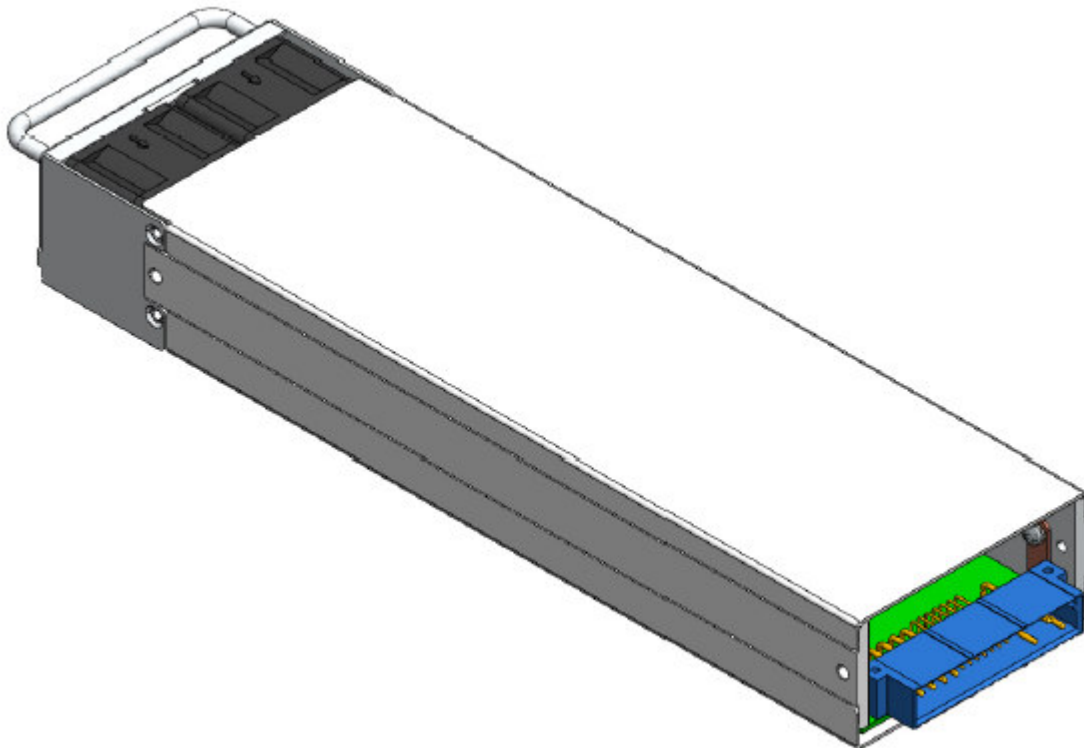


**Electrical Specification for: 48V 2.2KW 1U AC-DC Power Supply**

**TelkooR Model: PS-2248**



CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	1	OF 10

REVISION HISTORY					
Rev Level	Rev Date	Change Made	Reason for Change	Effective	Approved By
A	03/09/2012	Release for production	03/09/2012	S. Sadot	
A1	05/06/2013	Specification updated to 2.2KW	05/06/2013	s.sadot	

Approval		
	Name	Date
Written by:	S. Sadot	03/09/2012
Engineering:	S. Sadot	03/09/2012
Q.A:	G. Sela	03/09/2012

CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE	RELEASE DATE	03/09/12	SHEET	2	OF	10

<b>Input:</b>	
Input Voltage:	90 – 264Vac continuous, 47-63Hz , single phase
Maximum Input Current :	16A
Inrush Current:	Less than 50A
Power Factor:	0.98 typical at 230Vac, full load 0.99 typical at 115Vac, full load
Efficiency	92% typical at 200Vac, full load and 25°C ambient temperature 89% typical at 100Vac, full load and 25°C ambient temperature
Turn ON	84 – 88Vac
Turn OFF	<80Vac
Input Protection:	Internal Line Fuse: STP – 5X20 16A / 250 VAC High Capacity.
Brown– Out:	75 to 300Vac

**Output Voltages & Currents:**

<i>Input Range</i>	<i>Output Voltage</i>	<i>I Min. Load</i>	<i>I Max. Load</i>	<i>Max. Power</i>
90Vac – 140Vac	48V	0	25A	1200W
180Vc – 264Vac	48V	0	46A	2200W
90Vac – 254Vac	11.2 – 12.5 V (Auxiliary) (1)	0	0.5A	3.6W

<b>Output:</b>	
Line Regulation:	± 0.4% for Vin (Min) to Vin (Max).
Load Regulation:	± 0.5% for load changes from zero to full load.
48V/24V Ripple & Noise	240mV/200mV pk-pk Max @ 20 MHz bandwidth with 1u ceramic and 10 electrolytic on measure point.
Output Voltage Adjustment Range	± 10%
Output voltage set point:	48 ± 0.15V
Overshoot & Undershoot:	Less than 1% at turn ON-OFF
Transient Load Response:	± 3% Max. (2% typical) deviation for load change of 50% to 100%, at slew rate of 1A/uSec, recovery time less then 1mSec
Hold-up Time:	10 mSec typical at 100Vac input and less than 80% of full load.
Turn-On Rise Time:	50mSec Max.
Over-current Protection:	105 to 125% of IMax, constant current limit, automatic recovery, when cause of overload or short is removed
Over-voltage Protection:	Shut down at 110 ÷ 130% of nominal output, AC input must recycled to restart.
Temperature Protection:	Shutdown due to excessive ambient temperature at over heating or malfunction of cooling fans, unit recovers automatically typical hysteresis 30°C.
Remote Sense on V1	800mV Max. voltage compensation for cable losses with respect to the main
Current Share	± 10% Maximum, N+1 Redundancy Single wire.
Hot Swap	Internal O-Ring diode (FET)

CUSTOMER: GENERAL	SIZE	CAGE CODE	\$5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	3	OF 10

<b>Signals &amp; Commands</b>							
<i>Important note:</i> All signals and commands refer to +12V RTN.							
(See attached pin assignment table)							
Remote ON/OFF control		By electrical signal or dry contact, ON 0-0.6V or short OFF 2-15V or open.					
DC_OK#:		Open collector active high when the output drops 10% below nominal.					
AC_OK:		Open Collector Active high when AC out of range.					
Temperature Warning:		Open collector active high at 10°C below shut down.					
I <sup>2</sup> C (IPMI interface) - <i>OPTION</i>		Internal I <sup>2</sup> C/IPMI interface Card					
<b>Front Panel Indicators</b>							
AC_OK		Green LED illuminates for AC O.K					
DC_OK#		Green LED illuminates for DC OK.					
DC_FAIL		Red LED illuminates for DC FAIL					
<b>Environmental Specifications:</b>							
Temperature:		Operating: -10°C to +60°C (de-rating linearly to 70 °C with 50% de-rating). Storage: -40°C to +85°C.					
Temperature Coefficient:		0 to 70°C ± 0.02%/°C					
Cooling:		By internal fans, Variable speed control.					
Humidity:		10 to 90% RH non-condensation.					
Altitude:		Operating 10,000 ft. Non- operating 40,000 ft.					
Vibration and Shock		Meet ETS 300 019					
In addition the unit meet HP Shock and Vibration as follow:							
Test	Parameter	Frq(Hz)	Duration Min.	PSD(g <sup>2</sup> /HZ)	Acceleration(gRMS)	Slop(db/oct)	Axes
Operation	Random	5-350	10	0.0002	0.3	0	
		350-500	10	-	0.3	-6	
		500	10	0.0001	0.3	-	
Non Operation	Random	5-100	10	0.02	2.41	0	
		100-137	10	-	2.41	-6	
		137-350	10	0.0107	2.41	0	
		350-500	10	-	2.41	-6	
500	10	0.0052	2.41	-			
<b>Safety Regulatory &amp; EMC Specifications (Designed to meet):</b>							
MEETS FCC CLASS B, CISPR 22 CLASS B, EN55022 CLASS B with an external TBD line filter							
EN61000-3-2		HARMONICS					
EN61000-3-3		VOLTAGE FLUCTUATION					
EN6000-4-2		ESD +8KV AIR +4KV CONTACT DISCHARGE, performance criteria B					
EN61000-4-3		RADIATED IMMUNITY: 80-1000Mhz 3V/m, AM 80% (1KHz), criteria A					
EN61000-4-4		FAST TRANSIENT: 1KV for AC power port, 0.5KV for DC power I/O and signals Port, performance criteria B					
EN61000-4-5		SURGE: 2KV common mode and 1KV differential mode					
EN61000-4-6		3VRMS, 80% A.M. BY 1kHz					
EN61000-4-8		3A /m at 50Hz, performance criteria A.					
EN61000-11		VOLTAGE Dips and interruption: 30% reduction for 10mSec –Criteria B, 60% For 100mSec. Criteria C, 95% reduction for 5000mSec Criteria C.					

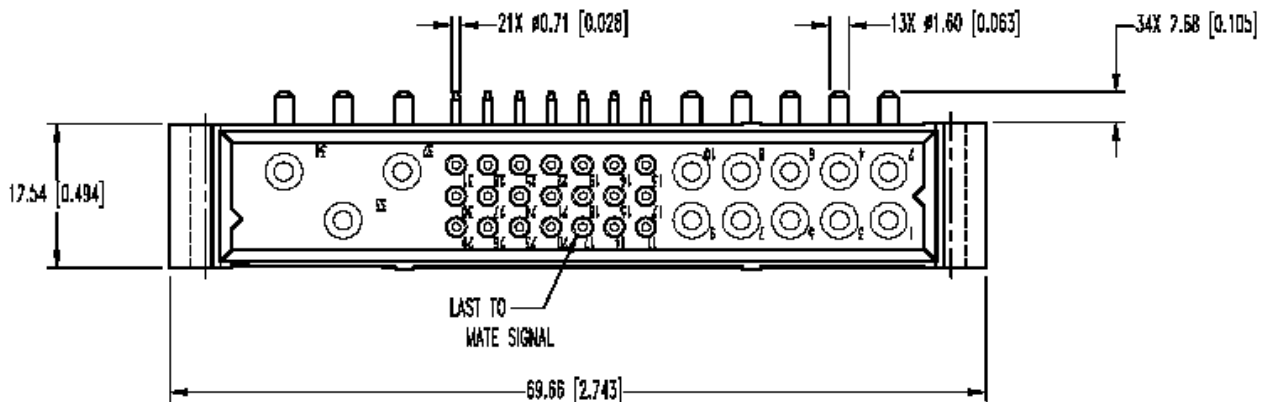
CUSTOMER: GENERAL	SIZE	CAGE CODE	\$5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	4	OF 10

Dielectric Withstand:		
Input to Case		1500VAC
Input to Output		3000VAC
Output to Case		500VDC

Safety Agency Compliances:		
Safety		UL60950, EN60950-1 , CB REPORT
leakage current:		Less than 1.1mA at 230Vac
MTBF:		300,000 hours minimum per BELCOR 332,issue 6 specification @ 30°C

Mechanical Dimensions		
Size (W,H,D)		3.35X1.61X11.8" Inch (85x41x300mm) see Outline Drawing
Weight		2.0Kg
I/O Connector		Positronic Right Angle PCB mount PCIM34W13M400A1/AA
Mating Connector		Positronic type PCIM34W13F400A1/AA

Right angles (90°) PCB mount male connector POSITRONIC#PCIM34W13M400A1/AA

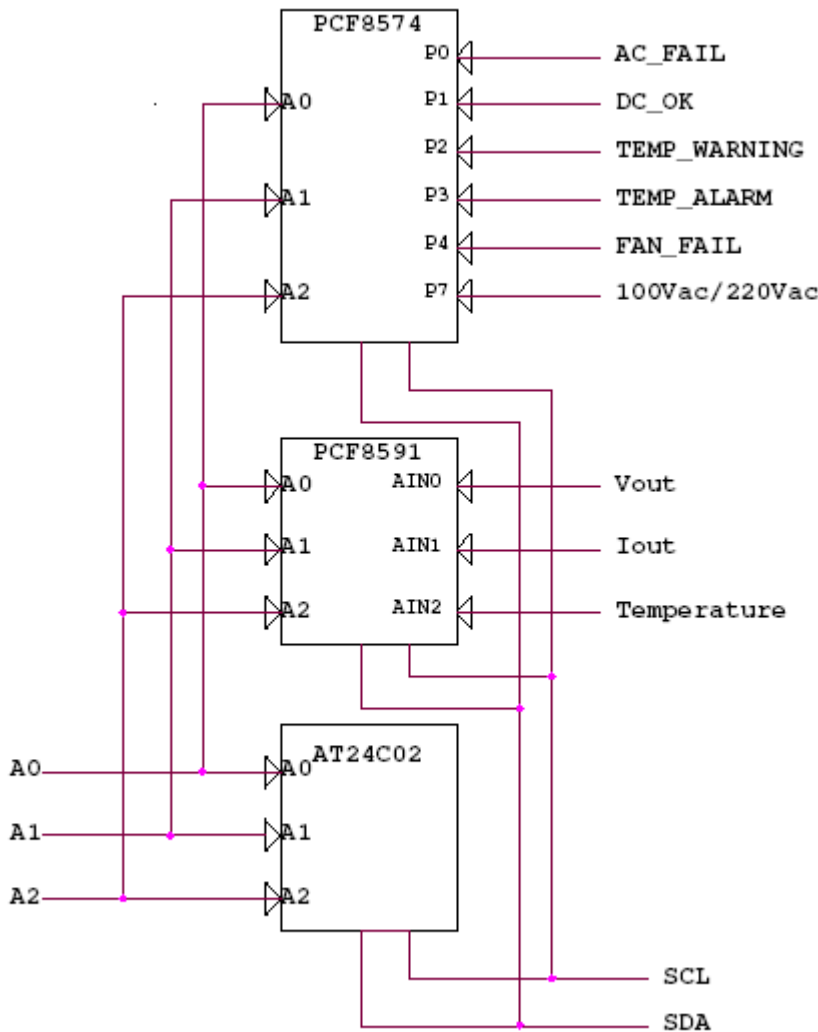


CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	5	OF 10

## Internal I<sup>2</sup>C Interface

The PS-1648 provide power good ,output current ,output voltage, internal temperature and fault reporting through I2C related to 5V no internal pull-up resistors.  
The address lines are internally pulled-up to +5V by 10K resistors.  
The block diagram below showed the I2C interface typical connection.

### Internal I<sup>2</sup>C Basic Functionality



CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	6	OF 10

### Status Signals Report

The power supply provides by a PCF8574 (8 bit register) through I2C protocol the signals status while "0" indicates OK and "1" indicates fault.

#### PCF8547 Function

BIT	FUNCTION	DESCRIPTION
0	DC_OK#	Output voltage is less than 80% of nominal output
1	TEMP_ALARM	Supply shut down by over temperature protection circuit
2	TEMP_WARNING	Internal temperature is 10% below shut down point
3	FAN_FAIL	Failure of one or two of internal fans
4	AC_FAIL	Input voltage lower than 82Vac
5	INHIBIT	Output Voltage shut down
6	N.C	Remain "0"
7	100Vac / 200Vac	Indicate Input range 100Vac "0" or 220Vac "1"

#### PCF8574 Slave Address

BYTE	BIT							
	7(MSB)	6	5	4	3	2	1	0(LSB)
address	L	H	L	L	A2	A1	A0	R/W

#### EEPROM Circuit AT24C02

The EEPROM data is arranged by "fields", each containing specific information. The overall size of data inside the chip is 256 bytes from address 0 to address 255.

Address	Data type	EEPROM data
0	Telkoor internal use	Do NOT change this field
1÷29	Manufacturer	TELKOOR_POWER_SUPPLIES_LTD._
30÷37	Date code	MMM/YYYY MMM for month (JAN,FEB...) YYYY for 4 digits year
38÷42	Serial Number	5 ASCII digit SN
43÷44	Revision	A1
45÷55	Part Number	900-1648-00
56÷85	Customer	Mellanox
86÷99	Model Number	CP-1648
100÷124	Standards	UL/CE/CB_REPORT
125÷255	Telkoor internal use	0xFF

CUSTOMER: GENERAL	SIZE	CAGE CODE	\$5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	7	OF 10

Slave AT24C02 Address

Bit	7	6	5	4	3	2	1	0
Rate	1	0	1	0	A2	A1	A0	R/W

PCF8591 8-bit A/D

The PCF8591 8-bit include four analog inputs and one analog output provides output voltage, output current and internal temperature via I2C bus.

PCF8591 Slave Address byte

1	0	0	1	A2	A1	A0	r/w
---	---	---	---	----	----	----	-----

Control byte

The second byte sent to a PCF8591 will be stored in its control register and is required to control the device function

The control bit for four single-ended inputs (programming we use) is as follows.

	msb				lsb			
Bit	7	6	5	4	3	2	1	0
Rate	0	0	X	X	0	X	X	X
Voltage	0	0	0	0	0	0	0	0
Current	0	0	0	0	0	0	0	1
Temperature	0	0	0	0	0	0	1	0
N.C	0	0	0	0	0	0	1	1

Resolution and Accuracy

PS-1648	Range	Resolution	Accuracy
Output Voltage	0-60V	0.2344V/Bit	2% of full scale±
Output Current	0-46A	0.186A/Bit-1.617A	10% of full scale±
Internal Temperature	0-110°C	0.4252°C/Bit	3°C of full scale±

A/D Conversion

$V_{out} = \text{bit rate} \times 0.2344(\text{V})$

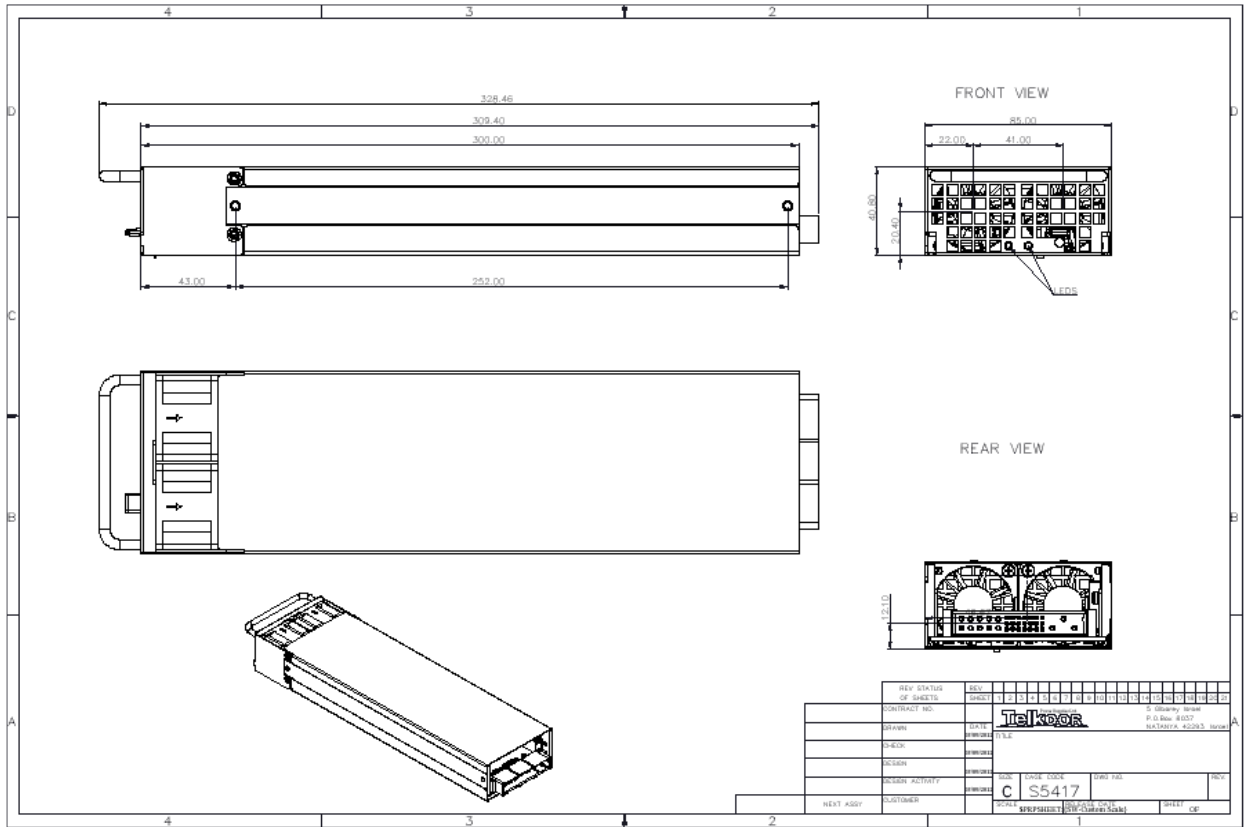
$I_{out} = \text{bit rate} \times 0.186-1.617(\text{A})$

$\text{Temperature} = \text{bit rate} \times 0.4252(^{\circ}\text{C})$

CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	8	OF 10



**Outline Drawing**



CUSTOMER: GENERAL	SIZE	CAGE CODE	S5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	9	OF 10

### Pins Assignment

Pin #	Signal Name	Remarks
1 - 5	48V_ RTN	48V Floating Negative output voltage
6 - 10	48V	48V Floating Positive output voltage
1	Signal _ Return	Return for the following control and supervisory signals : ENABLE, INHIBIT , Over_ Temperature Alarm, AC Fail , Auxiliary, PS EXIST, and PMBus signals: SCL, SDA, SMB ALERT. The Signal Return is isolated from the output terminals
2	PS EXIST	Connected to signal return
3	+12V Auxiliary	Auxiliary voltage output 11.5 to 12.5V 0.5A referenced to signal return
4	-SENSE	Negative Sensing, Should be connected to the negative terminal of the load.
5, 10, 11, 13, 14, 16, 17, 20		
6	Current Share	Current Sharing Signal , When units are connected in parallel ,the CS pins of the units should be connected to allow current balance Between the units
7 (Short Pin)	Enable (ON/OFF)	Turn the output to On and Off by electrical signal or dry contact referenced to signal return 0-0.6V or Short : On 2-15V or Open : Off The maximum sink current is 2.5mA
8	VOLTAGE PROGRAMING	
9	+SENSE	Positive sensing , Should be connected to the positive terminal of the load.
12	INHIBIT	Turn OFF the main output by electrical signal or dry contact referenced to signal return 0-0.6V or Short
15	DC OK	Open collector, Active LOW when Vout less than 80%± 5%. The maximum sink current is 10mA and maximum external voltage is 15V
18	Temperature Alarm	Open collector, referenced to signal return, Active high when the internal temperature is 10°C below thermal shut down. The maximum sink current is 10mA and maximum external voltage is 15V
19	+5V/V_REF	5V output referenced to -sense.
21	AC _ FAIL	Open collector, referenced to signal return, Active high when Vin less than 80Vrms ± 5%. The maximum sink current is 10mA and maximum external voltage is 15V
32(Long Pin)	AC Ground	AC ground connection ,
33(Long Pin)	AC Neutral	AC neutral connection
34(Long Pin)	AC Phase	AC line connection

CUSTOMER: GENERAL	SIZE	CAGE CODE	\$5417	DWG. NO.	2248-DOC1-10	REV	A1
	SCALE		RELEASE DATE	03/09/12	SHEET	10	OF 10