This specification is defined follow Intel design guide - Single Rail Power Supply Desktop Platform Form Factors **ATX12VO(12V Only)**. Power supply is designed with +12V and +12VSB outputs. The maximum continuous output power **300W , 400W , 500W** at 90 to 264Vac input. The power supply contains fan for forced cooling while meeting acoustic requirements.

1. AC input characteristics:

1.1 AC input requirements:

The input voltage, current, and frequency requirements for continuous operation are stated show in Table 1.

Table1

Parameter	Min	Nom	Max	Unit
Vin	90	**100 --- 240**	264	VACrms
Vin Frequency	47	**60 --- 50**	63	Hz
Iin（300W）		**5 ---- 2.5**		A
Iin（400W）		**6 ------ 3**		A
Iin（500W）		**8 ------ 4**		A

1.2 AC inrush current(cold start):

20A maximum at 115Vac, 30A maximum at 230Vac, 25°Celsius, Cold start.
Note: The inrush current shall be limited to a level below the surge rating of the ac power cord, AC on/off switch, bridge rectifier, fuse and EMI filter components.

2. DC Output characteristics:

2.1 Output voltage regulation Requirements:

The power supply output voltage must stay within the following voltage limits shown in Table2 when operating at steady state.

Table2

Parameter	DC Voltage Regulation	Min	Nom.	Max	Unit
+12V	±5%	+11.4	+12.0	+12.6	Volts
+12VSB	±5%	+11.4	+12.0	+12.6	Volts

When the +12V is in the peak current load, the range of the voltage tolerance is about 10% of the standard output voltage.

2.2 Output Current Requirements:

The power supply output current following shown in Table3.

Table3

300W

Parameter	Min	Max	Peak	Unit
+12V	0	**25**		Amps
+12VSB	0	**1.5**	2	Amps

Notes:

1. The maximum continuous DC output power shall not exceed **300W.**
2. +12VSB peak currents around 2.0A or higher, lasting no more than 500ms.

400W

Parameter	Min	Max	Peak	Unit
+12V	0	**33.3**		Amps
+12VSB	0	**1.5**	2	Amps

Notes:

1. The maximum continuous DC output power shall not exceed **400W.**
2. +12VSB peak currents around 2.0A or higher, lasting no more than 500ms.

500W

Parameter	Min	Max	Peak	Unit
+12V	0	**41.6**		Amps
+12VSB	0	**1.5**	2	Amps

Notes:

1. The maximum continuous DC output power shall not exceed **500W.**
2. +12VSB peak currents around 2.0A or higher, lasting no more than 500ms.

2.3 Output Transient Response:

Table 4 summarizes the expected output transient step sizes for each output.
The transient load slew rate is = 1.0 A/μs.

Table4

Parameter	Maximum Step Size (% of rated output amps)	Maximum Step Size (A)
+12V	85% load	
+12VSB		0.5A

NOTES:

1. Simultaneous load steps on the +12 VDC, outputs
   (all steps occurring in the same direction)
2. Load-changing repetition rate of 50 Hz to 10 kHz
3. AC input range per Section 1.1 and Capacitive loading per Table 8.

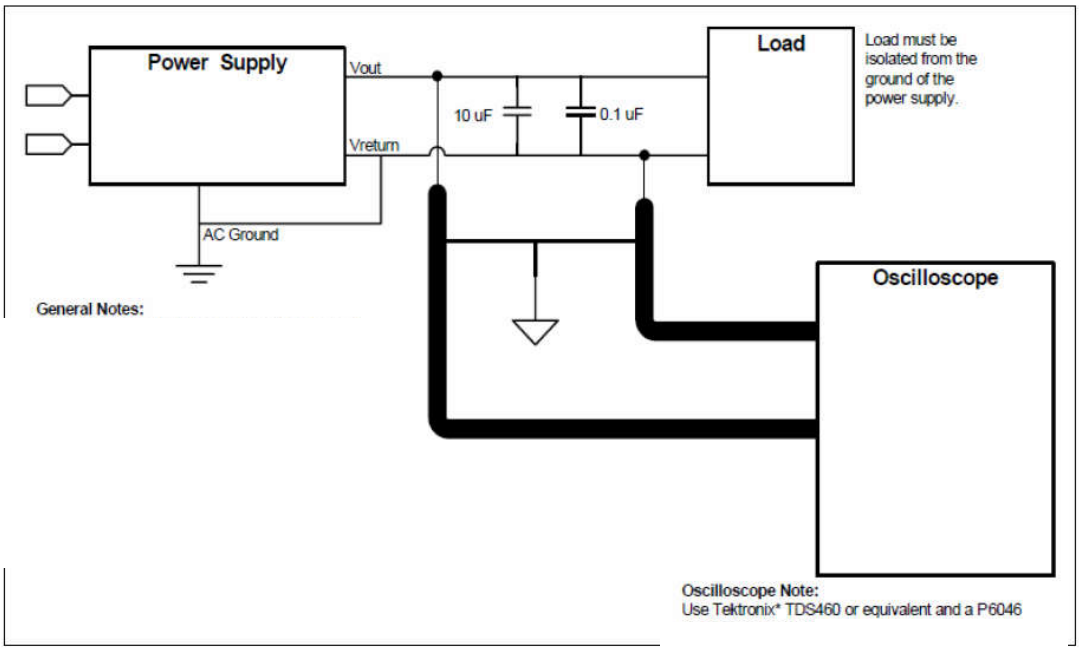
2.4 Output Ripple and Noise:

Table5

Output	Ripple and Noise	Unit
+12V	**60**	mVp-p
+12VSB	**60**	mVp-p

Note:
This is measured over a bandwidth of 10Hz to 20MHz at the power supply output connector. A 10μF electrolytic capacitor in a parallel with a 0.1μF ceramic capacitor is placed at the point of measurement.

Differential noise test setup



2.5 Efficiency:

2.5.1 In the 115Vac/60Hz input voltage the power supply efficiency is more than 89%.

Table6

Load	Efficiency(%)	Power Factor
20%	**90**	--
50%	**92**	>0.95
100%	**89**	>0.95

Note: There is 0.5% tolerance in mass production

2.5.2 ERP +12VSB Efficiency

Table7

+12VSB LOAD	Efficiency target (both 110V and 230V input)
1.5A	75%
0.625A	75%
0.4A	75%
0.23A	75%
38mA	55%
19mA	45%

2.5.3 Low Load Efficiency

The PSU above 400Watts shall meet **72%** efficiency @ 2% level.

2.6 Remote on/off control

When the logic level "PS-ON" is low, the DC outputs are to be enabled.
When the logic level is high or open collector, the DC outputs are to be disabled.

2.7 Overshoot:

The overshoot of the DC output voltage caused by switching AC power or switch PSON# should be less than 10% of the normal output, and no reverse polarity voltage should be produced.

2.8 Capacitance Loading

The power supply shall be stable and meet all requirements with the following capacitive loading ranges.

Table8

Capacitive Loading Conditions	
Output	Capacitive Load (μF)
+12V	3,300
+12VSB	3,300

3.Environment:

3.1 Operation temperature: Table9

Temperature	**0 to 50**℃
Relative Humidity	5% to 85%,on-condensing

3.2 Shipping and Storage: Table10

Temperature	-20℃～70℃
Relative Humidity	5% to 95%,non-condensing

3.3 Altitude: Table11

Operating	≤5000m
Storage	≤5000m

3.4 Cooling mode:

Forced air cooling.

3.5 Random Vibration:

Non-operating 0.01 g²/Hz at 5 Hz, sloping to 0.02 g²/Hz at 20 Hz, and maintaining 0.02 g²/Hz from 20 Hz to 500 Hz. The area under the PSD curve is 3.13 grams. The duration shall be 10 minutes per axis for all three axes on all samples.

4. Protection:

Due to over voltage, over power and short circuit, the protection function of the power supply circuit is self operated, and the power is self locked. There is no output at that time. When these reasons are removed, the power is restored to the normal output state when the power is restarted. (PSON# at least 1 second; AC shutdown at least 4 seconds).

4.1 Over power protection:

The power supply will be shutdown and latch off when output power within **130~160%** of rated DC output. Note: Assurance machine can work at low voltage, full load won't damage machine.

4.2 Over voltage protection:

Table12

Output	Output voltage protection point			Unit
	Min	Nom	Max	
+12V	13.4	15.0	15.6	V
+12VSB	13.4	15.0	15.6	V

4.3 Short circuit protection:

An output short circuit is defined as any output impedance of less than 0.1 ohms. The power supply shall shut down and latch off for shorting the +12VDC rails to return or any other rail. Shorts between main output rails and +12VSB shall not cause any damage to the power supply. The power supply shall either shut down and latch off or fold back for shorting the negative rails.+12VSB must be capable of being shorted indefinitely, but when the short is removed, the power supply shall recover automatically or by cycling PS_ON#. The power supply shall be capable of withstanding a continuous short-circuit to the output without damage or overstress to the unit

4.4 Over temperature protection:

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shutdown. When the power supply temperature drops to within specified limits, the power supply shall be in Latch mode.

4.5 Over current protection:

The power supply shall have current limit to prevent the +12V outputs from exceeding the values shown in Table. If the current limits are exceeded the power supply shall be shutdown and latch off. The damaged from repeated power cycling in this condition.+12VSB shall be protected under over current or shorted conditions so that no damage can occur to the power supply. All outputs shall be protected so that no damage occurs to the power supply under a shorted output condition.

Table13

Voltage	Over Current Limit (Iout limit)
+12V(300W)	28A minimum; 40A maximum
+12V(400W)	37A minimum; 54A maximum
+12V(500W)	46A minimum; 67A maximum

5. Power Supply Timing:

5.1 Signal timing drawing

Figure 2 is a reference for signal timing for main power connector signals and rails.

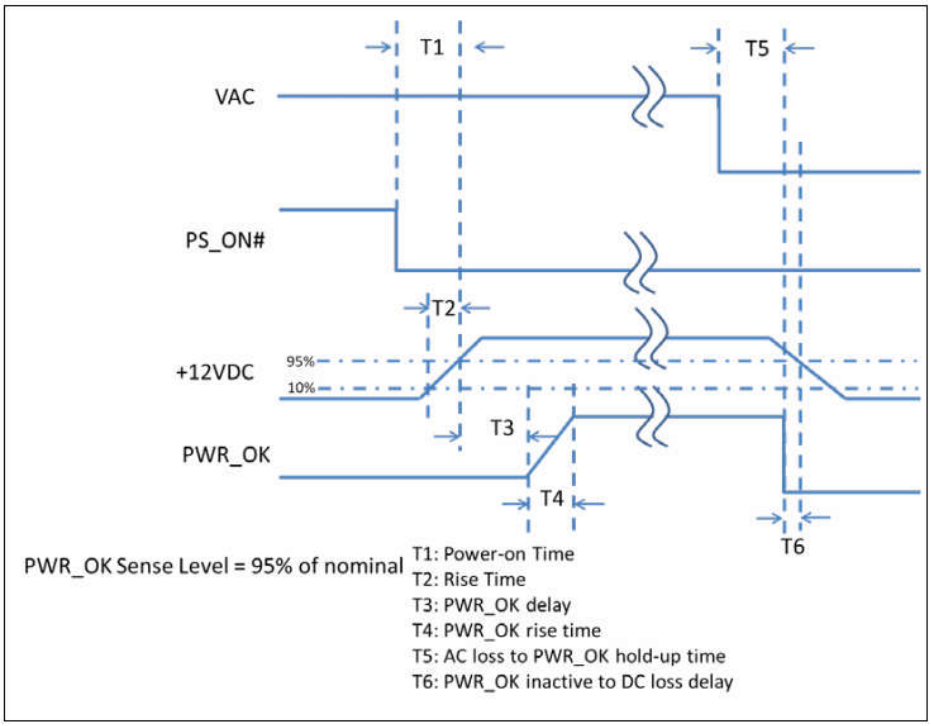


Table14

Parameter	Description	Required
T0	AC power on time	<2s
T1	Power-on time	1 – 150ms
T2	Rise time	0.2 – 20 ms
T3	PWR_OK delay	1– 150ms
T4	PWR_OK rise time	< 10 ms
T5	AC loss to PWR_OK hold-up time	**> 11 ms**
T6	PWR_OK inactive to DC loss delay	> 1 ms

The power supply should maintain output regulations per Table 14 despite a loss of input power at the low-end nominal range-115 VAC / 47 Hz or 230 VAC / 47 Hz – at maximum continuous output load as applicable for a minimum of 17ms (T5+T6)

6. SAFETY:

The power supply designed to meet **IEC 62368-1**.

6.1 Electrical strength:

Gradually increased from 0V to 1500V is applied in the AC line and the casing, and then keep for 1 minutes, the insulation should not breakdown; if the current increases rapidly due to the test voltage and gets out of the way, that is to limit the current insulation, insulation breakdown that has occurred; corona discharge or flashover is not a single moment that is the breakdown of insulation.

6.2 Ground resistance:

Ground resistance value less than < 0.1 ohm(40A)

6.3 Touch current:

When the input 250Vac, contact current less than 3.5mA.

6.4 EMC

6.4.1 ELECTROSTATIC DISCHARGE (ESD) – IEC 61000-4-2(EN 61000-4-2).
6.4.2 RADIATED SUSCEPTIBILTY – IEC 61000-4-3(EN 61000-4-3).
6.4.3 ELECTRICAL FAST TRANSIENT / BURST (EFT/B) – IEC 61000-4-4 (EN 61000-4-4).
6.4.4 SURGE – IEC 61000-4-5(EN 61000-4-5).
6.4.5 CONDUCTED SUSCEPTIBILTY – IEC 61000-4-6(EN 61000-4-6).
6.4.6 POWER FREQUENCY MAGNETIC FIELD – IEC 61000-4-8(EN 61000-4-8)
6.4.7 VOLTAGE DIPS – IEC 61000-4-11(EN 61000-4-11).
6.4.8 VOLTAGE FLUCTUATIONS – IEC 61000-3-3 (EN 61000-3-3).
6.4.9 HARMONIC CURRENT EMISSION – IEC61000-3-2(EN 61000-3-2).
6.4.10 EN55032:Class B Radio interference (CISPR 32).
6.4.11 ANSI C63.4-2009 / FCC Part 15 Subpart B / ICES-003 Issue 5 Class B 115VAC operation.

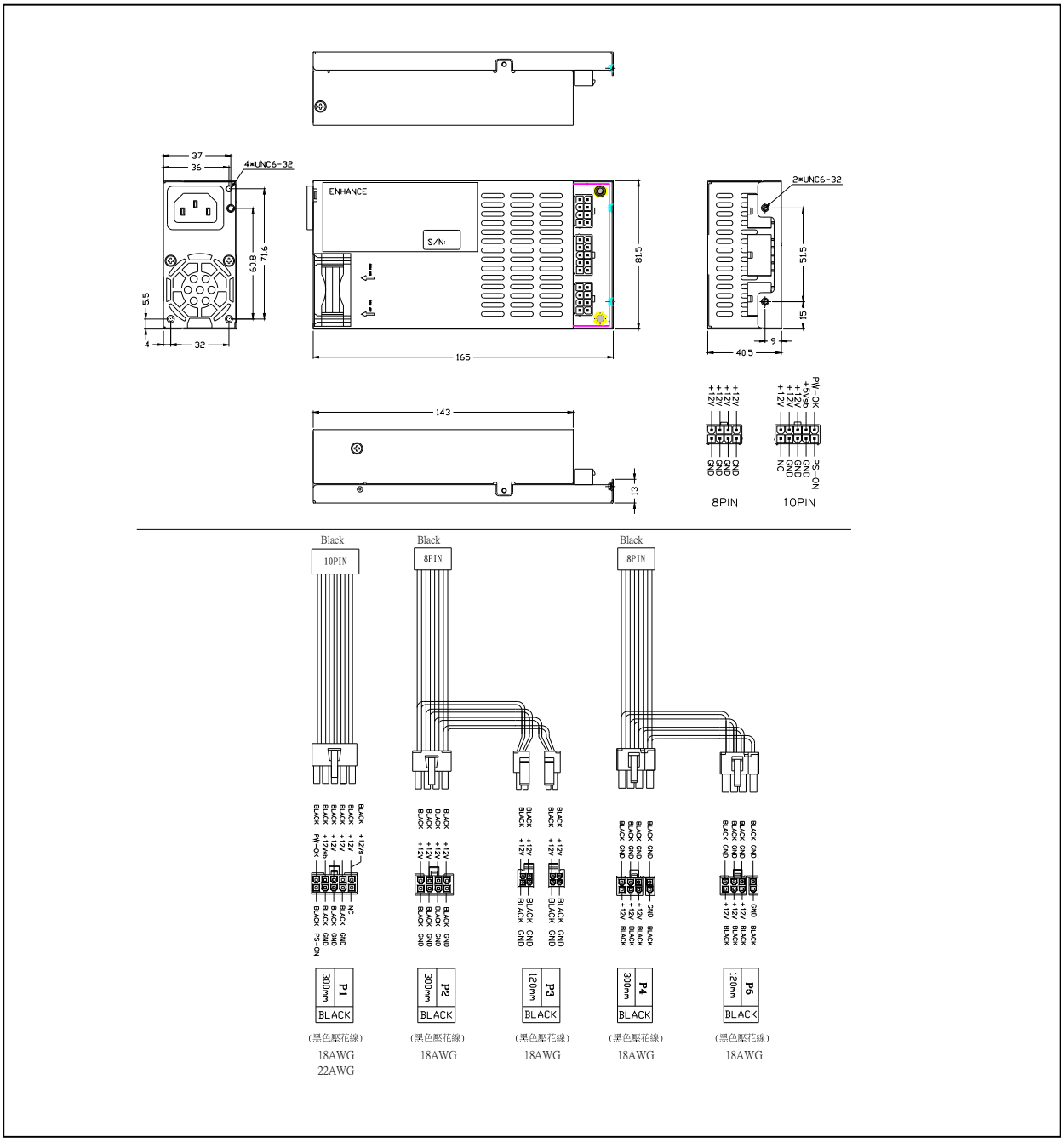
7. Reliability:

The demonstrated MTBF shall be 100,000 hours of continuous operation at 25℃ and full load and nominal voltage. The MTBF of the power supply shall be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.

8. Mechanical:

8.1 Physical dimension: L165mm W81.5mm H40.5mm

（ 線材組合&外露長度僅供參考，可根據客戶要求更改或新增。）



8.2 Connectors (INTEL approved equivalent):

M/B 10PIN (Molex / WST / LST or equivalent)

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
YELLOW	+12V +12Vsense (22AWG)	6	1		NC
YELLOW	+12V	7	2	GND	Black
YELLOW	+12V	8	3	GND	Black
PURPLE	+12VSB	9	4	GND	Black
GREY	PW-OK	10	5	PS-ON	GREEN

CPU 8PIN (Molex / WST / LST or equivalent)

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Black	COM	5	1	+12V	YELLOW
Black	COM	6	2	+12V	YELLOW
Black	COM	7	3	+12V	YELLOW
Black	COM	8	4	+12V	YELLOW

CPU 4+4PIN (Molex / WST / LST or equivalent)

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Black	COM	3	1	+12V	YELLOW
Black	COM	4	2	+12V	YELLOW
Black	COM	3	1	+12V	YELLOW
Black	COM	4	2	+12V	YELLOW

PCI-E 6+2PIN (Molex / WST / LST or equivalent)

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
YELLOW	+12V	1	4	COM	Black
YELLOW	+12V	2	5	COM	Black
YELLOW	+12V	3	6	COM	Black
Black	COM	1	2	COM	Black

9. FAN SPEED CONTROL

1. Fan voltage varies with the ambient temperature or output power.