

Input Parameters

NOMINAL INPUT VOLTAGE RANGE	100 - 240V AC or 133 - 318VDC*
MAX. INPUT VOLTAGE RANGE	90 - 264V AC or 120 - 350VDC*
INPUT FREQUENCY	45 - 440Hz MAXIMUM
MAXIMUM INPUT CURRENT	3A AC or 2.2A DC
INRUSH CURRENT	<40A

* For IEC/EN60601-1, 100 – 240Vac Nom. and 45 – 63Hz only

All ratings apply for ambient temperatures up to 50°C. From 50 to 65°C the total output power and the module current ratings are both derated at 2.5% per deg C.

Outputs

Output Parameters

NV175 models as described below:

Unit Configuration Code:

NVx-abcde-f-g-h-ijk

where:

- x = 1 for NV175
- a = Number of Outputs : 1, 2, 3 or 4
- b = Channel 1 Output Voltage†: 5, T, 7, F, E or G
- c = Channel 2 Output Voltage†: 1, 2, 3, 5, 5L or 0
- d = Channel 3 Output Voltage†: 3L, 5L, TL, FL, T, F, G followed by Y for negative output or 0
- e = Channel 4 Output Voltage†: 3H, 5H, T, F, TH, FH, 0H (fan only channel 4 output) followed by V for variable output followed by P for positive output or 0
- f = Global Option : N for 5V version, N1 for 12V version, N2 for 13.5V version, N3 for 5V version with ATX compatibility, N4 for 12V version with ATX compatibility, N5 for 13.5V version with ATX or nothing for no Global Option present
- g = U for U chassis, C for U chassis and cover, F for U chassis and cover with fan, I for U chassis and cover with fan and IEC inlet or nothing for Open Frame
- h = Blank is the standard upright output connector, R is for the right angle output connector, H is for high altitude, HR is for high altitude with right angle output connector, M is for IEC60601-1 reinforced spacings, MR is for IEC60601-1 reinforced spacings with right angle connector
- ijk = Three numbers from 0 to 9 which denotes various output voltages and currents within the specified ranges of each output for a particular unit or blank for standard output settings

† Table1: Output Voltage Cross Reference	
Designation	Output Voltage
0	Omit output
A	1.5
1	1.8
B	2
2	2.7
3	3.3
5	5
7	7
T	12
F	15
E	18
G	24

Output channels and Global Options ratings are in accordance with the following table:

Output Channel	Voltage designation	Vout	Adjustment Range	Output Current
CH1	5	5	5 - 5.5	25A
	T	12	12 - 15.5	15A
	F	15	12 - 15.5	15A
	E	18	16 - 20	10A
	G	24	24 - 28.5	7.5A
CH2	1	1.8	0.9 - 3.8	15A
	2	2.7	2.5 - 3.8	15A
	3	3.3	2.5 - 3.8	15A
CH2 (CH1 12V)	5	5	3.3 - 5.5	10A
CH2 (CH1 15V)	5	5	3.3 - 5.5	10A
CH2 (CH1 24V)	5L	5	Fixed	2A
	5	5	3.3 - 5.5	8A
	7	7	5.5 - 8	5.5A
CH3	T	+/-12	12 - 15	5A
	F	+/-15	12 - 15	5A
	G	+/-24	18 - 24.5	2.5A
	3L	+/-3.3	Fixed	2A
	5L	+/-5	Fixed	2A
	TL	+/-12	Fixed	2A
	FL	+/-15	Fixed	2A
CH4	3H	+/-3.3	Fixed	2A
	5H	+/-5	Fixed	2A
	T	+/-12	Fixed	1A
	F	+/-15	Fixed	1A
	TH	+/-12	Fixed	2A
	FH	+/-15	Fixed	2A
	THV	+/-12	12 - 15	2A
	FHV	+/-15	12 - 15	2A
CH4 (fan output)	OH	-	-	-
Global Option	N	5	Fixed	2A
	N1	12	Fixed	1A
	N2	13.5	Fixed	1A
	N3	5 (ATX version)	Fixed	2A
	N4	12 (ATX version)	Fixed	1A
	N5	13.5 (ATX version)	Fixed	1A

Channels 1 and 2 combined output currents must not exceed 25A

Variations and limitations of use:

1. All NV175 PSUs can output 180W except 5V channel 1 models which can output 175W.
2. Units with channel 1 T and G outputs (no other channels fitted) have a peak power output of 200W including the global option with the following duty cycles:

In any 5 minutes 30% at 200W followed by 70% at 171W (average 180W)

In any 5 minutes 20% at 200W followed by 80% at 175W (average 180W)

3. Options –M and –MR meet IEC60601-1 Edition 2 Reinforced spacings with the following limitations:

Channel 1 cannot be 5V model (T1 and T2 with foils)

Channel 2 cannot be fitted

Cannot be global option variants

4. Fan versions:

Channel 1 with G output, 25V maximum with 5V channel 2 maximum output current of 7A.
Channel 1 with G output, 25V maximum with 7V channel 2 maximum output current of 5.5A.
Channel 1 with G output, 5L channel 2 maximum output current 1.8A.
Channel 2 with T and F outputs, channel 2 maximum output current of 9A.
Channel 4 maximum output current of 1.5A

5. Model NV1-1G000 (with or without global option or –M/-MR option) may also be run with Channel 1 output voltage range 22.5V to 28V with maximum current of 7.5A and maximum power of 180W
6. Model NV1-1G000 (with or without –M option) may also be run at 88.9Vac to 240Vac nominal input (tested for continuous running at 80Vac input), output: 24V to 28V at 6.25A maximum current and 150W maximum power.

The products listed in the following table are typical examples:

Model	CH1	CH2	CH3	CH4	Global Option
NV1-453FF	5V/25A	3.3V/15A	15V/5A	-15V/1A	-
NV1-4G5FFH-N3	24V/7.5A	5V/8A	15V/5A	15V/2A	5V/2A
NV1-350TT-N	5V/25A	-	12V/5A	-12V/1A	5V/2A
NV1-453TT-N1	5V/25A	3.3V/15A	12V/5A	-12V/1A	12V/1A
NV1-250T0-N2	5V/25A	-	12V/5A	-	13.5V/1A

Output Limitations

- All outputs are SELV.
- Seriesing of outputs is not allowed.
- All outputs have operational spacings to earth, and due consideration must be given to this in the end product design.
- Adjusting output voltage beyond the stated range may cause overvoltage protection (OVP) to operate, whereby the output will cycle on and off or latch off for channels 1 & 2. To reset for normal operation simply adjust the potentiometer to reduce the output voltage to within it's range or cycle the input off then on if the unit has latched off.

Custom Models

All ratings as per standard models unless otherwise stated.

Model: NS-LAM/NV1-453TTH-N2-C (K10035)
Rated to 4600m altitude (operating air pressure: 54kPa to 106kPa)
Input voltage range from 90Vac to 264Vac

Model: NS-LAMF/NV1-4G5TTH-F (K10066)
5L low current channel 2 fitted.
Channel 2 rated: 5V, 1.4A

Important Safety Instructions

General

This product range has been assessed and approved for both DC & AC input. Further, the DC input can be derived from a non-isolated mains supply of up to 240Vac..

Critical Components

These products are not authorised for use as critical components in nuclear control systems, life support systems or equipment for use in hazardous environments without the express written approval of the Managing Director of Lambda Europe.

Servicing

These products are not customer serviceable. Repairs may only be carried out by Lambda UK or their authorised agents.

Approval Limitations: Use in North America (AC units only)

When this product is used on 180VAC-250VAC mains with no neutral, connect the two live wires to L(live) and N (neutral) terminals on the input connector. In this instance double pole fusing is required.

High Voltage Warning

Dangerous voltages present within the power supply. These products can be supplied with or without a case and the professional installer must protect service personnel from inadvertent contact with these dangerous voltages in the end equipment.

External Hot Surfaces

Section 6 of the Health and Safety at Work Act requires that manufacturers have an obligation to protect service engineers as well as users. In order to comply with this, a label must be fitted to these products which is clearly visible to service personnel accessing the overall equipment, and which legibly warns that surfaces of these products may be hot and must not be touched when the products are in operation.

Safety Class of Protection

These products are designed for the following parameters : Material Group IIb, Pollution Degree 2, Overvoltage Category II, Class 1 (earthed), Indoor use as part of an overall equipment such that the product is accessible to service engineers only.

Protective Earth Conductor

The Protective Earth conductor has been tested at 30A for 2 minutes through the J2 input connector. Additional testing may be required in the end use equipment.

Special Instructions for medical applications(IEC/EN/UL/CSA 60601-1)

- i) These products are designed for continuous operation within an overall enclosure, and must be mounted such that access to the mains terminals is restricted. See clause 16, IEC60601-1, EN60601-1 and UL/CSA 60601-1.
- ii) These products are NOT suitable for use in the presence of flammable anaesthetic mixtures with air or with oxygen, or with nitrous oxide.
- iii) These products are classed as ordinary equipment, type B and have a Reinforced barrier between input and output for options –M and –MR and a basic barrier between input and output for all other units according to IEC60601-1, EN60601-1 and UL/CSA 60601-1. They are NOT protected against the ingress of water.
- iv) Connect only apparatus complying with IEC60601-1, EN60601-1 and UL/CSA 60601-1 to the signal ports.
- v) Except for permanently installed equipment as defined in clause 57.6 of IEC60601-1, EN60601-1 and UL/CSA 60601-1, the overall equipment in which these products are installed must have double pole fusing (rated T3.15AH, 250V) on the input mains supply. The products themselves have single pole fusing (rated 3.15A, 250VT3.15AH, HBC) in the live line.
- vi) Reference should be made to local regulations concerning the disposal of these products at the end of their useful life.
- vii) These products have not been assessed to IEC/EN60601-1-2 (EMC) but EMC test data is available from Lambda UK.

Special Instructions for IEC/EN/UL/CSA 61010-1

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

If the earth terminal of the NV175 PSU is connected to the main incoming earth conductor of the end equipment, the installer must cover the NV175 earth symbol with a label bearing the earth symbol of IEC60417-5019.

Safety approvals

UL60950-1 and CSA22.2 No.60950-1 - UL Recognised. C-UL for Canada. IEC / EN60950-1 - CE mark.

CE marking when applied to any NV175 product, indicates compliance with the Low Voltage Directive (2006/95/EC) in that it complies with EN60950-1.

IEC/EN/UL/CSA 61010-1 and IEC/EN/UL/CSA 60601-1 - CB Report and Certificate

UL/CSA 60601-1 - UL + C -UL approval

Input markings and symbols

	Alternating Current (AC)	
	Direct Current (DC)	+ Live
	Danger, shock, hazard	- Neutral
	Caution refer to supplementary	E Earth

Environmental parameters

Operation

Temperature:	0 to 65°C (derating 2.5% above 50°C)
Humidity:	5 to 95% RH, non-condensing
Air Pressure:	70kPa to 106kPa
Altitude:	-200m to 3000m

Storage and Transportation

Temperature:	-40°C to +85°C
Humidity:	5 to 95% RH, non-condensing
Air Pressure:	54kPa to 106kPa
Altitude:	-200m to 5000m

Mounting Aspects

Customer air models:

Orientations:	Horizontal, cover uppermost
	PSU on its side
	Vertical

Fan models:

Orientations:	Horizontal, cover uppermost
	PSU on its side
	Vertical with input lowest

Note: fan models require a 50mm gap at the input and output ends.

Shock

+ / - 3 x 30G shocks in each plane, total 18 shocks. 30G shocks are 11ms (± 0.5 ms), half sine. Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987.

Vibration

Single axis 10 - 500Hz at 2G (sweep and endurance at resonance) in all 3 planes.

Cooling for units with customer supplied air (open frame, U and C options)

The following method must be used for determining the safe operation of PSUs.

The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of IEC60950-1:2005 Clause 4.5. Consideration should also be given to the requirements of other safety standards.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive, or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Circuit Ref.	Description	Max. Temperature (°C)
L3, L7	Common mode choke winding	130 † (140)
C1, C4	X capacitors	100
C6, C12	Capacitor	105
L2	Boost choke winding	130
C7	Electrolytic capacitor	70 † (105)
T1, T2	Transformer winding	130
XU3	Control board optocoupler	100
TX701	Global option transformer	90
L5	Channel 1 Output choke	125
XL401	Channel 2 Output choke	125
XL601	5L channel 2 output choke	125
XU601	5L channel 2 IC	115
XL501 or XL601	Channel 3 and 4 output choke	125
IC1*	Channel 4 Voltage regulator	110
XQ406	Ch2 highside FET (SMA 2)	115
XV504	Ch3 highside FET (SMA 3)	115
XU601	Ch4 IC (SMA 4)	115
Various	All other electrolytic capacitors	90 † (105)

* 1A channel 4 only

† The higher temperatures limits in brackets may be used but product life may be reduced.

See diagrams below for components to be monitored:

Level of insulation

Dielectric Strength testing is carried out as follows: Primary mains circuit to earth - 2.25 - 2.35Kvdc.

*Primary mains circuits to secondary:4.25-4.35kVDC. Outputs to earth are isolated to 200VDC.

*Important Note: This test is not possible with Y capacitors fitted to the unit as damage to these capacitors will occur. It is also necessary to short circuit the outputs together and to earth

General installation instructions

The NV175 family of component power supplies is designed for use within other equipment or enclosures which restrict access to authorised competent personnel only. For safe installation and operation of this product, carefully follow the instructions listed below.

- i) The unit cover/chassis is designed to protect skilled personnel from hazards. They must not be used as part of the external covers of any equipment where they may be accessible to operators, since under full load conditions, part or parts of the unit chassis may reach temperatures in excess of those considered safe for operator access. On units with end fans and IEC 60320 connector (-I), the fan and connector end of the unit is permitted to be user accessible.
- ii) These products are Class 1 and must therefore be reliably earthed and professionally installed in accordance with the prevailing electrical wiring regulations and the safety standards covered herein. For uncased models without the global option, Y1 to Y4 must be connected to Protective Earth in the end use equipment. For models with the global option, Y1 to Y3 and Y5, Y6 must be connected to Protective Earth in the end use equipment.
- iii) These products are IPX0, and therefore chemicals/solvents, cleaning agents and other liquids must not be used.
- iv) Potentiometers should be adjusted using Bourns tool H91

Mechanical parameters

DO NOT USE MOUNTING SCREWS WHICH PENETRATE THE UNIT BY MORE THAN 4.5 MM.

Weight 600gms max.

Connection details

Input Connections

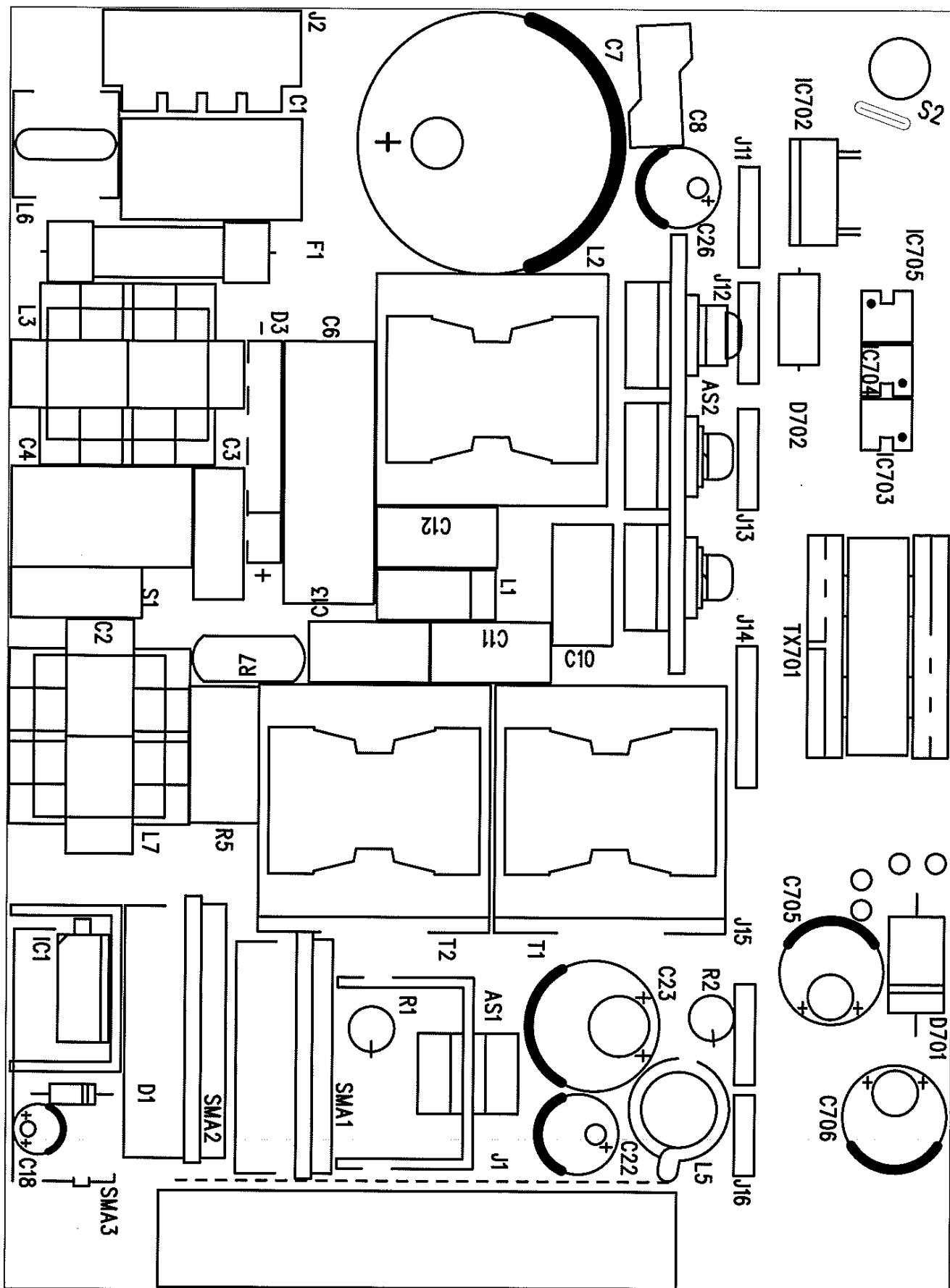
Molex 3 pin header 7A/250V MAX.

IEC 60320 inlet.

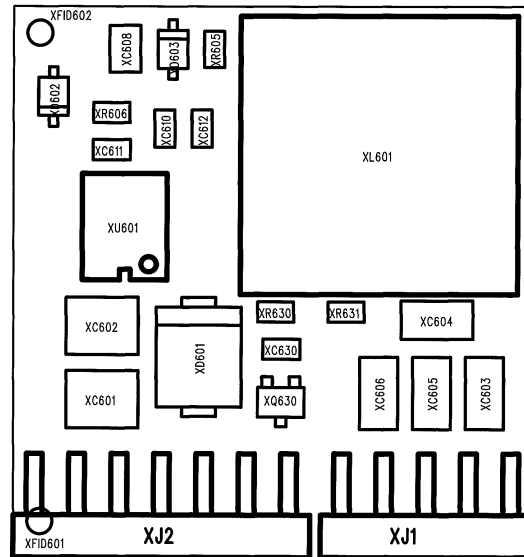
Fuse

Internal fuse (F1): T3.15AH, 250V, 5x20mm.

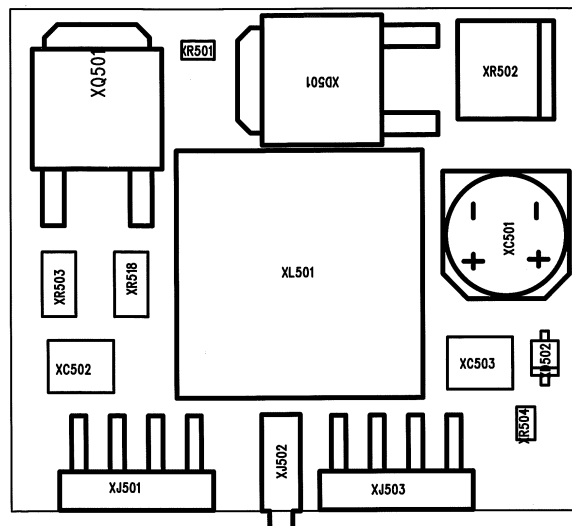
COMPONENTS TO BE MONITORED



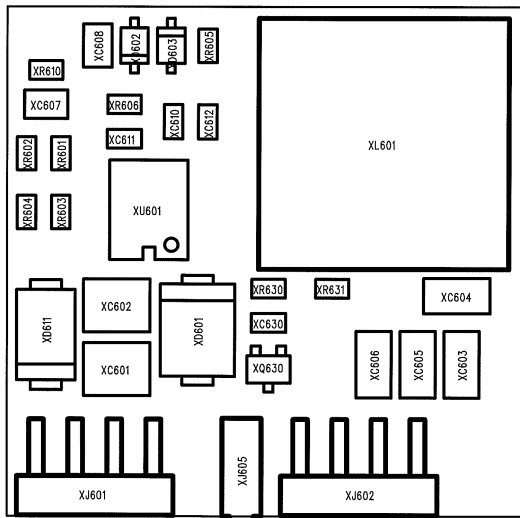
Base board



SMA 1 channel 2 board (low current)



SMA 2 channel 3 board (alternate)



SMA 3 channel 4 board

RA-NVDC-01, DC Front End (product code R14408), or NV175 DC Front End model as described below:

The RA-NVDC-01 (DC Front End or DC FE) assembly covered by this Report is a non-isolated DC to DC converter input option for use with the NV175 PSU providing functional insulation at working voltage between input to earth. It is approved as an open frame PCB Assembly but in reality it will be assembled into a 19 inch rack unit along with the NV175 unit. The NV175 DC FE unit requires 2m/sec of airflow to provide maximum output power of 225 W, but to determine that the product complies with IEC60950-1:2005 in the end equipment, various components are listed in the RA-NVDC-01 COOLING section of this Report along with their maximum temperatures and these must not be exceeded.

ELECTRICAL AND THERMAL RATINGS:

Input parameters

Input Voltage Range:	36 - 76Vdc
Input Frequency Range:	DC
Maximum Input Current:	8Adc

Output parameters

Nominal Output Voltage:	220Vdc
Nominal Output Power:	225W

ENVIRONMENTAL PARAMETERS

Operation

Temperature:	0 to 50 ⁰ C
Humidity:	5 to 95% RH, non-condensing
Air Pressure:	70kPa to 106kPa
Altitude:	-200m to 3000m

Storage and Transportation

Temperature:	-40 ⁰ C to +85 ⁰ C
Humidity:	5 to 95% RH, non-condensing
Air Pressure:	54kPa to 106kPa
Altitude:	-200m to 5000m

Mounting Aspects

Orientations:	All except PCB uppermost
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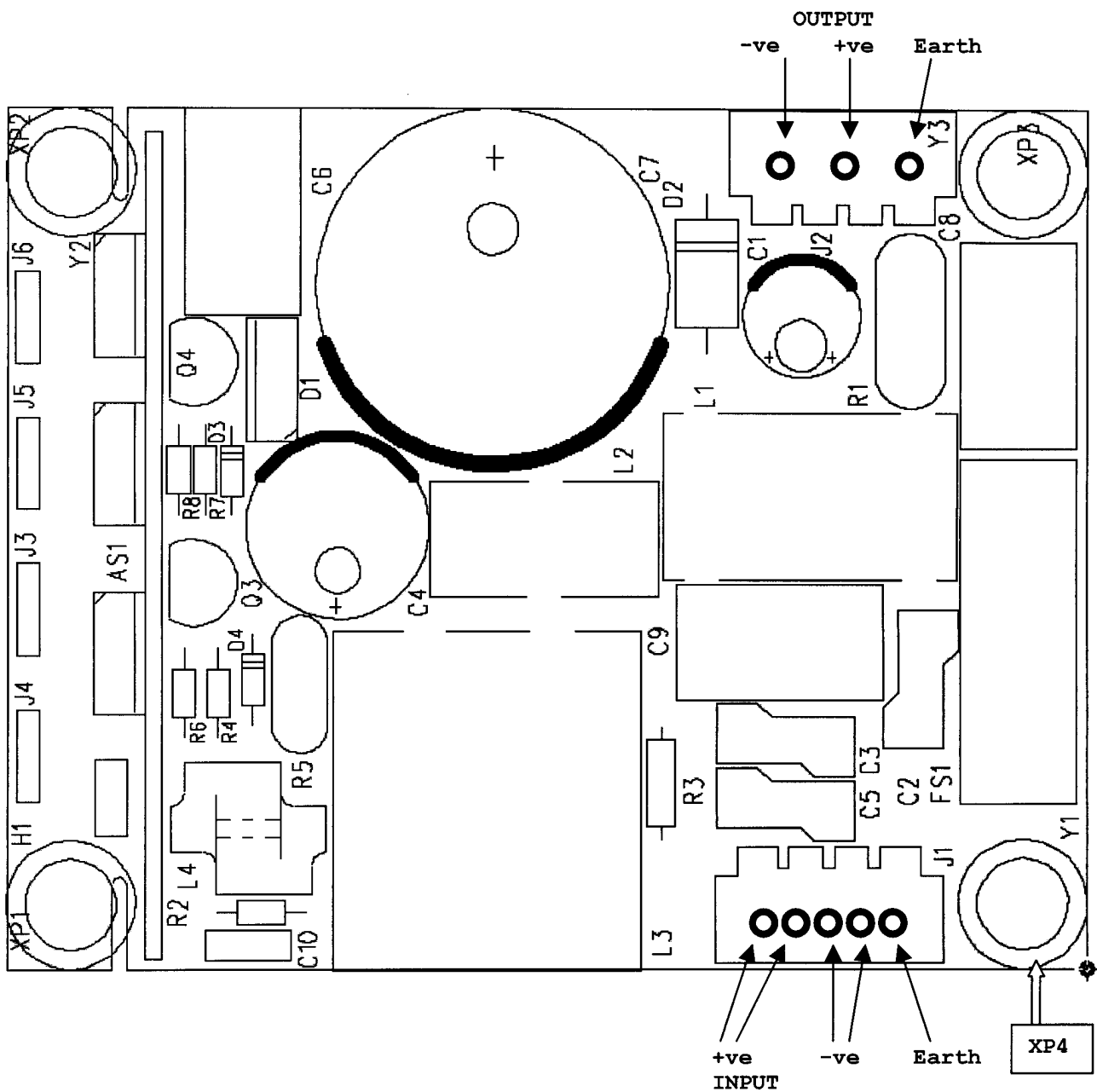
RA-NVDC-01 COOLING:

The following method must be used for determining the safe operation of PSUs in end equipment. The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of IEC/EN60950-1:2005 Clause 4.5. Consideration should also be give to the requirements of other safety standards.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive, or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

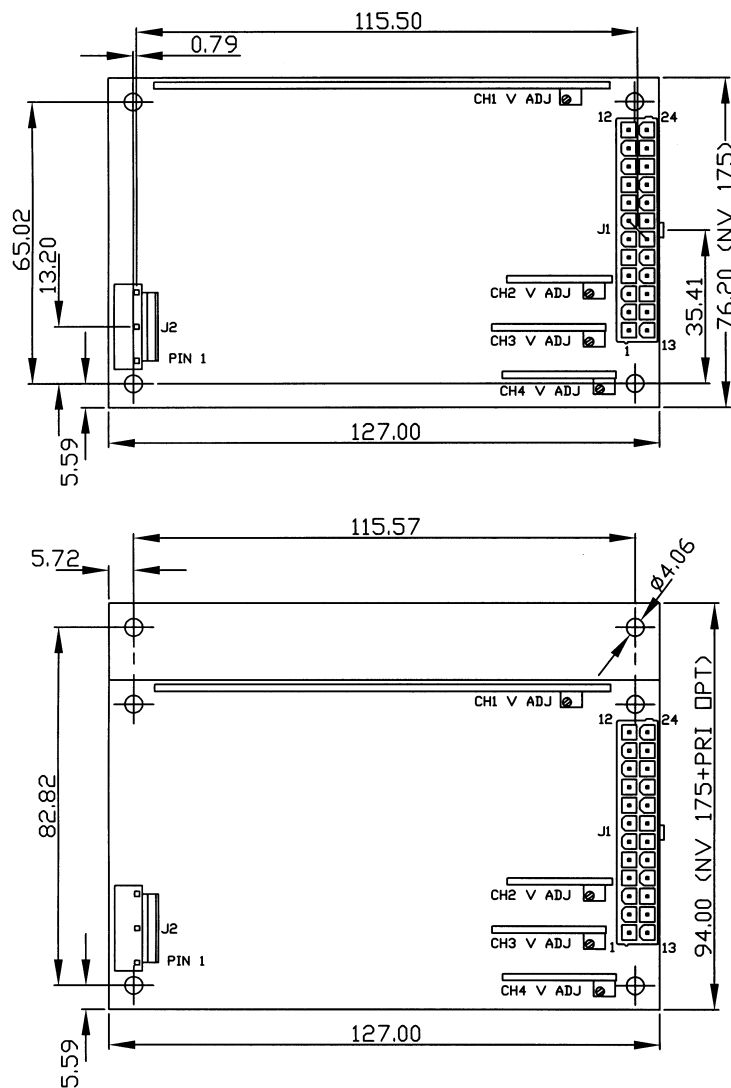
Component maximum temperature table:

Circuit Ref.	Description	Max. Temperature (°C)
L1	Common mode choke winding	130
L2	Series mode choke winding	130
L3	Boost choke winding	130
C6, C8, C9	X capacitors	100
C7, C1	Electrolytic capacitor	75
C4	Electrolytic capacitor	80



Vertical connector connection layout and dimensions

NV 175/NV 175 + GLOBAL OPTION
CUSTOMER OUTLINE & CONNECTION DRAWING
REVISION 13 08.08.06

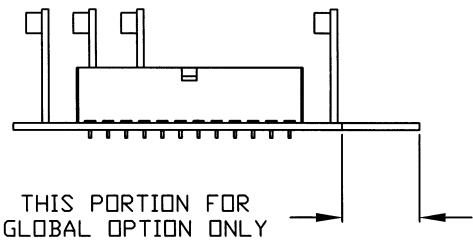
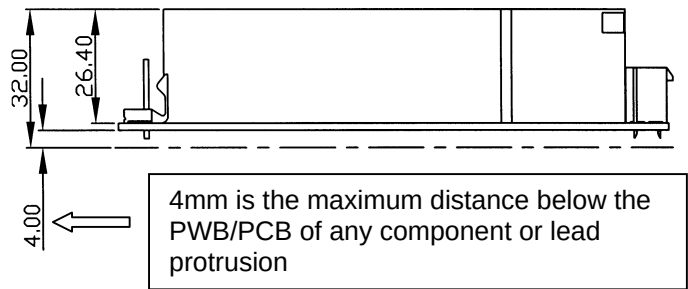


J2	
PIN	FUNCTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

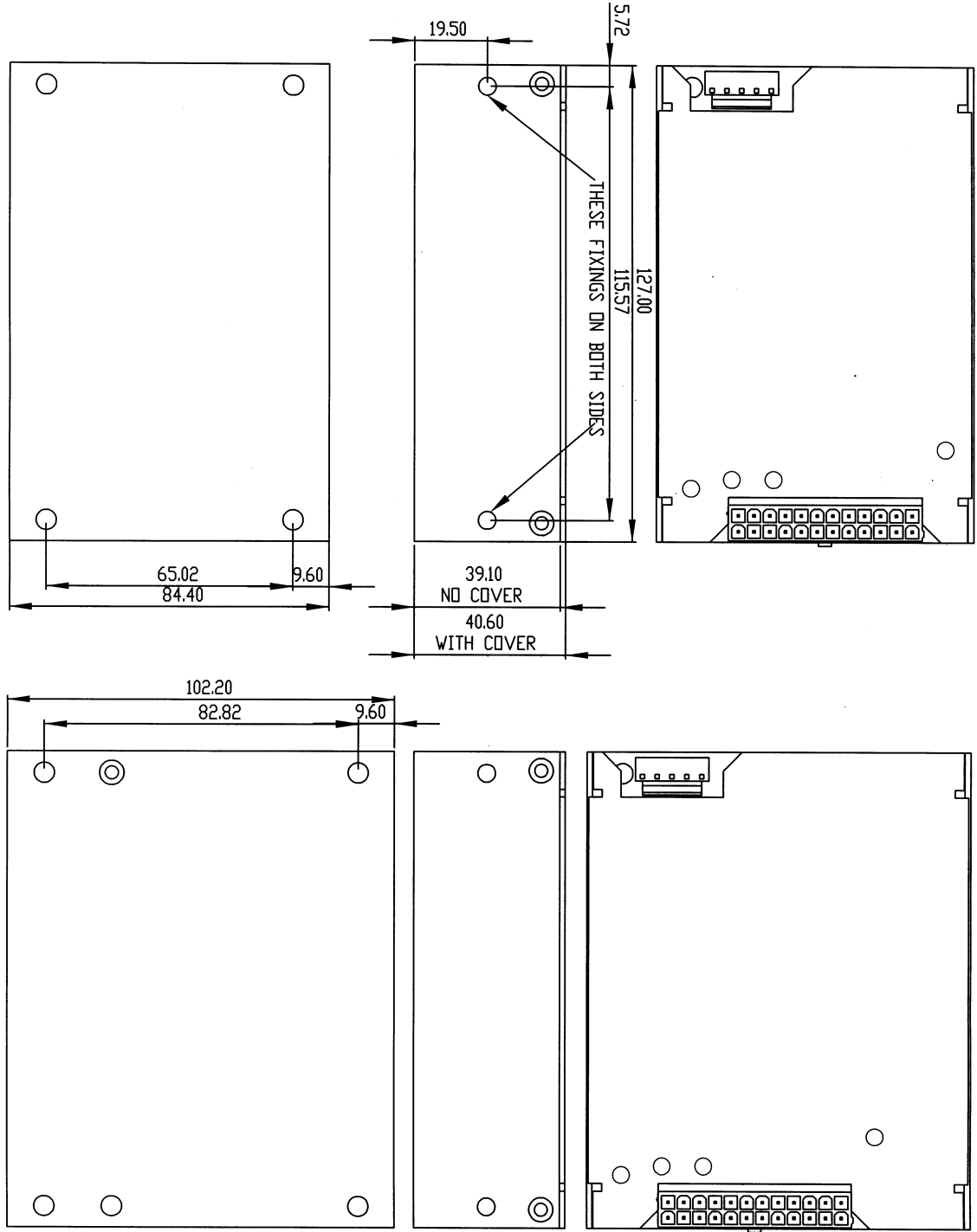
J1			
PIN	FUNCTION	PIN	FUNCTION
12	STANDBY +Ve	24	STANDBY RETURN
11	POWER GOOD	23	REMOTE ON/OFF
10	CH1 OUTPUT	22	CH1 POWER GOOD
9	CH1 OUTPUT	21	CH1 OUTPUT
8	CH1 OUTPUT	20	CH1 OUTPUT
7	+SENSE CH1	19	-SENSE CH1
6	0V COMMON	18	0V COMMON
5	0V COMMON	17	0V COMMON
4	CH2 OUTPUT	16	0V COMMON
3	CH2 OUTPUT	15	CH2 OUTPUT
2	+SENSE CH2	14	-SENSE CH2
1	CH3 OUTPUT	13	CH4 OUTPUT

MATING PARTS (MOLEX OR EQUIVALENT)

CONN	HOUSING	PINS
J1	39-01-2245	44476-3112
J2	09-50-8051	08-52-0113



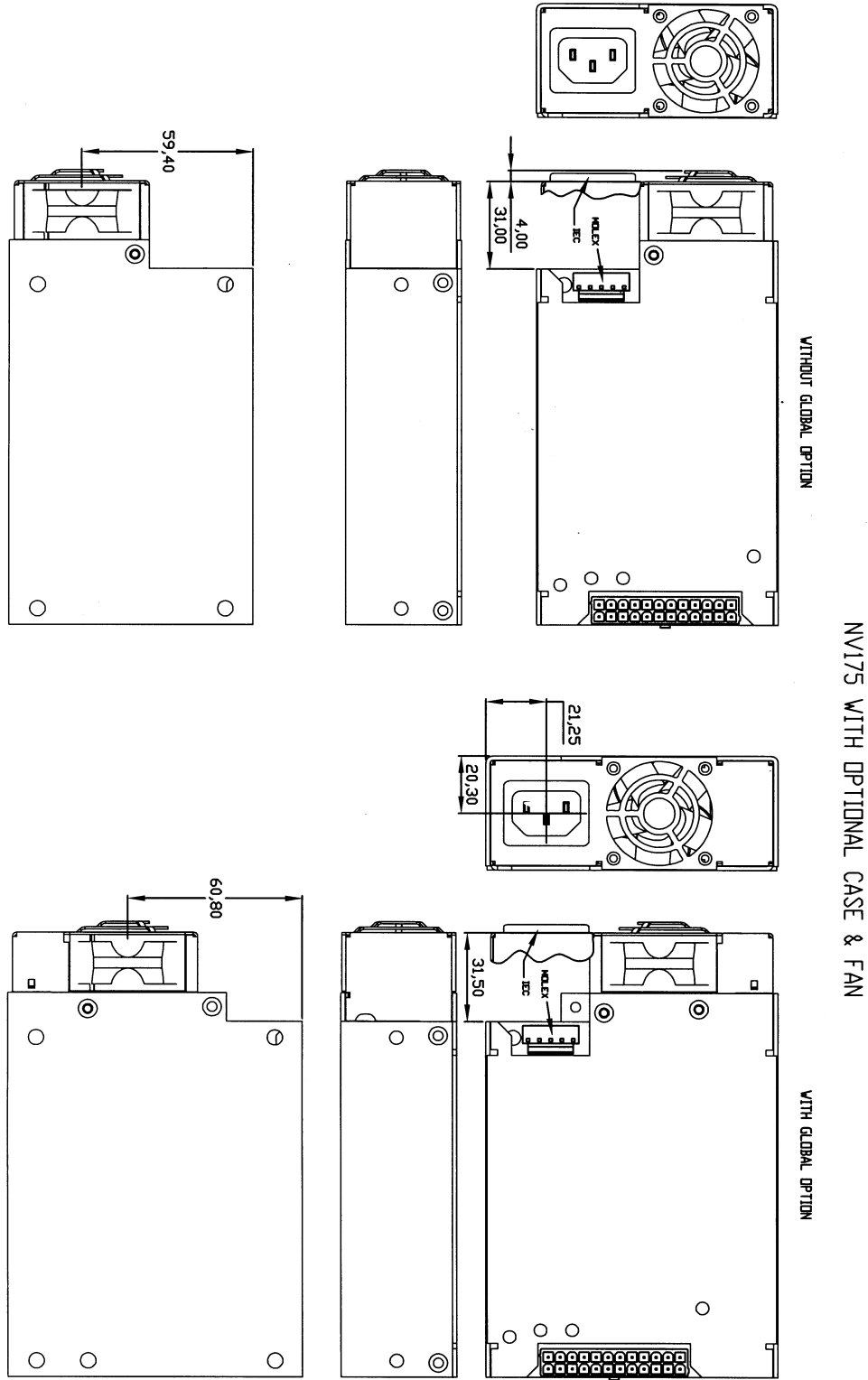
Chassis dimensions with vertical output connector



NV175 WITH OPTIONAL CASE

- NOTES
- 1 ALL CUSTOMER FIXINGS M3
MAXIMUM PENETRATION 4.5mm
MAXIMUM TORQUE 0.9Nm
 - 2 ALL TOLERANCES +/-0.5mm

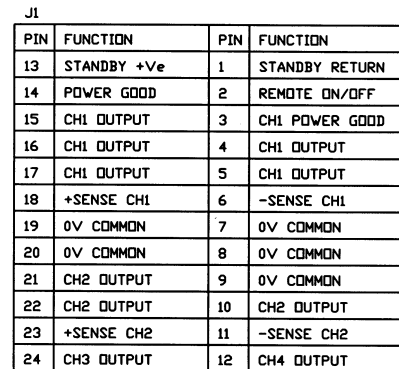
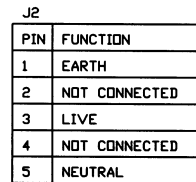
Fan/IEC version chassis layout with vertical output connector



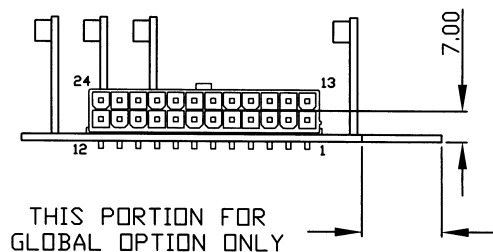
NV175 WITH OPTIONAL CASE & FAN

OTHER DIMENSIONS AS PER
CASES WITHOUT FANS

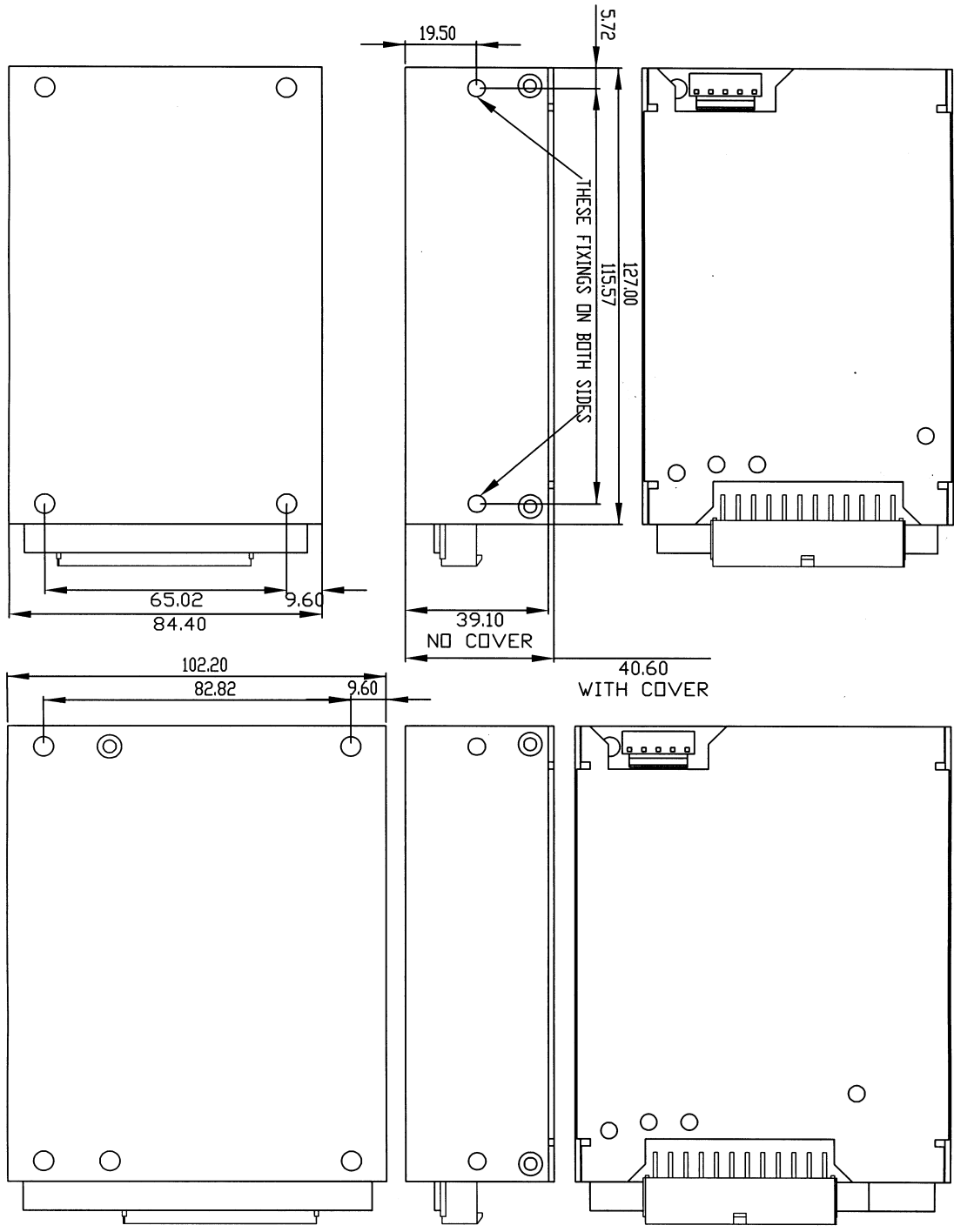
NV 175/NV 175 + GLOBAL OPTION
CUSTOMER OUTLINE & CONNECTION DRAWING
REVISION 13 08.08.06



CONN	HOUSING	PINS
J1	39-01-2245	44476-3112
J2	09-50-8051	08-52-0113



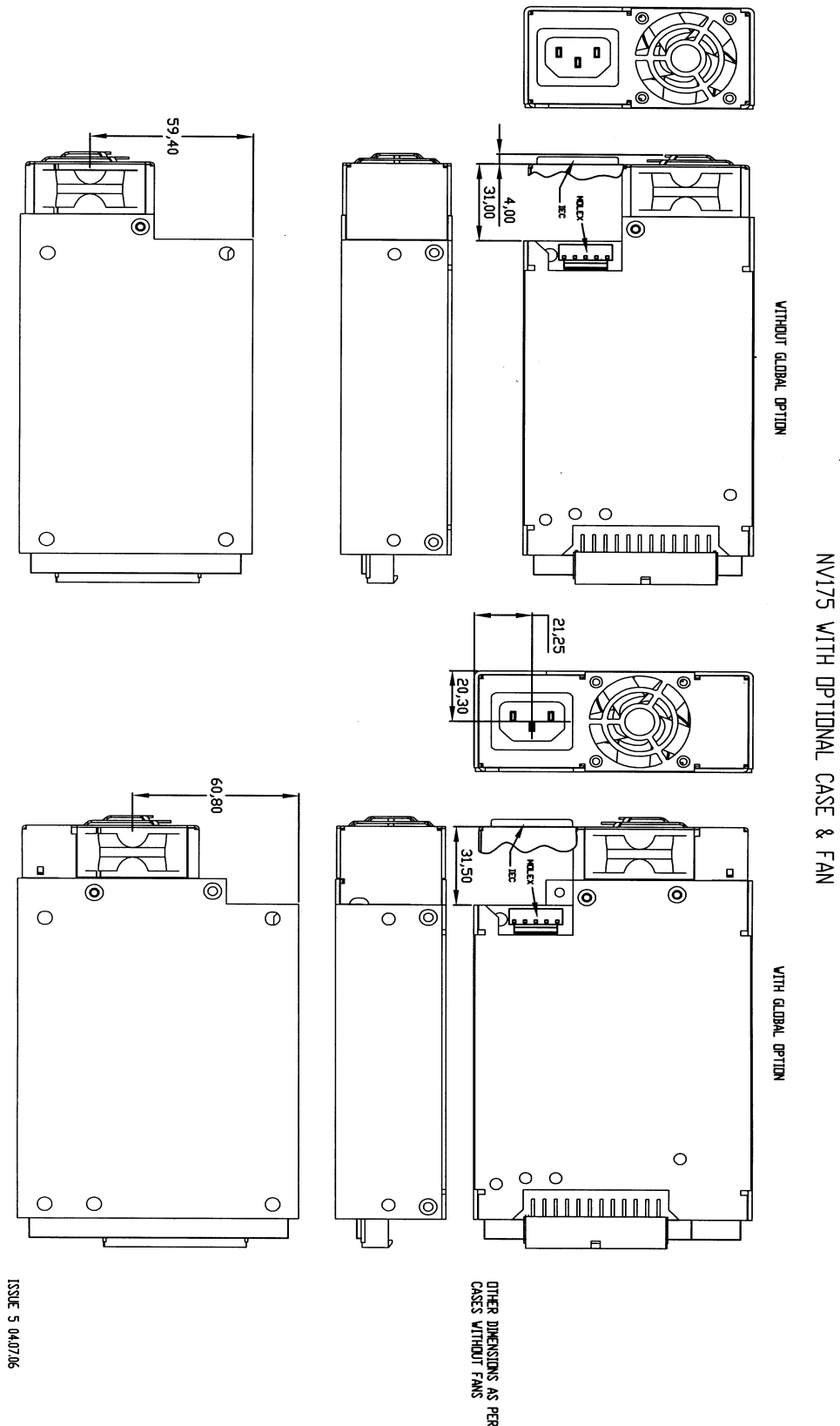
Chassis dimensions with right angle output connector



NV175 WITH OPTIONAL CASE

- NOTES
- 1 ALL CUSTOMER FIXINGS M3
MAXIMUM PENETRATION 4.5mm
MAXIMUM TORQUE 0.9Nm
 - 2 ALL TOLERANCES +/-0.5mm

Fan/IEC version chassis layout with right angle connector



CEL Part No. 17159 Issue 17, March 2008



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