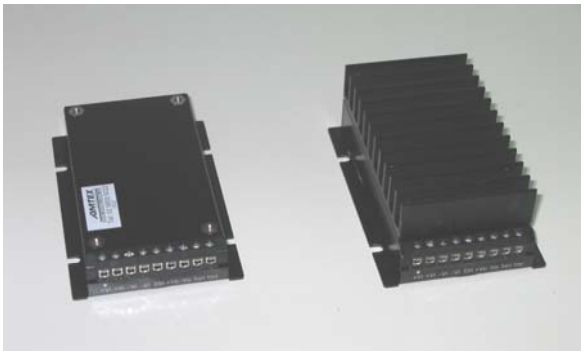
# WAF150(D) SERIES

**DC / DC Single Output: 150 Watts**



WAF150-24S12W WAF150-24S12W/HC

## Features

- 4:1 wide Input range: 9~36V & 18~75V
- Single output, up to 12.5A / 150 watts
- High power density package
- High efficiency up to 88%
- Regulated output & Short circuit protection
- 2250VDC isolation
- Remote ON / OFF, Positive Logic ( Negative Logic option )
- High operating temperature up to +85ºC
- Zero load operation
- External Output voltage trim
- Heatsink option
- EMC EN55022 Class A ( Class B option )
- WAF Flange mounting, WAD Rear panel mounting

## Specifications

| | |
|---|---|
| **Input Voltage** | **24VDC** ( 9 ~ 36 )<br>**48VDC** ( 18 ~ 75 ) |
| **Input Filter** | Common choke +Pi type |
| **Start-up Voltage** | 24V input: 8.8V typ.<br>48V input: 17.6V typ. |
| **Shutdown Voltage** | 24V input: 8.2V typ.<br>48V input: 16.2V typ. |
| **Input Surge Voltage**. | 24V: 50VDC. 48V: 100VDC ( 100ms ) |
| **Input Reverse Voltage Protection** | Input Parallel Diode<br>External input fuse required |
| **Start Up time** | Typically 25mS constant resistive load |
| **Remote ON/OFF**<br>Positive Logic - Standard | DC-DC ON Open or 3.0V < Vr < 12V<br>DC-DC OFF Short or 0V < Vr < 1.2V |
| Negative Logic -Option ) | DC-DC ON Short or 0V < Vr < 1.2V<br>DC-DC OFF Open or 3.0V < Vr < 12V |
| | Input current of remote control pin:<br>0.5mA~ 1.0mA<br>Remote off state input current: 3.5mA |
| **Output power** | 150 watts |
| **Voltage Accuracy** | ±1.0% |
| **Output Voltage Trim** | +0% to +20% External voltage trim |
| **Minim Load** | Zero |
| **Line Regulation** | ±0.2% Low line to High Line @ FL |
| **Load Regulation** | ±0.4% No load to Full load |
| **Remote Sense** | N/A |
| **Ripple & noise** | See table. 20MHZ bandwidth |
| **Temp. Coefficient** | ±0.02% / ºC |
| **Transient Response** | 200uS ( 25% load step change ) |
| **Over Voltage Protection** | Set at 125 ~140% of Voltage output nominal. Hiccup type |
| **Overload Protection** | Set at 105 ~ 120% of output current Constant current. |
| **Short Circuit protection** | Continuous hicc-up mode |

| | |
|---|---|
| **Efficiency** | Model dependant 86 ~ 88% |
| **Isolation** | Input – Output: 2250VDC<br>Input / Output – Case: 1600VDC |
| **Isolation Cap.** | 3500pF |
| **Switching Freq.** | 220-330KHz |
| **Safety** | Designed to meet EN60950-1, UL60950-1 |
| **Case Material** | Metal |
| **Base Material** | Metal |
| **Potting** | Silicon UL94-V0 |
| **Dimensions** | 98 x 65 x 17mm ( excluding heatsink option )<br>98 X 65 X 35mm ( including heatsink ) |
| **Weight** | 225~280g |
| **MTBF** | 1.353 x 10 5Hrs |
| **Operating Temp** | -40ºC to +85ºC ( with derating )<br>See derating graphs.<br>Units must be mounted on metal plate for conduction cooling. |
| **Case Temp** | +100ºC maximum case temperature |
| **Over Temp. Protection** | Shutdown approx 110ºC case temperature |
| **Thermal Impedance** | 2.73ºC / watt without heatsink<br>2.18ºC / watt with optional heatsink & base plate. |
| **Thermal shock** | MIL-STD-810F |
| **Vibration** | MIL-STD-810F |
| **Humidity** | 5-95% RH |
| **EMC** | EN55022 Class A ( see note 7 ) |
| **ESD** | EN61000-4-2 |
| **Radiated Immunity** | EN61000-4-3 |
| **Fast Transients** | EN61000-4-4 |
| **Surge** | EN61000-4-5 |
| **Conducted Immunity** | EN61000-4-6 |

# WAF150(D) SERIES

**DC / DC Single Output: 150 Watts**

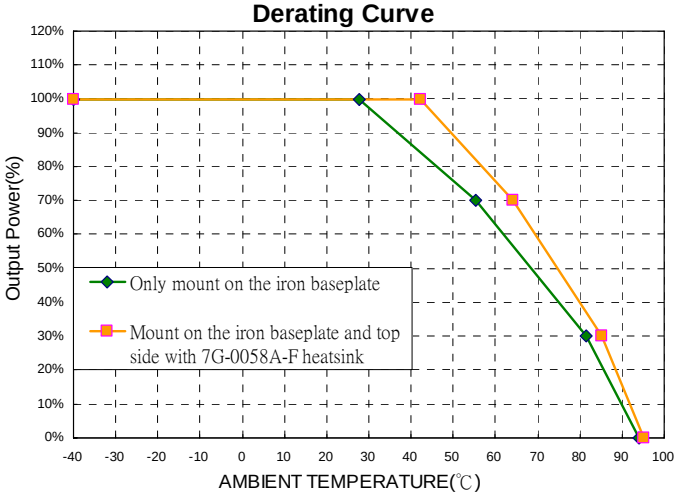
| Model Number | Input Range | Output Voltage | Output Current | | Output[4] | Input Current | | Eff [4] |
|---|---|---|---|---|---|---|---|---|
| | | | Min. load | Full load | Ripple & Noise | No load[3] | Full load[2] | (%) |
| **WAF150-24S12W** WAD150-24S12W | 9 – 36 VDC | 12 VDC | 0mA | 12.5 A | 100mVp-p | 70mA | 7.53A | 86 |
| **WAF150-24S15W** WAD150-24S15W | 9 – 36 VDC | 15 VDC | 0mA | 10 A | 100mVp-p | 80mA | 7.53A | 86 |
| **WAF150-24S24W** WAD150-24S24W | 9 – 36 VDC | 24 VDC | 0mA | 6.3 A | 200mVp-p | 95mA | 7.50A | 87 |
| **WAF150-24S28W** WAD150-24S28W | 9 – 36 VDC | 28 VDC | 0mA | 5.4 A | 200mVp-p | 120mA | 7.50A | 87 |
| **WAF150-24S48W** WAD150-24S48W | 9 – 36 VDC | 48 VDC | 0mA | 3.2 A | 350mVp-p | 130mA | 7.71A | 86 |
| **WAF150-48S12W** WAD150-48S12W | 18 – 75 VDC | 12 VDC | 0mA | 12.5 A | 100mVp-p | 50mA | 3.72A | 87 |
| **WAF150-48S15W** WAD150-48S15W | 18 – 75 VDC | 15 VDC | 0mA | 10 A | 100mVp-p | 60mA | 3.72A | 87 |
| **WAF150-48S24W** WAD150-48S24W | 18 – 75 VDC | 24 VDC | 0mA | 6.3 A | 200mVp-p | 60mA | 3.71A | 88 |
| **WAF150-48S28W** WAD150-48S28W | 18 – 75 VDC | 28 VDC | 0mA | 5.4 A | 200mVp-p | 70mA | 3.71A | 88 |
| **WAF150-48S48W** WAD150-48S48W | 18 – 75 VDC | 48 VDC | 0mA | 3.2 A | 350mVp-p | 70mA | 3.81A | 87 |

- Add **/HC** for top mounted heatsink

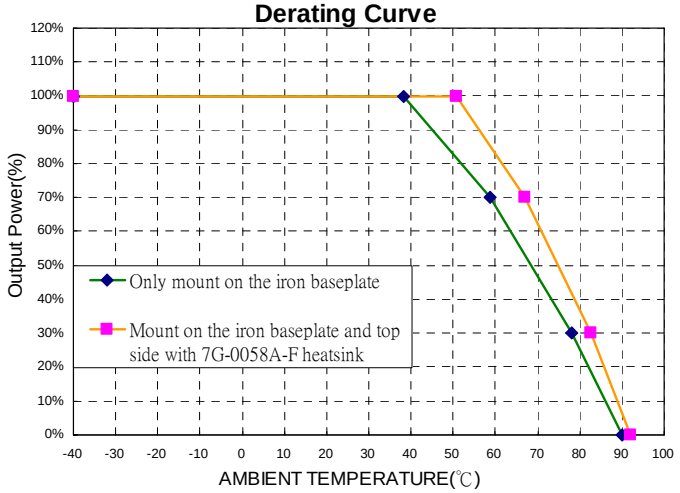
**Notes:**

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40ºC.
   MIL-HDBK-217F Notice2 @Ta=40 ºC, Full load , Air Flow = 400LFM (Ground, Benign, controlled environment).
2. Maximum value at nominal input voltage and full load.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load. (20MHZ BW.)
5. The remote ON/OFF control pin voltage is referenced to -Vin. The negative logic is optional.
   To order negative logic ON-OFF control adds the suffix -N (Ex: WAF150-24S24W-N).
6. The WAF(D)150 series meets EN55022 class A, without external components.
7. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   The filter capacitor Power Mate suggest: 24Vin : Nippon chemi-con KY series, 470μF/50V, ESR 45mΩ.
   48Vin : Nippon chemi-con KY series, 220μF/100V, ESR 48mΩ
8. Internal fusing is not included, so we suggest to use an input line fuse.
9. Use a resistor across on the Trim1 and Trim2 to adjust the output voltage.
10. The CC Mode is Constant Current Mode. And test by nominal input voltage.
11. Thermal test at WAF(D)150 mount on the iron base-plate. (The iron base-plate dimension is 19” * 3.5” * 0.063” The height is EIA standard 2U.)
    Heatsink is optional and P/N is “7G-0058A-F”.

**WAF(D)150-24S12W**
**Derating Curve**



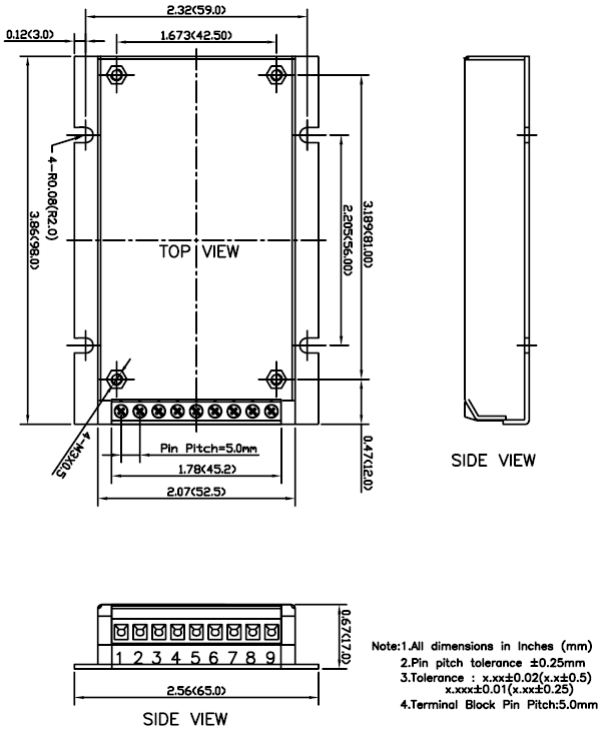

**WAF(D)150-48S24W**
**Derating Curve**



# WAF150(D) SERIES

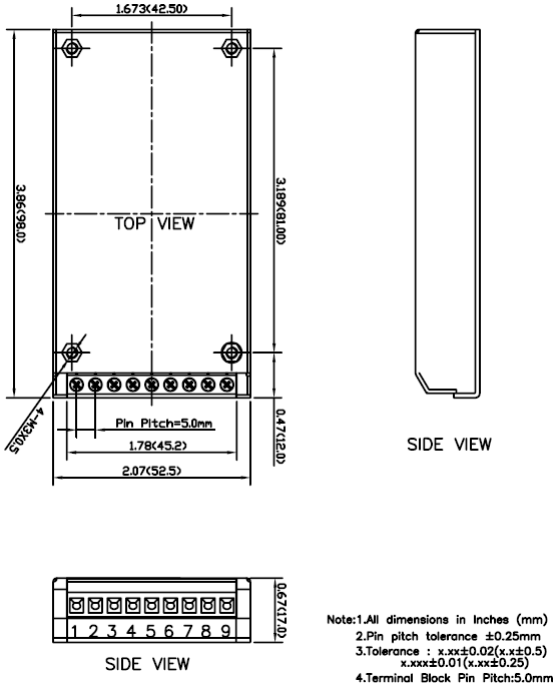
**DC / DC Single Output: 150 Watts**

## WAF150 DIMENSIONS



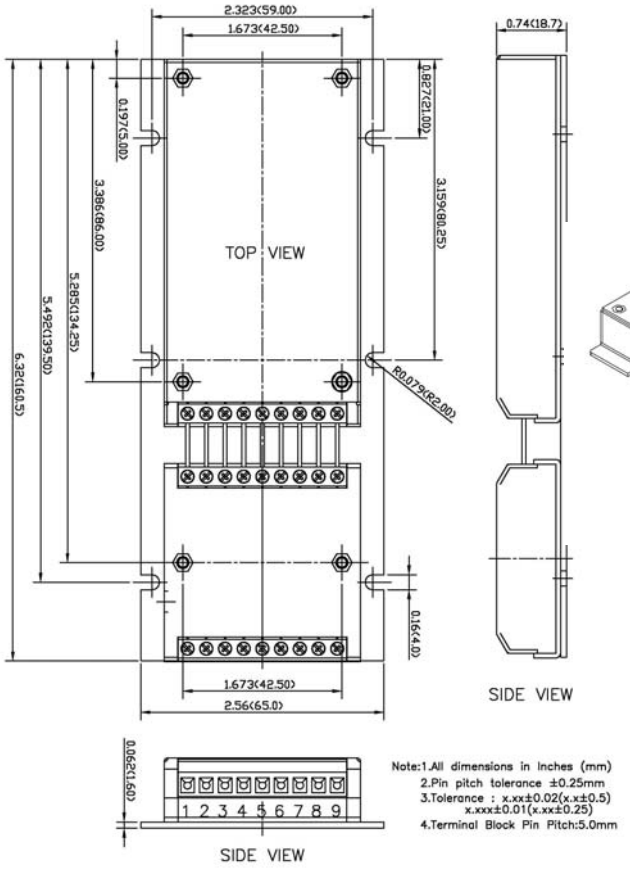

Note:1.All dimensions in Inches (mm)
2.Pin pitch tolerance ±0.25mm
3.Tolerance : x.xx±0.02(x.x±0.5)
x.xxx±0.01(x.xx±0.25)
4.Terminal Block Pin Pitch:5.0mm

## WAD150 DIMENSIONS

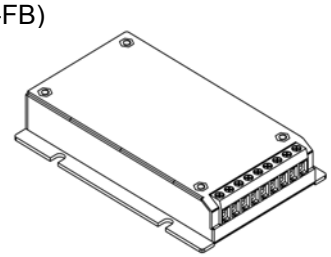


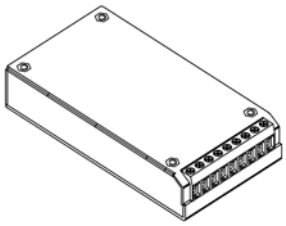

Note:1.All dimensions in Inches (mm)
2.Pin pitch tolerance ±0.25mm
3.Tolerance : x.xx±0.02(x.x±0.5)
x.xxx±0.01(x.xx±0.25)
4.Terminal Block Pin Pitch:5.0mm

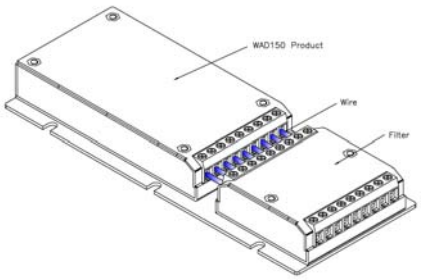
WAD150 with meets EN55022 class B Filter Module (Suffix-FB)




Note:1.All dimensions in Inches (mm)
2.Pin pitch tolerance ±0.25mm
3.Tolerance : x.xx±0.02(x.x±0.5)
x.xxx±0.01(x.xx±0.25)
4.Terminal Block Pin Pitch:5.0mm



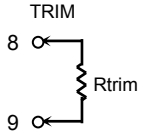




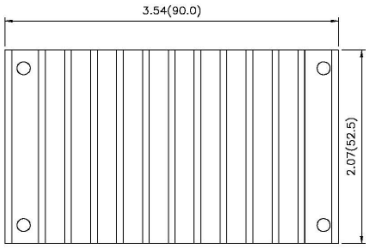

| PIN CONNECTION | | |
|---|---|---|
| PIN | Define | Recommend Matching Wire (AWG.) |
| 1 | +VIN | 14~16AWG |
| 2 | +VIN | 14~16AWG |
| 3 | -VIN | 14~16AWG |
| 4 | -VIN | 14~16AWG |
| 5 | CTRL | 14~24AWG |
| 6 | +VOUT | 14~16AWG |
| 7 | -VOUT | 14~16AWG |
| 8 | TRIM 1 | 14~24AWG |
| 9 | TRIM 2 | 14~24AWG |

## EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



## HEATSINK 7G-0058A-F DIMENSIONS: 90 x 52.5 x 17mm


unit: inch(mm)

| OPTIONS | |
|---|---|
| Option | Suffix |
| Positive remote ON/OFF logic | - |
| Negative remote ON/OFF logic | -N |
| With 7G-0058A-F Heatsink | -HC |
| With EN55022 class B Filter Module | -FB |

**Example：**

**WAF150-48S12W**

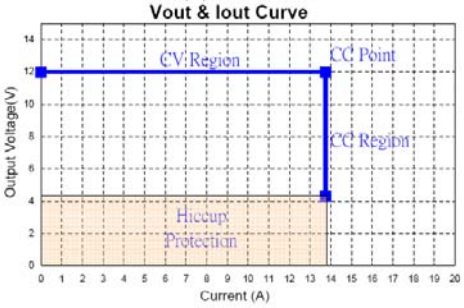
**WAD150-48S28W**

**WAF150-24S24W-N**

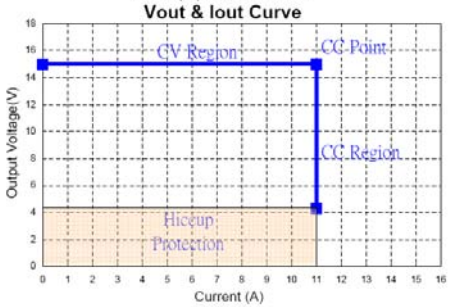
**WAF150-48S24W-HC**

**WAD150-48S28W-FB**

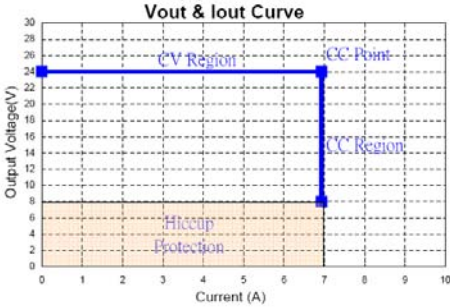
**WAF(D)150-24S12W**
**WAF(D)150-48S12W**
**Vout & Iout Curve**



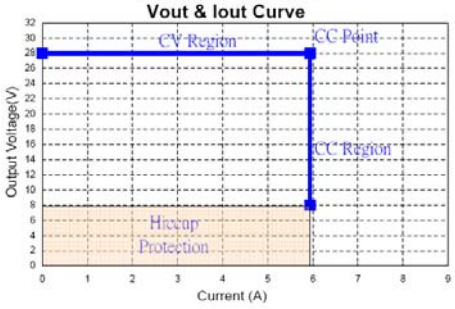

**WAF(D)150-24S15W**
**WAF(D)150-48S15W**
**Vout & Iout Curve**



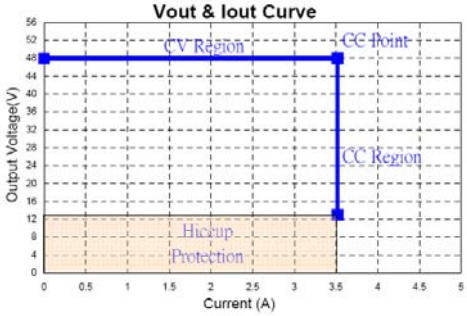

**WAF(D)150-24S24W**
**WAF(D)150-48S24W**
**Vout & Iout Curve**




**WAF(D)150-24S28W**
**WAF(D)150-48S28W**
**Vout & Iout Curve**




**WAF(D)150-24S48W**
**WAF(D)150-48S48W**
**Vout & Iout Curve**




Notes:

- CV Region: In normal operation. The output current in spec.
  Condition: Resistance Load > Vout / Iout (CC Point)
- CC Region: If the output load current are over rating. The output current will keep in a constant value. And output voltage will fall.
  Condition: Resistance Load < Vout / Iout (CC Point)
- Hiccup Protection: If the output resistance is become short. It will operate in hiccup protection.
  Condition: Vout < 4.3V (typ.) to Output Short. (WAF(D)150-xxS12W,WAF(D)150-xxS15W)
  Vout < 8.0V(typ.) to Output Short. (WAF(D)150-xxS24W,WAF(D)150-xxS28W)
  Vout < 13V(typ.) to Output Short. (WAF(D)150-xxS48W)