TC-1U20FX2

1U Flex ATX Power Supply

(1U 200W Flex Power)

SPECIFICATION

Revision: 1.0

727 Phillips Drive, City of Industry CA 91748 USA

WWW.XEAL.COM.TW

TEL: 626-303-8885 FAX: 626-301-0588

Contents

1. Introduction ……. …..3
1.1 Scope ……..…….…….3
1.2 General Description ……..……3

2. AC Input ……..……..……...3
2.1 Voltage Range ……..……..3
2.2 Frequency Range ……..……....3
2.3 Input Waveform ……..3
2.4 Input Current ……...3
2.4.1 Steady-state Current ……..…….3
2.4.2 Cold Start Inrush Current ……3
2.4.3 Warm Start Inrush Current ……..……...4
2.4.4 Power Factor Correction (PFC) ……..4
2.4.5 Input Over current Protection ……..……...4
2.4.6 Withstand Voltage ……4
2.4.7 Catastrophic Failure Protection ……..…..……..5

3. DC Output ……5
3.1 Output Voltage ……..…..……5
3.2 Output Regulation ……...……...6
3.2.1 Output Voltage Load Regulation ……6
3.2.2 Output Voltage Line Regulation ……..7
3.2.3 Cross Regulation ……..……..7
3.3 Efficiency ……..…….7
3.4 Output Periodic And Random Deviation (PARD) ……...7
3.5 Voltage Hold-up Time ……8
3.6 Power Sequencing ……..……8

3.7 Timing / Housekeeping / Control ……..……..……..9
3.7.1 PWR_OK ……....9
3.7.2 PS_ON # Signal ……...10
3.7.3 +5VSB ……10
3.7.4 Power –on Time ……..10
3.7.5 Output Rise time ……10
3.7.6 Overshoot at Turn-on / Turn-off ……..……..10
3.7.7 Reset after Shutdown ……..10
3.8 Output Protection …….....11
3.8.1 Over Current Protection ……...11
3.8.2 Over Voltage Protection ……..……11
3.8.3 Short Circuit Protection ……..……..11

4. General Specification ……..……....12
4.1 Physical Dimension and DC Connector ……...12
4.2 DC Connector Pin Description ……13
4.3 Environmental ……..13
4.3.1 Operating ……..……..14
4.3.2 None Operating ……14
4.4 Fan Control Function …….....14
4.5 Reliability / Mean Time Between Failure (MTBF) ……..14
4.6 EMI ……14
4.7 Safety / Agency Approvals ……14

1. Introduction

1.1 Scope

This specification defines the performance and characteristic for the model of TC-1U20FX2 power supply.

1.2 General Description

TC-1U20FX2 is a 200W switching power supply, with an FLEX-ATX form factor, +5V standby voltage, remote on/off, dual line input capability.

2. AC Input

2.1 Voltage Range

Voltage range : 100VAC ~ 240VAC

2.2 Frequency Range

Frequency range : 50Hz – 60Hz

2.3 Input Voltage Waveform

Input Voltage waveform: Sine wave, modified sine wave or square wave

2.4 Input Current

2.4.1 Steady-state Current

Maximum current at 115 VAC (RMS) : 6A

Maximum current at 230 VAC (RMS) : 4A

2.4.2 Cold Start Inrush Current

Maximum inrush current at 115 VAC : 40A

Maximum inrush current at 230 VAC : 50A

* Measured at 25□ ambient cold start.

2.4.3 Power Factor Correction (PFC)

TC-1U20FX2 (w/PFC) version is facilitated with the universal input 90VAC ~ 264VAC active PFC with the PF value □ 0.950

115V (Nominal) Operation

PFC reaches 95.0% at 115V, 60Hz, under full output loading in accordance with the EN 61000-3-2, class D standards.

230V (Nominal) Operation

PFC reaches 95.0% at 230V, 50Hz, under full output loading in accordance with the EN 61000-3-2, class D standards.

2.4.4 Input Over current Protection

The power supply is equipped with a non-reset-able fuse on the AC input to limit power consumption on a failure within the power supply module.

Input Fuse Rating:

Voltage	250 V
Current	10 A
De-activation time	300 ms

2.4.5 Withstand Voltage

The power supply is capable of withstanding a maximum 2200 VDC potential between the input and ground for a period of 1 minute.

2.4.6 Catastrophic Failure Protection

If a component failure occurs, the power supply will not exhibit any of the following:

* Flame
* Excessive smoke
* Charred PCB
* Fused PCB conductor
* Startling noise
* Emission of molten material

3.DC Output

3.1 Output Voltage

Table 1 below summarizes the minimum DC output voltages and associated power requirements for each output.

TC-1U20FX2 (200 Watts Load Ratings-Two +12V Rails for processor Power)

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0.5	-	16		Amps
+5V	0.5	-	16		Amps
+12V1	1.0	-	14		Amps
+12V2	1.0	-	14		Amps
-12V	0.0	-	0.5		Amps
-5V	0.0		0.3		Amps
+5VSB	0.0	-	2.5		Amps

Table 1. DC Output Specifications

Notes: (1)The maximum continuous total DC outputs power shall not exceed 200W .

(2) The maximum continuous load on +5V and +3.3V outputs shall not exceed 80W.

(3) The maximum continuous load of all outputs shall not exceed 200W

(4) When the combined load for the +12V and +3.3V is over200W,+5V min load is 2A.

(5) The peak load of +12V2 can last for 30 ms .at this time, the minimum out voltage

(6) The 5V standby output shall remain on while the AC input power connected, whether DC outputs are disabled (Off) or enabled (On) by the remote on control signal.

(7) Output Voltage -5V Optional.

3.2 Output Regulation

The DC voltage outputs will stay within the regulation band as measured at the terminal outputs due to any combination of the following conditions:

- Input voltage fluctuations
- Specified load range
- Centering
- Specified environmental conditions
- Changing load steps

3.2.1 Output voltage load regulation

The following table summarizes the allowable output voltage tolerances for each output rail.

DC Nominal Output	Output Voltage Tolerance
+12V DC	±5%
+5V DC	±5%
+3.3V DC	±5%
-12V DC	±10%
-5V DC	±5%
+5VSB	±5%

Table 2. DC Output Tolerance Specifications

3.2.2 Output Voltage Line Regulation

The following table specifies line regulation as measured from minimum to maximum load including the transient response requirements as detailed in this document.

DC Nominal Output	Output Voltage Tolerance
+12V DC	±1%
+5V DC	±1%
+3.3V DC	±1%
-12V DC	±1%
-5V DC	±1%
+5V SB	±1%

Table 3. DC Output Tolerance Specifications

3.2.3 Cross Regulation

The power supply DC outputs perform within all line and load specifications regardless of the static or transient loads on any of the outputs.

3.3 Efficiency

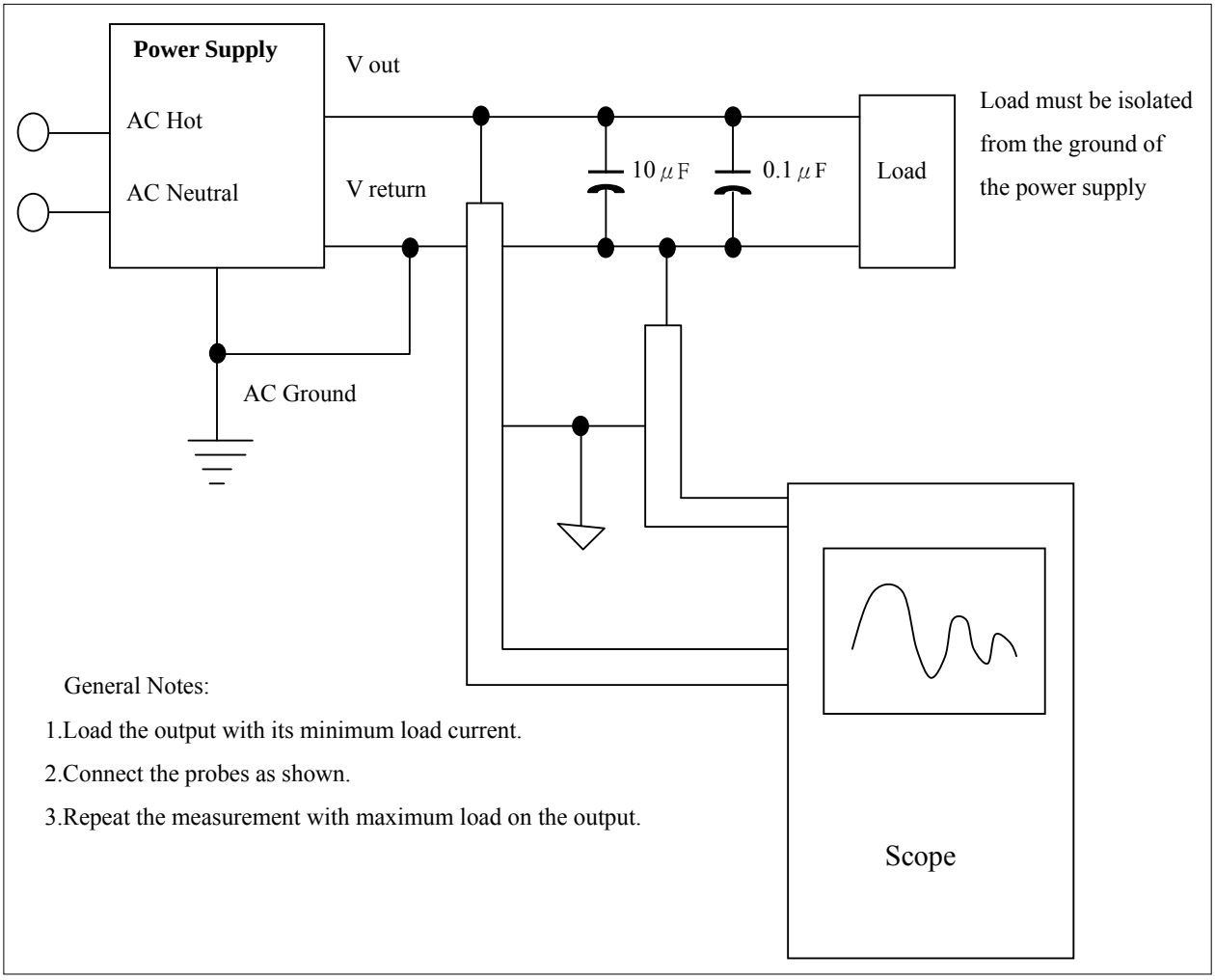
75% minimum at 115VAC, type load.

3.4 Output Periodic And Random Deviation (PARD)

There are two types of noise (PARD) specifications to be considered on the power supply; Common Mode and Differential Mode. Common mode is referred to as noise that is common between the specified voltage output and the associated ground line. Differential mode refers to noise that is only measured on the specified DC voltage output. In either case, noise is within the frequency range of 10 Hz – 20MHz and specifications are rated over the full output range for the power supply. Tables 4 provide the details for this specification.

DC Output	Ripple and Noise
+12V DC	□120mv(pk-pk)
+5V DC	□50mv(pk-pk)
+3.3V DC	□50mv(pk-pk)
-12V DC	□120mv(pk-pk)
-5V DC	□50mv(pk-pk)
+5V SB	□50mv(pk-pk)

Table 4. DC Output Periodic And Random Deviation (PARD)



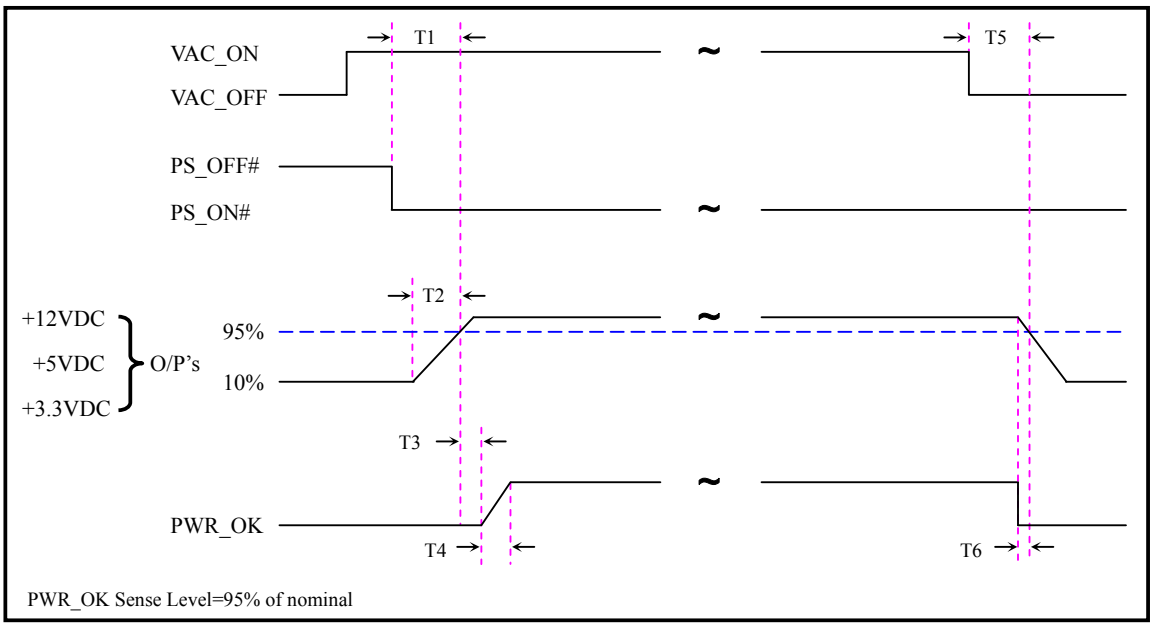
3.5 Voltage Hold-up Time

All output will stay within regulation for at least 17ms after an AC line voltage failure is detected at nominal line (115VAC or 230VAC) under 70% full load condition.

3.6 Power Sequencing

All outputs, regardless of loading, turn on within 50ms of each other. The 5VSB output is in regulation for a minimum of 10ms prior to the other output rails reaching regulation.

3.7 Timing / Housekeeping / Control



0.1ms ≦ T2 ≦ 20ms
100ms ＜ T3 ＜ 500ms
T4 ≦ 100Us
T5 ≧ 17ms
T6 ≧ 1ms

T2：Rise Time
T3：PWR_OK Delay
T4：PWR_OK Rise time
T5：AC Loss to PWR_OK Hold-up Time
T6：Power-down Warning

Figure 1 Power Supply Timing

3.7.1 PWR_OK

The power supply accepts a logic collector level which will disable/enable all the output voltages. As the logic level is low, output voltages are enable; As the logic level is high, output voltages are disable. The definition of logic low/high level is as:

High Level: 2.50V ~ 5.25V while sourcing 0.4mA maximum

Low Level: 0.0V ~ 0.50V while sinking 5.0mA maximum

Rise Time: 3.0ms maximum (10.0% ~ 90.0%)

3.7.2 PS_ON# Signal

The power supply provides an internal pull-up to TTL high. The power supply also provides debounce circuitry on PS_ON# to prevent it from oscillating on/off at startup when activated by a mechanical switch. The DC output enable circuitry is SELV-complaint.

	Min.	Max.
V_{IL}, Input Low Voltage	0.0V	0.8V
V_{IL}, Input Low Current (Vin = 0.4 V)		-1.6mA
V_{IH}, Input High Voltage (Iin = -200 μA)	2.0V	
V_{IH}, open circuit, Iin = 0		5.25V

Table 8. PS_ON# Signal Characteristics

3.7.3 +5VSB

The +5VSB is capable of delivering a maximum of 2.5A at +5V ±5% to external circuit. The power supply +5VSB is with over current protection.

3.7.4 5vsb Power-on Time

. The +5VSB has a power-on time of two seconds maximum after application of valid AC voltages. (Figure 1)

3.7.5 Output Rise time

The output voltages rise from ≤ 10% of nominal to within the regulation ranges within 0.1ms to 20ms (0.1ms ≤ T2 ≤ 20ms). (Figure 1)

3.7.6 Overshoot at Turn-on / Turn-off

Any overshoot at turn on or turn off is under 10% of the nominal DC output voltage with further stipulation that all DC outputs are within their specified DC voltage ranges before the generation of the power good signal. Additionally, no voltage may undershoot or overshoot once the power good signal has been asserted.

3.7.7 Reset after Shutdown

The power supply latches into a shutdown state because of a fault condition on its outputs, the power supply returns to normal operating after the fault has been removed and the PS_ON# (or AC input) has been cycled OFF/ON with a minimum OFF time of 1 second.

3.8 Output Protection

Each DC output is protected from over voltage, over current and short circuit. The following sections include the details for these protection mechanisms.

3.8.1 Over Current Protection

The power supply DC outputs are protected from supplying output current above the maximum ratings defined in Table 1, and when output power is between 110%~150%. With the exception of the 5VSB output, all DC outputs are latched off in the event of an over-current event on any of the DC outputs. In the event of a short circuit on any output, except the 5VSB rail, all outputs are disabled and remain disabled until the power supply is powered off back on. The 5VSB rail will recover upon removal of the over current condition.

3.8.2 Over Voltage Protection

The over voltage sense circuitry and reference reside in packages that are separate and distinct from the regulator control circuitry and reference. No single point fault is able to cause a sustained over voltage condition on any or all outputs. The power supply provides latch-mode over voltage protection defined as:

+5V output is between 5.8V to 6.3V

+12V output is between 13.5V to 16.0V

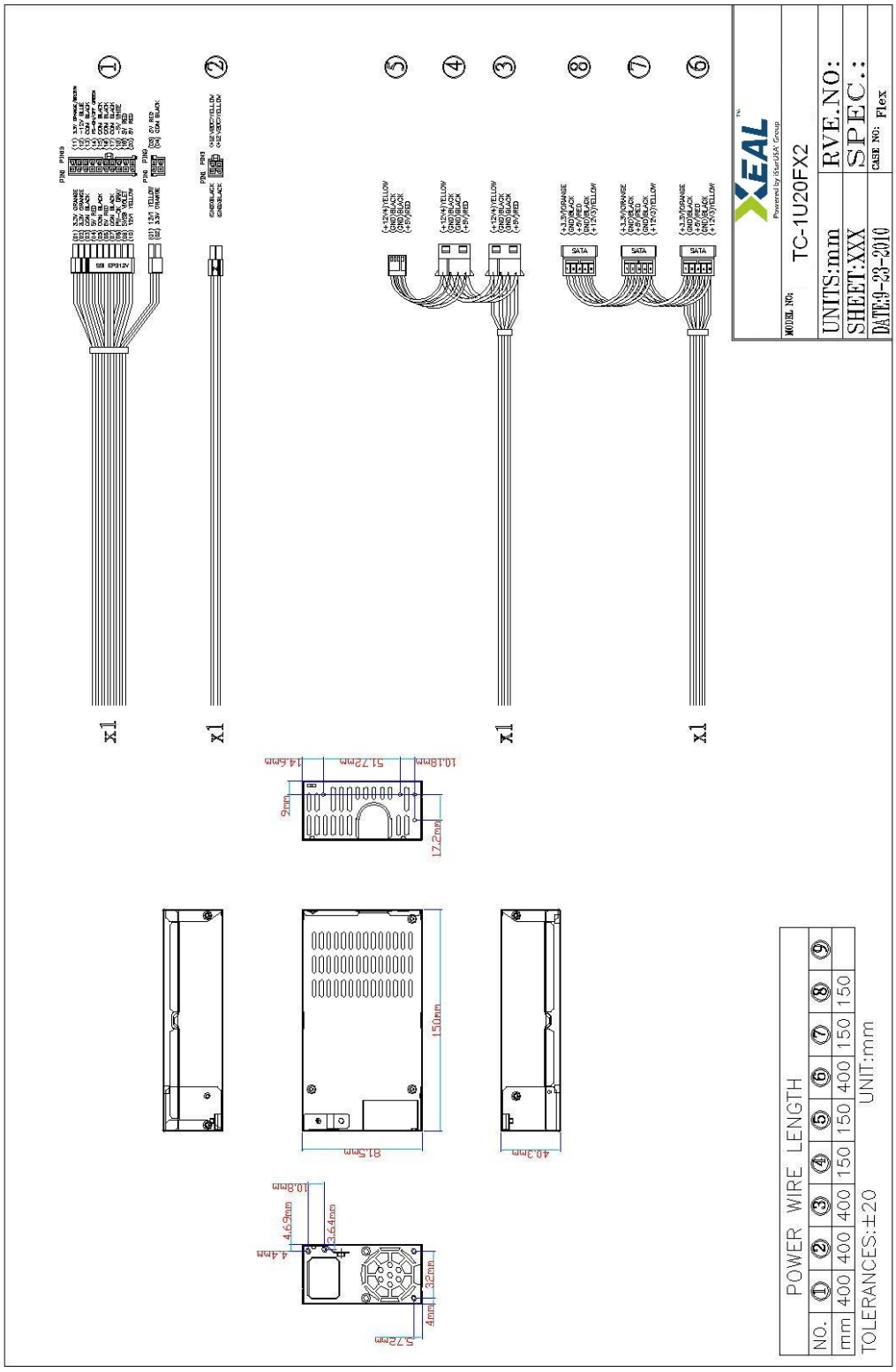
+3.3V output is between 3.6V to 4.2V

3.8.3 Short Circuit Protection

The power supply DC outputs are protected from damage due to faults, when any output shorts to ground. In the event of a short circuit on any output, all outputs shall be disabled and remain disable until the power supply is powered off and back on. The 5VSB rail will recover upon removal of the over current condition.

4.General Specifications

4.1 Physical Dimension



4.2 Environmental

4.2.1 Environmental (Operating)

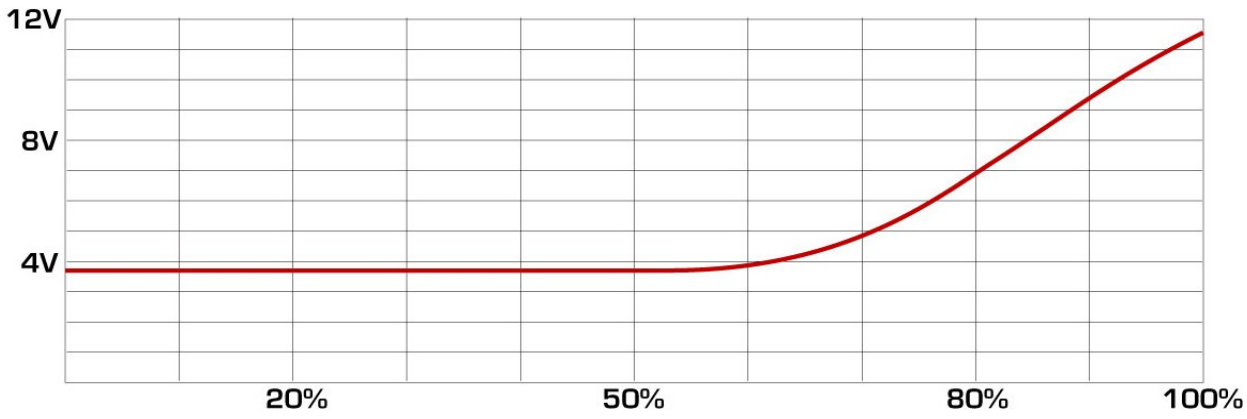
Temperature: 0□ to 50□
Humidity: 20% to 80% Relative Humidity (non condensing)
Altitude: -61meters to +3,048 meters
Shock: T.B.S.
Vibration: T.B.S.

4.2.2 Environmental (Non-Operating)

Temperature: -25□ to 85□
Humidity: 10% to 90% Relative Humidity (non condensing)
Altitude: -61meters to +15,244 meters
Shock: T.B.S.
Vibration: T.B.S.

4.3 Fan Control Function (Optional)

In order to prolong the fan's life cycle, the power supply is facilitated with a Thermostatic circuitry to monitor the fan speed under the power supply Operating temperature.



4.4 Reliability / MTBF

The power supply reliability is based on the calculation with the Part-Stress Analysis method of MIL-HDBK-217F using the quality factors listed in MIL-HDBK-217F. The power supply MTBF is 250,000 hours under the following conditions:

- Full-rated load
- 120VAC input
- Ground begin
- 25□ ambient

4.5 EMI

The power supply is complied with CISPR 22, Class B. Tests are performed at 110VAC 50Hz, 120VAC 60Hz, and 220VAC 50 Hz power. The TC-1U20FX2 meets the requirement of EN 61000-3-2 Class D, and EN 61000-3-3, and the Guidelines for the Suppression of Harmonics in Appliances and General Use Equipment Class D for harmonic line current content at full-rated power.

4.6 Safety / Agency Approval

UL 1950
CSA C22.2
ICE 950
TUV EN60950-1
CE EN 61000-3-2/1995, EN 61000-3-3/1995
EN 55024/1998, EN 5022/1994+A1: 1995+A2: 1997
FCC Part 15, Subpart B, Class B
CISPR 22: 1993+A1: 1995+A2: 1996, Class B
ANSI C63.4-1992

4.7 MTBF

MTBF (mean time between failures) calculation

The demonstrated MTBF shall be 100,000 hours of continuous operation at 25^{o}C, full load, 80% confidence limit and nominal line. The MTBF of the power supply be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.