

# DC/DC Converter

## 19" Rack 3U | 12HP

## 105 Watt

105 SBB 110 D15 E03

Art. No. 1200 – 01 – 03

CARS P/N: 113700002811

$V_{I\text{ nom}} = 72\text{ V}$

$V_{O\text{ nom}} = \pm 15\text{ V}$   $I_{O1, O2\text{ nom}} = \pm 3.5\text{ A}$

$V_{I\text{ nom}} = 110\text{ V}$

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
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### INPUT

$V_I$	Input voltage range	Continuously	50.4		137.5	$V_{DC}$
$V_{I\text{ min}}$	Input voltage range dynamic	$V_I = 43.2\text{ V} \dots 50.4\text{ V}$ for $t \leq 0.1\text{ s}$ $V_I = 137.5\text{ V} \dots 154\text{ V}$ for $t \leq 1\text{ s}$	43.2		154	$V_{DC}$ $V_{DC}$
$V_{I\text{ max}}$	Converter shutdown				43	$V_{DC}$
$V_{I\text{ max}}$	Converter shutdown		156		158	$V_{DC}$
$V_{\text{Enable}}$	Enable Function, PIN d22 Reference potential: $-V_I$	Converter On: Enable = low $V_{\text{Enable}} \leq 0.8\text{ V}$ , $I \leq 1.5\text{ mA}$ Converter Off: Enable = high $V_{\text{Enable}} \geq 3.0\text{ V}$ , $I \leq -50\text{ }\mu\text{A}^*$	0		0.8	$V_{DC}$
	Stand by current	$43.2\text{ V} \leq V_I \leq 154\text{ V}$ , Enable = high			18	mA
$I_I$	Input current	No load Nominal load Nominal load Nominal load	$V_I = 154\text{ V}$ , $I_{O1} = 0\text{ A}$ , $I_{O2} = 0\text{ A}$ $V_I = 72\text{ V}$ , $I_{O1} = 3.5\text{ A}$ , $I_{O2} = -3.5\text{ A}$ $V_I = 110\text{ V}$ , $I_{O1} = 3.5\text{ A}$ , $I_{O2} = -3.5\text{ A}$ $V_I = 43.2\text{ V}$ , $I_{O1} = 3.5\text{ A}$ , $I_{O2} = -3.5\text{ A}$		1.8 1.2	70 A A A
	Input current integral	$V_I = 154\text{ V}$			15	$\text{A}^2\text{s}$
$I_{O\text{ max}}$	Max. input switch on current $V_I \geq V_{I\text{ min}}$ , $V_{\text{Enable}} \rightarrow \leq 0.8\text{ V}$	$I_{O1} = 3.5\text{ A}$ , $I_{O2} = -3.5\text{ A}$ $\Delta t \leq 200\text{ ms}$			6	A
	Input fuse		10 A Pico Fuse			
$C_I$	Converter input capacitance				25	$\mu\text{F}$
	External line inductance				50	$\mu\text{H}$
	Reverse input protection	Parallel diode + internal fuse	1.5KE160A			

### OUTPUT: Power Unit

$43.2\text{ V} \leq V_I \leq 154\text{ V}$

$P_{O\text{ nom}}$	Output power			100		W
$V_{O\text{ nom}}$	Output voltage adjustment, factory set	$I_O = 1.7\text{ A}$	$\pm 14.9$	$\pm 15.0$	$\pm 15.1$	$V_{DC}$
$\Delta V_O$	Load regulation	$0\text{ A} \leq I_{O1, O2} \leq \pm 3.5\text{ A}$ $T_A = -40^\circ\text{C} \dots +85^\circ\text{C}$	$\pm 2.5\% V_{O\text{ nom}}$			$V_{DC}$
$\Delta V_{O\text{ dyn}}$	Load regulation dynamic	Pulse load: $20 - 80 - 20\% \times I_{O1, O2\text{ nom}}$			$\pm 500$	mV
$t_{\text{dyn}}$	Response time	Pulse load: $20 - 80 - 20\% \times I_{O1, O2\text{ nom}}$		1	2	ms
$V_{O\text{ rms}}$	Ripple	Nominal load BW 300 kHz		100	250	$\text{mV}_{\text{rms}}$
$V_{A\text{ pp}}$	Noise	Nominal load BW 20 MHz			350	$\text{mV}_{\text{pp}}$
$t_{\text{on}}$	Turn on time $V_O$	$50.4\text{ V} \leq V_I \leq 154\text{ V}$ , $0\text{ A} \leq I_O \leq \pm 3.5\text{ A}$ Resistive load 1.) $V_I \geq V_{I\text{ min}}$ , $V_{\text{Enable}} \rightarrow \leq 0.8\text{ V}$ 2.) $V_{\text{Enable}} \leq 0.8\text{ V}$ , $V_I \rightarrow \geq V_{I\text{ min}}$	25		200	ms
$t_{\text{off}}$	Hold up time	$50.4\text{ V} \leq V_I \leq 154\text{ V}$ $V_{O\text{ min}} = \pm 14.25\text{ V}$ $0\text{ A} \leq I_{O1, 2} \leq \pm 3.5\text{ A}$	0.5			ms
	Overvoltage shutdown $V_O$	$0\text{ A} \leq I_{O1, 2} \leq \pm 3.5\text{ A}$	Converter switch off: $V_{O1} + V_{O2} \leq 36\text{ V}$			
$I_{O1, O2}$	Output current			$\pm 3.5$		A
	Output current limitation		$\pm 3.55$			A
	Output short circuit current $I_{O1, O2}$	Short circuit between $+V_O$ and $-V_O$			4.2	A
	Cross load	one sided loaded $+/-V_O$	100% realising			
	Cross regulation, $V_O$	$+15\text{ V}$ : $100\% \times I_O$ , $-15\text{ V}$ : $0\% \times I_O$ $+15\text{ V}$ : $0\% \times I_O$ , $-15\text{ V}$ : $100\% \times I_O$	$\pm 14.7$	$\pm 15.0$	$\pm 15.3$	V
	Cross regulation, short circuit current	100% load ( $I_{O1, O2}$ )			8.1	A
	Sense lines	Max. voltage drop compensation			0.25	V
$C_O$	Output capacity converter	Output each output stage		5		mF

### OUTPUT: Signals

PF	Power Fail, PIN z20 Open Collector Transistor $V_{CE\text{ max}} \leq 70\text{ V}$ , $I_{CE\text{ max}} \leq -20\text{ mA}^*$ Reference potential: - Sense	Transistor on: PF= low, $V_O < V_{O\text{ min}}$ Transistor off: PF= high, $V_O \geq V_{O\text{ min}}$	$V_O < 0.95 \times V_{O\text{ nom}} \pm 2\%$ $V_O \geq 0.95 \times V_{O\text{ nom}} \pm 2\%$		V V
	Signals	Signal defined for $V_O \geq 0.6 \times V_{O\text{ nom}}$	LED yellow On		

### GENERAL SPECIFICATIONS

f	Switching frequency	$V_I = 110\text{ V}$ , $I_{O1, O2} = \pm 3.5\text{ A}$		75		kHz
$\eta$	Efficiency	$50.4\text{ V} \leq V_I \leq 154\text{ V}$ , $P_O \geq 0.7 \times P_{O\text{ nom}}$	83	85		%
	MTBF (SN 29500)	$V_I = 110\text{ V}$ , $I_{O1, O2} = \pm 3.5\text{ A}$ , $T_A = +40^\circ\text{C}$		500 000		h
	No load, short circuit proof		Continuously			

\* - Sign: sink current

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
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**SAFETY / DIMENSIONS**

	Creepage, Clearance PD2, OV 2 PCB: FR4, V0, TG = +140°C	Input – output Input – case Output – case	2.0 2.0 1.0			mm mm mm
	Converter dielectric strength test Type test: every unit Unit test: ramp function 2 s – 3 s – 2 s	Input – output Input – case Output – case			2100 2100 750	V <sub>DC</sub> V <sub>DC</sub> V <sub>DC</sub>
	Connectors DIN 41612	H15, Pin 24 leading				
	Pin assignment			see table		
	Protection class, protection system			I, IP 20		
	Dimensions w x h x d see figure	Plug - in unit incl. handle PCB	60.6 x 128.4 x 204.3 (3U/12HP)			mm mm
	Weight	Plug - in unit		0.95		kg

**ENVIROMENTAL CONDITIONS**

T <sub>A</sub>	Operating temperature range	Continuously EN 50155 Class Tx for 10 min. + 85°C	- 40 - 40		+ 70 + 85	°C °C
T <sub>Storage</sub>	Storage temperature range		- 50		+ 85	°C
	Start Up capability at T <sub>A</sub> = - 40°C	Storage @ -50°C for 16 hours, EUT in switched OFF condition	- 40			°C
	Cooling		Free air convection			
	Humidity	EN 50155, IEC 60571	75% av. year, 95% 30 days			
	Vibration / shock	EN 61373, IEC 68-2-27, Cat. I 3 shocks per axes	50 m / s <sup>2</sup> , 30 ms			

**FMC**

	Emission	Line conducted and radiated	EN 50121 - 3 - 2: 2006			
	Immunity	ESD EN 61000 - 4 - 2	6 kV / 8 kV Performance criteria - B -			
		High frequency field EN 61000 - 4 - 3	20 V / m 80 MHz ... 1 GHz Performance criteria - A -			
		Burst EN 61000 - 4 - 4	Level 3 asym., sym. Performance criteria - A -			
		Surge EN 61000 - 4 - 5	2 kV asym. / 1 kV sym. R <sub>f</sub> = 42 Ω Performance criteria - B -			
		HF – Current injection EN 61000 - 4 - 6	10 V <sub>eff</sub> , R <sub>f</sub> = 150 Ω Performance criteria - A -			

**STANDARDS**

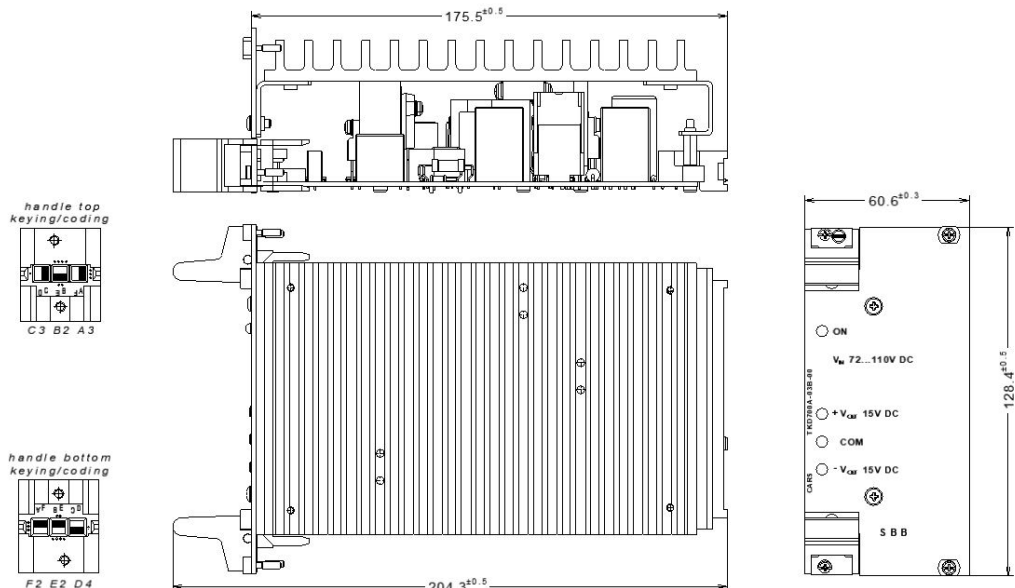
Applied Standards:	EN 50155: 2006	EN 50124 - 1: 2006	EN 50121 - 3 - 2:2006	IEC 60571	EN 60529
	SN 29 500	EN 50 121 - 1	EN 50125 - 1	EN 60068-2-6, 2...27	EN 61000 - 4 - 2...6
	IEC 571	IEC 61373 :1999	EN 60721 - 3 - 5		

Technical specifications valid for: - 40° C ≤ T<sub>A</sub> ≤ + 85° C, 43.2 V ≤ V<sub>I</sub> ≤ 154 V, unless otherwise noted.

**H15 – Pin Assignment**

Pin	
z 4	+ Sense
d 6	+ V <sub>O</sub>
z 8	0 Sense
d 10	GND
z 12	GND
d 14	- V <sub>O</sub>
z 16	- Sense
d 18	n.c.
z 20	Power Fail
d 22	Enable
z 24	⊥
d 26	+ V <sub>I</sub>
z 28	+ V <sub>I</sub>
d 30	- V <sub>I</sub>
z 32	- V <sub>I</sub>

**Dimensions (in mm)**



DETAIL: coding pin:  
black area is long pin.

Convection cooling:  
Keep free space over and under the unit: 100 mm