



CQB60W-110S SERIES

60 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/OCV/OVP/UVLO)
- 3000Vdc 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 (Basic Insulation) Approval
- EN 50155 Compliant with External Circuits
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 4000m Operating Altitude
- Safety Meets IEC/EN/UL 62368-1



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (1)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB60W-110S05	43-160 VDC	05 VDC	0 mA	12 A	5 mA	600 mA	91	6800uF
CQB60W-110S12	43-160 VDC	12 VDC	0 mA	5 A	5 mA	593 mA	92	3300uF
CQB60W-110S15	43-160 VDC	15 VDC	0 mA	4 A	5 mA	606 mA	90	3300uF
CQB60W-110S24	43-160 VDC	24 VDC	0 mA	2.5 A	5 mA	606 mA	90	1200μF
CQB60W-110S28	43-160 VDC	28 VDC	0 mA	2.14 A	5 mA	606 mA	90	1200μF
CQB60W-110S48	43-160 VDC	48 VDC	0 mA	1.25 A	5 mA	613 mA	89	470μF

NOTE:

1. Nominal Input Voltage 110 VDC.
2. An External Input Capacitor 68uF 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
CQB60W-	II	O	XX	L	-Y (Option)
CQB60W	110 : 110 VDC	S : Single	05 : 05VDC 12 : 12VDC 15 : 15VDC 24 : 24VDC 28 : 28VDC 48 : 48VDC	None : Positive N : Negative	None : M3x0.5 Mounting Inserts -C : Clear Mounting Insert (3.2mm DIA.)

Part Number Example:

CQB60W-110S12N-C: Quarter Brick, 60W, 4:1 43-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert



CQB60W-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 _{dc}
Input Surge Voltage	100ms max.	All			180	V _{dc}
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	43	110	160	V _{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All	40.5	42	42.5	V _{dc}
Turn-Off Voltage Threshold		All	37.5	38	39.5	V _{dc}
Lockout Hysteresis Voltage		All		03		V _{dc}
Maximum Input Current	V _{in} =43V, Full load	All		1.57		A
No-Load Input Current	V _{in} =110V, 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} =110V, 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 100°C	All			±0.03	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF tantalum capacitor and 1uF ceramic capacitors	5Vo			100	mV
		12Vo			150	
		15Vo			150	
		24Vo			240	
		28Vo			240	
		48Vo			480	
RMS.		5Vo			40	mV
		12Vo			60	
		15Vo			60	
		24Vo			100	
		28Vo			100	
		48Vo			200	
Output Current Range	V _{in} = 43 to 160V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	150	165	%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	P _o ≤max. rated power, I _o ≤ I _{o_max} .	All	-10		+10	%
Output Voltage Remote Sense Range	P _o ≤max. rated power, I _o ≤ I _{o_max} . % of nominal V _o	All			+15	%
Over Voltage Protection	Limited voltage, % of nominal V _o	All	115	125	140	%



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EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	$V_{in}=110V$	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 =0.1A/us (within 1% V _{out_nominal})	All			±5	%
Recovery Time					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		10		ms
Turn-On Delay Time, From Input	V _{in_min.} to 10%V _{o_set} , Power up	All		15		ms
Output Voltage Rise Time	10%V _{o_set} to 90%V _{o_set}	All		10		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			3000	V_{dc}
	1 Minute; input to case (base plate)				3000	V_{dc}
	1 Minute; output to case (base plate)				1500	V_{dc}
Isolation Resistance	Input to output	All	10			M Ω
Isolation Capacitance	Input to output	All		1000		pF
	Input to case (base plate)			1000		
	Output to case (base plate)			1000		

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		1.2	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0uA$, Pin open=on	All	3.5 or Open Circuit		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 or Open Circuit		75	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		0.3	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		2	5	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All		110		$^{\circ}C$
Over Temperature Recovery				100		

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 $^{\circ}C$	All		650		K hours
Weight		All		61.5		grams



CQB60W-110S Series

GENERAL SPECIFICATIONS

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	4000m Operating altitude, 12000m Transport altitude		
Thermal Shock	MIL-STD-810F		
Fire & Smoke	EN 45545-2 Compliant		
EMI	Meets EN 55032 & EN 50121-3-2 Compliant (with external filter)		Class A
ESD	EN 61000-4-2	Level 3: Air $\pm 8\text{kV}$, Contact $\pm 6\text{kV}$	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, $\pm 2\text{kV}$, external input capacitor required	Perf. Criteria A
Surge	EN 61000-4-5	Level 4: Line to Line, $\pm 0.5\text{kV}$, Line to line, $\pm 1\text{kV}$	Perf. Criteria A
Conducted immunity	EN 61000-4-6	Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Application Note Link		CQB60W-110S Series App Notes	
Packaging Information Link		Packaging Information	

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 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: $25^{\circ}\text{C} - 55^{\circ}\text{C}$ Humidity: 59% RH Duration: 48 hrs	Pass
Random and Increased Random Vibration Test	13.4.11	EN 61373	Temperature: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ Humidity: 65% $\pm 5\%$ 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
Shock Test	13.4.11	EN 61373	Temperature: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ Humidity: 65% $\pm 5\%$ RH Frequency range: 5 ~ 150 Hz $\pm$ Vertical: 30 m/s^2 $\pm$ Transverse: 30 m/s^2 $\pm$ Longitudinal: 30 m/s^2 Duration: 30ms x18 (Each axis 3 shocks)	Pass



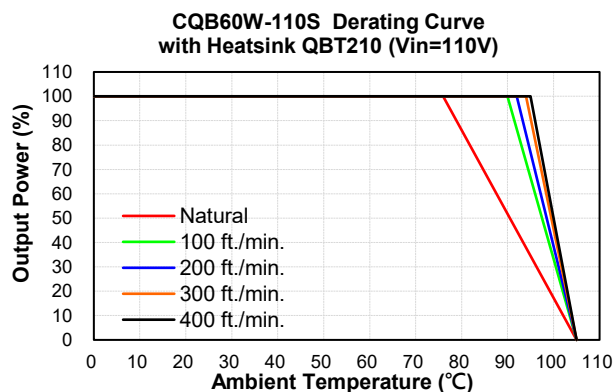
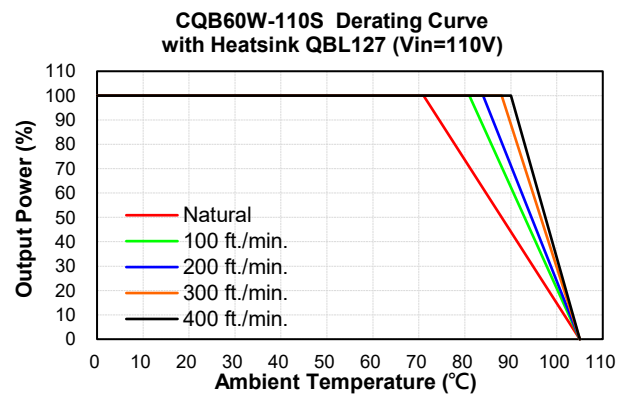
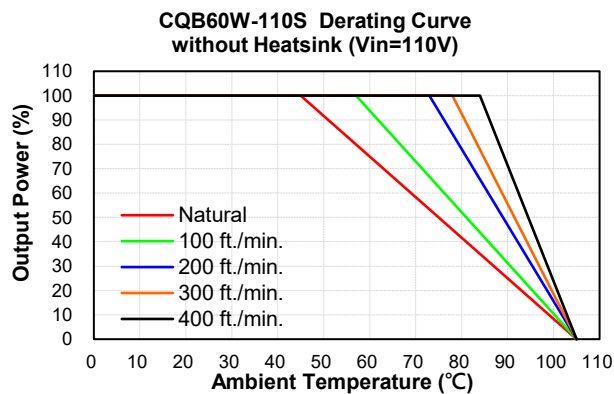
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EN 45545-2 Fire & Smoke Test Conditions

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	EN 45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2:2020+A1:2023 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

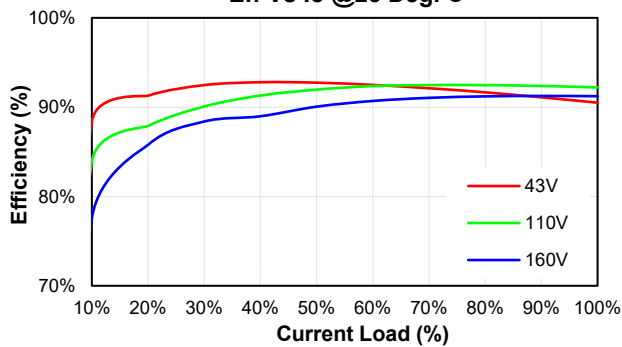




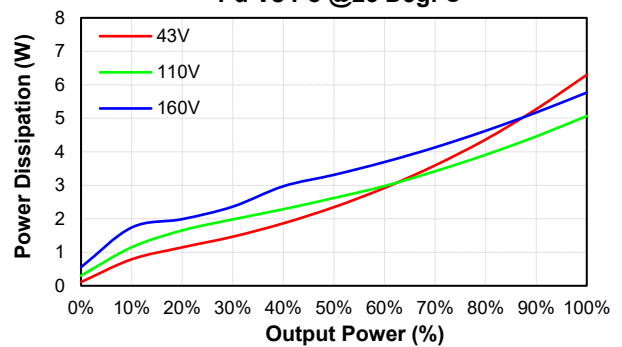
Performance Data

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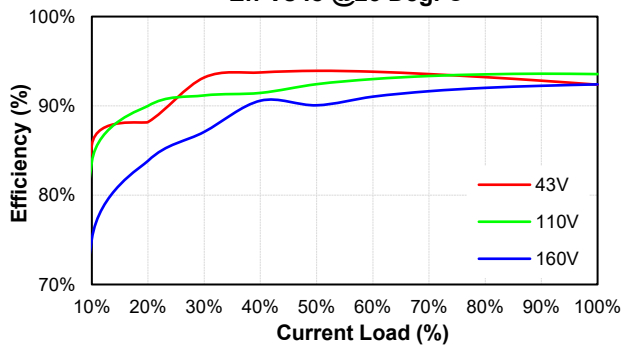
CQB60W-110S05
Eff Vs Io @25 Deg. C



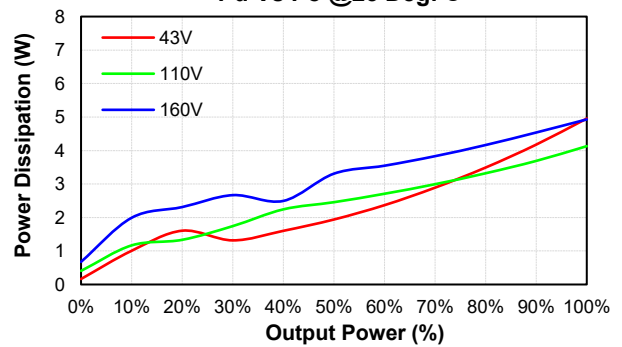
CQB60W-110S05
Pd Vs Po @25 Deg. C



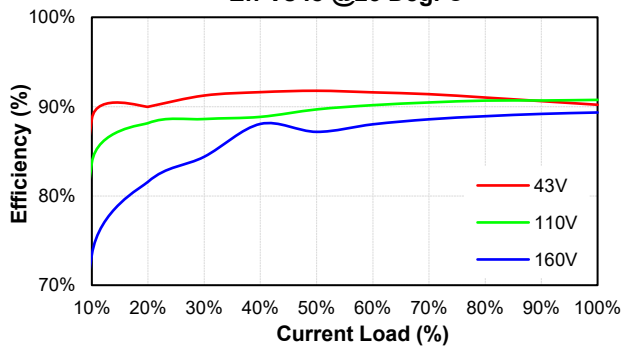
CQB60W-110S12
Eff Vs Io @25 Deg. C



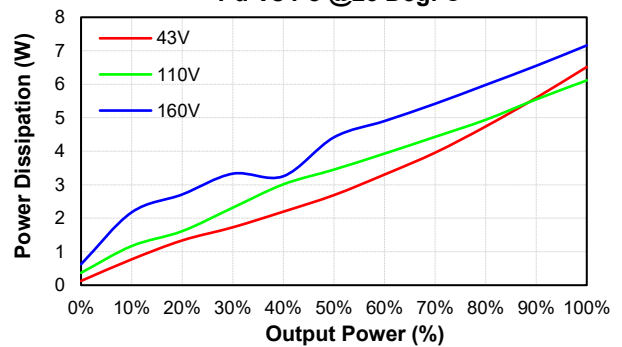
CQB60W-110S12
Pd Vs Po @25 Deg. C



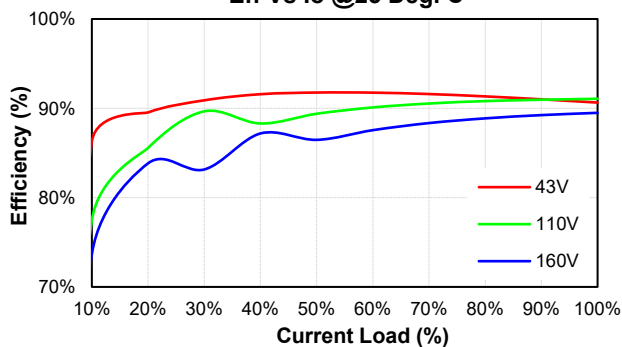
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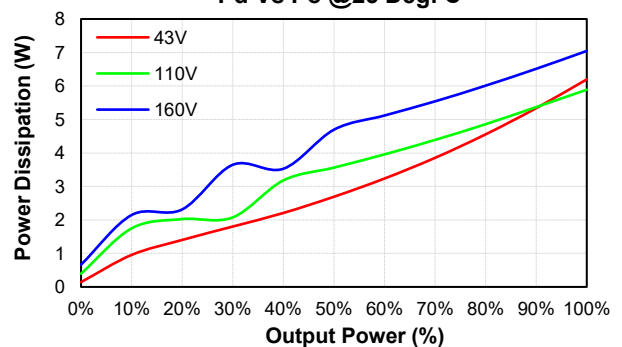
CQB60W-110S15
Pd Vs Po @25 Deg. C



CQB60W-110S24
Eff Vs Io @25 Deg. C



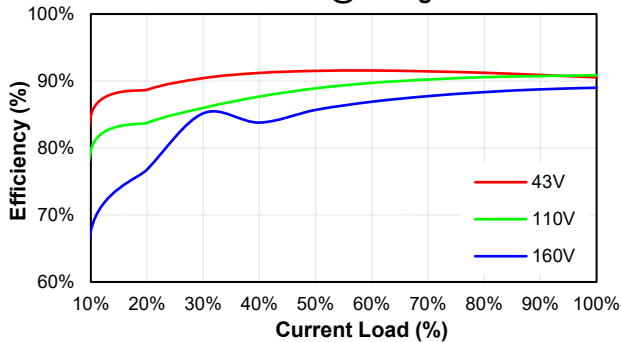
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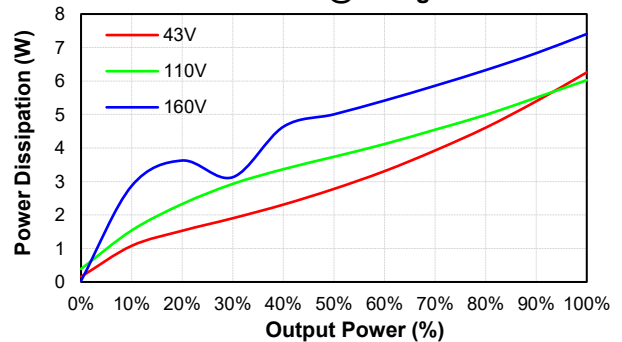


CQB60W-110 Series

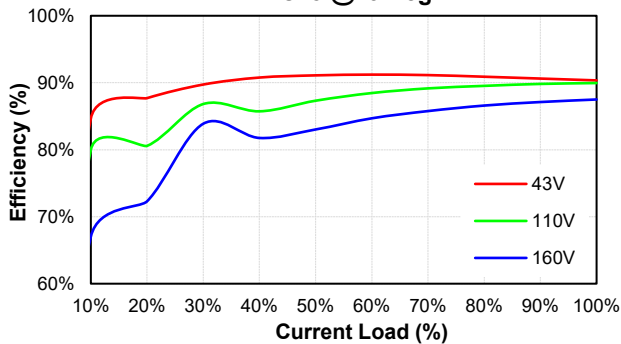
CQB60W-110S28
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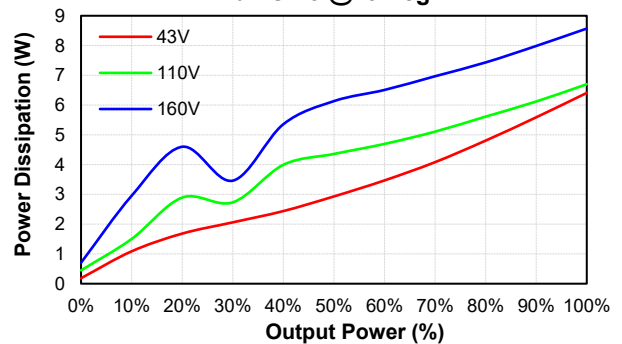
CQB60W-110S28
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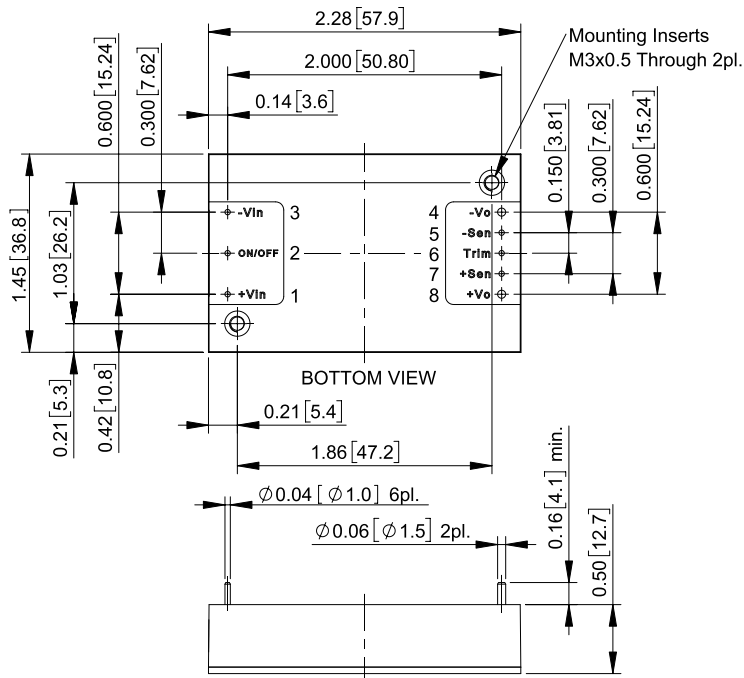
CQB60W-110S48
Eff Vs Io @25 Deg. C



CQB60W-110S48
Pd Vs Po @25 Deg. C



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

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

Note: Pin Size is $\phi 0.04 \pm 0.004$ Inch [$\phi 1.0 \pm 0.1$ mm]
Pin Size is $\phi 0.06 \pm 0.004$ Inch [$\phi 1.5 \pm 0.1$ mm]

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