



WAF150



WAD150

APPLICATIONS

Wireless Network
Telecom/Datacom
Industry Control System
Distributed Power Architectures
Semiconductor Equipment
Battery charger

FEATURES

- 200 WATTS MAXIMUM OUTPUT POWER
- 4:1 ULTRA WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 89%
- CV+CC MODE
- NO MINIMUM LOAD REQUIRED
- ADJUSTABLE OUTPUT VOLTAGE
- INPUT UNDER-VOLTAGE LOCKOUT
- INPUT REVERSE PROTECTION
- MEET EN55022 CLASS A WITHOUT EXTERNAL COMPONENTS
- CE MARK MEETS 2006/95/EC, 93/68/EEC AND 2004/108/EC
- UL60950-1, EN60950-1 AND IEC60950-1 LICENSED
- SIX-SIDED METAL SHIELDING
- WALL MOUNT APPLICATION
- TOP SIDE AND BOTTOM SIDE HEAT DISSIPATION

OPTIONS

- Negative logic remote ON/OFF
- WAD150 with EMI Filter Module
- Heat-sinks available for extended operation

DESCRIPTION

WAF(D)150-SERIES DC/DC converters provide up to 200 watts of output power. All model features a ultra wide input range, adjustable output voltage and constant current mode output limit. The WAF(D)150 converters are especially suited to telecom, networking and industrial applications.

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C otherwise noted

OUTPUT SPECIFICATIONS		
Output power (Rated)	Normal Vout and Iout	150 Watts
Output power (Maximum)	Vout trim to maximum. and CC mode Iout	200 Watts
Voltage accuracy		± 1.0%
Minimum load		0%
Voltage adjustability (Note 8)		0% ~ +20%
Line regulation	LL to HL at FL	± 0.2%
Load regulation	No Load to Full Load	± 0.4%
Temperature coefficient		±0.02% / °C, max.
Transient response recovery time	25% load step change	200µS
Over voltage protection threshold	Hiccup	125% ~ 140% of Vout(nom)
Over Load protection threshold	CC Mode (Note 9)	105% ~ 120% of Full Load
Short circuit protection		Hiccup, automatics recovery
GENERAL SPECIFICATIONS		
Efficiency		See table
Isolation voltage	Input to Output	2250VDC, min. 1minute
	Input(Output) to Case	1600VDC, min. 1minute
Isolation resistance		10 ⁹ ohms ,min.
Isolation capacitance		3500pF, max.
Switching frequency	24VDC input	48Vout
	48VDC input	Others
	110VDC input	
Switching frequency		275KHz±10%
		300KHz±10%
		225KHz±10%
Approvals and standard(Note11)	IEC60950-1, UL60950-1, EN60950-1	
Case material	Aluminum	
Base material	Aluminum	
Potting material	Silicon. (UL94-V0)	
Dimensions	WAF150	3.86X2.560X0.67 Inch (98X65.0X17 mm)
	WAD150	3.86X2.067X0.67 Inch (98X52.5X17 mm)
Weight	WAF150	225g (7.94oz.)
	WAD150	220g (7.76oz.)
MTBF (Note 1)	BELLCORE TR-NWT-000332	1.525 x 10 ⁶ hrs
	MIL-HDBK-217F	1.353 x 10 ⁵ hrs

INPUT SPECIFICATIONS		
Input voltage range	24VDC nominal input	9 ~ 36VDC
	48VDC nominal input	18 ~ 75VDC
	110VDC nominal input	43 ~ 160VDC
Start-up voltage	24VDC input	9VDC, max.
	48VDC input	18VDC, max.
	110VDC input	43VDC, max.
Shutdown voltage	24VDC input	7.9 ~ 8.5VDC
	48VDC input	15.6 ~ 16.8VDC
	110VDC input	33.0 ~ 36.0VDC
Input filter	Common choke + PI type	
Input surge voltage	24VDC input	50VDC 1sec, max.
	48VDC input	100VDC 1sec, max.
	110VDC input	185VDC 1sec, max.
Input reverse polarity protection	Input Parallel diode	
Start up time	Nominal input and constant resistive load	Power up 35mS, max.
		Remote ON/OFF 35mS, max.
Remote ON/OFF (Note 5)		
Positive logic (standard)	DC-DC ON	Open or 3V < Vr < 12V
	DC-DC OFF	Short or 0V < Vr < 1.2V
Negative logic (option)	DC-DC ON	Short or 0V < Vr < 1.2V
	DC-DC OFF	Open or 3V < Vr < 12V
Input current of remote control pin	Nominal input	-0.5mA ~ 1.0mA
Remote off state input current	Nominal input	3.5mA
ENVIRONMENTAL SPECIFICATIONS		
Operating case temperature	-40°C ~ +100°C	
Maximum case temperature	+100°C	
Storage temperature range	-55°C ~ +125°C	
Over temperature protection (case temperature)	110°C	
Thermal impedance (Note 10)	Only mount on the iron base-plate.	2.55°C/Watt
	Mount on the iron base-plate and top side with 7G-0058A Heat-sink	2.0°C/Watt
Thermal shock	MIL-STD-810F	
Vibration	MIL-STD-810F	
Relative humidity	5% to 95% RH	
EMC CHARACTERISTICS		
EMI (Note 6)	EN55022	Class A
ESD	EN61000-4-2	Air Contact ± 8KV Perf. Criteria A
		± 6KV Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m Perf. Criteria A
Fast transient (Note 7)	EN61000-4-4	± 2KV Perf. Criteria A
Surge (Note 7)	EN61000-4-5	± 1KV Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s Perf. Criteria A

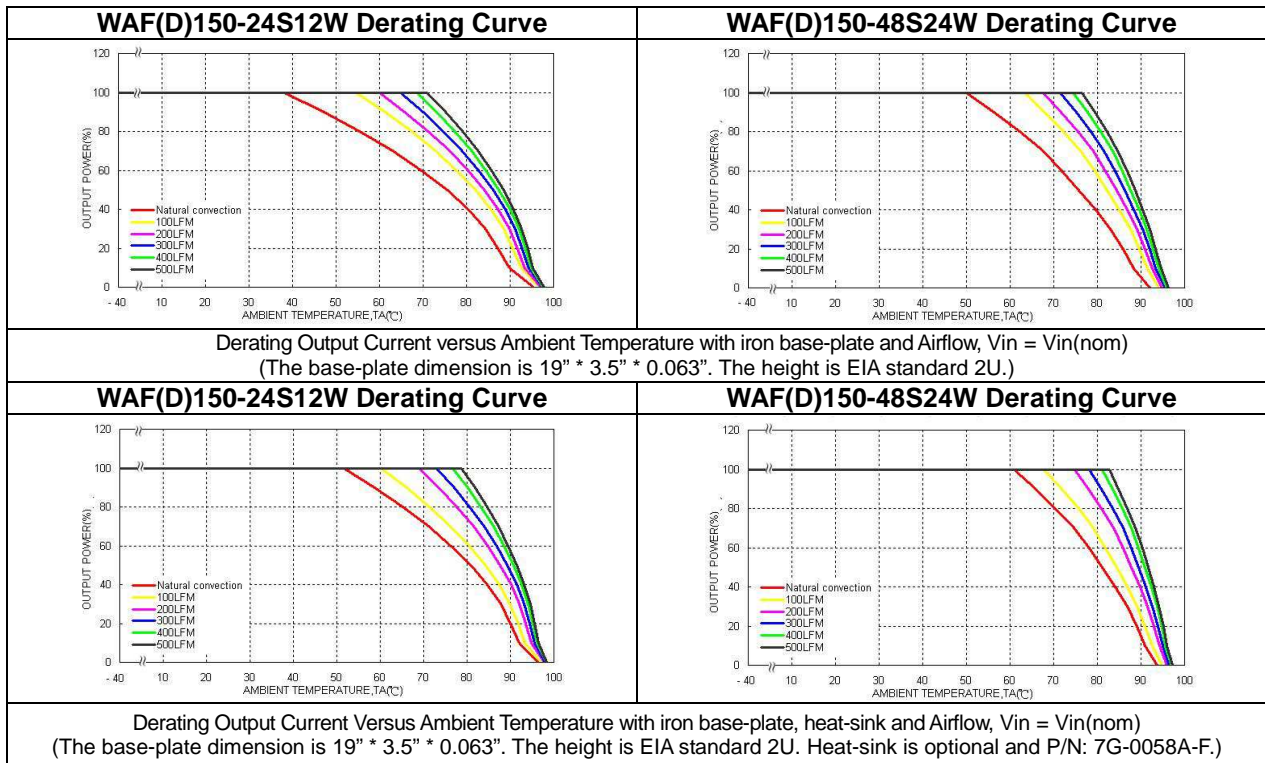


Model Number	Input Range	Output Voltage	Output Current		Output ⁽³⁾ Ripple & Noise	No load ⁽²⁾ Input Current	Eff ⁽³⁾ (%)	Capacitor ⁽⁴⁾ Load max.
			Min. load	Full load				
WAF150-24S12W WAD150-24S12W	9 ~ 36 VDC	12 VDC	0mA	12.5 A	100mVp-p	70mA	86	40000µF
WAF150-24S15W WAD150-24S15W	9 ~ 36 VDC	15 VDC	0mA	10 A	100mVp-p	80mA	86	26000µF
WAF150-24S24W WAD150-24S24W	9 ~ 36 VDC	24 VDC	0mA	6.3 A	200mVp-p	95mA	87	10000µF
WAF150-24S28W WAD150-24S28W	9 ~ 36 VDC	28 VDC	0mA	5.4 A	200mVp-p	120mA	87	7600µF
WAF150-24S48W WAD150-24S48W	9 ~ 36 VDC	48 VDC	0mA	3.2 A	350mVp-p	130mA	86	2600µF
WAF150-48S12W WAD150-48S12W	18 ~ 75 VDC	12 VDC	0mA	12.5 A	100mVp-p	50mA	87	40000µF
WAF150-48S15W WAD150-48S15W	18 ~ 75 VDC	15 VDC	0mA	10 A	100mVp-p	60mA	87	26000µF
WAF150-48S24W WAD150-48S24W	18 ~ 75 VDC	24 VDC	0mA	6.3 A	200mVp-p	60mA	88	10000µF
WAF150-48S28W WAD150-48S28W	18 ~ 75 VDC	28 VDC	0mA	5.4 A	200mVp-p	70mA	88	7600µF
WAF150-48S48W WAD150-48S48W	18 ~ 75 VDC	48 VDC	0mA	3.2 A	350mVp-p	70mA	87	2600µF
WAF150-110S12W WAD150-110S12W	43 ~ 160 VDC	12 VDC	0mA	12.5 A	100mVp-p	25mA	87	40000µF
WAF150-110S15W WAD150-110S15W	43 ~ 160 VDC	15 VDC	0mA	10 A	100mVp-p	25mA	88	26000µF
WAF150-110S24W WAD150-110S24W	43 ~ 160 VDC	24 VDC	0mA	6.3 A	200mVp-p	25mA	88	10000µF
WAF150-110S28W WAD150-110S28W	43 ~ 160 VDC	28 VDC	0mA	5.4 A	200mVp-p	25mA	89	7600µF
WAF150-110S48W WAD150-110S48W	43 ~ 160 VDC	48 VDC	0mA	3.2 A	350mVp-p	35mA	87	2600µF

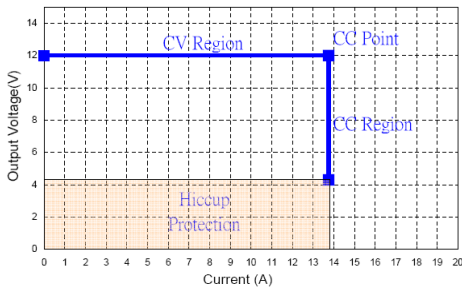
Note:

- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.
MIL-HDBK-217F Notice2 @Ta=40 °C, Full load , Air Flow = 400LFM (Ground, Benign, controlled environment).
- Typical value at nominal input and no load.
- Typical value at nominal input and full load. (20MHZ BW.)
- Test by minimum input and constant resistive load.
- The CTRL 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).
- The WAF(D)150 series meets EN55022 class A without external components.
- 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: 24VDC input : Nippon chemi-con KY series, 470µF/50V, ESR 45mΩ.
48VDC input : Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.
110VDC input : Nippon chemi-con KXJ series, 150µF/200V.
- Use a resistor across on the Trim1 and Trim2 to adjust the output voltage.
- The CC Mode is Constant Current Mode and test by nominal input.
- 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.)
Heat-sink is optional and P/N is "7G-0058A-F".
- WAF(D)150-110SxxW safety approvals are pending.

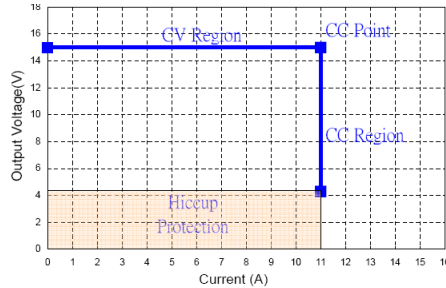
CAUTION: This power module is not internally fused, an input line fuse must always be used. If the load was having sourcing capability (Ex: Battery or Super Capacitor), an output line fuse must always be used.



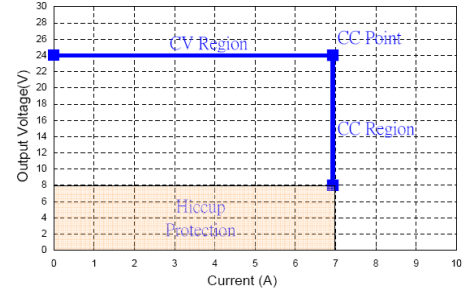
**WAF(D)150-xxxS12W
Vout & Iout Curve**



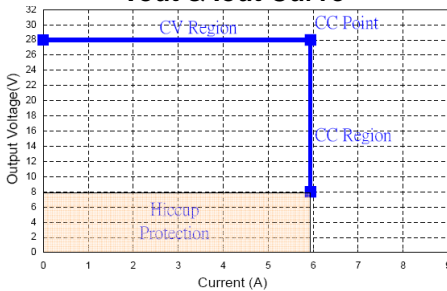
**WAF(D)150-xxxS15W
Vout & Iout Curve**



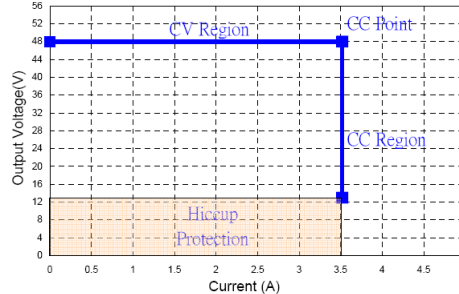
**WAF(D)150-xxxS24W
Vout & Iout Curve**



**WAF(D)150-xxxS28W
Vout & Iout Curve**



**WAF(D)150-xxxS48W
Vout & Iout Curve**

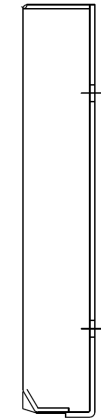
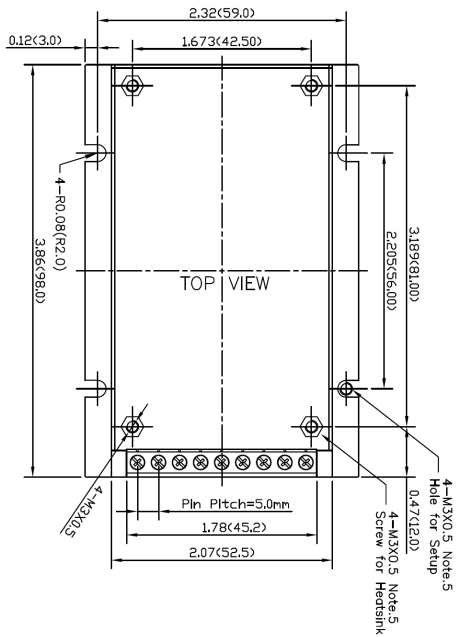


Note:

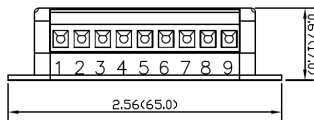
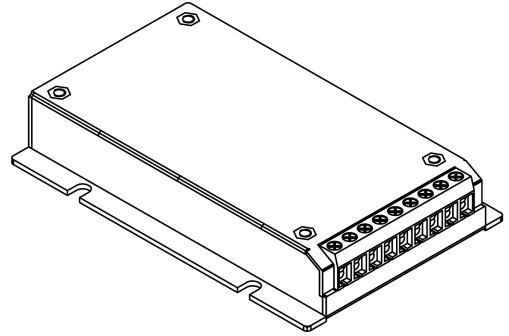
- CV Region: In normal operation. The output current in spec.
Condition: Resistance Load > V_{out} / I_{out} (CC Point)
- CC Region: If the output load current are over rating. The output current will keep in a constant value. And output voltage will fall.
Condition: Resistance Load < V_{out} / I_{out} (CC Point)
- Hiccup Protection: If the output resistance is become short. It will operate in hiccup protection.
Condition: $V_{out} < 4.3V$ (typ.) to Output Short. (WAF(D)150-xxxS12W, WAF(D)150-xxxS15W)
 $V_{out} < 8.0V$ (typ.) to Output Short. (WAF(D)150-xxxS24W, WAF(D)150-xxxS28W)
 $V_{out} < 13V$ (typ.) to Output Short. (WAF(D)150-xxxS48W)

Mechanical Drawing:

WAF150 dimensions

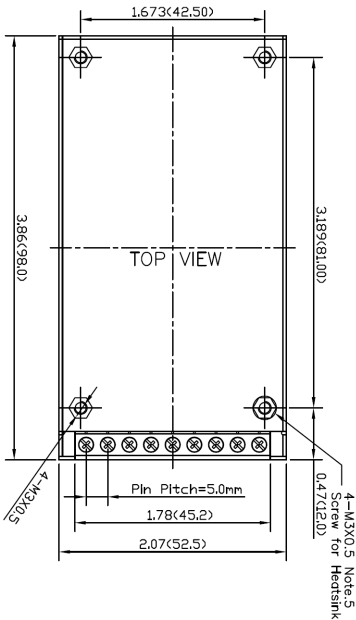


SIDE VIEW

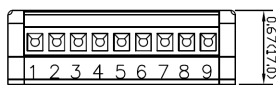
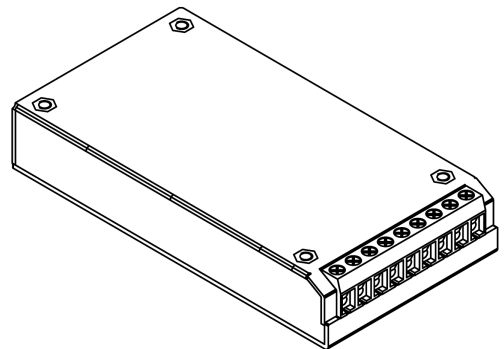


- Note: 1. All dimensions in Inches (mm)
 2. Pin pitch tolerance ± 0.25 mm
 3. Tolerance : $x.xx \pm 0.02$ ($x.x \pm 0.5$)
 $x.xxx \pm 0.01$ ($x.xx \pm 0.25$)
 4. Terminal Block Pin Pitch: 5.0mm
 5. The screw locked torque: MAX 0.49N.M (5.0kgf.cm)

WAD150 dimensions



SIDE VIEW

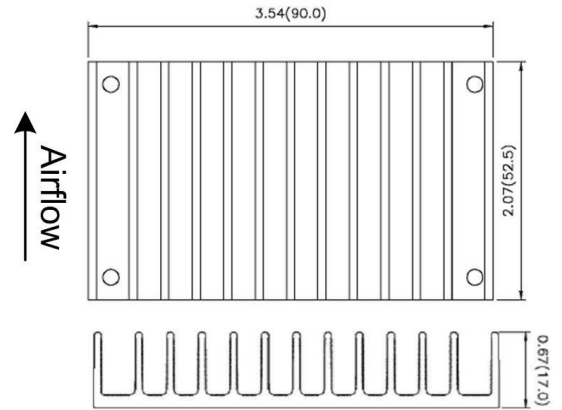
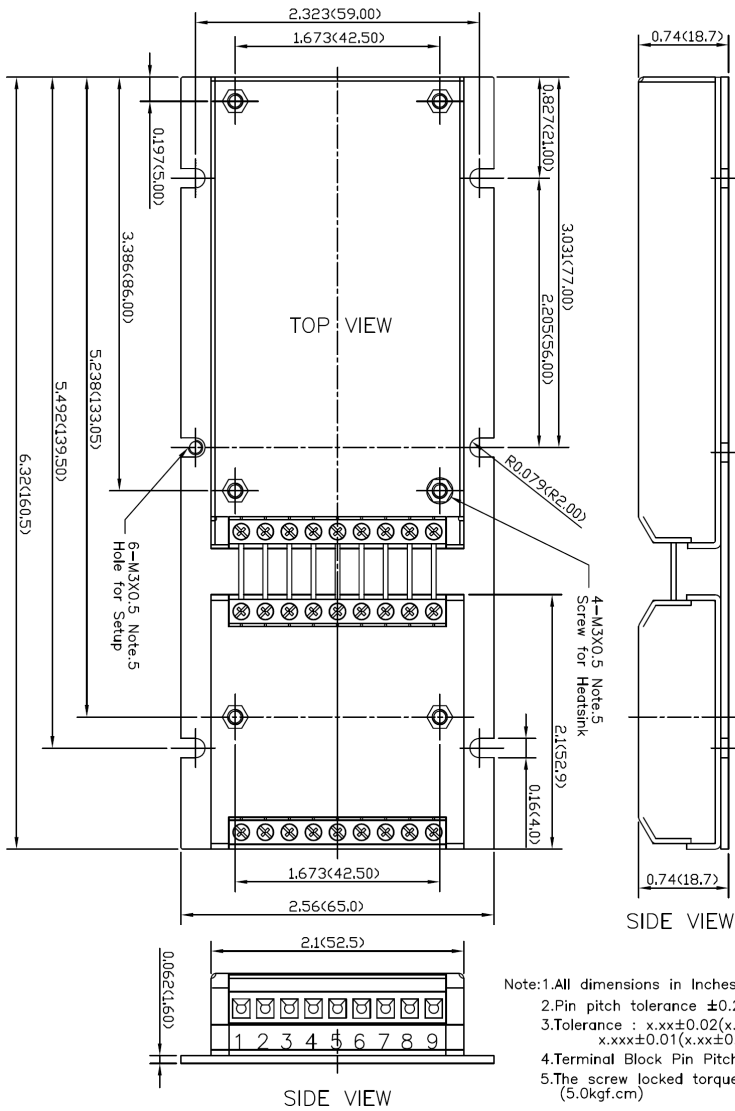


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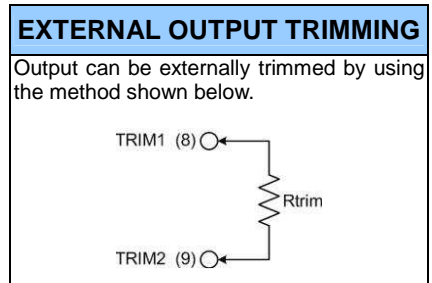
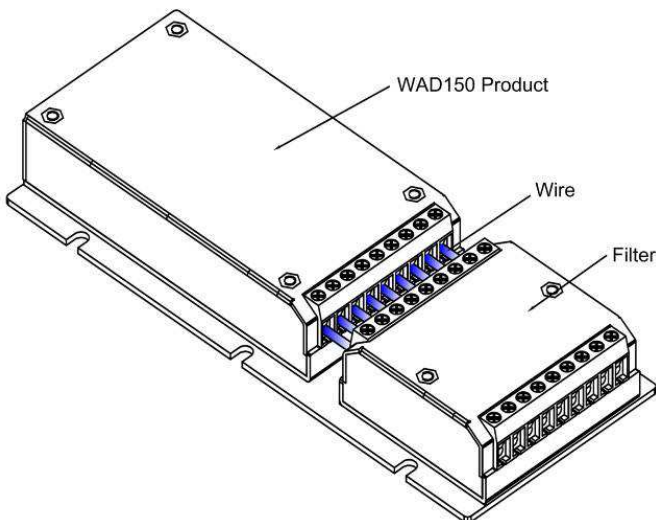
WAD150 with meet EN55022 class B Filter Module dimensions

Heat-sink Type: 7G-0058A-F

Suffix:-HC



PIN CONNECTION			
PIN	Define	Recommend Matching Wire	Recommend Screwing Torque
1	+VIN	14~16AWG	0.25N.M(2.5kgf.cm)
2	+VIN	14~16AWG	0.25N.M(2.5kgf.cm)
3	-VIN	14~16AWG	0.25N.M(2.5kgf.cm)
4	-VIN	14~16AWG	0.25N.M(2.5kgf.cm)
5	CTRL	14~24AWG	0.25N.M(2.5kgf.cm)
6	+VOUT	14~16AWG	0.25N.M(2.5kgf.cm)
7	-VOUT	14~16AWG	0.25N.M(2.5kgf.cm)
8	TRIM 1	14~24AWG	0.25N.M(2.5kgf.cm)
9	TRIM 2	14~24AWG	0.25N.M(2.5kgf.cm)



Part number structure:

WAF
WAD 150 - 24 S 12 W - N F HC

Series Name

Max. Output Power
150Watts

Input Voltage
24 : 9 ~ 36VDC
48 : 18 ~ 75VDC
110 : 43 ~ 160VDC

Singal Output

Output Voltage
12 : 12VDC
15 : 15VDC
24 : 24VDC
28 : 28VDC
48 : 48VDC

PRODUCT OPTION		Suffix
Heat-sink	H=0.670" Horizontal 7G-0058A-F	-HC

PRODUCT OPTION		Suffix
Meet EN55022 Class B Filter Module		-F

PRODUCT OPTION		Suffix
Postive logic remote ON/OFF logic		-
Negative logic remote ON/OFF logic		-N

4 : 1 Wide Input Voltage Range

Note: The EN55022 Class B filter module (suffix -F) for WAD150 series adds only, not for WAF150 series. (Ex: WAD150-24S24W-F)