

**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	4.9A rms or 3.5A DC
Maximum Input Current (400W peak power for 10 second maximum)	6.4A rms or 4.4A DC
Inrush Current	<40A AT 25°C

\* DC input for 60950 only, 45-63Hz for 60601 only.

\*\* Channel 1 output is linearly derated from 90Vac to 85Vac, 4W per volt to 280W.

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.

EFE300M models as described below:

Unit Configuration Code:

**EFE300Mx-a-b-cdef-ghijk**

where:

- x = Nothing or J for Japanese models (may have non-safety differences).
- a = Channel 1 output Voltage: see Ch1 in the outputs table below, adjustment range column.
- b = Standby voltage: see standby voltage table below.
- c = **HN for Open frame, no fan, with 12V / 1A fan supply.**  
**HU for U chassis, no fan, with 12V / 1A fan supply.**  
**HC for Cover + chassis, no fan, with 12V / 1A fan supply.**  
**EC for Cover + chassis, end fan (temp controlled).**  
**NN for Open frame, no fan, no fan supply.**  
**NU for U chassis, no fan, no fan supply.**  
**NC for Cover + chassis, no fan, no fan supply.**  
**CN for Open frame, no fan, with 12V / 0.25A fan supply.**  
**CU for U chassis, no fan, with 12V / 0.25A fan supply.**  
**CC for Cover + chassis, no fan, with 12V / 0.25A fan supply.**
- d = M for molex input connector or equivalent, J for JST connector or equivalent.
- e = D for dual fused input.
- f = S for standard Leakage, L for low Leakage, R for reduced Leakage, T for tiny Leakage. \*
- g = Y for Oring FET included **or N for nothing.**
- h = E for enable, T for inhibit.
- i = Nothing for horizontal output connector, -V for vertical output connector.
- j = 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).
- k = **Nothing or -x where x is** 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. L < 300uA leakage, R < 150uA leakage and T < 75uA leakage.

<b>Issue:</b>	7	8	9	10	<b>11</b>	6
<b>Mod:</b>	42898	43395	44055	44181	<b>45625</b>	17342
<b>Date:</b>	15.7.09	16.7.09	15.10.09	27.10.09	<b>12.4.10</b>	1.6.09
<b>Initials:</b>	KM	KM	VP	KM	<b>KM</b>	KM

**Output Parameters**

Output Channel	Voltage out nom (V)	Adjustment Range (V)	Max Output Current (A)	Max Output Power (W)
CH1	12	11.4 – 13.2*	25	300 (400**)
	24	22.8 – 26.4*	12.5	300 (400**)
	28	27 – 32*	10.72	300 (400**)
	40	36 – 42*	7.5	300 (350***)
	48	47 – 50*	6.25	300 (350***)
	50	50.1 – 54*	6.0	300 (350***)
Standby	5	Fixed	2	10
	12	Fixed	1	12
Fan output	12	Fixed	0.25	3
	12	Fixed	1	12

\* Can be adjusted from nominal at the factory only.

\*\* Peak power of 400W for 10 seconds maximum, maximum rms power of 300W:

\*\*\* Peak power of 350W for 10 seconds maximum, in any 1 minute cycle, maximum rms power of 300W:

$$\sqrt{(peakpower^2 \times T1 + reducedpower^2 \times T2) / (T1 + T2)} \leq 300Wrms$$

where T1 = peakpower time on  
and T2 = reduced power time on

Maximum continuous power output 300W (excluding fan output)

**Output Limitations**

- All outputs are SELV up to and including 48V nominal. Voltages above 48V nominal are non SELV and therefore all outputs are non-SELV and must not be accessible to an end operator.
- All outputs have basic spacings to earth, and due consideration must be given to this in the end product design.

Non Standard models.

Model: Y5J008# (where # can be any letter) or EFE300MJ-12.1-5-008 or EFE300MJ-12.1-5-008-SGP

Maximum outputs: 12.1V, 21.49A, plus 5V, 2A standby.

Maximum ambient: As standard model.

Orientations: As standard model.

Comments: Fan speed is controlled at 6600rpm up to and between 45 to 50 degrees C ambient after which the fan resumes its normal nominal voltage rating.

Model: Y5J006# (where # can be any letter) or EFE300MJ-12-5-006.

Maximum outputs: 11.4V to 13.2V\*, 25A, (300W max) plus 5V, 2A standby.

Maximum ambient: As standard model.

Orientations: As standard model.

Comments: Longer version than standard model to accommodate additional reservoir capacitor for a greater hold up time.

**Important safety instructions**

**General**

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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 UK Ltd.

**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.

**High Voltage Warning**

Dangerous voltages are 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**

In accordance with local regulations for Health and Safety at work, 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 40A for 2 minutes through the J1 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 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) 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 TDK-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 EFE300M PSU is connected to the main incoming earth conductor of the end equipment, the installer must cover the EFE300M 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 and IEC/EN60601-1 - CB Report and Certificate.

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CE marking when applied to any EFE300M product, indicates compliance with the Low Voltage Directive (2006/95/EC) in that it complies with EN60950-1.  
 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 70°C (derating 2.5% above 50°C)  
 Humidity: 5 to 95% RH, non-condensing  
 Air Pressure: 78kPa to 106kPa  
 Altitude: -200m to 5000m for UL/IEC/EN60950-1, UL/IEC/EN61010-1  
 -200M to 3000m for UL/IEC/EN60601-1

**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

**Note: fan models require a 40mm gap at the input and output ends.**

**Shock**

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

**Vibration**

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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 – 2.515kVdc to 2.525kVdc

\*Primary mains circuits to secondary:- 5.66kVDC.

Secondary circuits to earth 2.525kVdc to 2.525kVdc

\*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 EFE300M 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**

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

Weight 1kg max.

**Connection details**

**Input Connections**

3 pin header 7A/250V MAX.

**Fuse**

Internal fuses (F1): dual fuses in the L and N line, F8AH, 250V, 5x20mm.

**CAUTION: DOUBLE POLE NEUTRAL FUSING**

**Cooling for units with customer supplied air (HN or CN, HU or CU and HC or CC 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.

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Circuit Ref.	Description	Max. Temperature (°C)
J1	Input connector	75
L1, L2	Common mode choke winding	115 (130)
C7, C8	X capacitors	100
C9	Reservoir capacitor (electrolytic)	60 (105)
L3	Boost choke winding	115 (140)
TX1	Transformer winding	120 (130)
TX1	Transformer core	120 (130)
TX2	Transformer winding	120 (130)
TX2	Transformer core	120 (130)
TX2	Transformer braid (to pin 13)	120 (130)
U2, U4, U5, U6	Optocoupler	75 (100)
C10, C11	Channel 1 output capacitors	80 (105)
L6	Primary choke (24V, 28V, 40V, 48V and 50V model only)	120 (130)
L4	Channel 1 Output choke	115 (130)
XU602	Fan regulator	115 (130)
XQ201	Boost FET (IMS board)	115 (130)
Q1	Channel 1 output FET (adjacent to R4)	115 (130)
XU403	Primary IC	100 (130)
Various	All other electrolytic capacitors	80 (105)

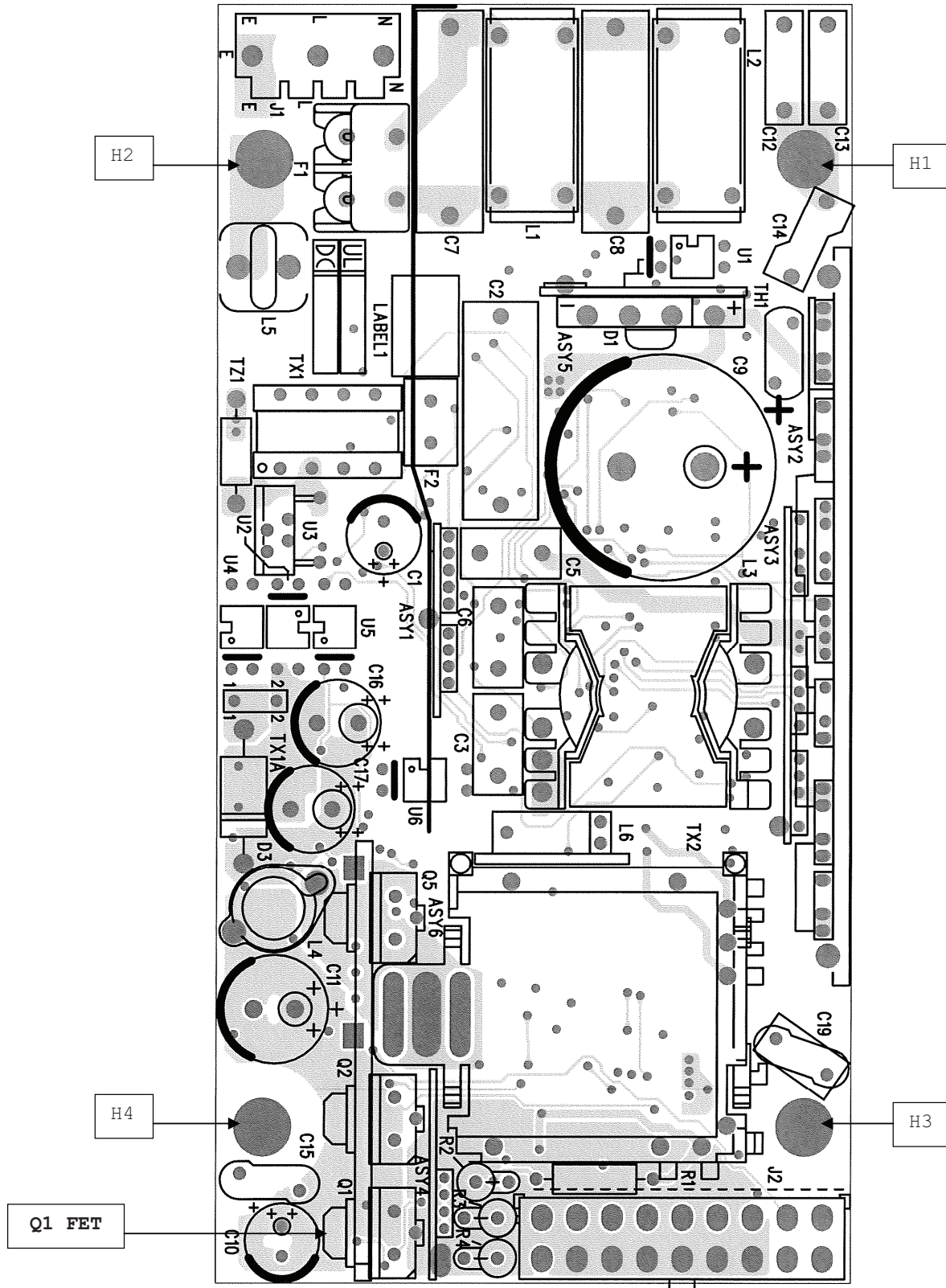
See components to be monitored diagram below.

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

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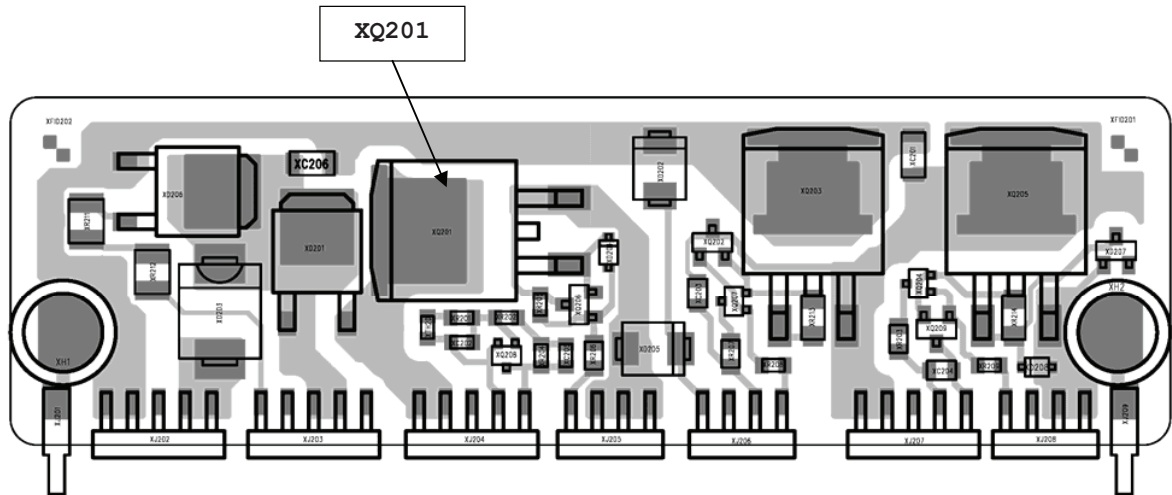
COMPONENTS TO BE MONITORED

Base board topside



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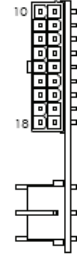
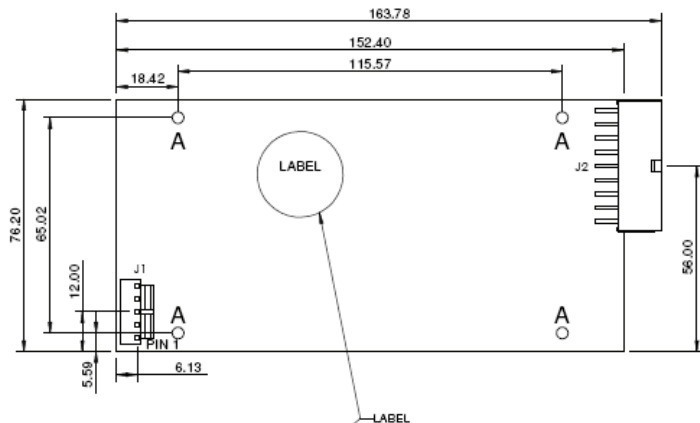
Primary IMS board



Primary control board

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J1

PIN	CONNECTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

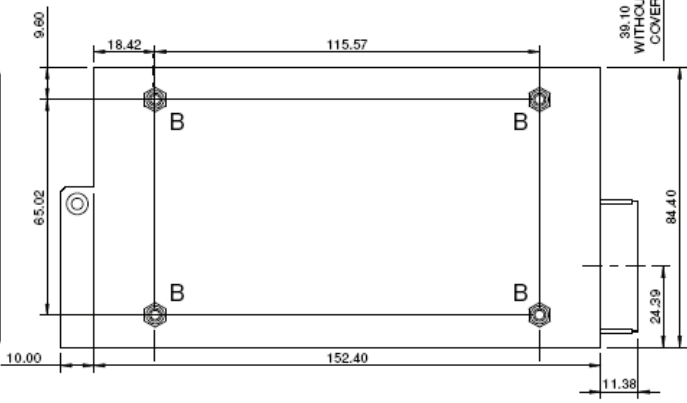
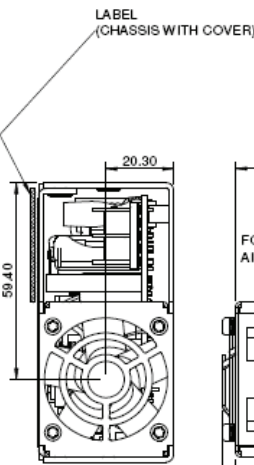
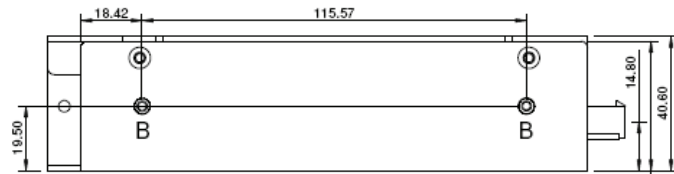
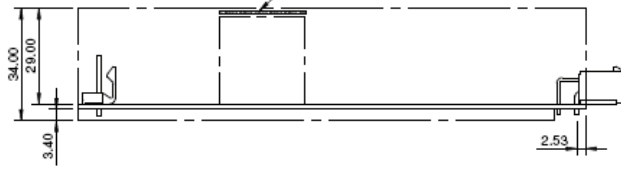
J2

PIN	CONNECTION	PIN	CONNECTION
10	0V STANDBY	1	+V STANDBY
11	POWER GOOD	2	REMOTE ON/OFF
12	0V CH1	3	+V CH1
13	0V CH1	4	+V CH1
14	0V CH1	5	+V CH1
15	0V CH1	6	+V CH1
16	0V CH1	7	+V CH1
17	0V CH1	8	+V CH1
18	+12V FAN (NOTE*1)	9	N/C

NOTE:\*1 (J) MODEL PIN N/C

MATING PARTS (MOLEX OR EQUIVALENT)

CONNECTOR	HOUSING	CRIMP PIN
J1	09-50-8051	08-52-0113
J2	39-01-2185	44476-3112

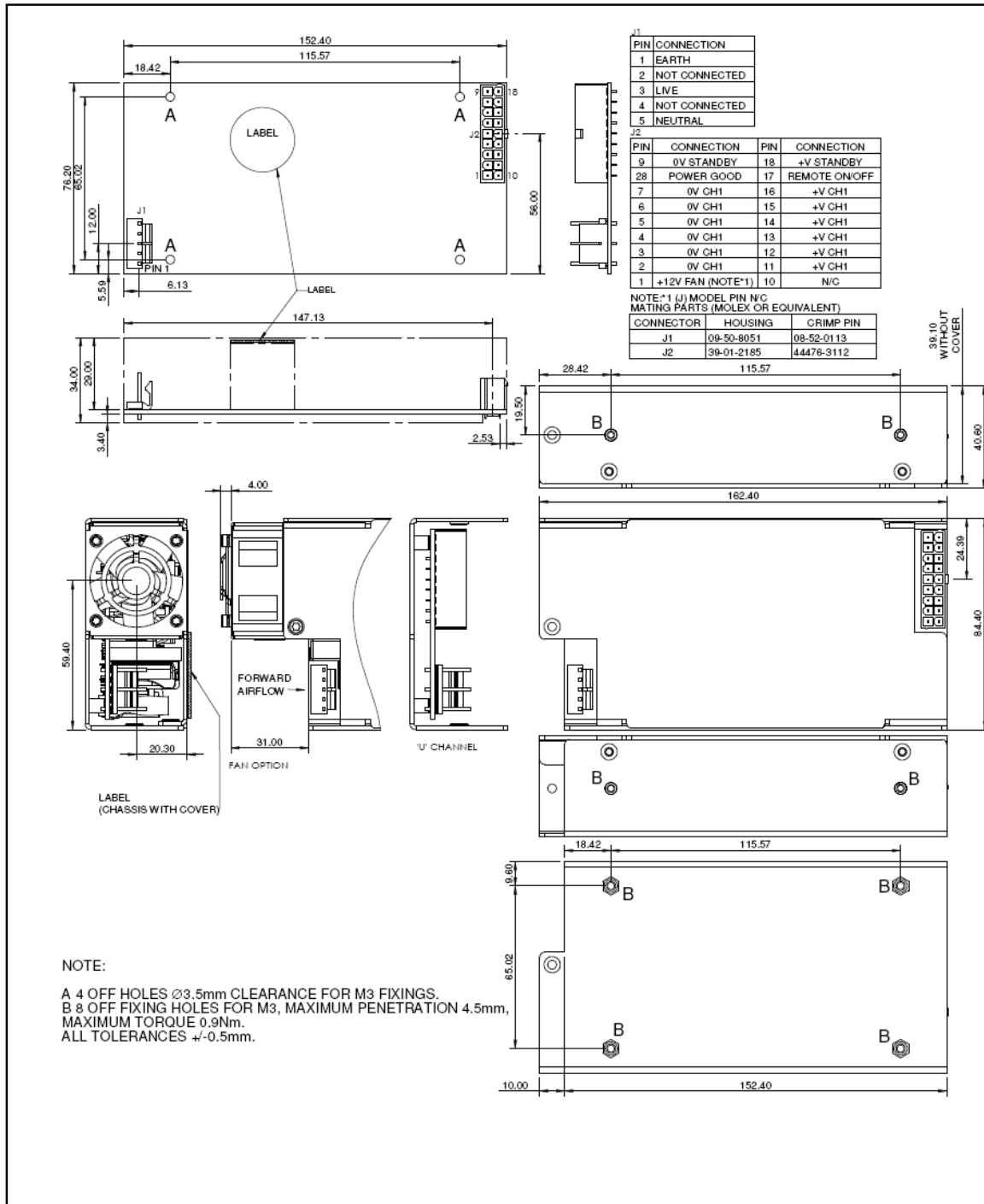


NOTE:

A 4 OFF HOLES  $\varnothing 3.5\text{mm}$  CLEARANCE FOR M3 FIXINGS.  
 B 8 OFF FIXING HOLES FOR M3, MAXIMUM PENETRATION 4.5mm,  
 MAXIMUM TORQUE 0.9Nm.  
 ALL TOLERANCES  $\pm 0.5\text{mm}$ .



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