

ECN List

Item	Spec. REV	Revise date	Revise description	Reason
1	01	2016-11-04		
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HK650-51PP Specification

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1.0 Input Characteristics

1.1 Input Voltage Range

90Vac to 264Vac, single phase.

Table1. Input Voltage Range

RANGE	MINIMUM	NORMAL	MAXIMUM	UNITS
Full Range	90	100~240	264	Vrms

The minimum starting up voltage should be less than 85V.

1.2 Input Frequency Range

50+/-3Hz and 60+/-3Hz; Normal Frequency Range: 50-60Hz

1.3 Input current

Max Input AC current: 10 Amp R.M.S max@115Vac full loads; 5Amp R.M.S max@230V .full load.

1.4 Inrush current

Power supply inrush current shall be less than the ratings of its critical components (including bulk rectifiers, fuses, and surge limiting device) under all conditions of line voltage of Section 1.1.

1.5 Power Efficiency

Min 82% efficiency under 20%full load condition, input Voltage:115Vac/60Hz

Min 85% efficiency under 50% full load condition, input Voltage: 115Vac/60Hz

Min 82% efficiency under100% load condition, input Voltage: 115Vac/60Hz

Range	+5V	+3.3V	+12V1	+12V2	+12V3	+12V4	-12V	+5Vsb	效率 (%)
100%负载	12.00	12.00	9.1	9.1	9.1	9.1	0.30	2.00	》 82.00
50%负载	6.00	6.00	4.55	4.55	4.55	4.55	0.15	1.00	》 85.00
20%负载	2.40	2.40	1.82	1.82	1.82	1.82	0.06	0.40	》 82.00

1.6 Harmonic Current

(1) The harmonic of the power line and neutral current shall comply the standard IEC61000-3-2 for class A equipment.

(2) Measurement shall be performed at 75W input power and full output load, Input voltage shall be 230Vac/50Hz. Don' t test power in process under low range.

2.0 Output Characteristics

2.1 Static output characteristics

Table2. Static output characteristics

Output Voltage	Load			Regulation	Ripple & Noise
	Min	Max	Surge		Max mV P-P
+5V	0A	15A		+/- 5%	50mV
+12V1	0A	15A		+/- 5%	120mV
+12V2	0A	15A		+/- 5%	120mV
+12V3	0A	15A		+/- 5%	120mV
+12V4	0A	15A		+/- 5%	120mV
+5VSb	0A	2A		+/- 5%	50mV
+3.3V	0A	15A		+/- 5%	50mV
-12V	0A	0.3A		+/- 10%	120mV

Ambient temperature: at 25°C

- (1) The total combined 3.3V&5V power shall not exceed 115W.
- (2) The continuous output power shall not exceed 550W.

2.2 The cross-load regulation in defined in the matrix below (UNIT: A)

Table 3. Cross Regulation

Range	+5V	+3.3V	+12V1	12V2	12V3	12V4	-12V	+5Vsb
1	0	0	0	0	0	0	0	0
2	0.2	0.2	0.2	0.2	0.2	0.2	0	0
3	8.00	15.00	9.1	9.1	9.1	9.1	0.30	2.00
4	15	8	37	9.1	9.1	9.1	0.30	2.00
5	6	4	10.5	10.5	10.5	10.5	0.30	2.00
6	14	13.7	9.0	9.0	9.0	9.0	0.30	2.00
7	12.00	12.00	9.1	9.1	9.1	9.1	0.30	0.00
8	12.00	12.00	9.1	9.1	9.1	9.1	0.30	3.00

Notes: Add 0.1uF ceramic disk capacitor and 10uF tantalum capacitors should be put across output terminals during ripple & noise test. The oscilloscope bandwidth is set at 20 MHz and co-axial probe will be used to measure it.

2.3 Dynamic Load

The following transient loads are to be applied to the output. The waveform shall be a square wave with the slope of the rise and fall at 0.1A/μs. The square wave shall have a frequency 50Hz to 10KHz with a duty cycle of 10 to 90%.

The output voltages shall not exceed regulation limits as defined in Table 2 under the following condition:

Table4. Dynamic Load Step Sizes

NOM. OUTPUT VOLTAGE (VDC)	CURRENT Imin	CURRENT Imax	STEP LOAD CHANGE (%)	TRANSIENT TOLERANCE (%)
+12V1	0A	15A	30	±5
+12V2	0A	15A	30	±5
+12V3	0A	15A	30	±5
+12V4	0A	15A	30	±5
+5V	0A	15A	30	±5
+3.3V	0A	15A	30	±5
+5Vsb	0A	2.0A	25	±5

(Adding external capacitor: 5V/6000uF, 12V/6000uF, 3.3V/6000uF, -12V/350uF, 5Vaux=350uF)

2.4 Capacitive Load

The power supply should be able to power up and operate with the regulation limits defined in Table 2, with the following capacitances simultaneously present on the DC outputs.

Table5. Output Capacitive Loads

Output	Capacitive Load
+12V	6000uF
+5V	6000 μ F
+3.3V	6000 μ F
-12V	350 μ F
+5VSb	350 μ F

2.5 The power supply shall have the output connector and wire harness configurations.

3.0 Protection

3.1 Over Voltage Protection

+5V: 7V max, +12V: 15.6V max, +3.3V: 4.7V max.

3.2 Short Circuit Protection

The main output shall shut down and latch off for shorting +5V, +12V, -12V or +3.3V rails to DC-return and shorting.

3.3 Over Current Protection

Any output shall not exceed requirement of the table. Otherwise, the unit would shut down. The overload currents should be ramped at a minimum rate of 10A/s starting from max load.

Table6. Over Current Protection

OUTPUT	12V1	12V2	12V3	12V4	5V	3.3V
OCP range	16-25A	16-25A	16-25A	16-25A	18-30A	18-30A

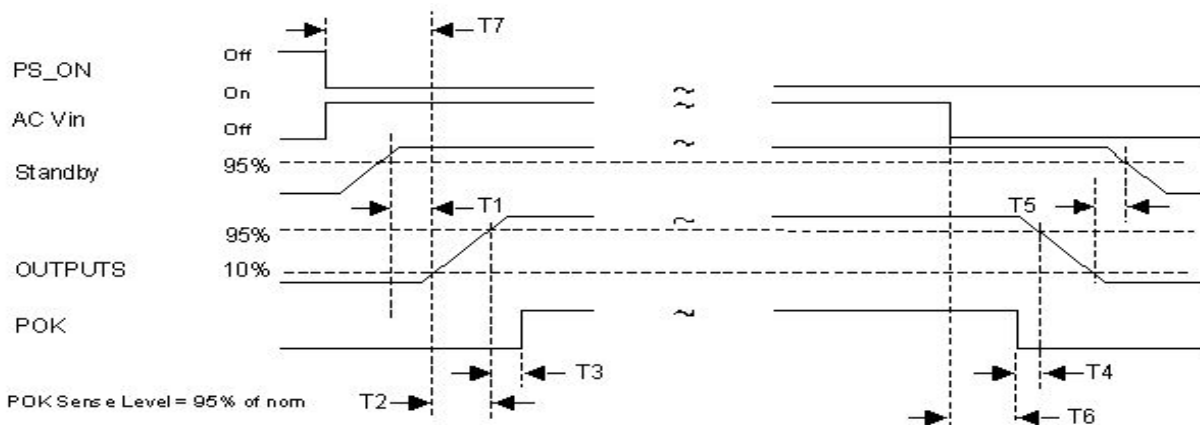
3.4 Over POWER Protection

Over Power Protection: 580-650W

3.5 Reset after shutdown

When the power supply latches into shutdown condition due to a fault on an output (over current, over voltage, short circuit or over power), the protection latch shall reset within 30S after the fault has been removed and the ON/Off signal has switched state. Also, the latch shall reset within 30S when AC power has been removed.

4.0 Time Sequence



4.1 Power-on time T1

Delay from 5Vsb within regulation to DC outputs turn on reached 10% of normal output voltage at least for 5ms but within 500 ms.

4.2 Rise time T2

The output voltages shall rise from 10% to 95% of normal output voltage at least for 2ms but within 20 ms.

4.3 PWR_OK delay time T3

Delay from output voltages within regulation to PWR_OK asserted at turn on at least for 100ms but within 500 ms.

4.4 Power Fail Delay Time T4

Delay from PWR_OK deasserted to output voltages (+3.3V, +5V, +12V, -12V) dropping out of regulation at least for 1ms at min load (table 3, load1) or full load after AC input is removed. (负载带 440W)

4.5 AC loss to +5Vaux hold-up time T5

Delay from DC output deasserted to +5Vaux dropping out of regulation at least for 5ms at full load after AC input is removed.

4.6 AC loss to PWR_OK hold-up time T6

The Power Good Signal shall remain an up level at least for 12msec after AC input is removed and shall go to a down level before +12V falls below their regulation limit at 80% load. (负载带 448W)

4.7 PS_ON to DC output delay time T7

Delay from PS_ON deasserted to DC outputs reached 10% of normal output voltage at least for 1ms but within 350ms.

4.8 Power OK (POK)

The power supply shall provide a “Power Good” signal to reset system logic, indicate proper operation of the power supply, and give advance warning of impending loss of regulation at turn off.

The electrical characteristics for the Power OK output driver are shown below

Table 6: Power OK Signal Characteristics

Power OK Signal Characteristics	
Signal Type	+5V TTL Compatible
Logic Level Low	<0.4V while sinking a maximum of 4mA
Logic Level High	Between 2.4V and 5V output while sourcing 200 μ A
High-State Output Impedance	5kΩ Pull-UP from +5Vaux or 5V to Termination Point

4.9 PS_ON

PS_ON is an active low, +5V tolerant TTL signal that allow the motherboard to remotely control the power supply. An internal pull-up resistor inside the power supply shall provide a TTL high output logic level, once an AC input voltage has been applied to the power supply. The electrical characteristics for the PS_ON signal are shown below:

Table 7: PS-ON Signal Characteristics

PS-ON Signal Characteristics		
Signal Description	Min	Max
Input Low Voltage	0.0V	0.8V
Input Low Current (Vin=0.4V)	-	-1mA
Input High Voltage (Iin=-200µA)	2.0V	
VIH open circuit	-	5.25V

NOTE: The power supply on signal must remain in the high STATE or OFF for 150ms minimum prior to switching PS_ON to a low state (ON). Minimum PS_ON cycle time is 100ms ON and 150ms OFF. The 5V auxiliary output will be active and in regulation whenever an AC input within the specified operating range is applied to the power supply input. The PS_ON pin of P1 will not affect the 5V auxiliary output.

6.0 Environment

6.1 Operating ambient

Table8. Operating ambient

Air Temperature	0 to 50 degrees centigrade with 550W
Relative Humidity	5 to 85 percent, non-condensing

6.2 Shipping and Storage

Table9. Shipping and Storage

Air Temperature	-40 to 55 degrees centigrade
Relative Humidity	5 to 95 percent, including condensation

6.3 Altitude

Operating to 3050 meters (10,000 ft)
 Non-operating to 15250 meters (50,000 ft).

6.4 Cooling

The power supply shall provide forced air cooling for the host system.

6.5 Fan speed control

The power supply shall contain thermal sensing circuitry capable of varying fan speed.

7.0 Safety and EMC

7.1 SAFETY REQUIREMENTS AND Certify

The power supply has been certified by CB, CE. The CE Safety mark shall appear on the product.

7.2 Conducted and Radiated Emissions

Conducted and radiated emissions of the power supply shall comply with the requirements of GB9254

& EN55022 Class B.

7.3 ESD

ESD of the power supply shall comply with the requirements of IEC61000-4-2 Level 4.

7.4 EFT

EFT of the power supply shall comply with the requirements of IEC61000-4-4 Level 3.

7.5 Surge Susceptibility

Surge Susceptibility of the power supply shall comply with the requirements of IEC61000-4-5 Level 3.

7.6 Hi-Pot:

- (a) primary to secondary: 1800Vac for 3 second. Cut off current 10mA MAX
- (b) Primary to F.G: 1800Vac for 3 second. Cut off current 10mA MAX

7.7 Grounding Continuity Test

100m Ω MAX at 25.0A Time 3.0S,

7.8 Ground Leakage Current

3.5mA MAX. at 264V 50Hz

7.9 Insulation resistance:

primary to safety ground: 500Vdc, 100Mohms min.

9.0 Mechanical**9.1 Mechanical outline****9.2 DC wire drawing****9.3 Label drawing**

Huntkey Hong Kong Development Co. Ltd.		File No.:
		Version: 01
Prepare by	Check by	Approved by
Date:	2016-11-04	

MTBF at 25°C

Ag (故障率/10e6時間)

1000

No.	部品名	内容	備考	MIL-HDBK-217F		Ag		数量	Ag 小計	Ag 小計 (MIL)
				at 25, 30°C	Pr at 60°C	Rohm(株式会社)のタイプ / 用途				
1	I C (リニア)	トランジスタ数 1~100	制御用 I C	at 25, 30°C	Pr at 60°C	Rohm(株式会社)のタイプ / 用途	0.024	1	0.024	
2		" 101~300					0.041	1	0.041	
3		" 300~1000					0.074	0	0	
30	ダイオード	スイッチ	Sect.5.2	0.22 0.18	3 3	0.001 0.0038	0.028	0	0	0 0 0 0 0 0 0 0 0 0
		一般用アナログ					0.0075	0	0	
		Si IMPATT (< 35GHz)					0	0	0	
		Gunn/Bulk Effect					0	0	0	
		Tunnel and Back (Including Mixers, Detectors)					0.0023	0	0	
		PIN					0.0081	0	0	
		Schottky Barrier					0.027	0	0	
		Varactor and step Recovery					0.0025	0	0	
		電力用整流器					3	0.069	0	
		ファーストリカバリ電力用整流器、ショットキー電力用ダイオード					2	0.003	0	
	高圧積層電力用整流器	2	0.005	0						
	トランジエクトサプレッサ / バリスタ	2	0.0013	0						
	電流レギュレータ	2	0.0034	0						
	電流レギュレータおよび電圧基準用 (アバランシェとツェナ)	2	0.002	0						
31		Diode for Electric power 電力用ダイオード					0.022	4	0.088	
32		ダイオード					0.024	0	0	
33		ダイオード					0.042	0	0	
34		整流ブリッジ					0.066	1	0.066	
35	光電子デバイス	LED					0.0012	0	0	
36		フォトダイオード					0.07	1	0.07	
37		フォトトランジスタ					0.07	0	0	
38	固定抵抗器	炭素皮膜抵抗器					0.0027	17	0.0459	
39		金属皮膜抵抗器				0.0037	0.0031	0	0	
40		電力型皮膜抵抗器					0.025	0	0	
41		電力型巻線抵抗器					0.028	0	0	
42	可変抵抗器	可変抵抗器					0.1	0	0	
43	サーミスタ thermistor	一般用サーミスタ					0.32	0	0	
44		パワーサーミスタ Power (NTC) Thermistor					0.32	1	0.32	
45	バリスタ	バリスタ					0.023	0	0	
46	温度ヒューズ付抵抗	温度ヒューズ付抵抗					0.068	0	0	
47	ヒューズ	一般用ヒューズ					0.02	1	0.02	
48		温度ヒューズ					0.04	0	0	
49	コンデンサ	アルミ電解コンデンサ					0.003	4	0.012	
50		タンタル電解コンデンサ					0.0039	0	0	
51		セラミックコンデンサ	C1B (131-67473292RC)	0.004878938	1			0.0074	5	0.037
52		フィルムコンデンサ					0.0038	1	0.0038	
53	コイル・トランス Coil Transformer	商用トランス Commercial Transformer					0.16	0	0	
54		インダクタ・トランス					0.023	1	0.023	
55		チョークコイル					0.023	1	0.023	
56		インダクタ					0.023	1	0.023	
57		スラット・トランス					0.023	0	0	
58		インダクタ・トランス					0.023	0	0	
59	コネクタ	一般用コネクタ					0.014	6	0.084	
68		プリント基板用					0.021	2	0.042	
70		ICソケット					0.0058	0	0	
71	プリント基板 PCB	without Through hole (無孔)					0.003	0	0	
72		with Through hole (有孔)					0.11	1	0.11	
73	接続 (半田) solder	フローはんだ (1点当たり)	0.000069				0.00052	107	0.05564	0.007383
74		手はんだ (1点当たり)	0.0013				0.0052	0	0	0
75		フローはんだ (1点当たり)					0.000138	0	0	
76	接続 (圧着)	1箇所当たり					0.00052	0	0	
77	接続 (ねじ)	Nuts, Screw					0.001	3	0.003	
78	ハイブリット I C	チップ部品、印刷抵抗など						0	0	
79	Transistor	discrete		0.0051						
80		discrete LC		0.12						
81		MOSFET	Sect.6.4	0.12						
82		JFET	Sect.6.4	0.0045						
83		all unijunction	Sect.6.4	0.0083						
84	Transistors, low noise, high frequency, bipolar		Sect.6.6	0.18	2.1					
85	Transistors, high frequency, GaAs FET			0.052	4.9					
86	Transistors, high frequency, Si FET	MOSFET	Sect.6.9	0.06	2					
87		JFET	Sect.6.9	0.023	2					
88	Thyristors(SCRs, Triacs)	all Types	Sect.6.10	0.0022	3					
89										
90										
91										
92	Green Indication Lamp	24V DC, LED Lamp		0.114	1			1		0.114
93	ファン, 選択→	MTBF=72,000H					13.8888889	1	13.88889	
	70000							14.98	Ag 合計	0.15
	71000							14980.23	Fif (Fit)	145.78
	72000							916305	hours	6859760
	75000							104.60	年 (参考)	783.08
	80000							66755	hours	71252
	100000							7.62	年 (参考)	8.13