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TDK·Lambda EFE300M / EFE400M

https://emea.lambda.tdk.com/efe-m
https://product.tdk.com/en/power/efe-m

Medical Industrial Test Broadcast Comms Renewable

300W and 400W, High Density AC-DC, digital power solution

Features	Benefits
• Reinforced isolation	Simplifies equipment design
• Full digital control	Improves product performance
• High efficiency	Minimises heat in system
• Temperature controlled fan option	Reduces noise in system
• 5 year warranty	Low cost of ownership



Input

Input Voltage	90-264Vac	Input Frequency	45 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<40A at 25°C and 230Vac (cold start) (meets EN61000-3-3). <50A for EFE400M
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)		
Earth Leakage Current	123µA at 120Vac (60Hz), 257µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 264Vac, 63Hz (normal condition, 0.5mA Single Fault Condition)		

Quick Selector (Standard models). Additional variants available - see below

Output Voltage	Current	Units without fan				Units with end fan	
		Open Frame		Cover + Chassis		Cover + Chassis	
		Description	Order Code	Description	Order Code	Description	Order Code
12V	25A	EFE300M-12-5-HNMDL-YT	U5Y0020	EFE300M-12-5-HCMDL-YT	U5Y001Z	EFE300M-12-5-ECMDL-YT	U5Y0031
	33.3A	EFE400M-12-5-HNMDL-YT	U6Y001H	EFE400M-12-5-HCMDL-YT	U6Y004L	EFE400M-12-5-ECMDL-YT	U6Y007P
24V	12.5A	EFE300M-24-5-HNMDL-YT	U5Y0053	EFE300M-24-5-HCMDL-YT	U5Y0042	EFE300M-24-5-ECMDL-YT	U5Y0064
	16.7A	EFE400M-24-5-HNMDL-YT	U6Y002J	EFE400M-24-5-HCMDL-YT	U6Y005M	EFE400M-24-5-ECMDL-YT	U6Y008Q
48V	6.25A	EFE300M-48-5-HNMDL-YT	U5Y0201	EFE300M-48-5-HCMDL-YT	U5Y0223	EFE300M-48-5-ECMDL-YT	U5Y0166
	8.3A	EFE400M-48-5-HNMDL-YT	U6Y003K	EFE400M-48-5-HCMDL-YT	U6Y006N	EFE400M-48-5-ECMDL-YT	U6Y009R

How To Create A Product Description

Output	Factory Setting Range EFE300M	Factory Setting Range EFE400M
12	11.4 - 13.2V	11.4 - 13.2V
24	22.8 - 26.4V	22.8 - 26.4V
28	27 - 32V	
48	47-50V	47-50V
50	50-54V	

Required output voltage must be specified at time of ordering

Case / Fan Option

-HN	Open frame, no fan, with 12V / 1A fan supply
-HU	U chassis, no fan, with 12V / 1A fan supply
-HC	Cover+chassis, no fan, with 12V / 1A fan supply
-EC	Cover+chassis, end fan (temp controlled)
-NN	Open frame, no fan, no fan supply
-NU	U chassis, no fan, no fan supply
-NC	Cover+chassis, no fan, no fan supply

-Y = ORing FET included
-N = Without ORing FET

blank = right angled
-V = vertical

EFE300M- or EFE400M-	Vout	-	Standby	Case/Fan Option	Input Connector	D - Dual Fused	Earth Leakage	ORing FET	Remote On/Off	Output Connector

Standby Voltage
0 = None (Only with EFE300M and 'N' Remote On/Off)
5 = 5V / 2A
12 = 12V / 1A

M = Molex
(see connection drawings for details)

L = 300µA

E = Enable
T = Inhibit
N = None

Confirm availability of created product with the sales office

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Isolation

Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to Earth	Basic	1 x MOPP (3rd edition 60601), 1.5kVac, 2.3kVdc
Output to Earth	Basic	1 x MOPP (3rd edition 60601), 1.5kVac

Output Specification

	EFE300M	EFE400M	
Output Power	300W	400W	Continuous (including fan supply) or RMS (including Peak power) EFE400M derates below 100Vac input and units fitted with fan, vertical output connector, ORing FET derate. See handbook for details.
Peak Power	400W	530W	EFE300M - for 10 seconds. Outputs above 36V, 350W. EFE400M - for 10 seconds. Outputs 47V and above, 470W.
Total Regulation	better than 4%		Including Line (for 90-264Vac input change), Load (for 0-100% load change) and temperature (0-50°C)
Ripple & Noise	1.5%		pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Setting Accuracy	±1%		at 50% load
Turn on Time	1.5s max		at 90 Vac & 100% rated output power. EFE400M 2s max.
Efficiency	up to 90%		
Hold up	>16ms		at 90 Vac, 75% load
Min Load	None		
Transient Response	<5%		of set voltage for 50% load change (in 50µs within the range 25 - 100% load)
Recovery	<1ms		for recovery to 2% of set voltage
Short circuit protection	Yes		Auto recovery after removal of short circuit
Over Temperature protection	Yes		Primary - auto recovers, secondary - cycle power to restart
Over Voltage Protection	Yes		Latching, need to cycle ac to restart unit.
Fan supply	12V / 1A		Depending on 'Case/Fan Option' selected. See previous page for details

Global Signals

Remote on/off	Enable - TTL logic level low (relative to Standby 0V) enables channel 1 and fan supply Inhibit - TTL logic level low (relative to Standby 0V) inhibits channel 1 and fan supply
Standby Supply	5V / 2A or 12V / 1A, isolated supply, not affected by remote on/off.
Power Good	Logic high indicates ac supply is good and Ch1 is within regulation
ORing FET	Allows redundant connection of power supplies with no additional diodes required.

Environment

Temperature	0°C to 50°C operational, -40°C to 70°C storage. Full load, with 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 70°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	Medical approval = -200 to 3000 metres operational (-200 to 5000m storage/transportation) Non medical approval = -200 to 5000$_a$ metres operational (-200 to 5000m storage/transportation) a - non open frame EFE400M units = -200 to 4000 metres
Pollution	Degree 2, Material group IIIb

Emissions EN61000-6-3:2007, EN60601-1-2:2007

Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A Class C - EFE300M at 100W and above
Flicker	EN61000-3-3	Compliant - d_{max} only

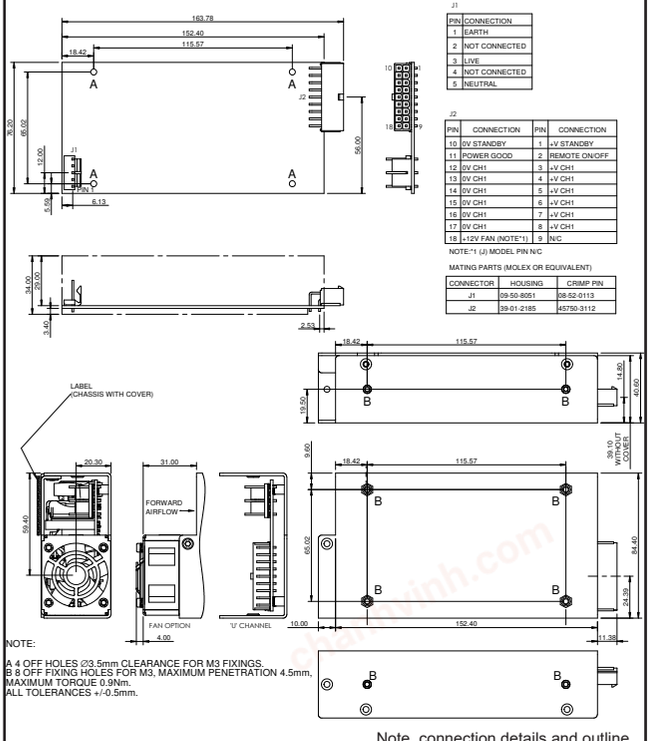
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Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 40% dip for 5 cycles (below 154Vac nominal), 1 cycle interruption and 5 sec interruption	A
Ring Wave	EN61000-4-12	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1	EFE300M approved (File E331788), EFE400M designed to meet
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
UKCA (EN62368-1)	Electrical Equipment (Safety) Regulations, electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

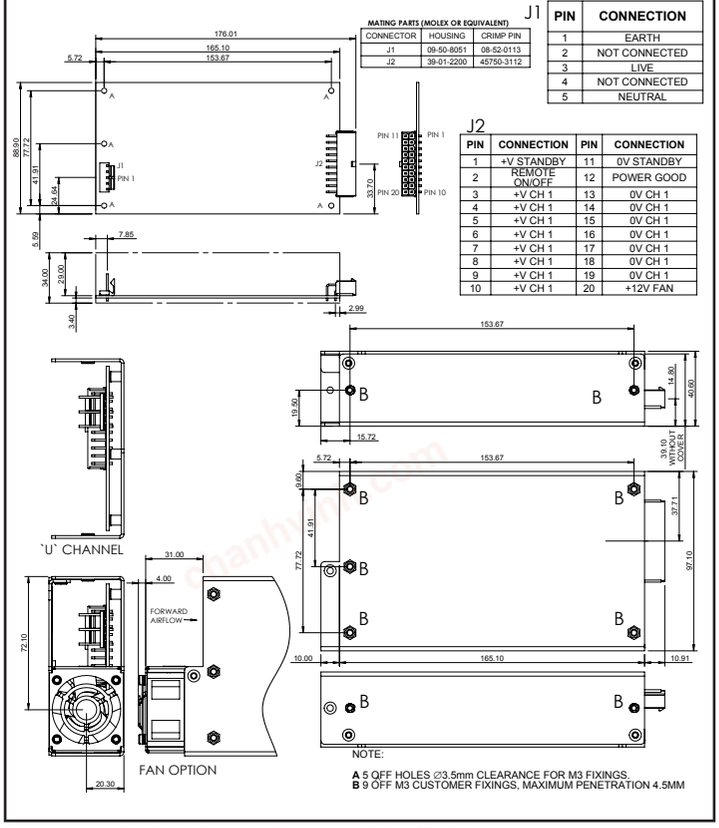
Outline & Connection Drawings

EFE300M (not -V version)



Note, connection details and outline drawings for -v (vertical) connector are different See handbook for details

EFE400M (not -V version)



Notes 1. All customer fixings M3
2. Maximum Penetration 4.5mm
3. Maximum torque 0.9Nm
4. All tolerances +/-0.5mm

Connectors are not included with the product. They are available from TDK-Lambda

1 off input connector and 3 crimps are available as part number is 94910.
1 off output connector and 18 crimps are available as part number 94752. (EFE300M)
1 off output connector and 20 crimps are available as part number 94912 (EFE400M)

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