

FHWS SERIES

50W WIDE INPUT RANGE

DANUBE

FEATURES

- 50W DIL PACKAGE
- INDUSTRY STANDARD PACKAGE
- 18-36V, 36-75V, WIDE INPUT RANGE
- REGULATED OUTPUT
- INPUT UVLO & OVLO
- HIGH EFFICIENCY
- UL 94V-0 PACKAGE MATERIAL
- Over Temperature Protection
- 3 YEARS WARRANTY



OUTPUT SPECIFICATIONS		INPUT SPECIFICATIONS	
Voltage Set-point Accuracy	+/-2% max.	Input Voltage Range	2:1 Input Range
Temperature Coefficient	+/-0.05%/°C	Input Filter	Pi Network
Ripple & Noise(20MHz BW) ¹	150mVp-p max.	Protection	Fuse Recommended
Line Regulation ²	+/-0.5% max.	OVLO(Over Voltage Lockout)	See Page 4
Load Regulation ³	+/-0.5% max.	UVLO(Under Voltage Lockout)	See Page 4
Minimum Load	10% of Full Load	OVLO & UVLO Circuit Restart	Automatic
Short Circuit Protection	Continuous	OTP(Over Temperature Protection)	120°C typ.
Short Circuit Restart	Automatic	Start up Time(Nominal Input)	10mS max.
Over Load Protection	130%~180%	GENERAL SPECIFICATIONS	
Transient Response ⁴	500uS max.		
External Trim Adj. Range	Vout:5V +/-10%	Efficiency	92% typ.
External Trim Adj. Range	Vout:12V,15V -20%~+10%	Isolation Voltage ⁵	1500VDC min.
ENVIRONMENTAL SPECIFICATIONS		Isolation Resistance	10 ⁹ ohms min.
		Isolation Capacitance	3000pF max.
Operating Temperature		Switching Frequency	300 KHz typ.
5V output	-40°C to +50°C	MTBF ⁶	>300,000 Hours
5V output(with 100LFM)	-40°C to +55°C	Weight	43 g typ.
12V & 15V output	-40°C to +55°C	Case Material	Six-Side Shielded Case
Case Temperature	+115°C max.	Case Size	50.8mm*25.4mm*13.7mm
Storage Temperature	-55°C to +125°C	Radiated Emissions	EN55032 Class A
Humidity	95% max.		
Cooling	Free-Air Convection		

ALL SPECIFICATIONS TYPICAL AT NOMINAL LINE, FULL LOAD, AND 25 °C UNLESS OTHERWISE NOTED.

¹ Measured with 1uF ceramic capacitor connect to the output pins.

² High Line to Low Line.

³ Load Regulation is for output load current change from 10% to 100%.

⁴ 25% Step Load Change.

⁵ For 10 seconds.

⁶ MIL-HDBK-217F @25°C, Ground Benign.

● **SELECTION GUIDE**
2:1 50W OUTPUT

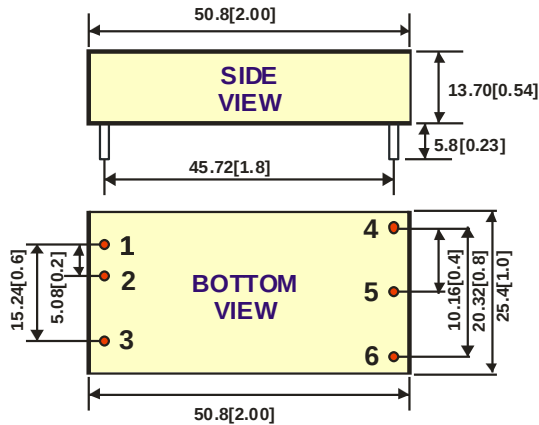
MODEL NUMBER	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	INPUT ⁷ CURRENT(mA)		EFF (%) ⁸	CAPACITOR LOAD (Max)
				FULL LOAD	NO LOAD		
FHWS-2405	18-36	5	10000	2264	95	92	10000uF
FHWS-2412	18-36	12	4170	2266	95	92	1800uF
FHWS-2415	18-36	15	3333	2262	95	92	1000uF
FHWS-4805	36-75	5	10000	1132	60	92	10000uF
FHWS-4812	36-75	12	4170	1133	60	92	1800uF
FHWS-4815	36-75	15	3333	1131	60	92	1000uF

Note: Other input to output voltages may be available. Please contact factory.

⁷ NOMINAL INPUT VOLTAGE.

⁸ NOMINAL INPUT VOLTAGE, FULL LOAD.

● MECHANICAL DIMENSIONS RECOMMENDED FOOTPRINT DETAILS



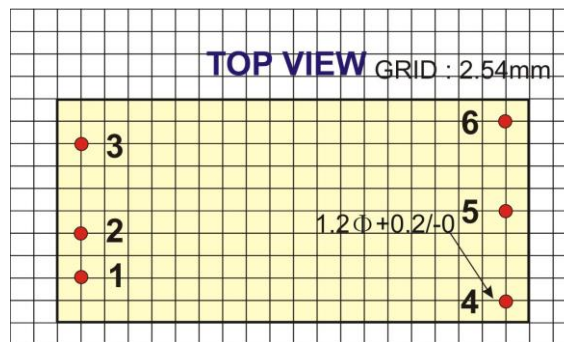
All dimensions are in millimeters [inches]

PIN	SINGLE
1	+Vin
2	-Vin
3	Remote On/Off
4	+Vout
5	-Vout
6	Trim

NOTE: Pin Size is Tolerance 1.0Φ ±0.10mm

All dimensions are in millimeters [inches]

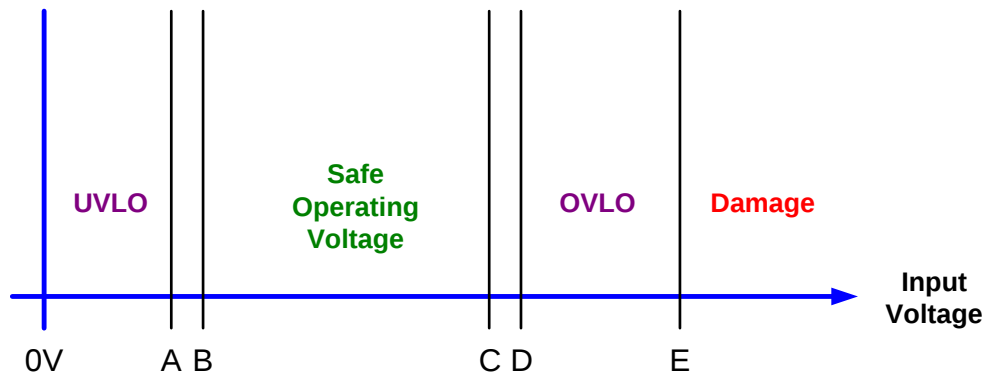
Tolerance .X or .XX= ±0.80mm



● Table1 (Remote On/Off Control)

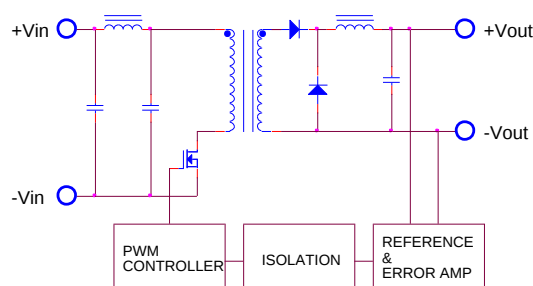
Remote On/Off Control			
Control Input	PIN3	Control Common	PIN2
Control Voltage		Converter Shutdown Idle Current	10mA
ON	>+2.5VDC or Open Circuit	Logic Compatibility	CMOS or Open
OFF	<+0.8VDC or Jumper to PIN2		Collector TTL

● INPUT OPERATING VOLTAGE



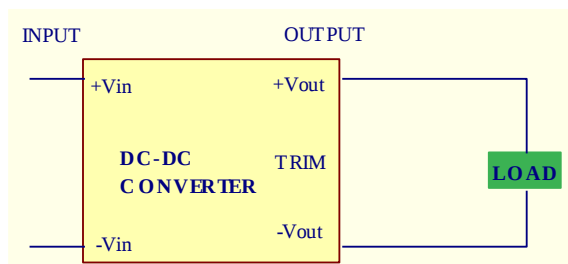
	A	B	C	D	E
FHWS-24****	16V typ.	18V	36V	40V typ.	50V
FHWS-48****	32V typ.	36V	75V	80V typ.	100V

● SIMPLIFIED SCHEMATIC

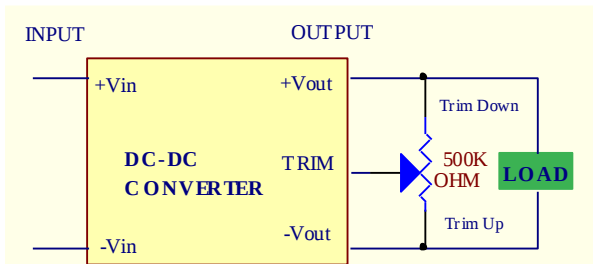


● TYPICAL APPLICATIONS

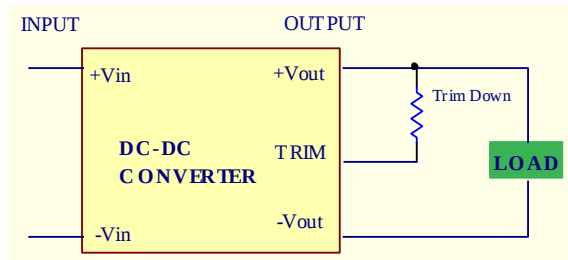
FIXED VOLTAGE OUTPUT



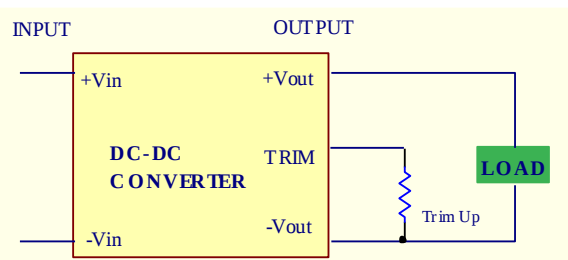
TRIM CONNECTIONS USING A TRIMPOT



FIXED-VALUE TRIM DOWN RESISTOR

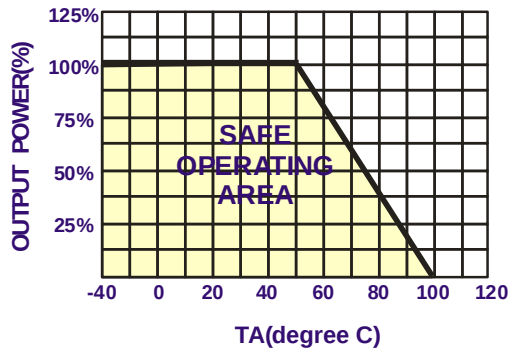


FIXED-VALUE TRIM UP RESISTOR

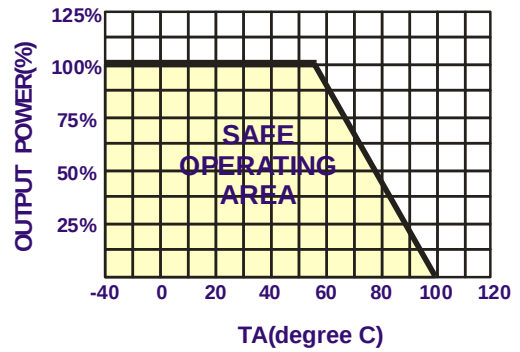


● TYPICAL PERFORMANCE CURVES

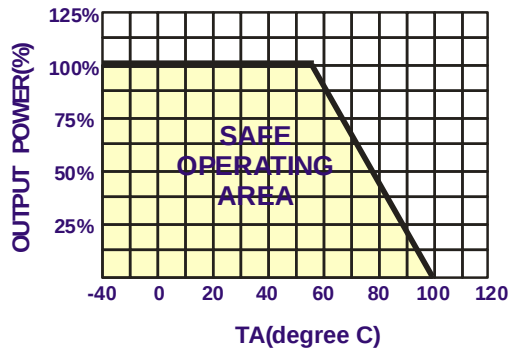
TEMPERATURE DERATING
5V OUTPUT



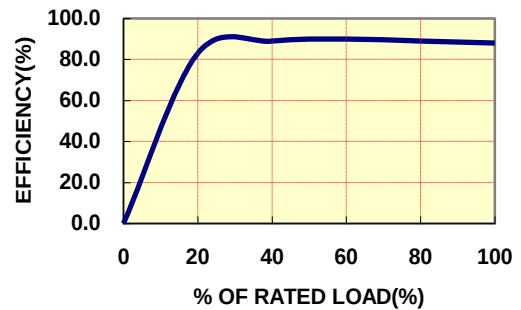
TEMPERATURE DERATING
5V OUTPUT(with 100LFM)



TEMPERATURE DERATING
(12V & 15V OUTPUT)



OUTPUT LOAD VS EFFICIENCY

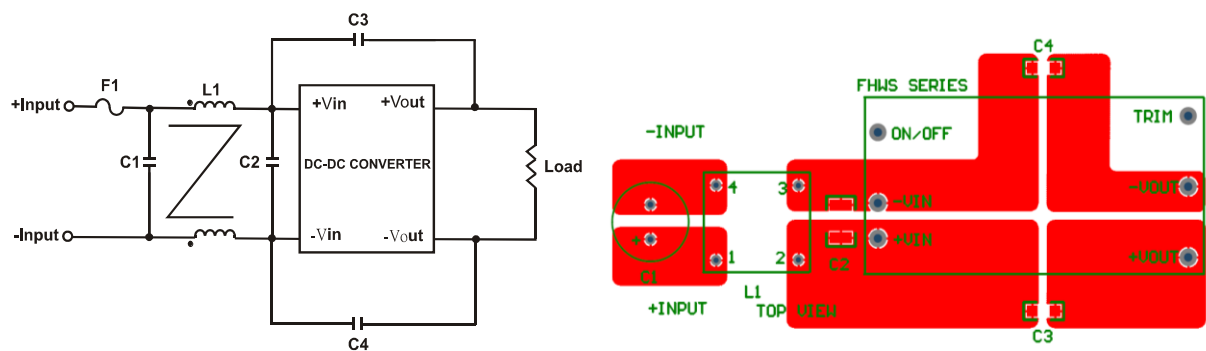


Specifications typical at $T_a=25^{\circ}\text{C}$, nominal input voltage, rated output current unless otherwise specified.

● RECOMMENDED FILTER FOR EN55032 CLASS B

The components used in the above figure, together with the manufacturer's part numbers for these components, are as follows:

	C1	C2	C3	C4	L1
FHWS-24*****	47 μ F/100V	N/A	1000pF/2KV MLCC	1000pF/2KV MLCC	325uH Common Choke
FHWS-48*****	47 μ F/100V	1.5uF/100V 1812 MLCC	1000pF/2KV MLCC	1000pF/2KV MLCC	325uH Common Choke



RECOMMENDED EN55032 CLASS B FILTER CIRCUIT LAYOUT

● INPUT FUSE SELECTION GUIDE

18-36V INPUT VOLTAGE(VDC)	36-75V INPUT VOLTAGE(VDC)
5000mA Slow-Blow Type	2500mA Slow-Blow Type

Note: Certain applications may require the installation of external fuse in front of the input.

FHWS SERIES APPLICATION NOTES:

EXTERNAL CAPACITANCE REQUIREMENTS:

No external capacitance is required for operation of the FHWS series.

External output capacitance is not required for operation; however it is recommended that 10uF tantalum and 0.1uF ceramic capacitance be selected for reduced system noise.

We Can Offer EMC-Filter According To EN55032 Class B.

Negative Outputs:

A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting –OUT as the negative output.

Remote ON/OFF:

The remote ON/OFF pin may be left floating if this function is not use. It is recommended to drive this pin with an open collector arrangement or a relay contact. When the ON/OFF pin is pulled low with respect to the –VIN, the converter is placed in a low power drain state.

Output TRIM:

The TRIM pin may be used to adjust the output +10% ~ -20% from the nominal setting .this function allows adjustment for voltage drops in the system wiring. If the TRIM function is not required the pin may be left floating.

FOR MORE INFORMATION CALL:

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Home Page

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