

Design Requirements

150W

POWER SUPPLY

FOR

TFT DISPLAYS

Release: 23.02.2004

1 Change history

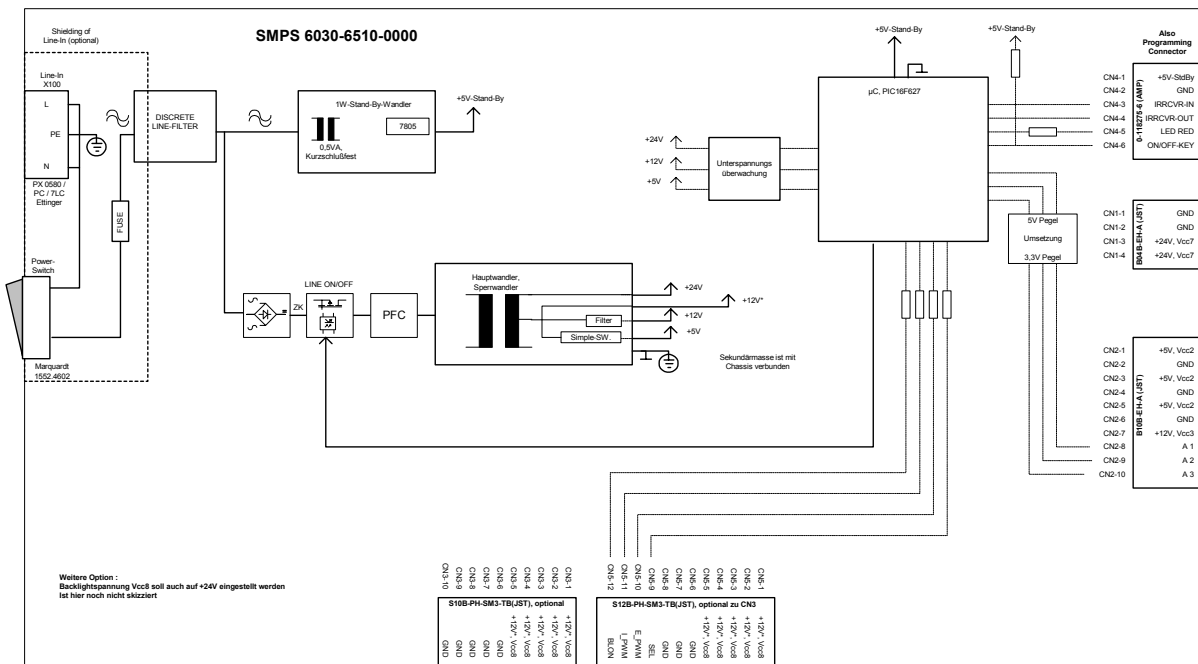
No.	Change	Date
01	First edition / Release Version	18.12.2003
02	Output power reduced	29.01.2004
03	Stand-By-Concept changed	23.02.2004
04		
05		
06		
07		
08		
09		
10		

2 Introduction

The 150W power supply for TFTs generates from the Line-Input-Voltage (200VAC-264VAC) different DC output-voltages which are used to drive a TFT up to 30" and the other electronics, incl speaker.

The SMPS has an active-Power-Factor-Control (PFC). It has an integrated controller for overload-protection and communication with external peripherals. The controller analyses a signal from an IR-Sensor or an On/Off-button and switches the SMPS form Stand-By-Mode to operating mode and reverse.

In the Stand-By-Mode the power-consumption of the SMPS is about 1W.



Suggestion for Circuit

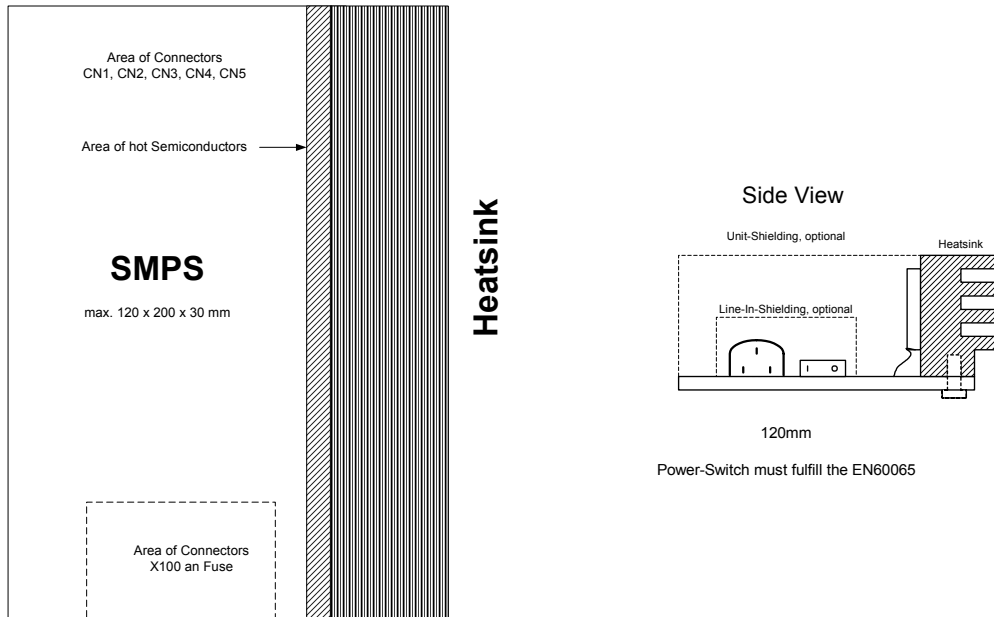
3 Mechanical concept

Following drawing shows the general mechanical concept. The Line-In-Connector and the power-switch should be located at one side of the pcb and the output connectors on the other side. All semiconductors, which will become hot during operation, should be placed in the marked area.

Maximum height of SMPS: 30mm (PCB top to top of devices)!

The SMPS should have the following options :

- the Line-In-Area should be shieldable by a thin sheet as drafted below
- the total SMPS should be shieldable by a thin sheet as shown below (for use in a plastic chassis)



4 Technical specification

4.1 Recommended environmental conditions

No.	Item	Condition	Rating
1	Temperature	Operation	0°C to 50°C (under the following condition): <ul style="list-style-type: none"> • Air cooling or contact cooling is necessary • Temperature of electric parts must be kept less than 100°C • Thermal shock condition must be kept less than 1.5°C/minute
		Storage	-5°C to 60°C
2	Humidity	Operation	20% to 85% RH (no condensation)
		Storage	20% to 80% RH (no condensation)
3	Pressure	Operation	800hPa to 1114hPa (Altitude: 0 to 2000m)
		Storage	800hPa to 1114hPa (Altitude: 0 to 2000m)

4.2 Input power type and specification

No.	Item	Condition	Rating
1	Input voltage		200 to 264V
2	Phase		Single phase
3	Frequency	Rated Input	45 to 65Hz
4	Current		tbd
5	Inrush current	Cold start	36A (0 to peak) or less
6	Leakage current	250V AC	0.75mA or less including on board EMI line filter
7	Line regulation	@ rated input voltage and rated current	80% min. or 115% max. less than 5s
8	Restart interval	Rated input and output	5s

4.3 Output power type and specification

No.	Item	Symbol	Term/Condition	Rating			OVP	Unit	
				Min.	Typ.	Max.			
1	Stand-By	Voltage	+5V StdBy		+4.8	+5.0	+5.2	+6.0	V
		Stability		0.1 – 1A			±4.0		%
		Ripple + Noise						200	mVpp
		Current (RMS)			0.01	0.015	0.02		A
		Current instant		tbd					A
		Current inrush		tbd					A
2	Logic circuit voltage	Voltage	Vcc2		+4.8	+5.0	+5.2	+6.0	V
		Stability					±4.0		%
		Ripple + Noise						200	mVpp
		Current (RMS)			0.1		2.0		A
		Current instant		tbd					A
		Current inrush		tbd					A
3	Intermediate supply voltage	Voltage	Vcc3		+11.2	+12.0	+12.7	+14.0	V
		Stability					±6.0		%
		Ripple + Noise						300	mVpp
		Current (RMS)			0.1	0.5	0.7		A
		Current instant		tbd					A
		Current inrush	10ms	10ms		2.0	3.0		A
4	Audio supply voltage	Voltage	Vcc7			+24.0		+32.0	V
		Stability		5mA – 500mA				±5.0	%
		Ripple + Noise						200	mVpp
		Current (RMS)			0.05		1.0		A
		Current instant		tbd					A
		Current inrush		tbd					A
5	Inverter Supply Voltage	Voltage			+10.8	+12.0	+13.2	+15.0	V
		Stability						±10.0	%
		Ripple + Noise						400	mVpp
		Current (RMS)			0	7.5	8.5		A
		Current instant		tbd					A
		Current inrush		tbd				10	A

tbd = to be defined

4.4 Internal connector pinning

- X100 -> Supply input voltage

Type : PX 0580 / PC / 7LC made by Ettinger

Contact No.	Name	Description
L	L (AC)	
N	N (AC)	
PE	PE	

- CN1 -> Supply voltage signal processing

Type: B04B-EH-A made by JST

Contact No.	Name	Description
1	GND	
2	GND	
3	+24V, Vcc7	Supply voltage audio amplifier
4	+24V, Vcc7	Supply voltage audio amplifier

- CN2 -> Supply voltage signal processing

Type: B10B-EH-A made by JST

Contact No.	Name	Description
1	+5V StdBy	
2	GND	
3	+5V Vcc2	
4	GND	
5	+5V Vcc2	
6	GND	
7	+12V Vcc3	
8	A1	
9	A2	
10	A3	

- CN3 -> Vinverter Out

Type : S10B-PH-SM3-TB made by JST

Contact No.	Description
1	+12V*, Vcc8
2	+12V*, Vcc8
3	+12V*, Vcc8
4	+12V*, Vcc8
5	+12V*, Vcc8
6	GND
7	GND
8	GND
9	GND
10	GND

- CN4 -> to Keypad, programming connector

Type: 0-1882-75-6 made by AMP

Contact No.	Name	Description
1	+5V-StdBy	
2	GND	
3	IRRCVR-IN	
4	IRRCVR-OUT	
5	LED-Red	
6	ON/OFF-Key	

- CN5 -> Vinverter Out

Type : S12B-PH-SM3-TB made by JST

Contact No.	Description
1	+12V*, Vcc8
2	+12V*, Vcc8
3	+12V*, Vcc8
4	+12V*, Vcc8
5	+12V*, Vcc8
6	GND
7	GND
8	GND
9	SEL
10	I PWM
11	E PWM
12	BLON

5 Standards

5.1 EMI Standards

APPROVAL SMPS

		Criteria
EMI/EMC:	EN55013 -6dB EN55020 EN55022-B -6dB EN55024 (latest revisions)	
Limits for harmonic current emission <16A:	EN61000-3-2	D
Interruptions:	0.5 mains period, 6 times per minute	
Line dips:	EN61000-4-11 -20%, 1 sec. Duration -30%, 50 msec. Duration, 6 times per minute	A(C)
Line surges:	EN61000-4-11 +15%, 1 sec. Duration +20%, 50 msec. Duration, 6 times per minute	A

ESD:	EN61000-4-2 contact discharge 4kV EN61000-4-2 air discharge 8kV	B
Radiated RF (80-1000MHz):	EN61000-4-3 (20V/m 80% modulation level from 80 – 1000MHz)	A
Bursts:	EN61000-4-4 N, L1, PE	B
Surges:	EN61000-4-5 Asymmetric coupling L -> PE 2kV, N -> PE 2kV Symmetric coupling L -> N 1kV	
Conducted disturbances induced by RF fields:	EN61000-4-6 (10Veff, AM 80%, 1kHz from 150kHz – 80MHz)	A
Radiated RF:	ENV50204:1995 900MHz, 20V/m, pulse 50%	A

5.2 Vibration and shock

MECHANICAL STRESS

Shock:	20G, 11ms, half sine (x/y direction)
	15G, 11ms, half sine (z direction)
Vibration:	1.2G, 10 – 55Hz, sinus
Sweep:	1 minute/octave
Amplitude:	0.35mmp-p (x-direction)
	0.35mmp-p (y direction)
	0.175mmp-p (z-direction)
Time :	30 minutes
Standard:	Conform to EN60065

5.3 Product safety and approval

- EN60065/09.93 + A11 (latest revision)
- EN60950:2000 (latest revision)
- Designed to meet UL1950 3rd edition or higher

The safety distances must be **20% more** than required in the EN60065 and EN60950 (to compensate component tolerances)

5.4 Label

The following items are indicated on a label that is attached to the unit:

- Part number
- Manufacturer logo mark
- Serial number and revision number
- Manufacturer date code
- UL sign on PCB

5.5 Accoustic Noise

- Max. 22 dB(A) @ 18 dB(A) ambient noise

6 Reliability

CONRAC performs an accelerated life test at an ambient temperature of 60°C with 10 kits of the pilot run. The proof of an MTBF time larger than 25.000 hrs. @ 50°C is an essential part of this design. The design has not finished without this qualification step. The contractor is obliged to enhance the reliability if failures occur during the life test time.

The basics for the MTBF calculations are as follows:

- Daily operational time: 8hrs.
- Yearly usage time: 365 days
- Usage time: 7 years
- Ambient temperature: 50°C for the integrated electronic module

Warranty: 24 months

6.1 Design documentation

The following design documents have to be handed over before the official end of the design project:

- Layout files (Gerber format) and PCB production films
- Schematics
- Silk screen
- Part list, incl. supplier info
- Performance test
- Circuit description on block diagram level
- Firmware and source codes on data carrier
- Alignment procedure
- Recommended spare part list

7. Product Release

The Design Requirements are released by the general management.

22. Dezember 2003

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Datum

gez. Brüggemann

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U. Brüggemann