



# CHB300-300S SERIES

## 300 WATT 2:1 INPUT

## ISOLATED DC-DC CONVERTER

### Features

- Efficiency Up to 90%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Fully protected (OTP/OCP/OVP/UVLO)
- 3000Vac I/O Isolation
- Operating Case Temperature -40 to +100°C
- Half Brick Size Meet Industrial Standard  
2.28x2.40x0.50
- CB Test Certificate IEC60950-1
- UL60950-1(Reinforce Insulation) Approval
- Safety Meets IEC/EN/UL 62368-1
- Shock & Vibration MIL-STD-810F(EN61373) Compliant
- Fire & Smoke EN45545-2 Compliant
- 2000m Operating Altitude
- -55°C Operating Available (Suffix "-M2")



| MODEL NUMBER  | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT |        | INPUT CURRENT |           | % EFF.<br>(1) | CAPACITOR<br>LOAD MAX. |
|---------------|---------------|----------------|----------------|--------|---------------|-----------|---------------|------------------------|
|               |               |                | MIN.           | MAX.   | NO LOAD       | FULL LOAD |               |                        |
| CHB300-300S05 | 180-425 VDC   | 5 VDC          | 0 mA           | 60 A   | 10 mA         | 1125 mA   | 89            | 10000uF                |
| CHB300-300S12 | 180-425 VDC   | 12 VDC         | 0 mA           | 25 A   | 10 mA         | 1135 mA   | 88            | 10000uF                |
| CHB300-300S24 | 180-425 VDC   | 24 VDC         | 0 mA           | 12.5 A | 10 mA         | 1110 mA   | 90            | 6000uF                 |
| CHB300-300S28 | 180-425 VDC   | 28 VDC         | 0 mA           | 10.7 A | 10 mA         | 1110 mA   | 90            | 6000uF                 |
| CHB300-300S48 | 180-425 VDC   | 48 VDC         | 0 mA           | 6.25 A | 10 mA         | 1110 mA   | 90            | 3000uF                 |

#### NOTE:

1. Nominal Input Voltage 300 VDC.
2. Measured at Nominal Input Voltage.
3. An External Input Capacitor 150uF for All Models are Recommended to Reduce Input Ripple Voltage.
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              |
|---------|-----------------------|-------------------|--------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------|
| CHB300- | II                    | O                 | XX                                                                 | L                                   | -Y (Option)                                                                   | -Z (Option)                             |
| CHB300  | 300 : 300 VDC         | S : Single        | 05 : 05VDC<br>12 : 12VDC<br>24 : 24VDC<br>28 : 28VDC<br>48 : 48VDC | None : Positive<br><br>N : Negative | None : M3x0.5 Mounting Inserts<br><br>-C : Clear Mounting Insert (3.2mm DIA.) | None : -40~100°C<br><br>-M2 : -55~100°C |

#### Part Number Example:

**CHB300-300S12N-C-M2:** Half Brick, 300W, 2:1 180-425Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert, -55~100°C Operating Case Temp. Range



# CHB300-300S 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       |      | 425        | V <sub>dc</sub> |
| Input Surge Voltage        | 100ms max.                                                                       | All        |            |      | 500        | V <sub>dc</sub> |
| Operating Case Temperature | At the center part of case plate (with Derating)<br>Suffix "-M2" (with Derating) | All<br>-M2 | -40<br>-55 |      | 100<br>100 | °C              |
| Storage Temperature        |                                                                                  | All        | -55        |      | 125        | °C              |

### INPUT CHARACTERISTICS

| PARAMETER                         | NOTES and CONDITIONS                      | Device | Min.                   | Typ. | Max. | Units            |
|-----------------------------------|-------------------------------------------|--------|------------------------|------|------|------------------|
| Operating Input Voltage           |                                           | All    | 180                    | 300  | 425  | V <sub>dc</sub>  |
| Input Under Voltage Lockout       |                                           |        |                        |      |      |                  |
| Turn-On Voltage Threshold         | Full load                                 | All    | 165                    | 170  | 175  | V <sub>dc</sub>  |
| Turn-Off Voltage Threshold        | Full load                                 | All    | 155                    | 160  | 165  | V <sub>dc</sub>  |
| Lockout Hysteresis Voltage        | Full load                                 | All    |                        | 10   |      | V <sub>dc</sub>  |
| Maximum Input Current             | V <sub>in</sub> =180V, Full load          | All    |                        | 1.91 |      | A                |
| No-Load Input Current             | V <sub>in</sub> =300V, 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    |                        | 50   |      | mA               |

### OUTPUT CHARACTERISTICS

| PARAMETER                                                | NOTES and CONDITIONS                                                                                                                                                                       | Device | Min.                      | Typ. | Max.  | Units |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------|------|-------|-------|
| Voltage Set Point Accuracy                               | V <sub>in</sub> =300V, 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,<br>5V: 47uF T521 KO CAP. <55mR and 1uF ceramic capacitor<br>48V: 10uF aluminum capacitor and 1uF ceramic capacitor<br>Others: 10uF tantalum capacitor and 1uF ceramic capacitor | 5Vo    |                           |      | 120   | mV    |
|                                                          |                                                                                                                                                                                            | 12Vo   |                           |      | 150   |       |
|                                                          |                                                                                                                                                                                            | 24Vo   |                           |      | 240   |       |
|                                                          |                                                                                                                                                                                            | 28Vo   |                           |      | 280   |       |
|                                                          |                                                                                                                                                                                            | 48Vo   |                           |      | 480   |       |
| RMS.                                                     |                                                                                                                                                                                            | 5Vo    |                           |      | 60    | mV    |
|                                                          |                                                                                                                                                                                            | 12Vo   |                           |      | 60    |       |
|                                                          |                                                                                                                                                                                            | 24Vo   |                           |      | 120   |       |
|                                                          |                                                                                                                                                                                            | 28Vo   |                           |      | 150   |       |
|                                                          |                                                                                                                                                                                            | 48Vo   |                           |      | 200   |       |
| Output Current Range                                     | V <sub>in</sub> = 180 to 425V                                                                                                                                                              |        | See Model Number Table    |      |       | A     |
| Over Current Protection                                  | Hiccup mode. Auto recovery                                                                                                                                                                 | All    | 105                       | 125  | 140   | %     |
| Short Circuit Protection                                 |                                                                                                                                                                                            | All    | Continuous, Auto Recovery |      |       |       |
| External Load Capacitance                                | Full load (Constant resistive load)                                                                                                                                                        |        | See Model Number Table    |      |       | uF    |



# CHB300-300S 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    | -20  |      | +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 | $V_{in}=300V$ , 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<br>$dI/dt=0.1A/us$<br>(within 1% $V_{out}$ nominal) | All    |      |      | $\pm 5$ | %     |
| 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    |      | 300  |         | 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<br>(100% factory Hi-Pot tested @2sec.) | 1 Minute; input to output             | All    |      |       | 3000<br>4200 | $V_{ac}$<br>$V_{dc}$ |
|                                                          | 1 Minute; input to case (base plate)  | All    |      |       | 2500<br>3500 | $V_{ac}$<br>$V_{dc}$ |
|                                                          | 1 Minute; output to case (base plate) | All    |      |       | 500<br>700   | $V_{ac}$<br>$V_{dc}$ |
| Isolation Resistance                                     | Input to output                       | All    | 100  |       |              | $M\Omega$            |
| Isolation Capacitance                                    | Input to output                       | All    |      | None  |              | pF                   |
|                                                          | Input to case (base plate)            |        |      | None  |              |                      |
|                                                          | Output to case (base plate)           |        |      | 20000 |              |                      |

## FEATURE CHARACTERISTICS

| PARAMETER                                                       | NOTES and CONDITIONS                              | Device        | Min.   | Typ. | Max.       | Units |
|-----------------------------------------------------------------|---------------------------------------------------|---------------|--------|------|------------|-------|
| Switching Frequency                                             | Pulse width modulation (PWM), fixed               | All           | 270    | 300  | 330        | KHz   |
| On/Off Control, Positive Remote On/Off Logic, Refer to -Vin Pin |                                                   |               |        |      |            |       |
| Logic Low (Module Off)                                          | $V_{on/off}$ at $I_{on/off}=1.0mA$                | -M2<br>Others | 0<br>0 |      | 1.0<br>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<br>Others | 0<br>0 |      | 1.0<br>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,     | All           |        | 105  |            | °C    |
| Over Temperature Recovery                                       | non-latching                                      | All           |        | 95   |            | °C    |



# CHB300-300S Series

## GENERAL SPECIFICATIONS

| PARAMETER                               | NOTES and CONDITIONS                                                                    | Device                      | Min.                                          | Typ.              | Max. | Units            |
|-----------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------|-------------------|------|------------------|
| MTBF                                    | $I_o=100\%$ of $I_{o\_max}$ ;<br>MIL-HDBK - 217F_Note 1, GB, 25°C                       | Vo=5.0V<br>Vo=12V<br>Others |                                               | 470<br>590<br>760 |      | K<br>hours       |
| Weight                                  |                                                                                         | All                         |                                               | 90                |      | 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/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 $\pm 8kV$ , Contact $\pm 6kV$                                  |                             |                                               |                   |      | 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, $\pm 2kV$ , external input capacitor required |                             |                                               |                   |      | Perf. Criteria A |
| Surge                                   | EN61000-4-5 Level 4: Line to earth, $\pm 2kV$ , Line to line, $\pm 2kV$                 |                             |                                               |                   |      | 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                   |                                                                                         |                             | <a href="#">CHB300S-300S Series App Notes</a> |                   |      |                  |
| Packaging Information Link              |                                                                                         |                             | <a href="#">Packaging Information</a>         |                   |      |                  |

## Immunity to Environmental Conditions

| Phenomenon                    | EN50155; 2017 Reference Clause(s)              | 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<br>Vibration Waveform: Random<br>Vibration Frequency: 15 ~ 2000 Hz<br>Vibration axis: X、Y、Z axis<br>Duration: 1hr / axis                                                                                                        | Pass   |
| Shock Test                    | MIL-STD-810F 516.5 Table 516.5-I               | MIL-STD-810F       | Wave form: Sawtooth Wave<br>Test Category: Crash Hazard Test for Ground Equipment<br>Duration: 10 ms<br>Peak Acceleration: 75 G<br>Cross-Over Frequency: 80 Hz<br>No. of Shock: Each axis 3 times<br>Shock Direction: $\pm X$ , $\pm Y$ , $\pm Z$ axis | Pass   |
| Thermal Shock Cycling Test    | MIL-STD-810F 503.4 Figure 503.4-1              | MIL-STD-810F       | Temperature: -55°C to 105°C<br>Humidity: 95%RH<br>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°C to 30°C<br>Humidity: 95%RH<br>Duration: 240 hrs                                                                                                                                                                                      | Pass   |



# CHB300-300S Series

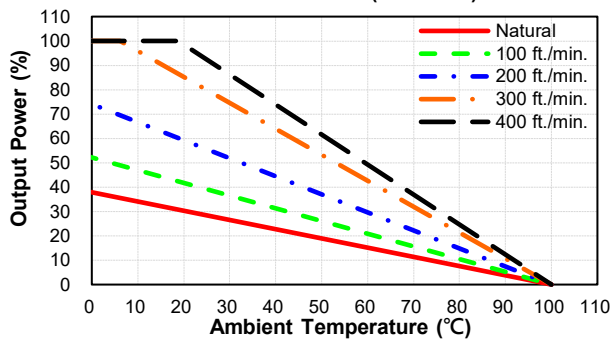
## EN45545-2 Fire & Smoke Test Conditions

| Item |                     | Standard                                 | Hazard Level  |
|------|---------------------|------------------------------------------|---------------|
| R22  | Oxygen Index Test   | EN 45545-2: 2013<br>EN ISO 4589-2: 2006  | HL1, HL2, HL3 |
|      | Smoke Density Test  | EN 45545-2: 2013<br>EN ISO 5659-2: 2013  | HL1, HL2, HL3 |
|      | Smoke Toxicity Test | EN 45545-2: 2013<br>NF X70-100: 2006     | HL1, HL2, HL3 |
| R23  | Oxygen Index Test   | EN 45545-2: 2013<br>EN ISO 4589-2: 2006  | HL1, HL2, HL3 |
|      | Smoke Density Test  | EN 45545-2: 2013<br>EN ISO 5659-2: 2013  | HL1, HL2, HL3 |
|      | Smoke Toxicity Test | EN 45545-2: 2013<br>NF X70-100: 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<br>EN 60695-2-11:2001    | HL1, HL2, HL3 |
| R26  | Vertical Flame Test | EN 45545-2: 2013<br>EN 60695-11-10: 2013 | HL1, HL2, HL3 |

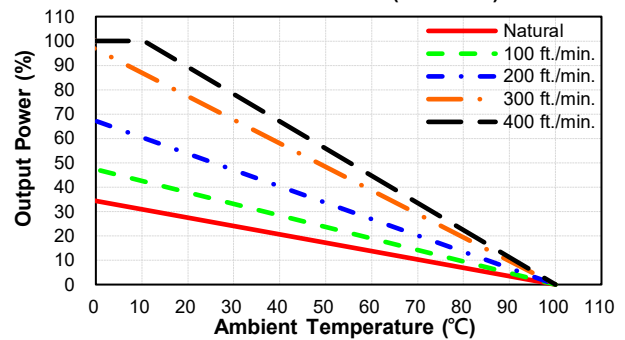
## CHARACTERISTIC CURVE

### Power Derating Curve

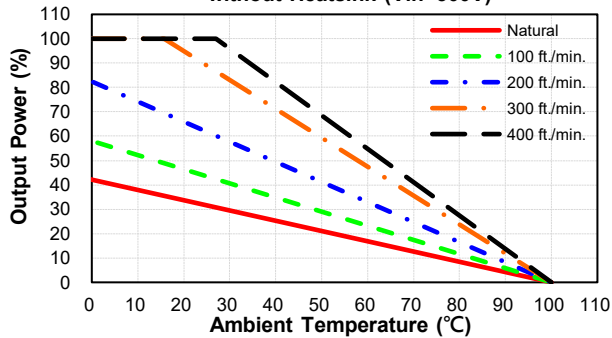
CHB300-300S05 Derating Curve  
without Heatsink (Vin=300V)



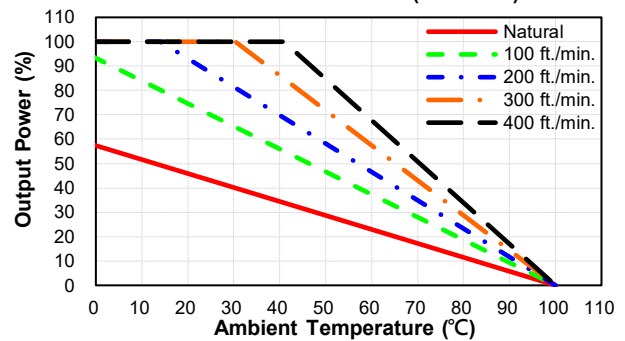
CHB300-300S12 Derating Curve  
without Heatsink (Vin=300V)



CHB300-300S24,28,48 Derating Curve  
without Heatsink (Vin=300V)



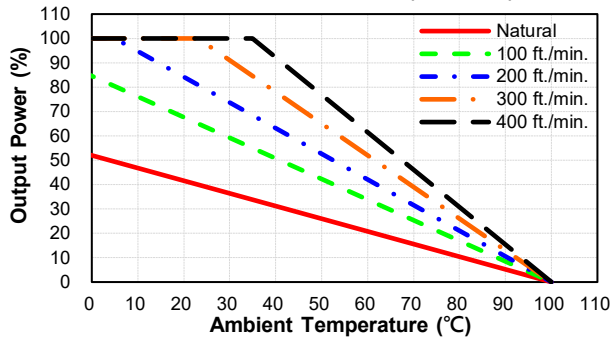
CHB300-300S05 Derating Curve  
with Heatsink HBT127 (Vin=300V)



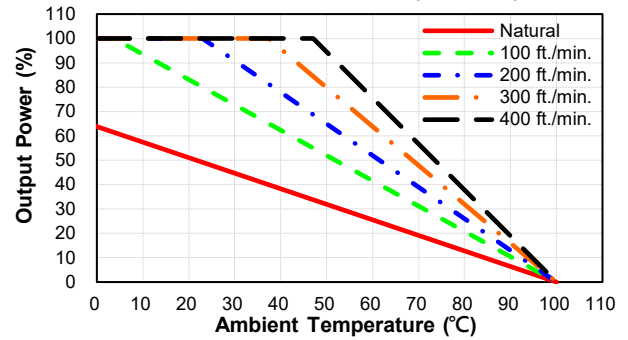


# CHB300-300S Series

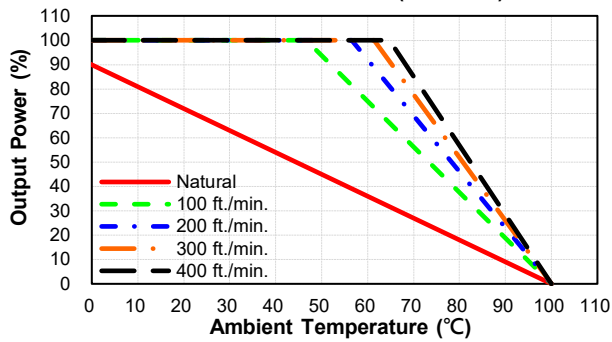
**CHB300-300S12 Derating Curve  
with Heatsink HBT127 (Vin=300V)**



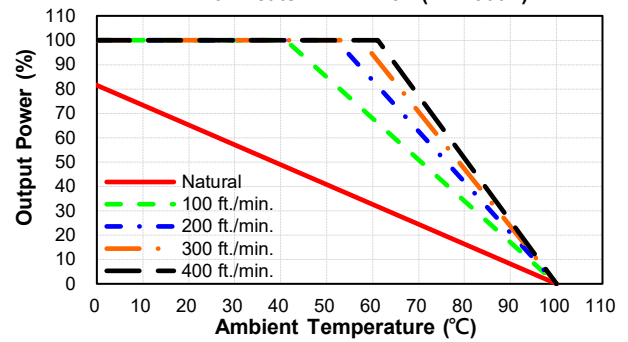
**CHB300-300S24,28,48 Derating Curve  
with Heatsink HBT127 (Vin=300V)**



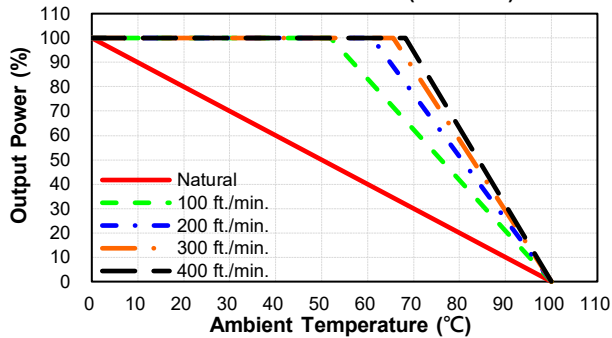
**CHB300-300S05 Derating Curve  
with Heatsink HBT254 (Vin=300V)**



**CHB300-300S12 Derating Curve  
with Heatsink HBT254 (Vin=300V)**



**CHB300-300S24,28,48 Derating Curve  
with Heatsink HBT254 (Vin=300V)**

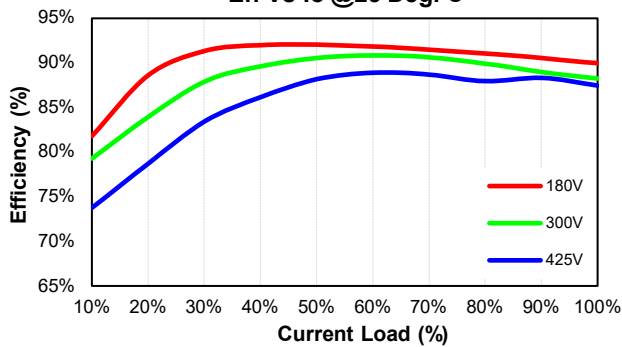




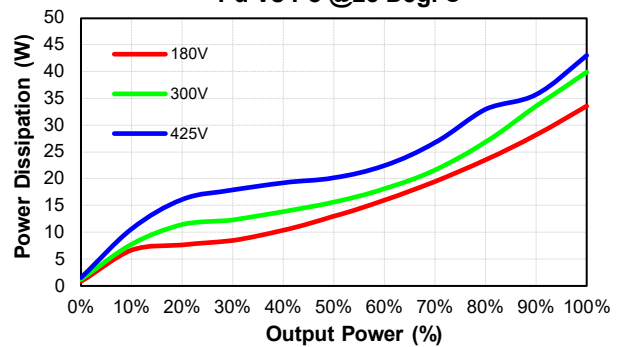
## Performance Data

# CHB300-300S Series

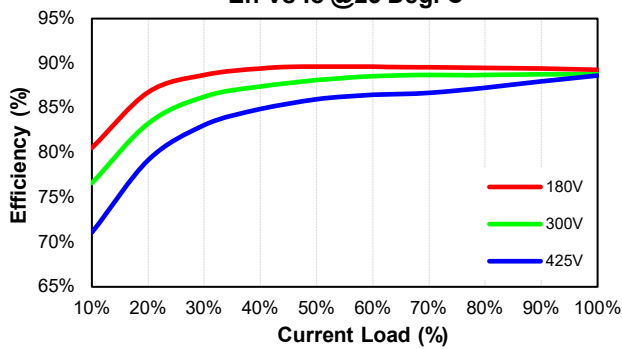
**CHB300-300S05**  
**Eff Vs Io @25 Deg. C**



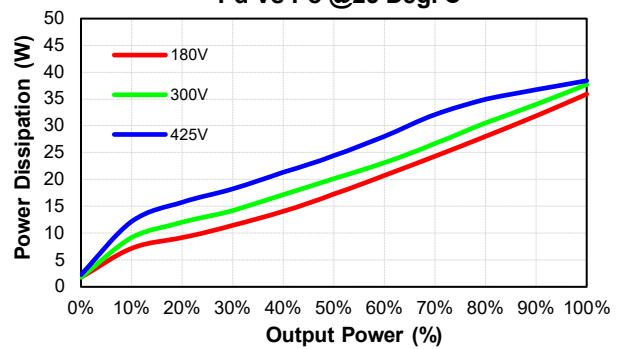
**CHB300-300S05**  
**Pd Vs Po @25 Deg. C**



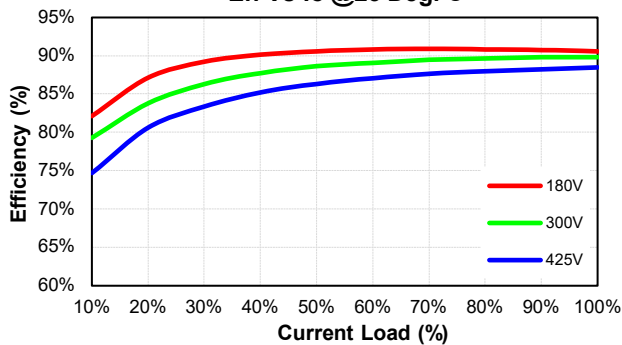
**CHB300-300S12**  
**Eff Vs Io @25 Deg. C**



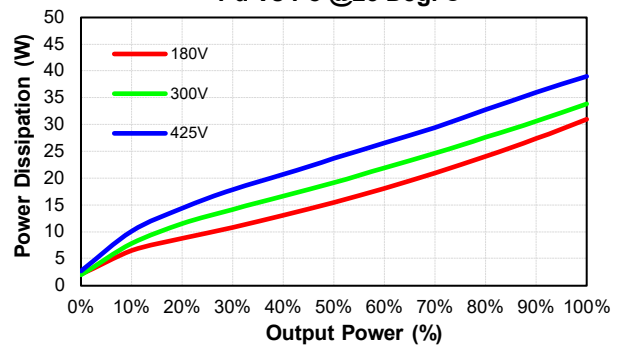
**CHB300-300S12**  
**Pd Vs Po @25 Deg. C**



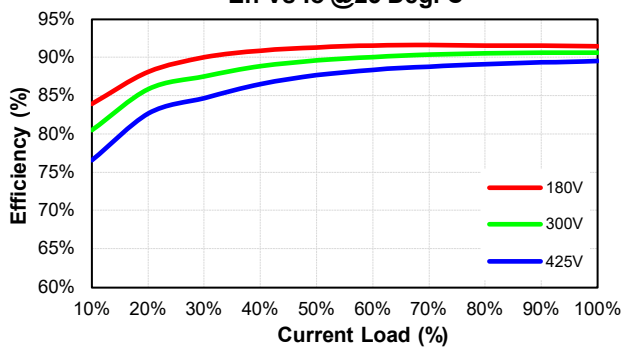
**CHB300-300S24**  
**Eff Vs Io @25 Deg. C**



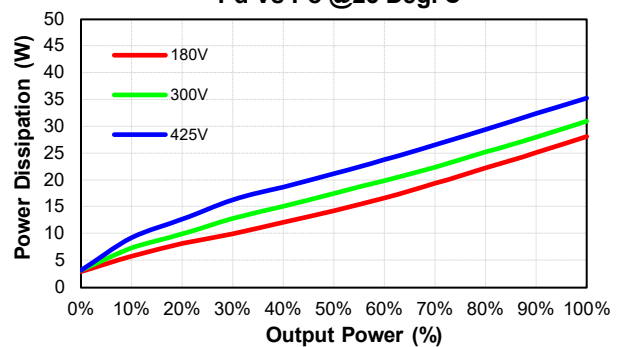
**CHB300-300S24**  
**Pd Vs Po @25 Deg. C**



**CHB300-300S28**  
**Eff Vs Io @25 Deg. C**



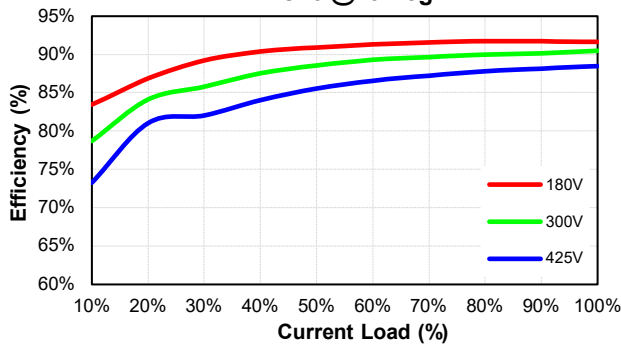
**CHB300-300S28**  
**Pd Vs Po @25 Deg. C**



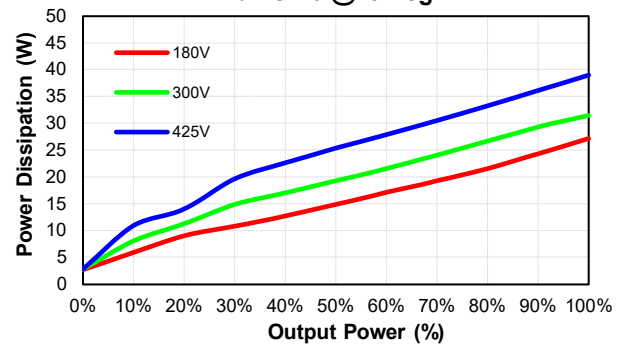


# CHB300-300S Series

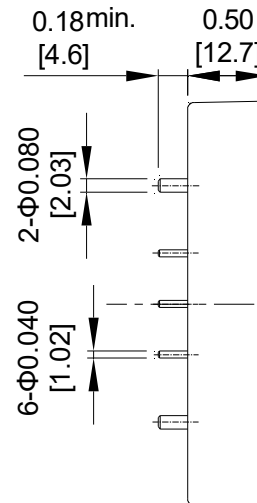
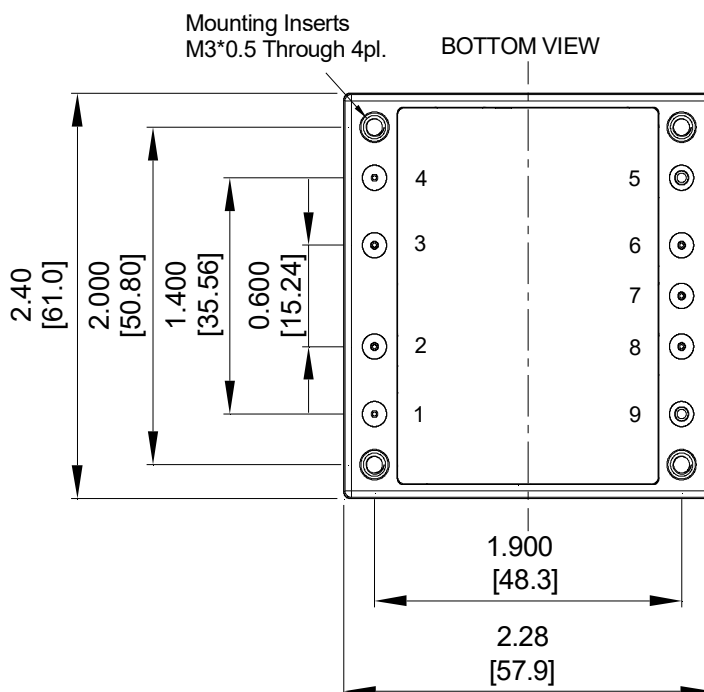
**CHB300-300S48**  
**Eff Vs Io @25 Deg. C**



**CHB300-300S48**  
**Pd Vs Po @25 Deg. C**



## MECHANICAL SPECIFICATION



| Pin | Function  |
|-----|-----------|
| 1   | +V Input  |
| 2   | On/Off    |
| 3   | NP        |
| 4   | -V Input  |
| 5   | -V Output |
| 6   | -Sense    |
| 7   | Trim      |
| 8   | +Sense    |
| 9   | +V Output |

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