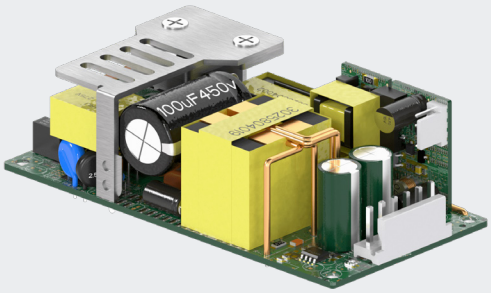
NCF150 SERIES

120/150 Watts CF Rated Medical



Medical | Data Center | Telecom | Industrial

Advanced Energy's NCF150 series are CF rated products for critical medical applications needing low leakage current. Voltages of 12V, 15V, 19V, 24V, and 48V together with an optional 5V standby and 12V fan output. Each model accepts a universal input of 85 to 264VAC. Full-Load efficiency of greater than 90%, these compact sitch-mode power supplies feature output overvoltage and short-circuit protection. These units are ideal for use in industrial and medical applications.

AT A GLANCE

Total Power

150 W

Input Voltage

85 to 264 VAC

# of Outputs

Single

SPECIAL FEATURES

- 150 W max output power
- 4.0" x 2.0" x 1.26"
- Industrial/Medical safety
- -40°C to 70°C with derating
- 5 V standby @ 0.5 A
  12 V fan output @ 0.4 A
- High efficiency: 90% typical
- ± 10% adjustment range

EMI/EMC

- EMI Class B
- IEC/EN61000 4th edition

SAFETY

UL	UL60601
CSA	No. 60601
CB Report	EN60601-1 IEC60601-1

FEATURE

1. Clearance and creepage requirements between primary and ground for one MOPP, primary and secondary for two MOPP and secondary and ground for one MOPP.

2. Hi-pot tests betwen primary and ground, primary and secondary and secondary and ground.

3. Type CF patient leakage current <10uA under normal condition and <50uA under single fault condition

Note: As the NCF series is classified as a component power supply, it cannot be declared an applied part, and therefore cannot be declared CF rated. However, the NCF Series has been evaluated for and meets the requirements related for use in CF applications.

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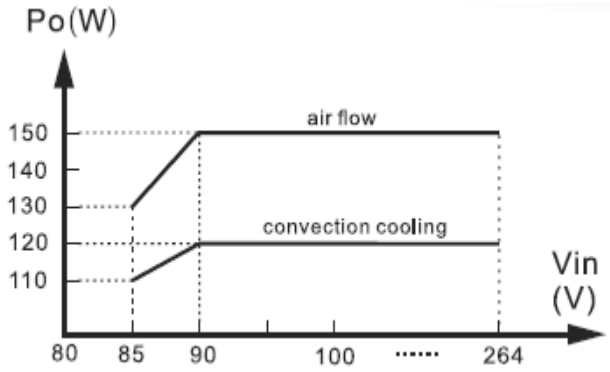
ELECTRICAL SPECIFICATIONS

Input				
Input Range		85 to 264 VAC (Operating) (Safety Rating 100 to 240 VAC). Derating below 90 VAC		
Frequency		47 to 63 Hz		
Power Factor		0.9 minimum		
Inrush Current		240 VAC, cold start: will not exceed 80 A peak (<2 ms Duration).		
Harmonics		Meets EN61000-3-2, Class A		
Input Current		2.5A max at 90VAC input		
Hold Up Time		16 ms minimum for main O/P, Measured at Full Load from 115 VAC and Vout reduces to 90% of original value before the AC drop out.		
Efficiency		91% min at 115 VAC/230 VAC, full load		
Leakage Current (Type CF)	Earth Leakage Current (Input - Earth)	Typical PSU Performance: <300 µA under NC @ 264Vac, 60 Hz <1000 µA under SFC @ 264Vac, 60 Hz	IEC60601-1 Limits: <5 mA under NC @ 264Vac, 60 Hz <10 mA under SFC @ 264Vac, 60 Hz	IEC60601-1, Ed 3.2, Figure 13
	Patient Leakage Current (Input - Output)	Typical PSU Performance: <9 µA under NC @ 264Vac, 60 Hz <30 µA under SFC @ 264Vac, 60 Hz	IEC60601-1 Limits: <10 uA under NC @ 264Vac, 60 Hz <50 uA under SFC @ 264Vac, 60 Hz	IEC60601-1, Ed 3.2, Figure 15
	Patient Leakage Current (Output - Earth)	Typical PSU Performance: <40 µA under NC @ 264Vac, 60 Hz	IEC60601-1 Limits: <50 µA under NC @ 264Vac, 60 Hz	IEC60601-1, Ed 3.2, Figure 16
Turn On Time		3 s max at 115 VAC		
Isolation Voltage - Type CF		Input to GND 1500 VAC (1 MOPP) Input to Output 4000 VAC (2 MOPP) Output to GND 1500 VAC (1 MOPP) 5 kV Defibrillator Pulse Withstand[1]		
Output				
Output Power		120 Watts (Convection); 150 Watts (200 LFM Airflow)		
Load Regulation		± 2% for Main & 5 VSB, ± 20% for Fan		
Line Regulation		± 0.5%		
Minimum Load		None required		
Ripple and Noise		1% of Vout		
Output Adjustability		± 10%		
Over Load Protection		120% to 180% of rated output current value, hiccup mode, auto-recovery		
Short Circuit Protection		Short across the output terminals will not cause damage to the unit. hiccup mode		
Over Voltage Protection		115% to 155% of nominal output voltage. Latching, recycle AC power to recover.		
Over Temperature Protection		Will shut down upon an overtemperature condition, auto-recovery.		

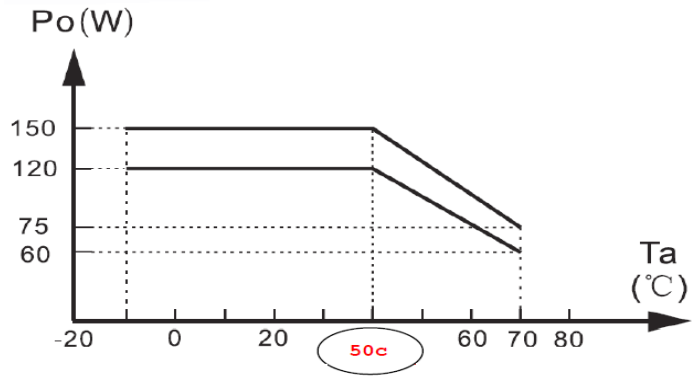
Note 1: Meets the 5 kV difbrillation tests under clause 8.5.5 of IEC60601 for non-output parts. Refer to safety report for details.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to +70°C (output power derated to 50% load at 70°C)
Storage Temperature	-40°C to +85°C
Humidity	5% to 95%, non-condensing
MTBF	>250 K hours
Altitude	Operating: -500 m to 5,000 meters
Vibration	Random vibration per MIL-STD-810E, Method 514.4, Cat. 1, Figure 514.4-1, 1 hr in each of three axes
ROHS	Product must be ROHS compliant
REACH	REACH compliance required



Output Power Vs Input Voltage



Output Power Vs Ambient Temperature

ORDERING INFORMATION

Model Number[1]	Output Voltage	Minimum Load	Maximum Load with Convection Cooling	Maximum Load with 200LFM Forced Air	Max Power	Regulation	Ripple P/P(PARD)
NCF150S12K	12 V	0 A	10 A	12.5 A	150 W	± 2%	120 mV
NCF150S15K	15 V	0 A	8.0 A	10.0 A	150 W	± 2%	150 mV
NCF150S19K	19 V	0 A	6.32 A	7.9 A	150 W	± 2%	190 mV
NCF150S24K	24 V	0 A	5.0 A	6.25 A	150 W	± 2%	240 mV
NCF150S36K	36 V	0 A	3.3 A	4.16 A	150 W	± 2%	360 mV
NCF150S48K	48 V	0 A	2.5 A	3.13 A	150 W	± 2%	480 mV

*Note 1: Contact AEI for availability of the 36V model or other output voltages.

PIN ASSIGNMENT

Connector	Definition	Pin Number(s)
AC Input (CN1)	AC Line	#3
	AC Neutral	#1
	Ground	PE
DC Output (CN2)	+Vout	# 4&5&6
	-Vout	# 1&2&3
Standby & Fan Connector (SCN1)	5V Standby	#1
	5V Standby Return	#2
	12V Fan Output	#3
	12V Fan Return	#4

MATING CONNECTOR

AC Input	TE/AMP# 640445-3 Mates With: AMP 640250-3	#1 AC NEUTRAL #3 AC LINE
	Mates With: Molex 19002-0005	PE
DC Output	TE/AMP# 640445-6 Mates With: AMP 640250-6	#1, #2, #3 -Vout #4, #5, #6 +Vout
Standby & Fan Connector	Landwin P/N: 2511P0400T Mates With: 2600S0400	#1 5V Standby #2 5V Standby Return #3 +12V Fan Output #4 -12V Fan Output

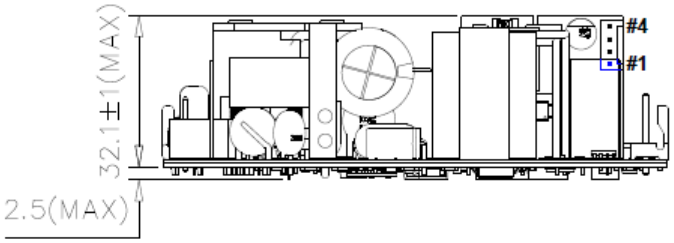
*Note: All connectors can be applied with equivalent products.

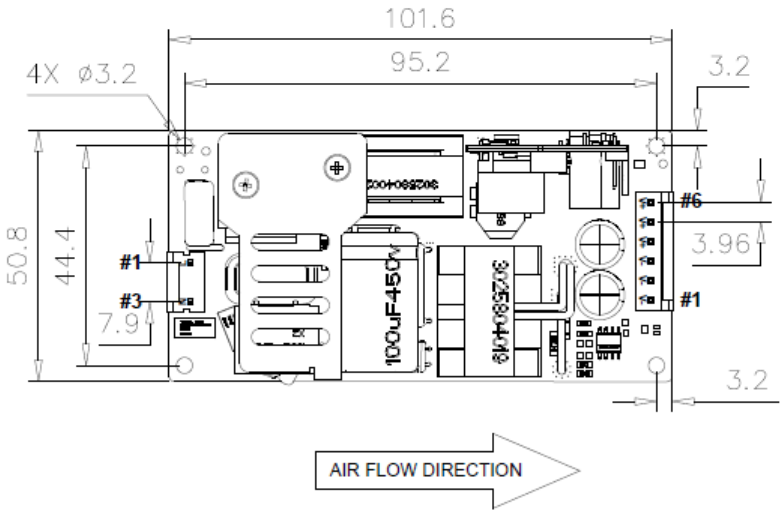
EMI/EMC COMPLIANCE

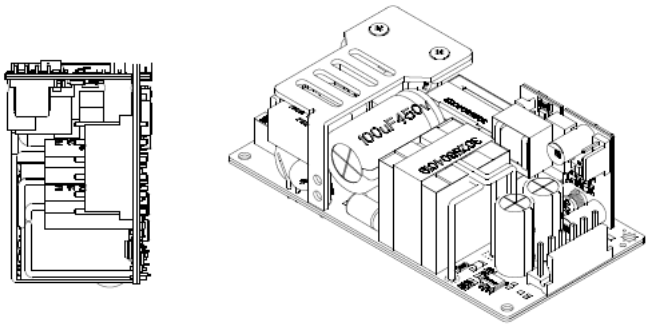
Parameter	Specification
Conducted Emissions	CISPR32 Class B EN55032 Class B, at 115 and 230 VAC, at 50% and 100% load steps.
Radiated Emissions	CISPR32 Class B EN55032 Class B, at 115 and 230 VAC, at 50% and 100% load.
Harmonic Current Emissions	EN61000-3-2, Class A.
Flicker	IEC61000-3-3
Electro Static Discharge (ESD) Immunity	IEC61000-4-2, IEC60601-1-2, 4th Edition, Level 4: +/- 8kV contact, +/- 15kV air, Criteria A.
Radiated RF EM Fields Susceptibility	IEC61000-4-3, IEC60601-1-2, 4th Edition, 10V/m, 80MHz to 2.7GHz, 80% AM at 1kHz, Criteria A.
Electrical Fast Transients (EFT)/Bursts	IEC61000-4-4, IEC60601-1-2, 4th Edition.
Surges - Line to Line (DM) and Line to GND (CM)	IEC61000-4-5, IEC60601-1-2, 4th Edition, Level 4, +/-2kV DM, +/-4kV CM, Criteria A.
Conducted Disturbances induced by RF Fields	IEC61000-4-6, IEC60601-1-2, 4th Edition, 3V/m – Level 4, 0.15 MHz to 80 MHz; and 12V/m in ISM and amateur radio bands between 0.15 MHz and 80 MHz, 80% AM at 1 KHz IEC60601-1, Criteria A.
Rated Power frequency magnetic fields	IEC61000-4-8, IEC60601-1-2, 4th Edition, Level 4: 30A/m, 50/60 Hz, Criteria A.
Voltage Interruptions, Dips, Sags & Surges	IEC61000-4-11, IEC60601-1-2, 4th Editio, -100% dip for 10 ms, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees: --100% dip for 20ms, 0 deg., Criteria A, --100% dip for 4000ms (250/300 cycles), Criteria B - 30% dip for 500ms, Criteria A.

Note - EMI filtering is provided to meet the EMC requirements above. Unless otherwise stated, all tests are done at full load and 115 and 230Vac input. If any test would be marginal at other conditions, testing may be done at other stated conditions. All tests are to be performed in accordance with the stated standard. Acceptance is based on the supply continuing to function properly. Under some conditions, the outputs may pass through some level of signal.
According to the standards, performance criteria are defined as following:
A – Normal performance during and after the test
B – Temporary degradation, self-recoverable
C – Temporary degradation, operator intervention required to recover the operation
D – Permanent damage

MECHANICAL DRAWINGS







ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than four decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

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For international contact information,
visit advancedenergy.com.

powersales@aei.com (Sales Support)
productsupport.ep@aei.com (Technical Support)
+1 888 412 7832

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