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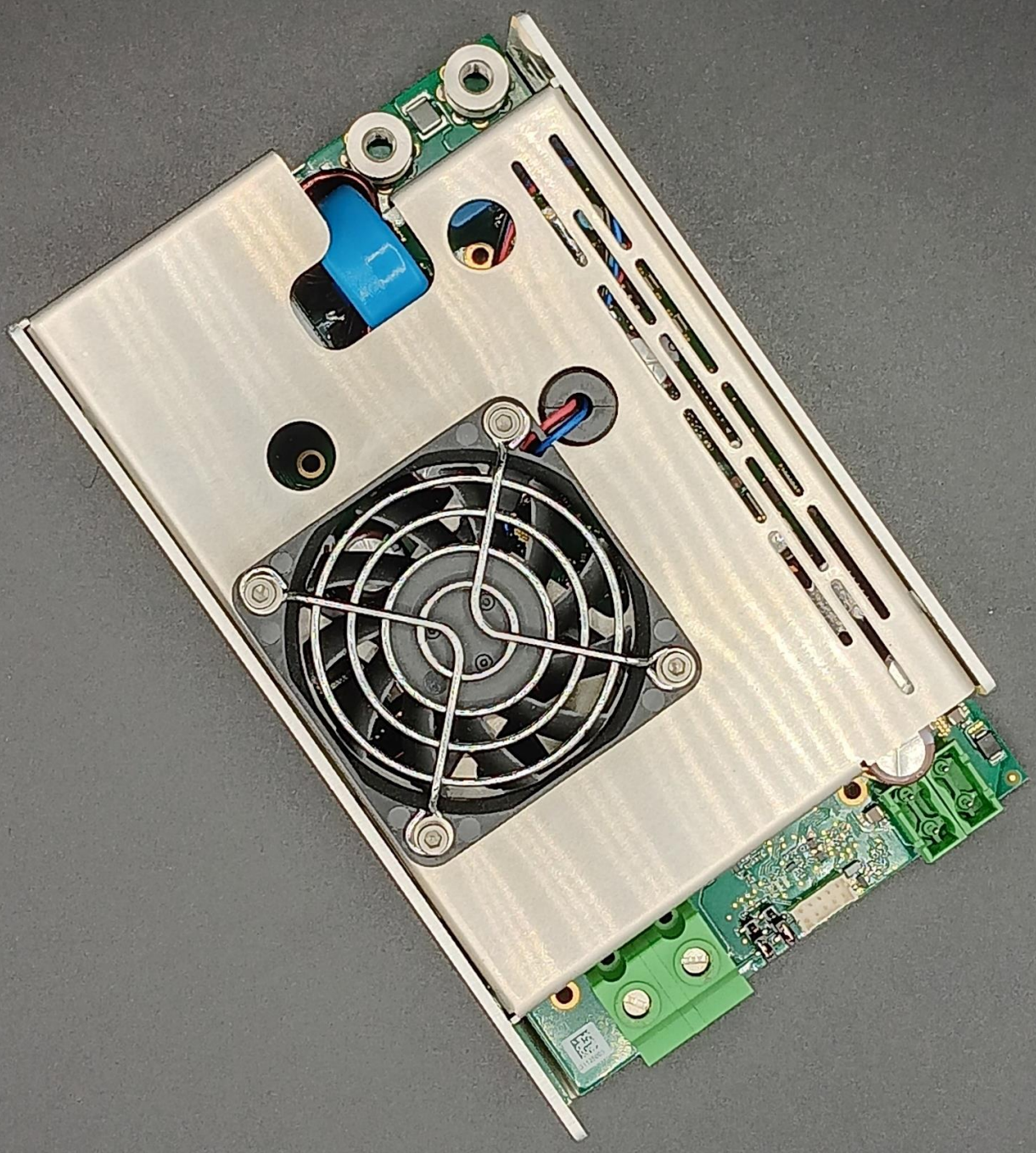

DDL3050-48

48V DC/DC converter

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DDL3050-48 (long version)

48V DC/DC converter

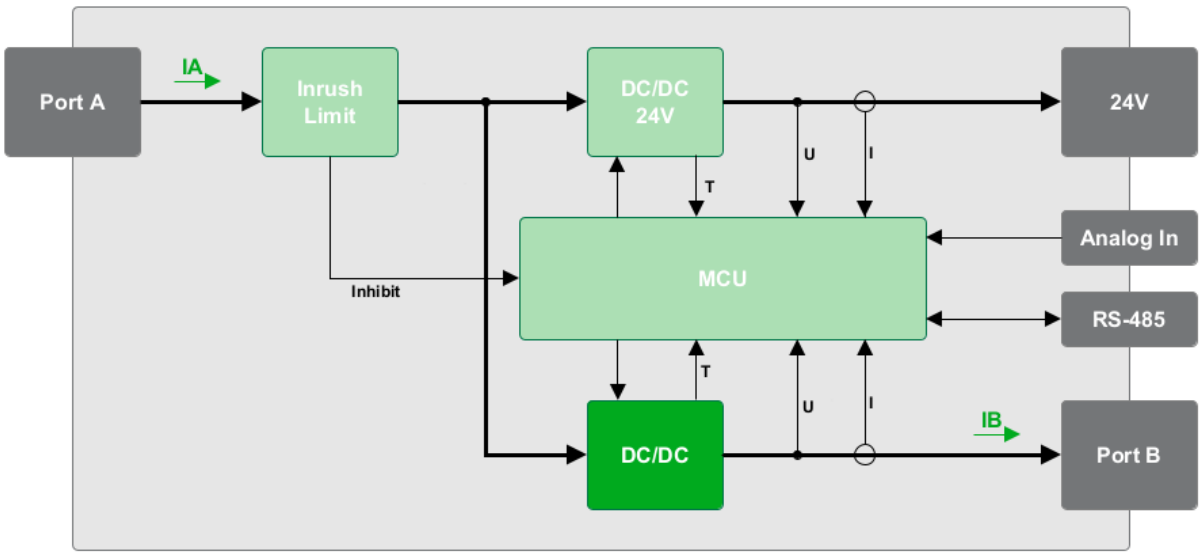
Description

The DDL3050-48 is a non-isolated high-power DC/DC Converter handling energy transfer from Port A to Port B. The converter operates in buck mode and provides a reduced voltage level at Port B.

An additional +24V constant voltage output features a power supply for a lot of applications. With the Modbus interface, a variety of parameters can be set individually. Several safety functions e.g., overvoltage, overcurrent and overtemperature protection are integrated.

- Programmable input/output
- High efficiency
- Remote control (Modbus / Analog)
- Overload protection
- Low standby power consumption
- Inrush current limitation
- Auxiliary 24V output

Technical Data Sheet



Converter basic principle

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48V DC/DC Converter

Specification

The following parameters are valid for operation at 25°C and under nominal conditions, unless specifically stated otherwise. Nominal condition includes in particular $U_A > U_B$ and $U_A > 40V$.

General

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Overvoltage tol. Port A Port B Port B Sense 24V	 $U_{A,pk}$ $U_{B,pk}$ $U_{Bsns,pk}$ $U_{24V,pk}$	 66 66 66 27	 - - - -	 - - - -	 V V V V	 10s, No protection against reverse current
Inrush Current Port A	 $I_{A,Inrush}$	 -	 -	 10	 A	 Active limitation
Dropout	$U_{A\_B,Drop}$	-	-	2	V	$U_A - U_B$ at $I_{B,nom,max}$
Efficiency Port A to Port B 24V	 $\eta_{A,B}$ η_{24V}	 96 94	 97 96	 - -	 % %	 for $I_B > 0.5 \cdot I_{B,nom,max}$ at U_A = 48V and U_B = 46V for $P_{24V} > 0.3 \cdot P_{24V,nom}$
Withstand Voltage Ports A, B to Case	$U_{iso,wth}$	100	-	-	V	
Impedance Ports A, B to Case	Z_{iso}	-	>1000	-	kΩ	Depending on EMC
Fuse Rating	I_{Fuse}	-	None	-	A	Suitable breaker placed in application(1)
Startup time(2)	t_{Setup}	-	-	1.5	s	

(1) Converter has no integrated fuse. Application handles overcurrent protection via suitable circuit breaker (melting fuse, electro-thermal or electro-magnetic breaker, etc.).

(2) Startup time is defined as the timespan between $U_{A,nom,max} > U_A > U_{A,nom,min}$ and start of operation of Port B and 24V output.

Port A

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Startup Voltage	$U_{A,Start}$	-	-	39	V	
Input Voltage	$U_{A,nom}$	40	-	60	V	Fully operational
Current	$I_{A,nom}$	-	-	75	A	Hardware current limit(1)

(1) Peak value only reached at sudden output voltage changes, due to control loop tracking voltage setpoint.

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Port B

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Voltage	$U_{B,nom}$	20	-	60	V	Adjustment range $U_B < (U_A - U_{A\_B,Drop})$
Ripple&Noise	$U_{B,Ripple}$	-	-	100	mV	pk-pk, 20MHz, 47uF
Load Regulation	$dU_{B,Load}$	-0.3	-	0.3	V	
Line Regulation	$dU_{B,Line}$	-0.3	-	0.3	V	
Rise time(1)	$t_{B,rise}$	-	-	60	ms	
Current						
Nominal	$I_{B,nom}$	53	-	-	A	
Peak	$I_{B,pk}$	60	-	-	A	
Limit	$I_{B,lim}$	-	-	60	A	2h
Power	$P_{B,nom}$	3000	-	-	W	
Load transient						Load Jump 80/20%
Deviation	$d_{B,trans}$	-0.3	-	0.3	V	
Recovery(2)	$t_{B,trans}$	-	100	-	ms	

(1) Rise time is defined from the point of time where $U_{EnB} > U_{EnB,pth}$ and the point of time where $U_B = U_{B,set} \pm dU_{B,set}$ while $U_A > U_{A,nom.min}$ is applied for $t > t_{Setup}$.

(2) Transient recovery is defined as the timespan between the transient and return of U_B to $U_{B,set} \pm d_{B,trans}$

24V Output

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Voltage	$U_{24V,nom}$	-	24	-	V	Fixed
Tolerance	$dU_{24V,all}$	-0.24	-	0.24	V	Line + Load + Setpoint
Ripple&Noise	$U_{24V,Ripple}$	-	-	150	mV	pk-pk, 20MHz, 47µF
Rise time(1)	$t_{24V,rise}$	-	-	60	ms	
Current	$I_{24V,cont}$	12.5	-	-	A	
Limit	$I_{24V,lim}$	-	-	14	A	
Power	$P_{24V,nom}$	300	-	-	W	
Capacitive Load	C_{24V}	-	-	35	mF	No additional load applied

(1) Rise time is defined from the point of time where $U_A \geq U_{A,nom}$ is applied for $t > t_{Setup}$ and the point of time where $U_{24V} = U_{24V,nom} \pm dU_{24V,all}$.

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Port B Modbus Control

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Voltage						
Setpoint	$U_{B,set}$	20	-	60	V	
Tolerance	$dU_{B,set}$	-0.3	-	0.3	V	
Resolution	$S_{UB,set,nom}$	-	1	-	mV/Bit	
Current						
Setpoint	$I_{B,set}$	2.0	-	60	A	
Tolerance	$dI_{B,set}$	-0.6	-	0.6	A	
Resolution	$S_{IB,set,nom}$	-	1	-	mA/Bit	

Port B Analog Control

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Output Enable						
Pos. Threshold	$U_{EnB,pth}$	-	-	2.3	V	Positive going edge
Neg. Threshold	$U_{EnB,nth}$	1.0	-	-	V	Negative going edge
Input resistance	R_{EnB}	4.5	-	-	kΩ	
Output Trim						
Dead band	$U_{TrB,db}$	-	200	-	mV	
Slope	$S_{TrB,nom}$	-	7.6	-	V/V	
Bandwidth	f_{TrB}	1	-	-	Hz	

Monitoring

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Sense Resolution	n_{sns}	-	16	-	Bit	
Sense Bandwidth	f_{sns}	50	-	-	Hz	
Voltage Sense						
Tolerance	dU_{sns}	-0.6	-	0.6	V	
Slope	$S_{Usns,nom}$	-	1	-	mV/Bit	
Current Sense						
Port A tolerance	$dI_{A,sns}$	-0.6	-	0.6	A	
24V tolerance	$dI_{24V,sns}$	-0.6	-	0.6	A	
Slope	$S_{Isns,nom}$	-	1	-	mA/Bit	
Temperature Sense	Temp	-10	-	80	°C	
Tolerance	dT_{sns}	-5	-	5	°C	
Slope	$S_{Tsns,nom}$	-	1	-	°C/Bit	

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Monitoring Continued

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Port B Power Good						
HI Level	$U_{PGB,hi}$	2.3	-	-	V	I_{PGB} = 1mA
LO Level	$U_{PGB,lo}$	-	-	1.0	V	I_{PGB} = -1mA
Threshold	$U_{PGB,thr}$	-	1.0	-	V	$U_{B,Set}$ ± 1V or
	$I_{PGB,thr}$	-	1.0	-	A	$I_{B,Set}$ ± 1A
24V Power Good						
HI Level	$U_{PG24V,hi}$	2.3	-	-	V	I_{PG24V} = 1mA
LO Level	$U_{PG24V,lo}$	-	-	1.0	V	I_{PG24V} = -1mA
Threshold	$U_{PG24V,thr}$	-	500	-	mV	$U_{24V,Set}$ ± 500mV
MCU Power Good						Set after startup, pulled low by reset.

Environmental Conditions

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Storage Temperature	T_{Stor}	-25	-	60	°C	
Ambient Temperature	$T_{amb,nom}$	5	-	80	°C	
Baseplate Temperature	$T_{base,nom}$	5	-	58	°C	at $P_{B,nom,min}$ and $P_{24V,nom,min}$
Thermal Protection Limit	$T_{Base,Prot}$	60	-	-	°C	Converter will be deactivated above 60°C
Humidity	φ_{Nom}	5	-	95	%	Non-condensing
Airflow	v_{Air}	0	-	-	m/s	No Airflow

Mechanical

Parameter	Symbol	Value			Unit	Comment
		min.	typ.	max.		
Size						
Width	W	-	104	-	mm	Connectors mounted on short sides (W)
Height	H	-	62	-	mm	
Depth	D	-	170	-	mm	
Weight	M	-	0.7	-	kg	

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Certification

Parameter	Standard	Comment
Safety	EN62368-1	
Emission	EN61000-6-3	
Immunity	EN61000-6-2	Basic standards: EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-8

Notice:

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without Querom's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless Querom, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of Querom products in such safety-critical applications.

Document history

Version	Date	Author	Reason for change
V1.0	23.05.2024	JS	Initial
V1.1	30.05.2024	JS	CD
V1.2	16.07.2024	JS	New cover slide

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