

Input Parameters

NOMINAL INPUT VOLTAGE RANGE	100 - 240V AC or 133 - 318VDC**
MAXIMUM INPUT VOLTAGE RANGE	90* - 264V AC or 120 - 350VDC**
INPUT FREQUENCY	45 - 440Hz MAXIMUM or DC
MAXIMUM INPUT CURRENT	6.1A rms or 4.2A DC**
MAXIMUM INPUT CURRENT (at 530W peak power for 10 second maximum)	8.2A rms or 5.7A DC**
INRUSH CURRENT	<30A AT 25°C

* PSU linearly derated from 90Vac to 85Vac 5W per volt to 375W
 ** DC input for 60950-1 only

All ratings apply for ambient temperatures up to 50°C. From 50 to 70°C the output power is derated at 2.5% per deg C.

Output Parameters

EFE400 models as described below:

EFE400x-a-bcde-f-g-hij

Where:

- x = Nothing or J for Japanese models (may have non-safety differences)
- a = Channel 1 Output Voltage: any voltage within the Adjustment Range for the Vout (nom) from the Output Table below, e.g. 12.8 for 12.8V output (12Vout nom), 24.6 for 24.6V output (24Vout nom).
- b = CN for Open Frame with fan output, CU for U chassis with fan output, CC for U chassis and cover with fan output, EC for U chassis and cover with fan.
- c = M for molex input connector or equivalent, J for JST connector or equivalent.
- d = D for dual fused input.
- e = S for Standard Leakage, L for Low Leakage, R for Reduced Leakage, T for Tiny Leakage.*
- f = Nothing for horizontal output connector, V for vertical output connector.
- g = Nothing for standard channel 1 output voltage, xD or xPD where D is for units with programmed negative load regulation, PD is for units with programmed positive load regulation, x is the voltage of the regulation in 100mVolts and is within the Output Adjustment range (example, 7D = 0.7V of negative load regulation, 24PD = 2.4V of positive load regulation).
- hij = Three numbers from 0 to 9 which denotes various output voltage/current settings within the specified ranges of each output for a particular unit or blank for standard output settings. (may define non-safety related parameters/feature, e.g. reduced primary current limit, reduced OVP)

* At 440Hz, leakage current is > 3.5mA and therefore must be assessed in the end use application.

OUTPUTS:

Output Channel	Nominal Voltage (V)	Adjustment Range (V)	Max Output Current (A)	Max Output Power (W)
CH1	12	11.4 – 13.2*	33.3	400 (530**)
	24	22.8 – 26.4*	16.67	400 (530**)
Fan output	12	Fixed	0.25	3

* Can be adjusted by +10%, -5% at the factory only

** Peak power of 530W for 10 seconds maximum, maximum rms power of 400W:

$$400W_{rms} \geq \sqrt{(peakpower^2 \times T1 + reducedpower^2 \times T2)/(T1 + T2)}$$

where T1 = peakpower time on
 and T2 = reducedpower time on

Maximum continuous power output 400W (excluding fan output)

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Mod:	42176,425 46	42728	42963	42898	43472	44180/43 890		
Date:	24.4.09	27.05.09	1.06.09	15.7.09	27.7.09	21.10.09		
Initials:	KM	VP	KM	KM	KM			

Output Limitations

- All outputs are SELV.
- All outputs have functional spacings to earth, and due consideration must be given to this in the end product design.

Important safety instructions

General

This product range has been assessed and approved for both DC & AC input and designed to accept a DC input derived from a non-isolated mains supply 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 TDK-Lambda EMEA.

Servicing

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

Energy Hazard

The main output of this product must be treated as providing hazardous energy (240VA). Final equipment manufacturers must provide protection to service personnel against inadvertent contact with these output terminals. These output terminals must not be user accessible.

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.

High Voltage Warning

Dangerous voltages are present within the power supply. These products can be supplied with or with-out 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 IIIb, 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 32A for 2 minutes through the J1 input connector. Additional testing may be required in the end use equipment.

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 EFE400 PSU is connected to the main incoming earth conductor of the end equipment, the installer must cover the EFE400 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.

IEC/EN61010-1 and IEC/EN60950-1 - CB Report and Certificate in progress

CE marking when applied to any EFE400 product, indicates compliance with the Low Voltage Directive (2006/95/EC) in that it complies with EN60950-1.

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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 70°C(derating 2.5% above 50°C)
 Humidity: 5 to 95% RH, non-condensing
 Air Pressure: 78kPa to 106kPa
 Altitude: -200m to 3000m

Storage and Transportation

Temperature: -40°C to +70°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 either side
 Vertical

Fan models:

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

Shock

+ / - 3 x 30G shocks in each plane, total 18 shocks. 20G shocks are 11ms (±0.5ms), 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.

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.

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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.

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General installation instructions

The EFE400 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.
- 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, H1 to H4 must be connected to Protective Earth. H1 to H4 fixing screw head/washer diameter must not exceed 6mm.
- iii) These products are IPX0, and therefore chemicals/solvents, cleaning agents and other liquids must not be used.
- iv) These units must be installed in a fire enclosure in accordance with the safety standards covered herein.

Mechanical parameters

Weight 1kg max.

Connection details

Input Connections

Molex 3 pin header 7A/250V MAX.

Fuse

Internal fuses (F1): dual fuses in the L and N line, F10AH, 250V, 5x20mm

CAUTION: DOUBLE POLE NEUTRAL FUSING

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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 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.

COMPONENTS TO BE MONITORED

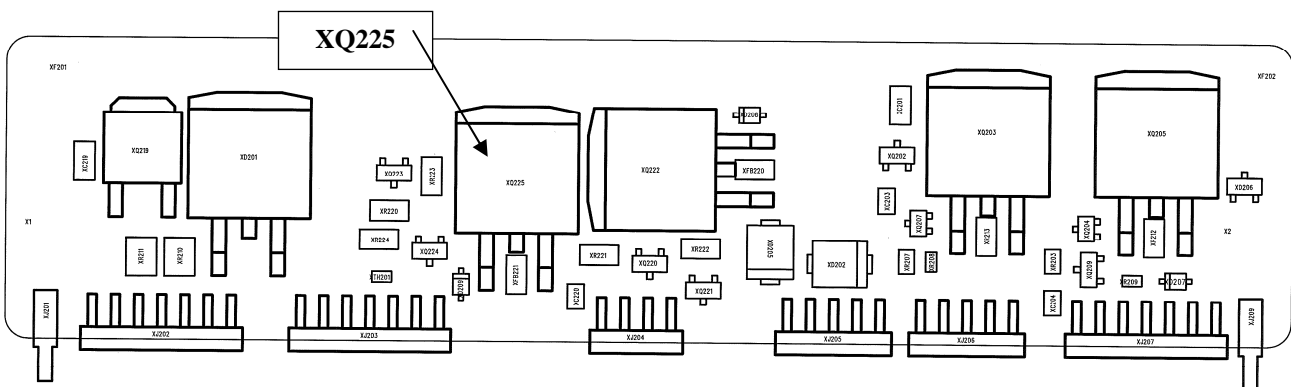
Circuit Ref.	Description	Max. Temperature (°C)
J1	Input connector	75* (105)
L1, L2	Common mode choke winding	115
C7, C8	X capacitors	100
C9	Reservoir capacitor (electrolytic)	70 (105)
L3	Boost choke winding	115
TX2	Transformer winding	120
TX2	Transformer core	120
TX2	Transformer braid (to pin 13)	120
U2	Optocoupler	75
C11	Channel 1 output capacitor	90 (105)
L7	Channel 1 Output choke	115
L4	Primary choke (24V model only)	120 (130)
XU8	Fan regulator	95
XQ225	Boost FET (IMS board)	115
Q1	Channel 1 output FET	115
XU3	Main driver IC	100
Various	All other electrolytic capacitors	90 (105)

See components to be monitored diagram below.

* For temperatures above 75°C a suitably temperature rated mating connector must be used.

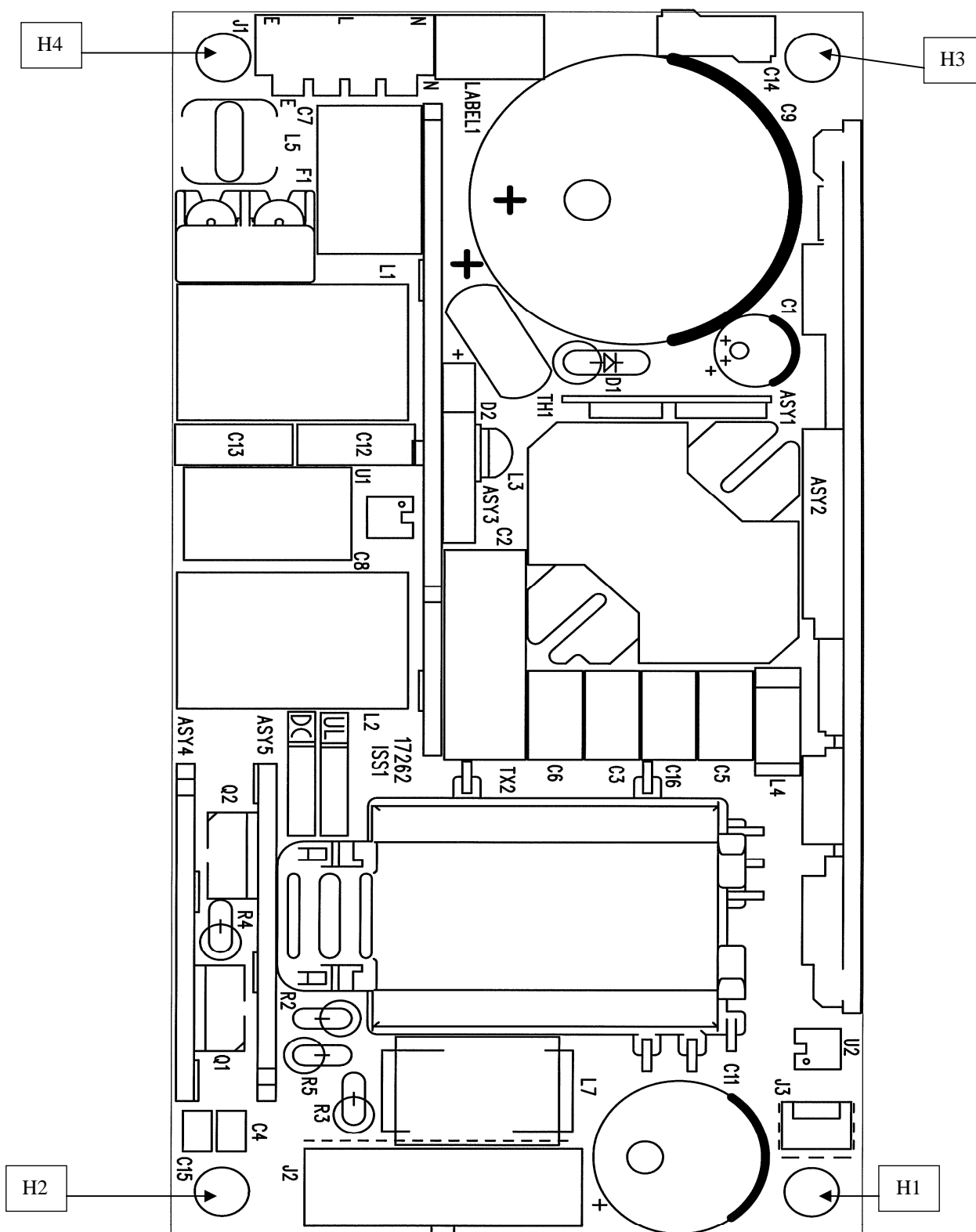
Higher temperatures limits (in brackets) may be used but product life may be reduced.

Primary IMS board (Asy2)



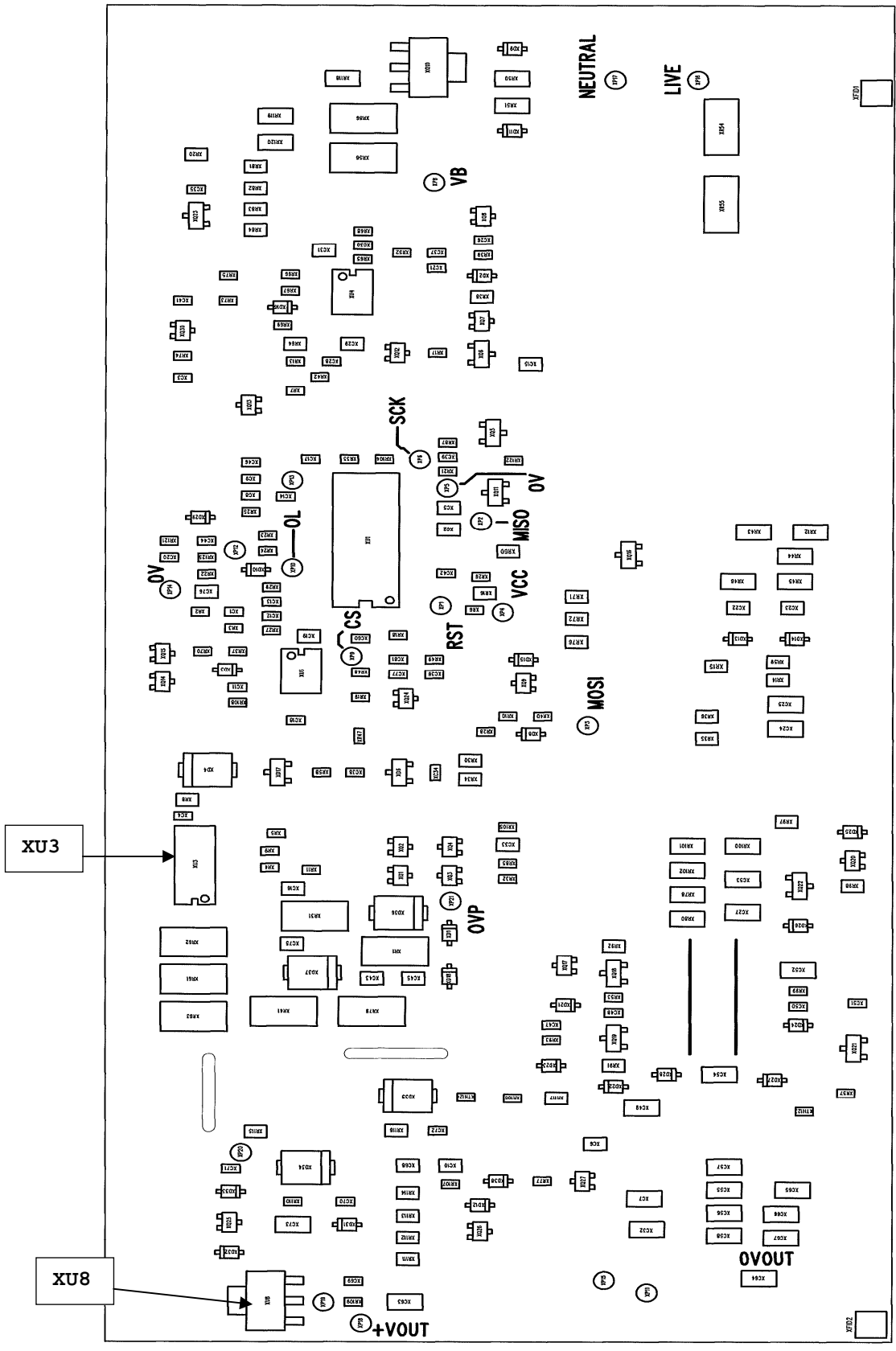
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Base board topside



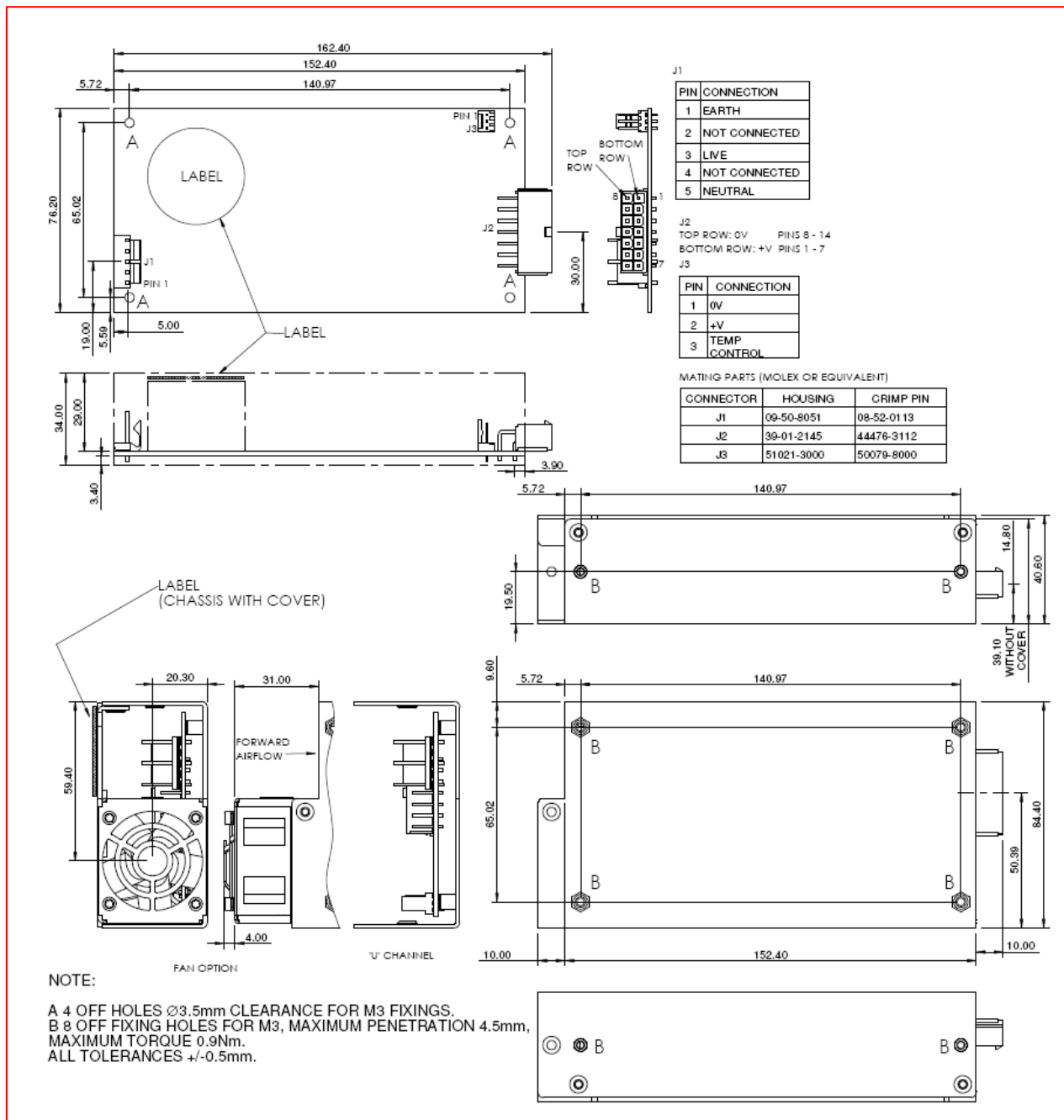
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Base board bottomside

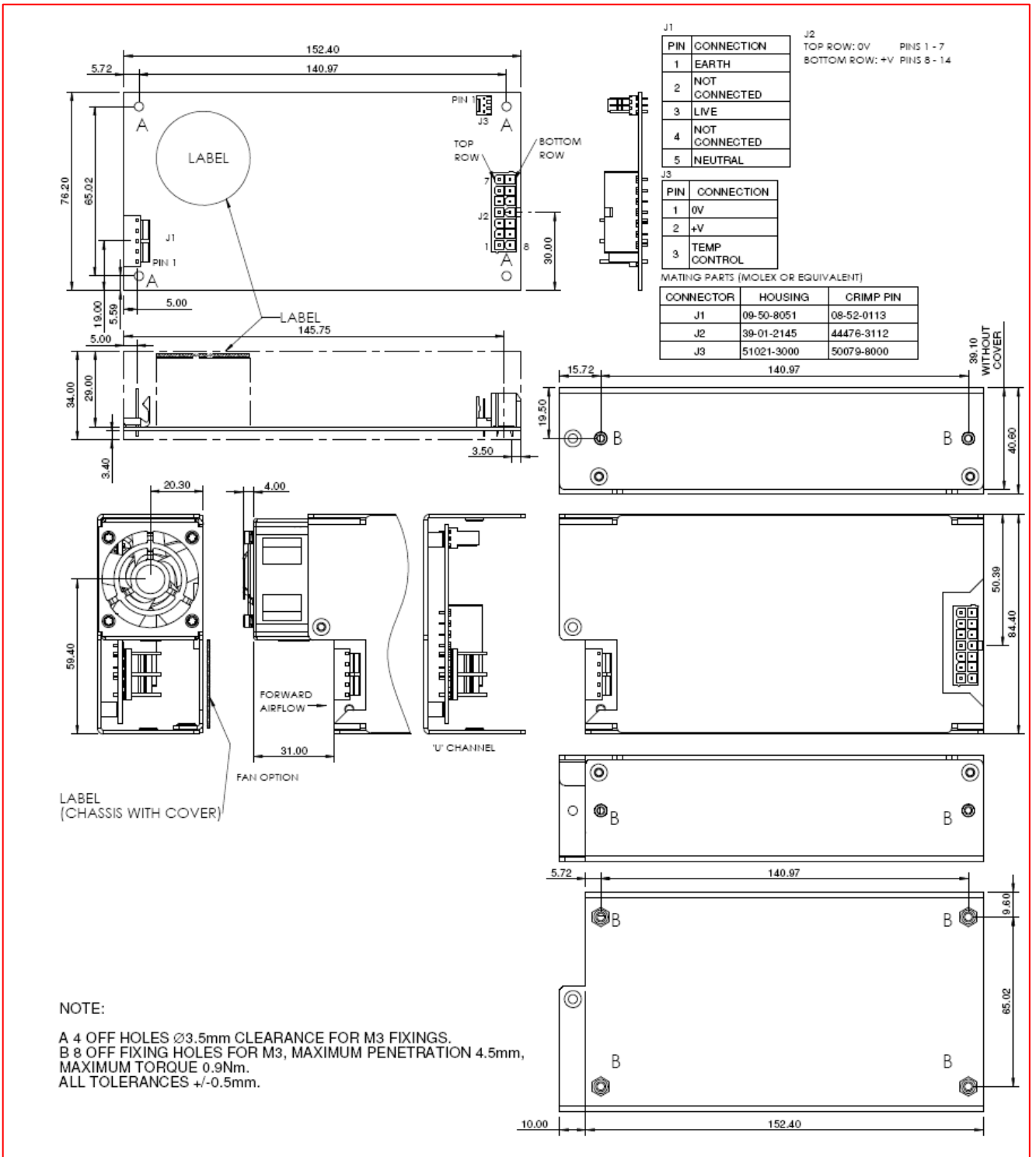


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EFE400 OUTLINES AND CONNECTIONS



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