CQB150-300S SERIES
150 WATT 2:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 89%
- 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"
- IEC/EN/UL 62368-1 (Reinforce Insulation) Approval
- CB Test Certificate IEC62368-1
- Shock & Vibration MIL-STD-810F(EN61373) Compliant
- Fire & Smoke EN45545 Compliant
- 2000m Operating Altitude
- -55℃ Operating Available (Suffix "-M2")

E176177

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (2)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB150-300S05	180-425 VDC	5 VDC	0 mA	30 A	10 mA	580 mA	86	10000μF
CQB150-300S12	180-425 VDC	12 VDC	0 mA	12.5 A	10 mA	560 mA	89	8800μF
CQB150-300S15	180-425 VDC	15 VDC	0 mA	10 A	10 mA	560 mA	89	8800μF
CQB150-300S24	180-425 VDC	24 VDC	0 mA	6.25 A	10 mA	570 mA	88.5	3300μF
CQB150-300S28	180-425 VDC	28 VDC	0 mA	5.4 A	10 mA	570 mA	88.5	3300μF
CQB150-300S48	180-425 VDC	48 VDC	0 mA	3.2 A	10 mA	570 mA	89	1000μF

NOTE:

1. Nominal Input Voltage 300 VDC.
2. Measured at 300Vin.
3. Require a Ceramic Capacitor 1500pF Connected Between –Vin to Case for All Models.
4. An External Input Capacitor 68uF for All Models are Recommended to Reduce Input Ripple Voltage.
5. -55℃ 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
CQB15 0-	II	O	XX	L	-Y (Option)	-Z (Option)
CQB150	300 : 300 VDC	S : Single	05 : 5.0VDC 12 : 12VDC 15 : 15 VDC 24 : 24VDC 28 : 28VDC 48 : 48VDC	None : Positive N : Negative	None : M3x0.5 Mounting Inserts -C : Clear Mounting Insert (3.2mm DIA.)	None : -40~105℃ -M2 : -55~105℃

Part Number Example:

CQB150-300S12N-C-M2: Quarter Brick, 150W, 2:1 180-425Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert -55~105℃ Operating Case Temp. Range

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		425	V_{dc}
Input Surge Voltage	100ms max.	All			500	V_{dc}
Operating Case Temperature	At the center part of case plate (with Derating) Suffix "-M2" (with Derating)	All -M2	-40 -55		105 105	℃
Storage Temperature		All	-55		125	℃

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	180	300	425	V_{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All	165	170	175	V_{dc}
Turn-Off Voltage Threshold		All	155	160	165	V_{dc}
Lockout Hysteresis Voltage		All		10		V_{dc}
Input Over Voltage Lockout						
Turn-Off Voltage Threshold		All		500		V_{dc}
Turn-On Voltage Threshold		All		440		V_{dc}
Maximum Input Current	V_{in}=180V, Full load	All		1000		mA
No-Load Input Current	V_{in}=300V, Io=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}=300V, 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	Output ripple and noise measured with an external MLCC 1000pF connected between –Vin to Case, and 10uF aluminum and 1uF ceramic capacitor across output for 48Vout, and with 10uF tantalum and 1uF ceramic capacitor for others	05Vo 12Vo 15Vo 24Vo 28Vo 48Vo			100 150 150 280 280 480	mV
RMS.		05Vo 12Vo 15Vo 24Vo 28Vo 48Vo			60 60 60 100 100 200	mV
Output Current Range	V_{in}= 180 to 425V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	125	160	%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Trim Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o\_max.}$	All	-20		+10	%
Output Voltage Remote Sense Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o\_max.}$ % of nominal V_o	All			+10	%
Over Voltage Protection	Limited voltage, % of nominal V_o	All	115	125	140	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V_{in}=300V, Full load	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		250		ms
Turn-On Delay Time, From Input	V_{in_min} to 10%V_{o_set}, Power up	All		250		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	All			3000 4200	V_{ac} V_{dc}
	1 Minute; input to case (base plate)	All			2500 3500	V_{ac} V_{dc}
	1 Minute; output to case (base plate)	All			500 700	V_{ac} V_{dc}
Isolation Resistance	Input to output	All	100			MΩ
Isolation Capacitance	Input to output Input to case (base plate) Output to case (base plate)	All All All		None None 10000		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse width modulation (PWM), fixed	All	330	360	390	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	-M2 Others	0 0		1.0 1.2	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	-M2 Others	0 0		1.0 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

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Off Converter Input Current	Shutdown input idle current	All		2.5	4	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All		110		℃
Over Temperature Recovery		All		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℃	300S05		810		K hours
		300S12		870		
		300S15		930		
		300S24		900		
		300S28		790		
		300S48		1100		
Weight		All		65		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					
Humidity	95% RH max. Non Condensing					
Altitude	2000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN45545-2 Compliant					
EMI	Meets EN55032 & EN55022 Compliant (with external filter)					Class A
ESD	EN61000-4-2	Level 3: Air ±8kV, Contact ±6kV				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, ±2kV, external input capacitor required				Perf. Criteria A
Surge	EN61000-4-5	Level 4: Line to earth, ±4kV, Line to line, ±2kV				Perf. Criteria A
Conducted immunity	EN61000-4-6	Level 3: 0.15~80MHz, 10V				Perf. Criteria A
Power Frequency Magnetic Field immunity	EN61000-4-8	50/60Hz, 3A/m (r.m.s.)				Perf. Criteria A
Application Note Link						CQB150-300S Series App Notes
Packaging Information Link						Packaging Information

Immunity to Environmental Conditions

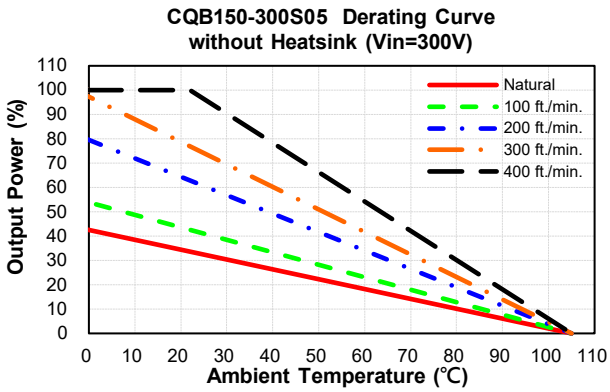
Phenomenon	Reference Clause	Reference Standard	Test Conditions	Result
Vibration Test	MIL-STD-810F Table 514.5C-VIII Figure 514.5C-6	MIL-STD-810F	Unit are Non-Operating Vibration Waveform: Random Vibration Frequency: 15 ~ 2000 Hz Vibration axis: X、Y、Z axis Duration: 1hr / axis	Pass
Shock Test	MIL-STD-810F 516.5 Table 516.5-I	MIL-STD-810F	Wave form: Sawtooth Wave Test Category: Crash Hazard Test for Ground Equipment Duration: 10 ms Peak Acceleration: 75 G Cross-Over Frequency: 80 Hz No. of Shock：Each axis 3 times Shock Direction: ±X, ±Y, ±Z axis	Pass
Thermal Shock Cycling Test	MIL-STD-810F 503.4 Figure 503.4-1	MIL-STD-810F	Temperature: -55℃ to 105℃ Humidity: 95%RH Duration: 8hrs/ 3 times cycling & 4hrs dwell time	Pass
Thermal Humidity Cycling Test	MIL-STD-810F Notice 3 Method 507.4	MIL-STD-810F	Temperature: 60℃ to 30℃ Humidity: 95%RH Duration: 240 hrs	Pass

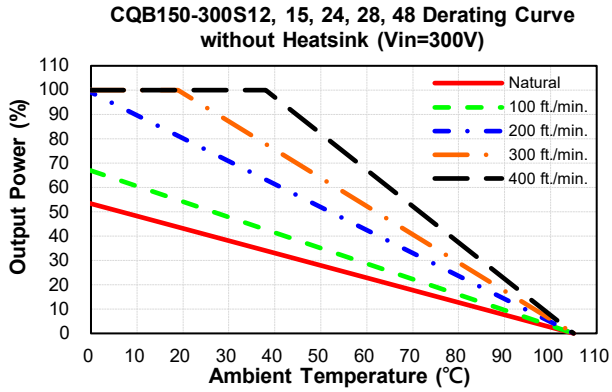
EN45545-2 Fire & Smoke Test Conditions

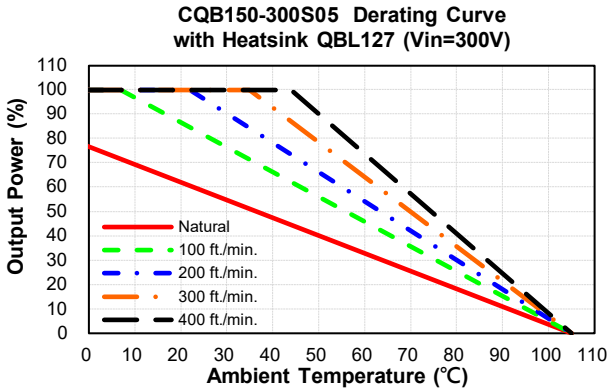
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1,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

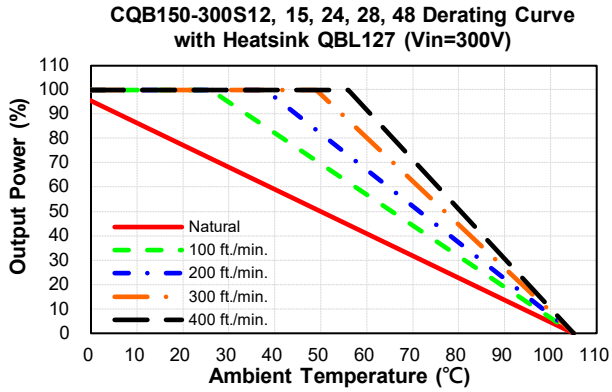
CHARACTERISTIC CURVE

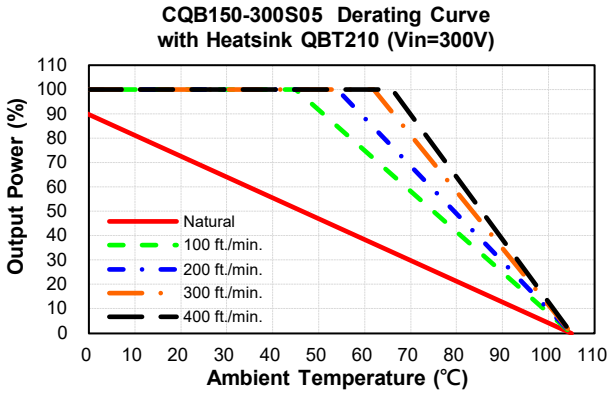
Power Derating Curve

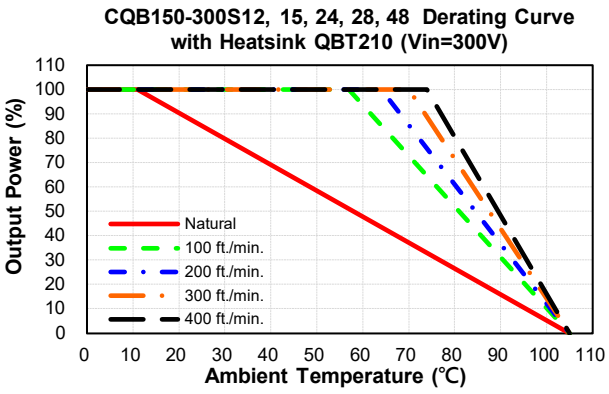












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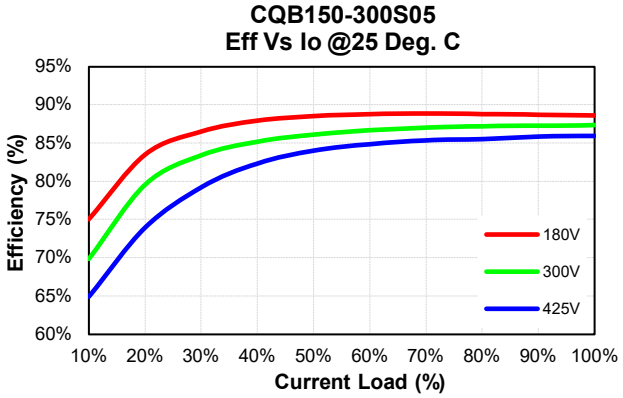
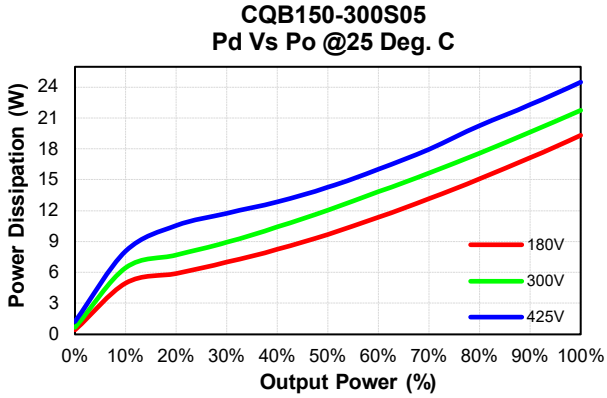
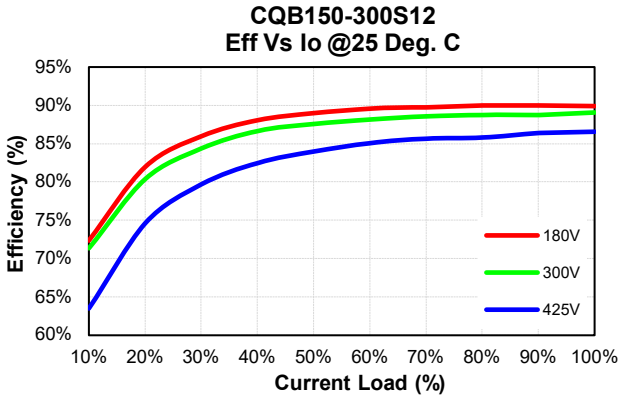
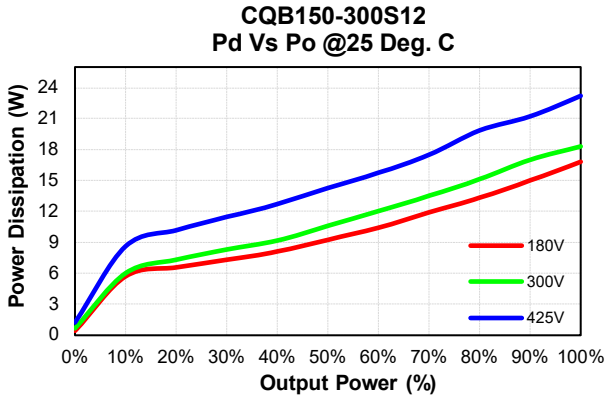
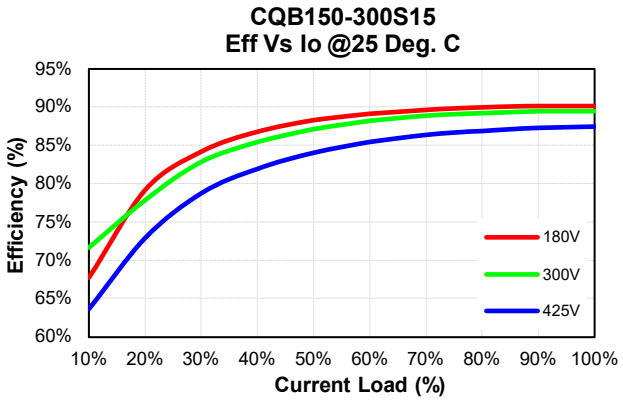
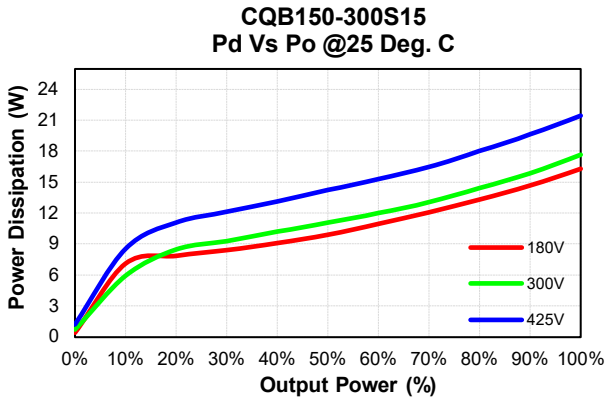




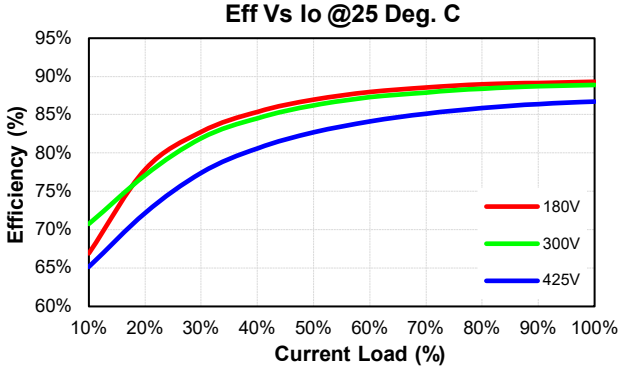




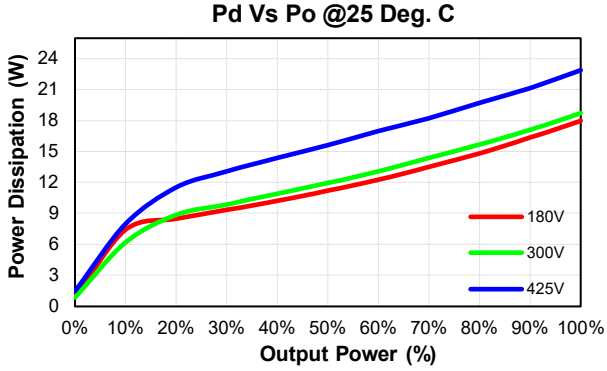




CQB150-300S24
Eff Vs Io @25 Deg. C



CQB150-300S24
Pd Vs Po @25 Deg. C



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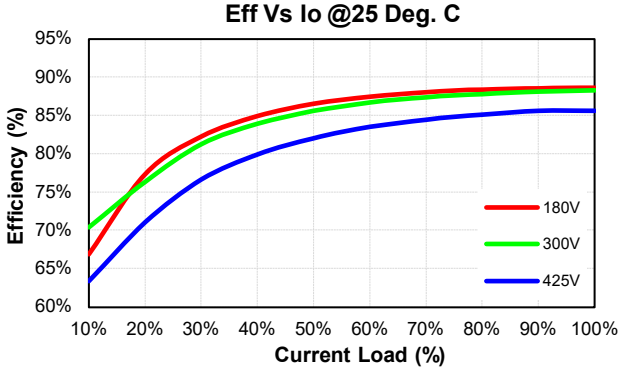

CQB150-300S28
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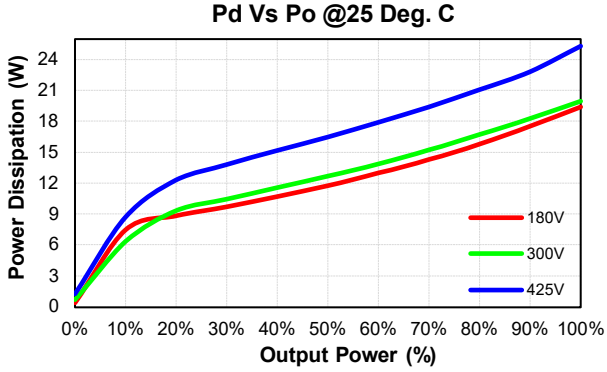
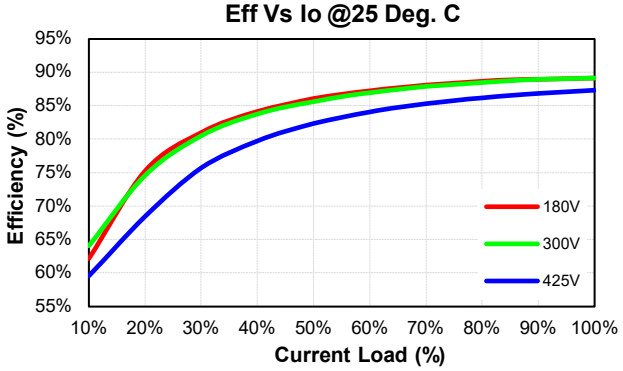
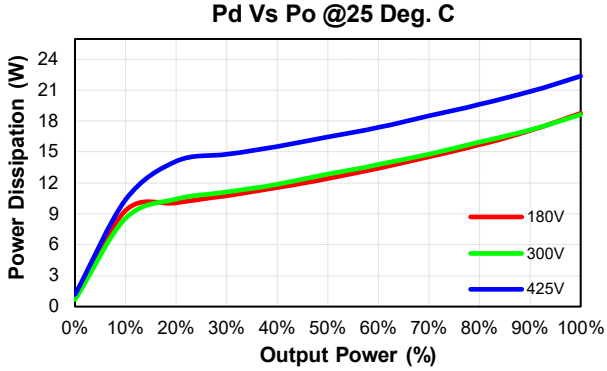


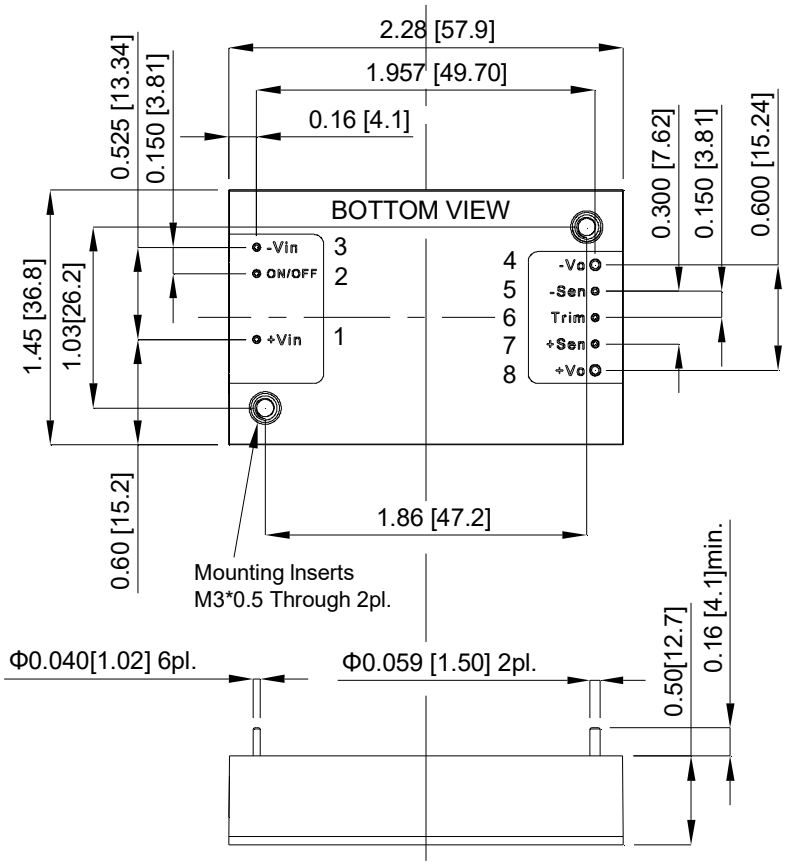
CQB150-300S48
Eff Vs Io @25 Deg. C



CQB150-300S48
Pd Vs Po @25 Deg. C



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]
Tolerance Inches:x.xx=±0.02 ,x.xxx=±0.010
Millimeters:x.x=±0.5 , x.xx=±0.25

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