



# CHB300W-110S SERIES 198-300 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency Up to 91%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully Protected (OTP/OCP/OVP/UVLO)
- 3000Vdc I/O Isolation
- Operating Case Temperature -40 to +100°C
- Half-Brick Size Meet Industrial Standard  
2.28"x2.40"x0.50"
- CB Test Certificate IEC 60950-1 (Except 3.3Vout)
- UL 60950-1 2nd (Basic Insulation) Approval  
(Except 3.3Vout)
- EN 50155 Compliant with External Circuits
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 5000m 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 |            |                     |
| CHB300W-110S3V3 | 43-160 VDC    | 3.3 VDC        | 0 mA           | 60 A   | 10 mA         | 2093 mA   | 86         | 60000uF             |
| CHB300W-110S05  | 43-160 VDC    | 5 VDC          | 0 mA           | 60 A   | 10 mA         | 3099 mA   | 88         | 60000uF             |
| CHB300W-110S12  | 43-160 VDC    | 12 VDC         | 0 mA           | 25 A   | 10 mA         | 3030 mA   | 90         | 25000uF             |
| CHB300W-110S24  | 43-160 VDC    | 24 VDC         | 0 mA           | 12.5 A | 10 mA         | 3064 mA   | 89         | 12500uF             |
| CHB300W-110S28  | 43-160 VDC    | 28 VDC         | 0 mA           | 10.7 A | 10 mA         | 3064 mA   | 89         | 10700uF             |
| CHB300W-110S48  | 43-160 VDC    | 48 VDC         | 0 mA           | 6.25 A | 10 mA         | 2997 mA   | 91         | 4700uF              |

**NOTE:**

1. Nominal Input Voltage 110 VDC.
2. An External Input Capacitor 220uF for All Models are Recommended to Reduce Input Ripple Voltage.
3. To Meet EN50155 and RIA12 refer to Application Note.

## PART NUMBER

| Series   | Nominal Input Voltage | Number of Outputs | Nominal Output Voltage   | Remote On/Off Logic             | Mounting Inserts  |
|----------|-----------------------|-------------------|--|---------------------------------|---|
| CHB300W- | II                    | O                 | XX   | L                               | -Y (Option)   |
| CHB300W  | 110 : 110 VDC         | S : Single        | 3V3 : 3.3VDC<br>05 : 05VDC<br>12 : 12VDC<br>24 : 24VDC<br>28 : 28VDC<br>48 : 48VDC | None : Positive<br>N : Negative | None : M3x0.5 Mounting Inserts<br>-C : Clear Mounting Insert (3.2mm DIA.) |

Part Number Example:

**CHB300W-110S12N-C:** Half Brick, 198-300W, 4:1 43-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert



# CHB300W-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 <sub>dc</sub> |
| Input Surge Voltage        | 100ms  | All    |      |      | 200  | V <sub>dc</sub> |
| Operating Case Temperature | At the center part of base plate (with derating) | All    | -40  |      | 100  | °C              |
| Storage Temperature        |  | All    | -55  |      | 125  | °C              |

### INPUT CHARACTERISTICS

| PARAMETER                         | NOTES and CONDITIONS                      | Device                 | Min. | Typ. | Max. | Units            |
|-----------------------------------|---|------------------------|------|------|------|------------------|
| Operating Input Voltage           |   | All                    | 43   | 110  | 160  | V <sub>dc</sub>  |
| Input Under Voltage Lockout       |   |                        |      |      |      |                  |
| Turn-On Voltage Threshold         |   | All                    | 40   | 42   | 43   | V <sub>dc</sub>  |
| Turn-Off Voltage Threshold        |   | All                    | 37   | 39   | 40   | V <sub>dc</sub>  |
| Lockout Hysteresis Voltage        |   | All                    |      | 3    |      | V <sub>dc</sub>  |
| Maximum Input Current             | V <sub>in</sub> =43V, Full load           | Vo=3.3V                |      | 5500 |      | mA               |
|                                   |   | Others                 |      | 8000 |      |                  |
| No-Load Input Current             | V <sub>in</sub> =110V, 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                    |      | 40   |      | mA               |

### OUTPUT CHARACTERISTICS

| PARAMETER  | NOTES and CONDITIONS   | Device                 | Min.                      | Typ. | Max.  | Units |
|--|--|------------------------|---------------------------|------|-------|-------|
| Voltage Set Point Accuracy                               | V <sub>in</sub> =110V, 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 100°C   | All                    |                           |      | ±0.02 | %/°C  |
| Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth) |  |                        |                           |      |       |       |
| Peak-to-Peak   | Full load, 10uF aluminum solid and 1uF ceramic capacitors (for 3.3V & 5V: 47uF T521 KO CAP. <55mR and 1uF ceramic capacitor) | 3.3Vo                  |                           |      | 120   | mV    |
|  |  | 5Vo                    |                           |      | 120   |       |
|  |  | 12Vo                   |                           |      | 150   |       |
|  |  | 24Vo                   |                           |      | 240   |       |
|  |  | 28Vo                   |                           |      | 280   |       |
|  |  | 48Vo                   |                           |      | 480   |       |
| RMS.   |  | 3.3Vo                  |                           |      | 60    | mV    |
|  |  | 5Vo                    |                           |      | 60    |       |
|  |  | 12Vo                   |                           |      | 80    |       |
|  |  | 24Vo                   |                           |      | 120   |       |
|  |  | 28Vo                   |                           |      | 140   |       |
|  |  | 48Vo                   |                           |      | 220   |       |
| Output Current Range                                     | V <sub>in</sub> = 43 to 160V   | 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    |



# CHB300W-110S Series

| PARAMETER                         | NOTES and CONDITIONS   | Device | Min. | Typ. | Max. | Units |
|-----------------------------------|--|--------|------|------|------|-------|
| Output Voltage Trim Range         | $P_o \leq \text{max. rated power}$ , $I_o \leq I_{o\_max}$ .                       | All    | -10  |      | +10  | %     |
| Output Voltage Remote Sense Range | $P_o \leq \text{max. rated power}$ , $I_o \leq I_{o\_max}$ .<br>% 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 | $V_{in}=110V$        | 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<br>$dI/dt=0.1A/us$<br>(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% $V_{o\_set}$   | All    |      |      |      | 20    | ms |
| Turn-On Delay Time, From Input          | $V_{in\_min.}$ to 10% $V_{o\_set}$   | All    |      |      |      | 20    | ms |
| Output Voltage Rise Time                | 10% $V_{o\_set}$ to 90% $V_{o\_set}$   | All    |      |      |      | 15    | ms |

## ISOLATION CHARACTERISTICS

| PARAMETER  | NOTES and CONDITIONS                  | Device | Min.  | Typ. | Max. | Units |          |
|--|---------------------------------------|--------|-------|------|------|-------|----------|
| Isolation Voltage<br>(100% factory Hi-Pot tested @2sec.) | 1 Minute; input to output             | All    |       |      |      | 3000  | $V_{dc}$ |
|  | 1 Minute; input to case (base plate)  |        |       |      |      | 3000  |          |
|  | 1 Minute; output to case (base plate) |        |       |      |      | 500   | $V_{ac}$ |
| Isolation Resistance                                     | Input to output                       | All    | 100   |      |      | MΩ    |          |
| Isolation Capacitance                                    | Input to output                       | All    | 3000  |      |      | pF    |          |
|  | Input to case (base plate)            | All    | 3000  |      |      |       |          |
|  | Output to case (base plate)           | All    | 20000 |      |      |       |          |

## FEATURE CHARACTERISTICS

| PARAMETER   | NOTES and CONDITIONS                                       | Device          | Min.       | Typ.       | Max.       | Units |    |    |
|---|--|-----------------|------------|------------|------------|-------|----|----|
| Switching Frequency   | Pulse width modulation (PWM), fixed                        | 3.3Vo<br>Others | 225<br>270 | 250<br>300 | 275<br>330 | 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        |            |            | 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        |            |            | 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             |            |            |            | 0.3   | 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             |            |            |            | 3     | 5  | mA |
| Over Temperature Shutdown                                       | Temperature at the center part of base plate, non-latching | All             |            |            |            | 110   | °C |    |
| Over Temperature Recovery                                       |  |                 |            |            |            | 100   |    |    |



# CHB300W-110S Series

## GENERAL SPECIFICATIONS

| PARAMETER           | NOTES and CONDITIONS   | Device         | Min. | Typ.       | Max. | Units      |
|---------------------|--|----------------|------|------------|------|------------|
| MTBF                | $I_o=100\%$ of $I_{o\_max.}$ ;<br>MIL-HDBK - 217F_Notice 1, GB, 25°C | 48Vo<br>Others |      | 900<br>600 |      | K<br>hours |
| Weight              |  | All            |      | 114        |      | grams      |
| Case Material       | Plastic, DAP, UL 94V-0   |                |      |            |      |            |
| Base plate Material | Aluminum   |                |      |            |      |            |
| Potting Material    | UL 94V-0   |                |      |            |      |            |
| Pin Material        | Base: Copper<br>Plating: Nickel with Matte Tin                       |                |      |            |      |            |
| 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                             | EN 50155 Compliant (with external filter)   | Class A          |
| ESD                             | EN 61000-4-2 Level 3: Air $\pm 8kV$ , Contact $\pm 6kV$   | 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, $\pm 2kV$ , external components required                     | Perf. Criteria A |
| Surge                           | EN 61000-4-5 Level 4: Line to earth, $\pm 4kV$ , Line to line, $\pm 2kV$ , external components required | 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, external hold up circuit and capacitor required                  | Perf. Criteria A |
| Supply Change Over              | EN 50155 Class C2: During a supply break of 30ms, external hold up circuit and capacitor required       | Perf. Criteria A |
| Application Note Link           | <a href="#">CHB300W-110S Series App Notes</a>   |                  |
| Packaging Information Link      | <a href="#">Packaging Information</a>   |                  |



# CHB300W-110S Series

## 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<br>Temperature: -40°C<br>Duration: 2 hrs   | Pass   |
| Dry Heat Test   | 13.4.5                            | EN 60068-2-2       | Class OT6 & ST0<br>Temperature: 85°C<br>Duration: 6 hrs  | Pass   |
| Low Temperature Storage Test                                  | 13.4.6                            | EN 60068-2-1       | Temperature: -40°C<br>Duration: 16 hrs   | Pass   |
| Cyclic Damp Heat Test   | 13.4.7                            | EN 60068-2-30      | Temperature: 25°C - 55°C<br>Humidity: 90% RH<br>Duration: 48 hrs   | Pass   |
| Random Vibration Test   | 13.4.11                           | EN 61373           | Frequency range: 5 ~ 150 Hz<br>Vertical: 1.01 $m/s^2$<br>Transverse: 1.01 $m/s^2$<br>Longitudinal: 1.01 $m/s^2$<br>Duration: 10 min / axis | Pass   |
| Simulated Long Life Test at Increased Random Vibration Levels | 13.4.11                           | EN 61373           | Frequency range: 5 ~ 150 Hz<br>Vertical: 5.72 $m/s^2$<br>Transverse: 5.72 $m/s^2$<br>Longitudinal: 5.72 $m/s^2$<br>Duration: 5 hrs / axis  | Pass   |
| Shock Test  | 13.4.11                           | EN 61373           | ±Vertical: 50 $m/s^2$<br>±Transverse: 50 $m/s^2$<br>±Longitudinal: 50 $m/s^2$<br>Duration: 30ms x18 (Each axis 3 shocks)                   | Pass   |

## EN45545-2 Fire & Smoke Test Conditions

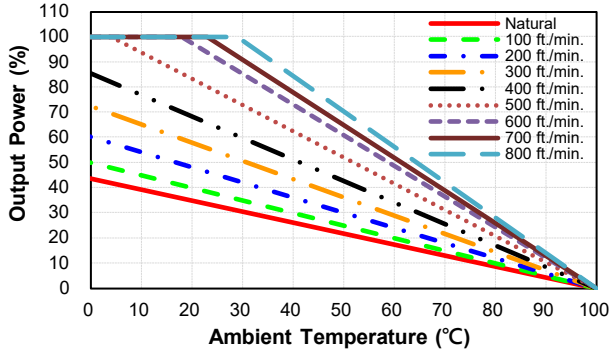
| Item |                     | Standard  | Hazard Level  |
|------|---------------------|---|---------------|
| R22  | Oxygen Index Test   | EN 45545-2: 2013+A1:2015<br>EN ISO 4589-2: 2017       | HL1, HL2, HL3 |
|      | Smoke Density Test  | EN 45545-2: 2013+A1:2015<br>EN ISO 5659-2: 2017       | HL1, HL2, HL3 |
|      | Smoke Toxicity Test | EN 45545-2: 2013+A1:2015<br>NF X70-100-1 and -2: 2006 | HL1, HL2, HL3 |
| R23  | Oxygen Index Test   | EN 45545-2: 2013+A1:2015<br>EN ISO 4589-2: 2017       | HL1, HL2, HL3 |
|      | Smoke Density Test  | EN 45545-2: 2013+A1:2015<br>EN ISO 5659-2: 2017       | HL1, HL2, HL3 |
|      | Smoke Toxicity Test | EN 45545-2: 2013+A1:2015<br>NF X70-100-1 and -2: 2006 | HL1, HL2, HL3 |
| R24  | Oxygen Index Test   | EN45545-2: 2013<br>EN ISO 4589-2                      | HL1, HL2, HL3 |
| R25  | Glow - Wire Test    | EN 45545-2:2013+A1:2016<br>EN 60695-2-11:2014         | HL1, HL2, HL3 |
| R26  | Vertical Flame Test | EN 45545-2: 2013+A1:2015<br>EN 60695-11-10: 2013      | HL1, HL2, HL3 |



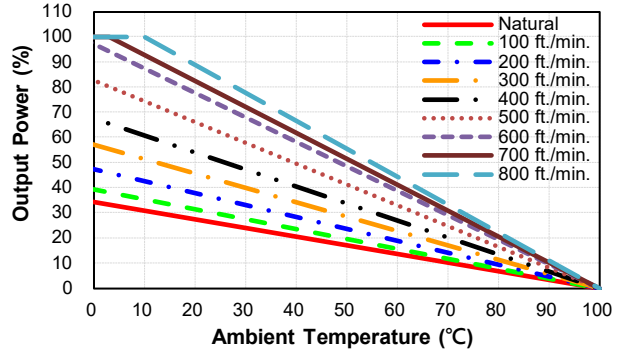
## CHARACTERISTIC CURVE

### Power Derating Curve

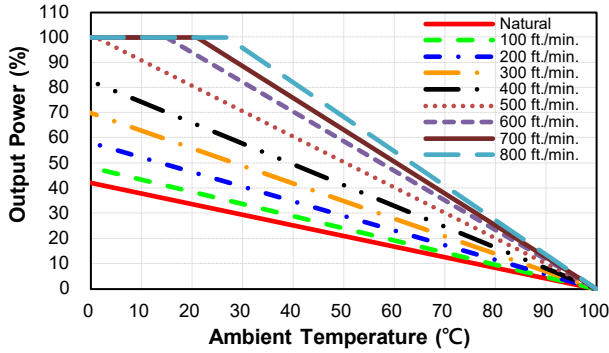
**CHB300W-110S3V3 Derating Curve without Heatsink (Vin=110V)**



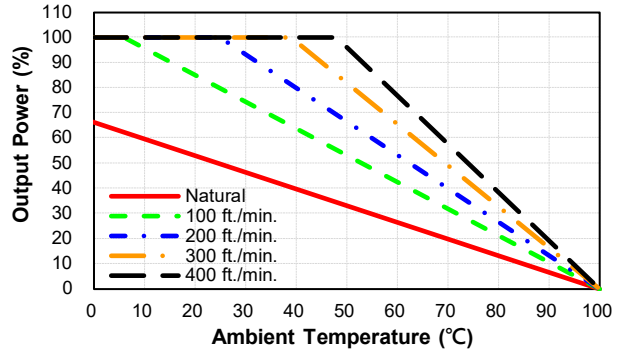
**CHB300W-110S05,24,28 Derating Curve without Heatsink (Vin=110V)**



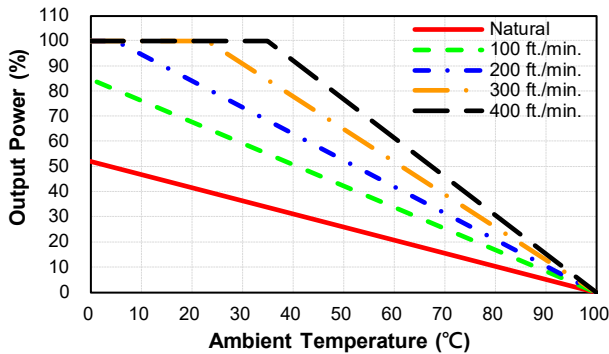
**CHB300W-110S12,48 Derating Curve without Heatsink (Vin=110V)**



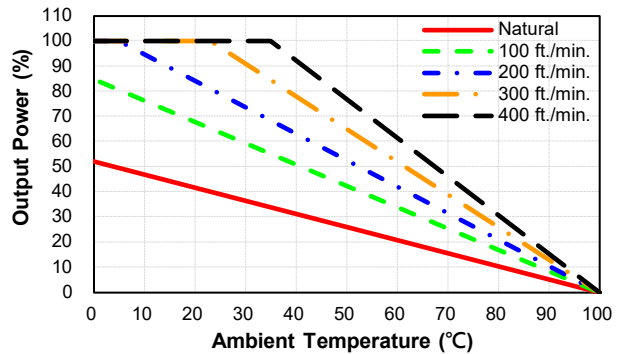
**CHB300W-110S3V3 Derating Curve with Heatsink HBT127 (Vin=110V)**



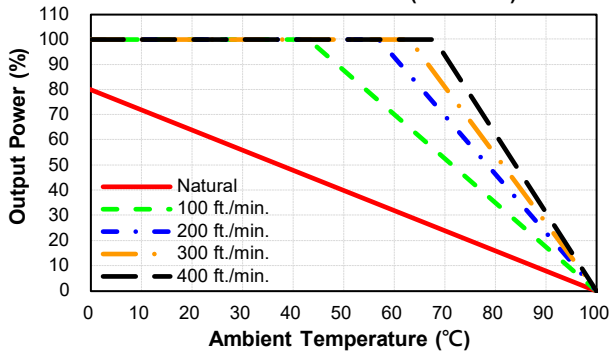
**CHB300W-110S05,24,28 Derating Curve with Heatsink HBT127 (Vin=110V)**



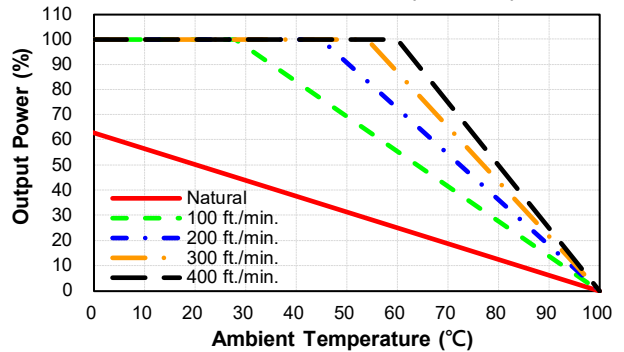
**CHB300W-110S12,48 Derating Curve with Heatsink HBT127 (Vin=110V)**



**CHB300W-110S3V3 Derating Curve with Heatsink HBL210 (Vin=110V)**



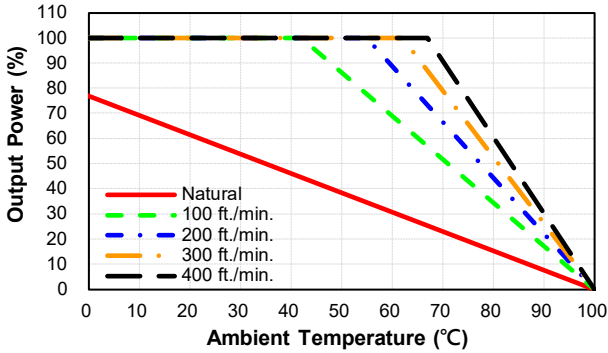
**CHB300W-110S05,24,28 Derating Curve with Heatsink HBL210 (Vin=110V)**



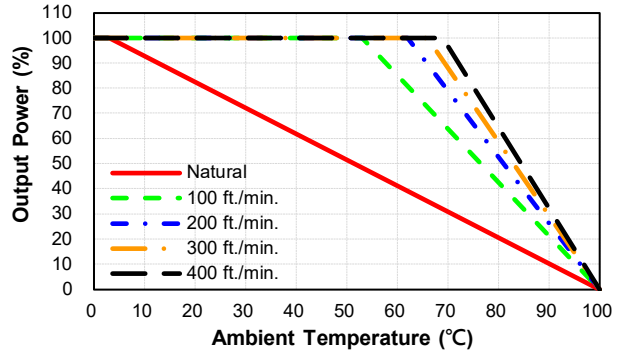


# CHB300W-110S Series

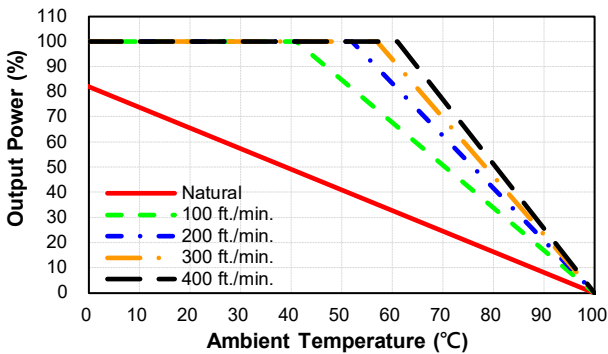
**CHB300W-110S12,48 Derating Curve with Heatsink HBL210 (Vin=110V)**



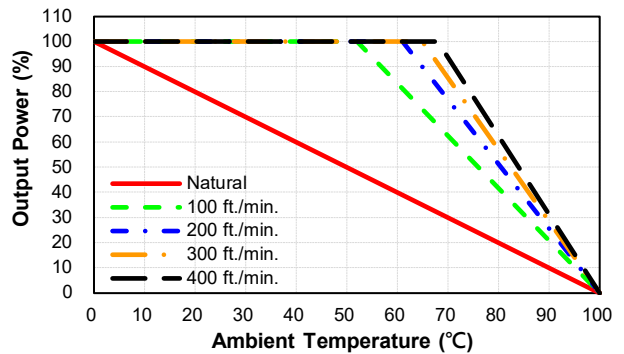
**CHB300W-110S3V3 Derating Curve with Heatsink HBT254 (Vin=110V)**



**CHB300W-110S05,24,28 Derating Curve with Heatsink HBT254 (Vin=110V)**

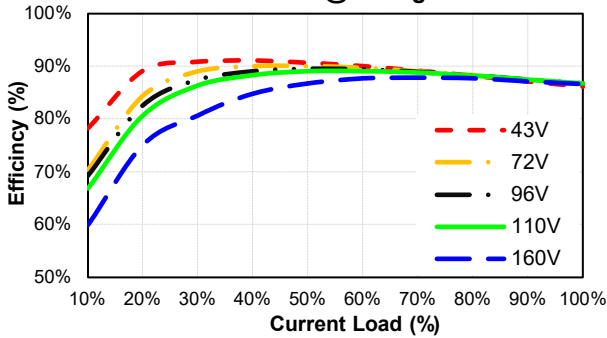


**CHB300W-110S12,48 Derating Curve with Heatsink HBT254 (Vin=110V)**

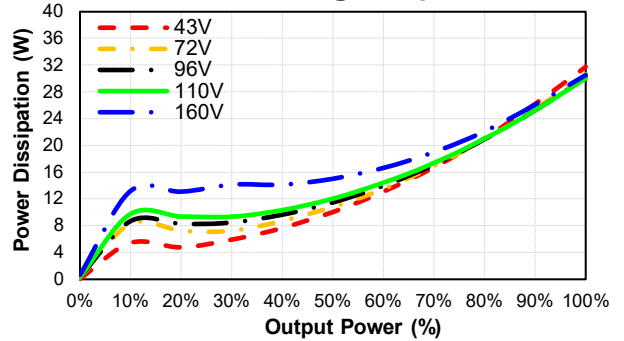


## Performance Data

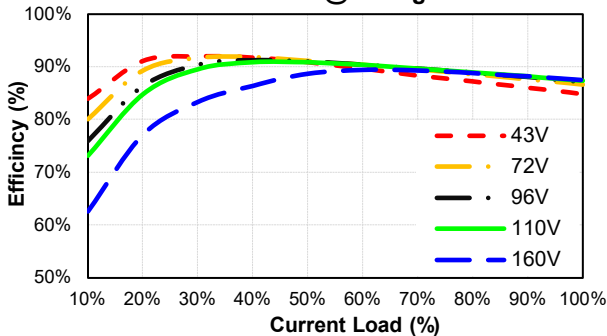
**CHB300W-110S3V3 Eff Vs Io @25 Deg. C**



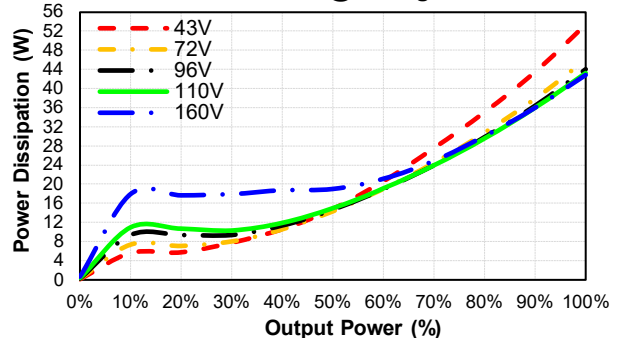
**CHB300W-110S3V3 Pd Vs Po @25 Deg. C**



**CHB300W-110S05 Eff Vs Io @25 Deg. C**



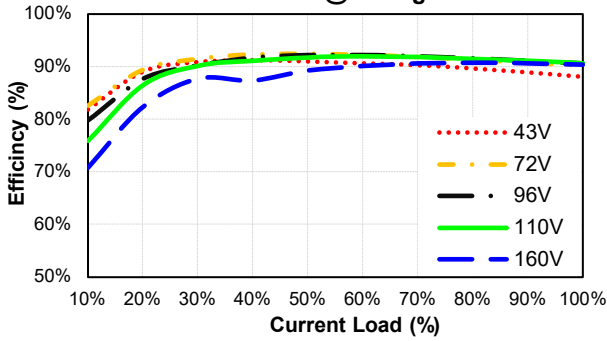
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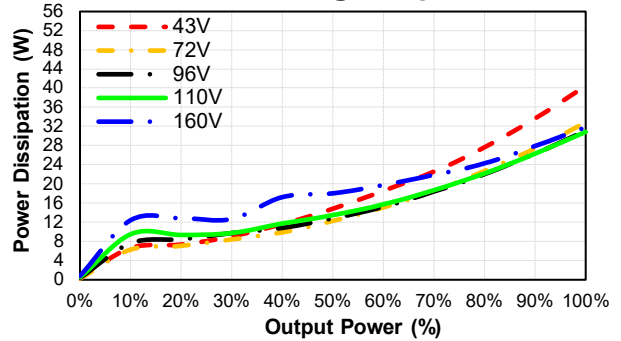


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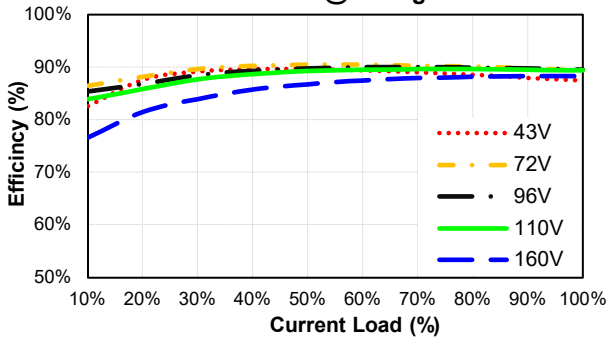
**CHB300W-110S12**  
Eff Vs Io @25 Deg. C



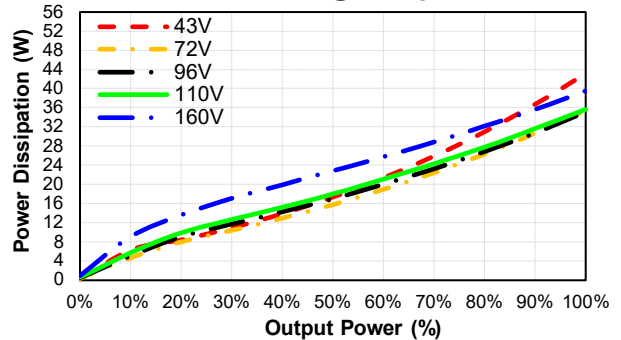
**CHB300W-110S12**  
Pd Vs Po @25 Deg. C



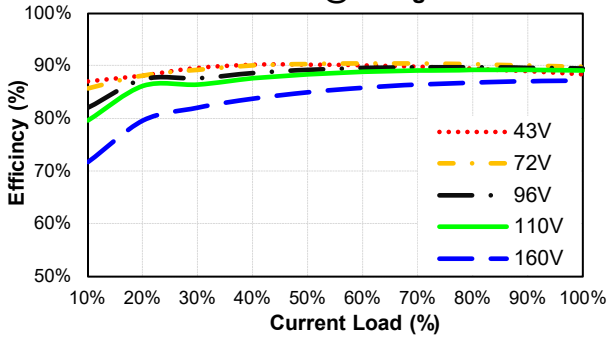
**CHB300W-110S24**  
Eff Vs Io @25 Deg. C



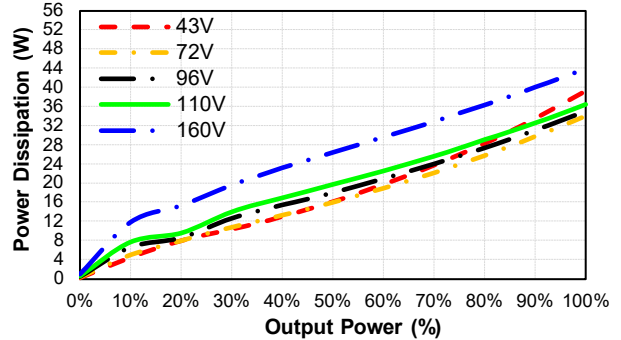
**CHB300W-110S24**  
Pd Vs Po @25 Deg. C



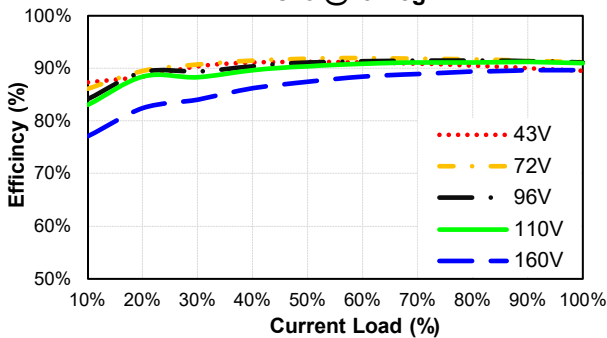
**CHB300W-110S28**  
Eff Vs Io @25 Deg. C



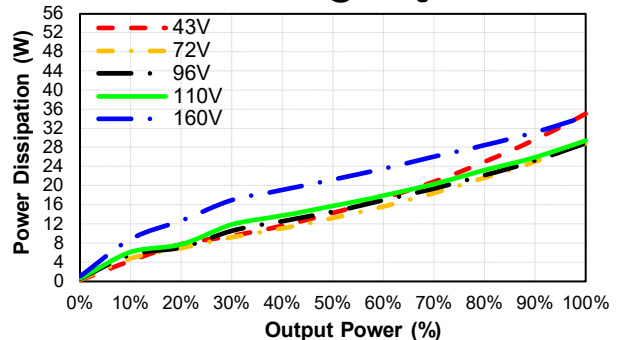
**CHB300W-110S28**  
Pd Vs Po @25 Deg. C



**CHB300W-110S48**  
Eff Vs Io @25 Deg. C



**CHB300W-110S48**  
Pd Vs Po @25 Deg. C







# CHB300W-110S Series

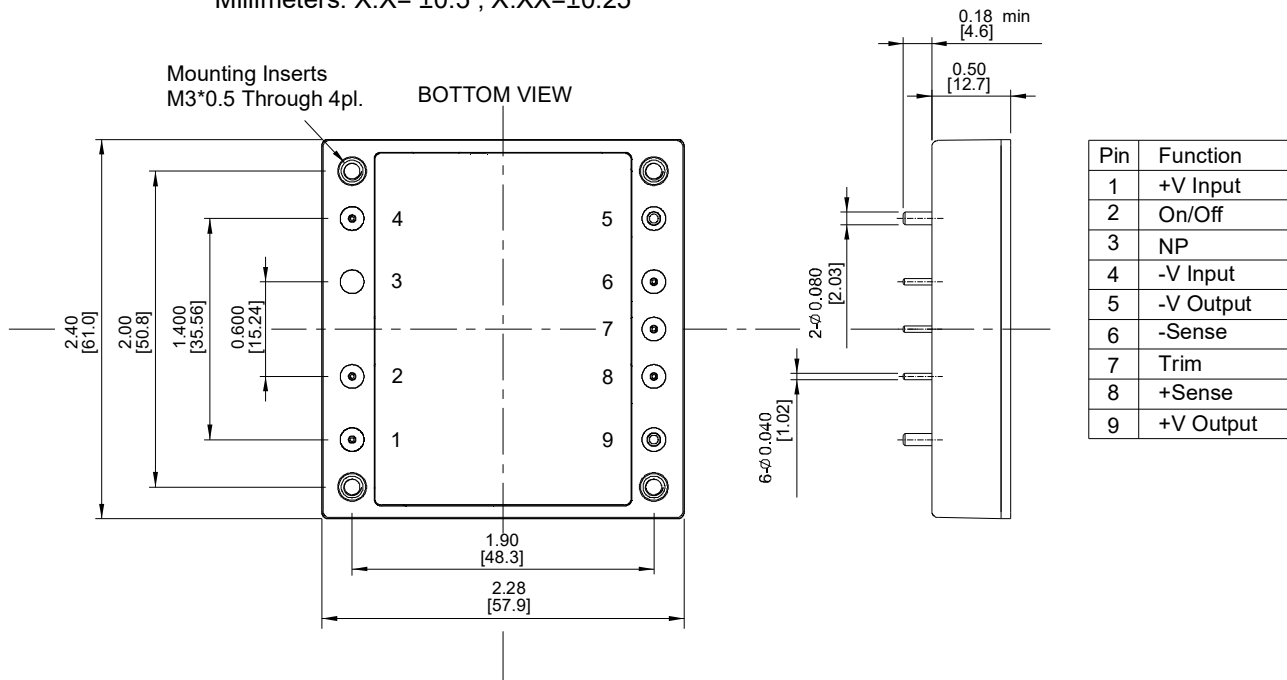
## MECHANICAL SPECIFICATION

CASE HB

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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