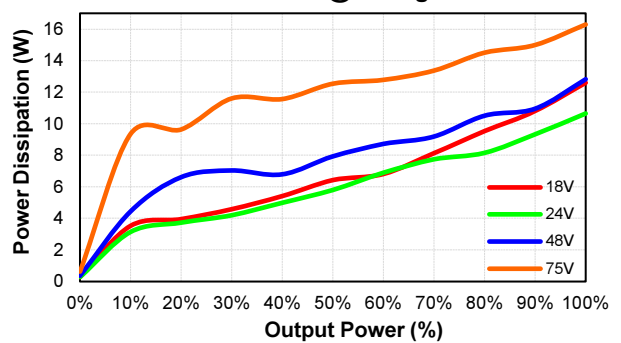
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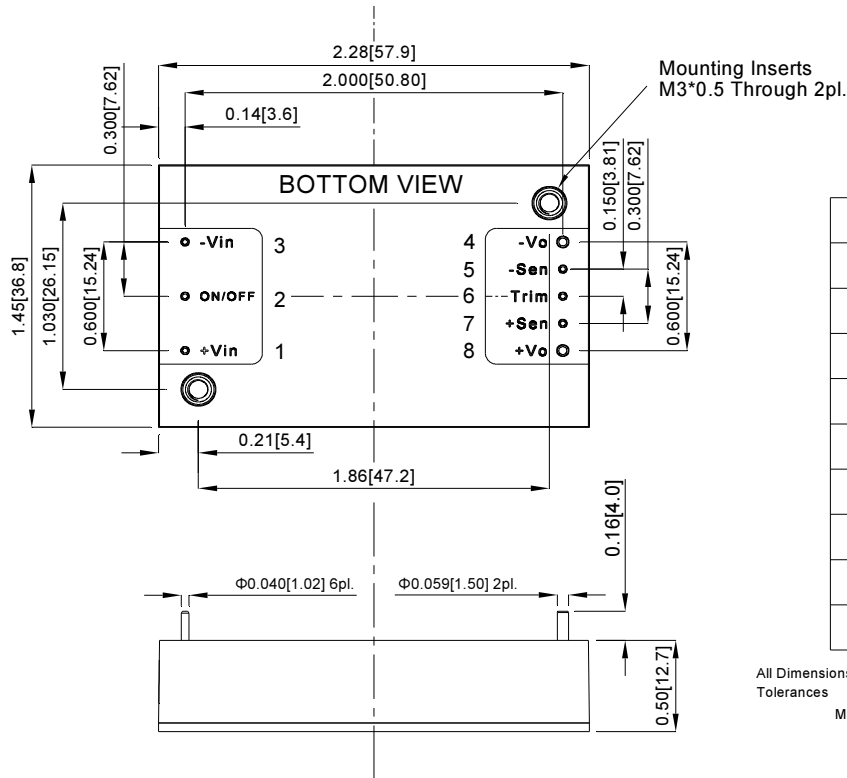
CQB150W-48S48
Pd Vs Po @25 Deg. C





CQB150W Series

MECHANICAL SPECIFICATION



PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

All Dimensions In Inches(mm)
 Tolerances Inches: X.XX= ±0.02 , X.XXX= ±0.010
 Millimeters: X.X= ±0.5 , X.XX=±0.25

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