cPCI AC/DC Converter 110 Watt

Grau Elektronik GmbH

110 PCB 220 Q05 E10

$V_{In\ Nom}$ = 220 V_{AC} $V_{O1\ Nom}$ = 5.05 V, $I_{O1\ Nom}$ = 16 A $V_{O2\ Nom}$ = 3.3 V, $I_{O2\ Nom}$ = 5 A
$V_{O3\ Nom}$ = 12 V, $I_{O3\ Nom}$ = 0.5 A $V_{O4\ Nom}$ = - 12 V, $I_{O4\ Nom}$ = - 0.5 A

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT						
V_{In}	Input Voltage Range	Continuously	176	220	265	V_{AC}
$V_{In\ low}$	Switch ON Switch OFF		160 150		180 160	V_{AC} V_{AC}
$V_{In\ high}$	Switch OFF	*Protecting semiconductors*	267	270	285	V_{AC}
λ	Power Factor	V_{In} = 220 V_{AC}, ∑ P_O = 110 W	0.95	0.98		
f	Input line frequency		47	50	63	Hz
I_{leak}	Leakage current	V_{In} = 265 V_{AC}, 50Hz		1	3	mA
R_{leak}	Leakage resistance	Input to ground @ 500 V_{DC}	10	30		GΩ
I_{In}	Input Current no load Nominal Loads Nominal Loads	V_{In} = 265 V_{AC}, ∑ P_O = 0 W V_{In} = 220 V_{AC}, ∑ P_O = 110 W V_{In} = 176 V_{AC}, ∑ P_O = 110 W		15 0.6	20 1.0	mA A_{rms} A_{rms}
	Switch ON Input Current Integral	V_{In} = 265 V_{AC}			10	A^2s
	Input Fuse			4 A		
C_{In}	Input Capacity Converter				1.5	µF
	Maximum External Line Inductivity				50	µH
OUTPUT POWER		176 V_{AC} ≤ V_{In} ≤ 265 V_{AC}				
$P_{O\ Nom}$	Continuously	∑ P_O		110		W
V_{O1}	Voltage Factory Adjust		5.00	5.05	5.15	V_{DC}
Δ V_{O1}	Regulation Accuracy V_{O1} static (V_{in} I_o T_A t)	0 W ≤ P_{O1} ≤ 80 W	≤ 2 % $V_{O1\ Nom}$			
$V_{O\ 2}$	Voltage Factory Adjust		3.25	3.33	3.40	V_{DC}
Δ V_{O2}	Regulation Accuracy V_{O2} static (V_{in} I_o T_A t)	0 W ≤ P_{O2} ≤ 17 W	≤ 2 % $V_{O2\ Nom}$			
V_{O3}	Voltage Factory Adjust		11.9	12.0	12.1	V_{DC}
Δ V_{O3}	Regulation Accuracy V_{O3} static (V_{in} I_o T_A t)	0 W ≤ P_{O3} ≤ 6 W	≤ 3 % $V_{O3\ Nom}$			
V_{O4}	Voltage Factory Adjust		- 11.9	- 12.0	- 12.1	V_{DC}
Δ V_{O4}	Regulation Accuracy V_{O4} static (V_{in} I_o T_A t)	0 W ≤ P_{O4} ≤ 6 W	≤ 3.0 % $V_{O4\ Nom}$			
$V_{O\ pp}$	Ripple & Noise in acc. to $V_{o,\ nom}$	$V_{O1\ -\ O4}$: Nominal Loads BW 20 MHz			1.5	%
t_{On}	Set Up Time $V_{O1\ -\ O4}$	0 W ≤ P_O ≤ 110 W		1500	2000	ms
t_H	Hold Up Time @Input Voltage Interruption	3.3V_5A and 5.0V_16A	20			ms
I_{O1}	Output Current	V_{O1} : 5.05 V		16.0		A
I_{O2}	Output Current	V_{O2} : 3.33 V		5.0		A
I_{O3}	Output Current	V_{O3} : + 12 V		0.5		A
I_{O4}	Output Current	V_{O4} : - 12 V		- 0.5		A
	Threshold Output Current Limit $I_{O1\ /\ O2\ /\ O3\ /O4}$		120 % x $I_{O1\ /\ O2\ /\ O3\ /\ O4\ Nom}$			
I_{OSC}	Output Short Circuit Current		130 % x $I_{O1\ /\ O2\ /\ O3\ /\ O4\ Nom}$			
Signaling						
LED	V_{in}, $V_{o1\ -\ 4}$ (V_{oi} = summary signalling)	LED Green at front plate LED Red at front plate	ON, when V_{In} o.k. ON, when V_{oi} not o.k.			
CONTROL						
Enable	Converter ON: EN connected to GND Converter OFF: EN open	Potential ref. to output GND				
Inhibit	Modular Power Operation	INH# = EN# = Power status =	Low Low "OFF"	Low Open "OFF"	Open Low "ON"	Open Open "OFF"
COMMON DATAS						
f1	Switching Frequency	PFC converter		65		kHz
f2		Step Down converter		100		kHz
η	Efficiency	P_O ≥ 0.7 x $P_{O\ Nom}$	81	83		%
	MTBF (SN 29500)	V_{In} = 220 V_{AC}, P_O = 110 W, T_A = + 40°C		400 000		h
	Expected life time, used Al caps: 7'000h	$L\vartheta$ = L0 * $2^{\Delta T/10K}$ (Arrhenius law)		112'000		h
	No load & Short Circuit Approved		continuously			

Life Time: mainly limited by used Al-caps. L0 = OEM guaranteed life (h) at defined temperature here + 105°C.
$L\vartheta$ is expected life (h) at desired ambient temperature
Example: L for 105°C Al capacitor = 7'000h → $L\vartheta$ (+ 55°C) = 7'000h * $2^{(105°C\ -\ 65°C)/10K}$ = 112'000h
ϑcap = T_A = + 40°C + ϑ(internal heat) = 25K = + 65°C

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SAFETY / DIMENSIONS						
	Creepage, Clearance OV2 Port 10 Polution Degree PD2 PCB FR4, V0, T_G = + 140°C	Primary | Secondary Primary | Chassis Secondary | Chassis	4.0 2.0 2.0			mm mm mm
	Isolation Test Voltage Piece Test: Ramp Function: 2s – 3s – 2s Type Test: 1Min.	Primary | Secondary Primary | Chassis Secondary | Chassis			3'500 2'500 1'000	V_{DC} V_{DC} V_{DC}
	Isolation resistance @ 500_{DC} test voltage	Primary | Secondary	15			GΩ
	Connector	Positronic	PCIH47M400A1/11			
		Required female plug:	PCIH47F300A1/AA			
	Protection Class, Protection Degree		I, IP 20			
	Dimensions incl. Front Plate	w x h x d (3RU / 8HP, 19" rack)	128.4 x 40.6 x 169.4			mm
	Weight			750		g
AMBIENT CONDITIONS						
T_A	Operating temperature range	See derating curve page 3	- 40		+ 85	°C
T_{St}	Storage temperature Range		- 40		+ 85	°C
	Cooling		free convection			
	Humidity		75% averaged per year 95% 30 days			
	Vibration / Shock	IEC 61373, IEC 68-2-27, BN 411002 Kat. I 3 Shocks each Axis	50 m / s² , 30 ms			
EMC						
	Radiation *)	Line & Radiated	EN 61000 – 6 – 4 A			
	Immunity *)	ESD EN 61000 - 4 - 2	6 kV / 8 kV Performance Criteria - A -			
		High Frequency Field EN 61000 - 4 - 3	20 V / m 80 MHz ... 2,5 GHz - Performance Criteria - A -			*)
		Burst EN 61000 - 4 - 4	Level 4 asym., sym. Performance Criteria - A -			
		Surge EN 61000 - 4 – 5	2 kV asym. / 1 kV sym. Performance Criteria - A -			
		HF – Injection EN 61000 - 4 - 6	10 V_{rms} , R_i = 150 Ω Performance Criteria - A -			

STANDARDS

	Applied Standards:	SN 29500	VDE 0106-1	EN 50124 - 1: 1996	EN 61000 - 4 - 2…6	EN 50529
		IEC/EN 60255-5	IEC/EN 60255-6	EN 50125 - 1	EN 60068 - 2 - 6, 2…32	IEC/EN60707
		IEC 60255-11	IEC 61373: 1999	EN 60721 - 3 - 5	IEC 60068-2-1 / 2 / 14	IEC 61373

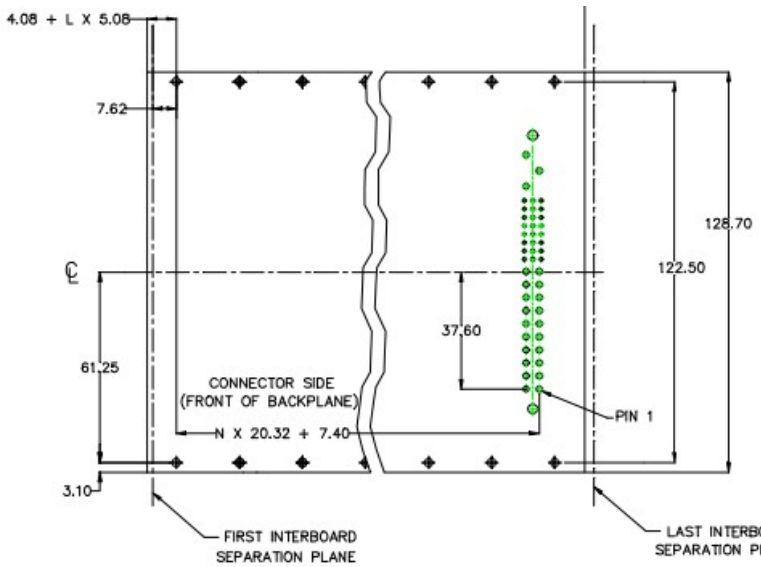
Technical data referenced at: - 40° C ≤ T_A ≤ + 60° C, 176 V_{AC} ≤ V_{In} ≤ 265 V_{AC}, if not otherwise specified.
Temperature reference point: 10 cm below dc/dc converter unit. Please, consider free air convection is possible
*) In closed housing, emission: radiated @ EN 50121-3-2, conducted @ EN 50121-3-2
**) 1400 MHz – 2100MHz 10V/m 2100MHz – 2500MHz 5V/m 2000MHz – 2700MHz 1V/m

Pin assignment

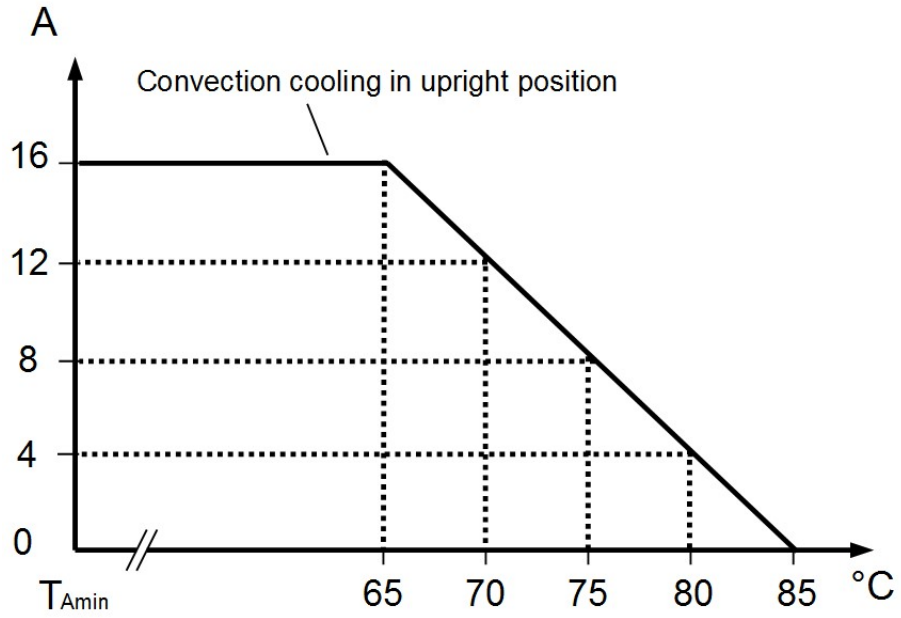
Pin	Signals Output
1-4	V_{o1} (+ 5V)
5-12	V_{o1} and V_{o2} Return
13-18	V_{o2} (+ 3,3V)
19	V_{o3} Return
20	V_{o3} (+ 12V)
21	V_{o4} (- 12V)
22	Signal Return
23	reserved
24	V_{o4} Return
26	reserved
27	EN (Enable)
29	V_{o1} Adjust
30	V_{o1} Sense
32	V_{o2} Adjust
33	V_{o2} Sense
34	Sense Return
36	V_{o3} Sense
39	INH (Inhibit)
42	FAL (Fail Signal)
	Signals Input and PE
45	PE (chassis ground)
46	+ AC Input (L)
47	- AC Input (N)

Pin 25,28,31,35,37,38,40,41 n.c.

Mechanical drawing backplane



Note, that the slot in the card guide and injector/ejector PCB mounting surface are shifted 2.54 mm to the right respect to the front panel keying and alignment pin.



Output current at 5V output versus temperature Ta at $V_{in\ Nom}$
(Only using 5V output)