TECHNICAL DATASHEET

600-650W Medical Open Frame

FSP650M-K48 Series

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FEATURES

- Compact size 4 x 8 x 2.58 inches
- Certified medical safety IEC 60601-1
- High altitude 5000 meters operation
- Power Fail Detect (PFD) signal
- Inhibit – TTL high to disable output
- BF Class insulation
- Meet EN55011 and FCC Class B
- Over voltage protection
- Over current protection
- Over temperature protection
- Compliant with RoHS requirement

SAFETY STANDARD APPROVAL

c UL us E178020

DESCRIPTION

The FSP650M-K48 series is Class-I design in 4 x 8 inches, AC/DC switching power supplies are capable of delivering 600-650 watts of continuous output power at 30 CFM forced air cooling. The unit is constructed on a printed circuit board with U-bracket or enclosed form for mechanical support. All models meet EN55011 and FCC class B emission limits, and are designed for medical applications.

INPUT SPECIFICATIONS

Input voltage:	90-264 VAC
Input frequency:	47-63 Hz
Input current:	< 8.4 A (rms) for 115 VAC < 4.2 A (rms) for 230 VAC
Earth leakage current:	< 350 μA @ 264 VAC, 63 Hz
Touch current:	< 100 μA @ 264 VAC, 63 Hz

OUTPUT SPECIFICATIONS

Output voltage/current:	See rating chart
Maximum output power:	See rating chart
Remote sense:	Compensation for cable losses up to 0.5 V
Protection:	
Over voltage:	Provided on output. Set at 115% to 140% of its nominal output voltage.
Over current:	The power supply will shut down without damage and enter auto-recovery mode.
Over temperature:	The power supply will enter into shut down while the abnormal thermal rise occurs.
Temperature coefficient:	All outputs ±0.04% /℃ maximum.
Transient response:	Maximum excursion of 4%, recovering to 1% of final value within 500μs after a 25% step load change.
Fan power:	12 V at 500 mA maximum
Standby power:	5 V at 200 mA maximum

ENVIRONMENTAL SPECIFICATIONS

Operating temperature:	-10℃ to +70℃
Storage temperature:	-40℃ to +85℃
Operating humidity:	10% to 90% RH non-condensing
Storage humidity:	5% to 95% RH non-condensing
Temperature derating:	Derate from 100% at +50℃ linearly to 50% at +70℃, applicable to convection and forced-air cooling conditions

GENERAL SPECIFICATIONS

Switching frequency:	85 KHz (typical)
Power factor:	0.98 typical at 115 VAC
Efficiency:	See rating chart
Hold-up time:	20 ms minimum at 110 VAC & 650 W
Line regulation:	±0.5% maximum at full load
Inrush current:	20 A @ 115 VAC, or 40 A @ 230 VAC, at 25℃ cold start
Operating altitude:	5000 meters
Withstand voltage:	4000 VAC from input to output (2 MOPP) 1500 VAC from input to ground (1 MOPP) 1500 VAC from output to ground
MTBF:	190,000 hours at full load at 25℃ ambient , calculated per MIL-HDBK-217F
EMC Performance (IEC60601-1-2)	
EN55011:	Class B conducted, class B radiated
FCC:	Class B conducted, class B radiated
VCCI:	Class B conducted, class B radiated
EN61000-3-2:	Harmonic distortion, Class A and D
EN61000-3-3:	Line flicker
EN61000-4-2:	ESD, ±15 KV air and ±8 KV contact
EN61000-4-3:	Radiated immunity, 10 V/m
EN61000-4-4:	Fast transient/burst, ±2 KV
EN61000-4-5:	Surge, ±1 KV diff., ±2 KV com.
EN61000-4-6:	Conducted immunity, 10 Vrms
EN61000-4-8:	Magnetic field immunity, 30 A/m
EN61000-4-11:	Voltage dip immunity, 30% reduction for 500 ms, 60% reduction for 100 ms, and >95% reduction for 10 ms

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OUTPUT VOLTAGE/CURRENT RATING CHART

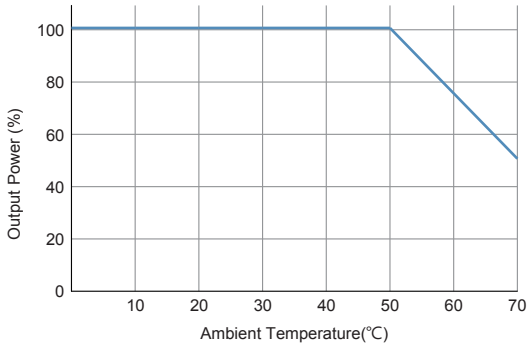
Model(1)	Output							Average Active Efficiency (typical) @ 115 / 230 VAC
	V1	Min. Current	Max. Current at 30 CFM	Peak Current	Tolerance	Ripple & Noise(2)	Max. Power(3)	
FSP600M-K48-12C	12 V	0 A	50.00 A	55.00 A	±2%	120 mV	600 W	88% / 90%
FSP600M-K48-15C	15 V	0 A	40.00 A	44.00 A	±2%	150 mV	600 W	88% / 90%
FSP650M-K48-18C	18 V	0 A	36.12 A	40.00 A	±2%	180 mV	650 W	88% / 90%
FSP650M-K48-24C	24 V	0 A	27.09 A	30.00 A	±2%	240 mV	650 W	88% / 90%
FSP650M-K48-28C	28 V	0 A	23.22 A	25.50 A	±2%	280 mV	650 W	89% / 91%
FSP650M-K48-36C	36 V	0 A	18.06 A	20.00 A	±2%	360 mV	650 W	89% / 91%
FSP650M-K48-48C	48 V	0 A	13.55 A	15.00 A	±2%	480 mV	650 W	89% / 91%
FSP650M-K48-57C	57 V	0 A	11.41 A	12.50 A	±2%	570 mV	650 W	89% / 91%

NOTES:
1. Change suffix “C” for enclosed form with cover and fan assembly to “B” for U-bracket form , e.g. FSP600M-K48-12B.
2. Ripple and noise is maximum peak-to-peak voltage value measured at output within 20 MHz bandwidth, at rated line voltage and output load ranges, and with a 10 µF tantalum capacitor in parallel with a 0.1 µF ceramic capacitor across the output.
3. 600 W or 650 W for “C” version or with 30 CFM forced air provided by user for “B” version.

INTERFACE SIGNALS

PFD	TTL logic high for normal operation and TTL logic low upon loss of input power. Turn-on delay time 100-750 ms, turn-off delay time 1 ms minimum.
Inhibit	TTL high level signal to inhibit output.

OUTPUT POWER DERATING CURVE



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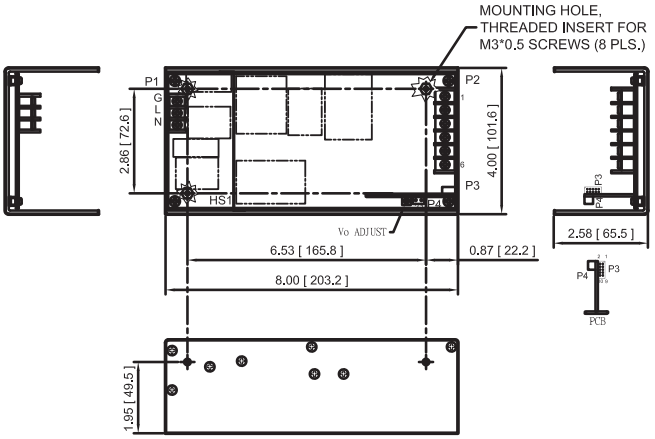
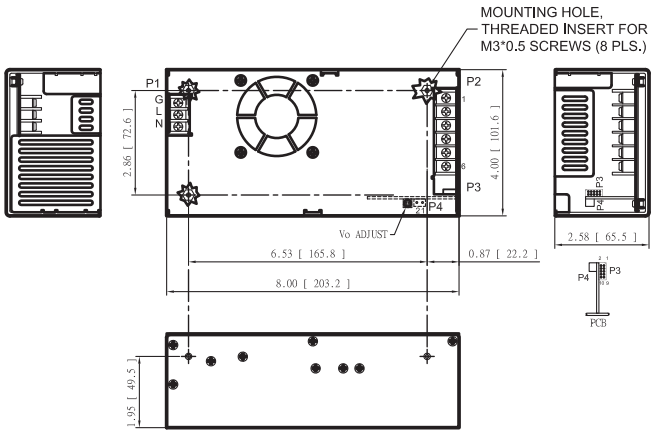
MECHANICAL SPECIFICATIONS

U-bracket Form



Enclosed Form



NOTES:
1. Dimensions shown in inches [mm].
2. Tolerance 0.02 [0.5] maximum.
3. Input connector P1 is Dinkle terminal P/N DT-35-B01W-03, with nickel plated M3 screws.
4. Output connector P2 is Dinkle terminal P/N DT-4N-B01W-06, with nickel plated M3.5 screws.
5. Output connector P3 is is JST header S10B-PHDSS or equivalent, mating with JST housing PHDR-10VS or equivalent.
6. Fan connector P4 is JST header S2B-ZR-3.4 or equivalent, mating with JST housing ZHR-2 or equivalent.
7. Maximum penetration depth of fixing screws is 4 mm from the outer surface of chassis.
8. Weight: 1.8 Kgs (3.97 lbs.) approx. for U-bracket form, 2.0 Kgs (4.41 lbs.) approx. for enclosed form.

PIN CHART

Connector	P1			P2						P4	
Pin No.	1	2	3	1	2	3	4	5	6	1	2
Polarity	Ground	Live	Neutral	+V1			Common Return			+12V Fan	Common Return

Connector	P3									
Pin No.	1	2	3	4	5	6	7	8	9	10
Polarity	+V1 Sense	-V1 Sense	PFD	Common Return	N.A.	N.A.	Inhibit	N.A.	+5V Standby	+5V Standby Return