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AUTRONIC
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DC-DC CONVERTER **AER20**

RAILWAY CONVERTER.

FOR PCB MOUNTING

HIGHLIGHTS

- Output Power up to 20 Watts
- Efficiency up to 88 %
- Wide Input Range
- Wide Temperature Range
- RoHS compliance
- According to EN50155
- Remote On/Off

INPUT

Input Voltage Nominal	12/24 VDC, 36/48 VDC, 72/110 VDC

OUTPUT

Output Voltage	5, 12, 15, 24 V and ±12, ±15 V
Initial Set Accuracy	< 1 %*
Output Voltage Balance	Dual Output, Balanced Loads ± 2,0 %
Minimum Load	No minimum load
Short Circuit	Continuous short circuit proof
Line Regulation	± 0,2 %
Load Regulation	Single Output ± 0,5 % (0 % - 100 % load) Dual Output ± 1,0 % (0 % - 100 % load)
Ripple & Noise	<1 % pk-pk, 20 MHz bandwidth**
Start Time	50 ms
Max. Output Capacitance	See table page 2 - 5
Temperature Coefficient	± 0.02 %/°C

FEATURES

Remote On/Off	See page 8
Trim	± 10 %, See page 7

PROTECTION

Over Voltage Protection (OVP)	120-125% $V_{out\ nom}$
Over Current Protection (OCP)	See table page 2 - 5

GENERAL

Product Standard	EN 50155
Isolation	Input to Output 4200 VDC, Reinforced Input or Output to case 2200 VDC
Isolation Resistance	>1000 MΩ (@500 VDC)
Isolation Capacitance	max. 1,5 nF (100 kHz, 1 V)
Switching Frequency	Typ. 320 kHz
Lead Temperature	260°C (1,5 mm from case for 10 sec.)
Dimensions [mm]	50,8 x 25,4 x 11,0
Weight	40,5 g
MTBF	665.100h acc. to MIL-HDBK-217F (GB, 25°)
Fire & Smoke	EN 45545-2

ENVIRONMENTAL

Operating Ambient Temp.	-40°C to +88°C
Operating Case Temp.	max. +105°C
Storage Temperature	-50°C to +125°C
Vibration / Shock / Bump	EN 61373, Cat. 1B

EMC & SAFETY

EMC Standard	EN 50121-3-2
Conducted Emissions	EN 55032, FCC part 15, Class A***
ESD Immunity	EN 61000-4-2 Air ± 8 kV, Contact ±6 kV, Criteria A
Burst	EN 61000-4-4 ±2 kV, Criteria A****
Surge	EN 61000-4-5 ±2 kV, Criteria A****
Conducted Immunity	EN 61000-4-6 10 Vrms, Criteria A
Radiated Immunity	EN 61000-4-3 20 V/m, Criteria A
Power Frequency Magnetic Field Immunity	EN 61000-4-8, 3 A/m, Criteria A
Safety	UL/cUL 60950-1 recognition (UL certificate), IEC/EN 60950-1(CB-report), IEC 60571 UL/cUL 62368-1 recognition (UL certificate), IEC/EN 62368-1 (CB-report)

* For T_{amb} = 25°C, $V_{in\ nom}$, $I_{out\ nom}$
** 5 Vo, 12 Vo, 15 Vo= Measured with a 10 µF/25 V MLCC
24 Vo = Measured with a 4,7 µF/50 V MLCC
*** In built-in condition our devices may show different EMC properties
**** See note 5 page 7

TECHNICAL DATA

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

SINGLE OUTPUT

SPECIFICATION Input 9 - 36 VDC (24 Vin nom) ; K = with Heatsink

	TYPE		AER20-24S05 AER20-24S05/K			AER20-24S12 AER20-24S12/K			AER20-24S15 AER20-24S15/K			AER20-24S24 AER20-24S24/K		
	ORDER NUMBER		11 75 11 2211 3 11 75 11 2214 6			11 75 11 2221 6 11 75 11 2224 9			11 75 11 2231 9 11 75 11 2234 3			11 75 11 2241 3 11 75 11 2244 6		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	9...36											
	Input Voltage Range	V	9...50 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	9											
	Under Voltage Turn-off (typical)	V	7,5											
	Input Current @ Full Load	mA		958			960			955			957	
	Input Current @ No Load (typical)	mA	25											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		87			87			87			87	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

SPECIFICATION Input 18 - 75 VDC (48 Vin nom) ; K = with Heatsink

	TYPE		AER20-48S05 AER20-48S05/K			AER20-48S12 AER20-48S12/K			AER20-48S15 AER20-48S15/K			AER20-48S24 AER20-48S24/K		
	ORDER NUMBER		11 75 11 2511 9 11 75 11 2514 3			11 75 11 2521 3 11 75 11 2524 6			11 75 11 2531 6 11 75 11 2534 9			11 75 11 2541 9 11 75 11 2544 3		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	18...75											
	Input Voltage Range	V	18...100 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	18											
	Under Voltage Turn-off (typical)	V	16											
	Input Current @ Full Load	mA		479			474			472			473	
	Input Current @ No Load (typical)	mA	15											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		87			88			88			88	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

SPECIFICATION Input 40 - 160 VDC (110 Vin nom) ; K = with Heatsink

	TYPE		AER20-110S05 AER20-110S05/K			AER20-110S12 AER20-110S12/K			AER20-110S15 AER20-110S15/K			AER20-110S24 AER20-110S24/K		
	ORDER NUMBER		11 75 11 2711 4 11 75 11 2714 7			11 75 11 2721 7 11 75 11 2724 1			11 75 11 2731 1 11 75 11 2734 4			11 75 11 2741 4 11 75 11 2744 7		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	40...160											
	Input Voltage Range	V	40...170 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	40											
	Under Voltage Turn-off (typical)	V	37											
	Input Current @ Full Load	mA		216			212			211			211	
	Input Current @ No Load (typical)	mA	10											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		84			86			86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

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TECHNICAL DATA

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

DUAL OUTPUT

SPECIFICATION Input 9 - 36 VDC (24 Vin nom) ; K = with Heatsink

	TYPE		AER20-24D12 AER20-24D12/K			AER20-24D15 AER20-24D15/K		
	ORDER NUMBER		11 75 11 2222 1 11 75 11 2225 4			11 75 11 2232 4 11 75 11 2235 7		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	9...36					
	Input Voltage Range	V	9...50 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	9					
	Under Voltage Turn-off (typical)	V	7,5					
	Input Current @ Full Load	mA		969			969	
	Input Current @ No Load (typical)	mA	25					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

SPECIFICATION Input 18 - 75 VDC (48 Vin nom) ; K = with Heatsink

	TYPE		AER20-48D12 AER20-48D12/K			AER20-48D15 AER20-48D15/K		
	ORDER NUMBER		11 75 11 2522 7 11 75 11 2525 1			11 75 11 2532 1 11 75 11 2535 4		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	18...75					
	Input Voltage Range	V	18...100 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	18					
	Under Voltage Turn-off (typical)	V	16					
	Input Current @ Full Load	mA		479			479	
	Input Current @ No Load (typical)	mA	15					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		87			87	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

SPECIFICATION Input 40 - 160 VDC (110 Vin nom) ; K = with Heatsink

	TYPE		AER20-110D12 AER20-110D12/K			AER20-110D15 AER20-110D15/K		
	ORDER NUMBER		11 75 11 2722 2 11 75 11 2725 5			11 75 11 2732 5 11 75 11 2735 8		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	40...160					
	Input Voltage Range	V	40...170 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	40					
	Under Voltage Turn-off (typical)	V	37					
	Input Current @ Full Load	mA		211			212	
	Input Current @ No Load (typical)	mA	10					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

For each output

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TECHNICAL DATA

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

SINGLE OUTPUT – A-PINNING

SPECIFICATION Input 9 - 36 VDC (24 Vin nom) ; K = with Heatsink

	TYPE		AER20A-24S05 AER20A-24S05/K			AER20A-24S12 AER20A-24S12/K			AER20A-24S15 AER20A-24S15/K			AER20A-24S24 AER20A-24S24/K		
	ORDER NUMBER		11 75 11 2217 9 11 75 11 2218 4			11 75 11 2227 3 11 75 11 2228 7			11 75 11 2237 6 11 75 11 2238 1			11 75 11 2247 9 11 75 11 2248 4		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	9...36											
	Input Voltage Range	V	9...50 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	9											
	Under Voltage Turn-off (typical)	V	7,5											
	Input Current @ Full Load	mA		958			960			955			957	
	Input Current @ No Load (typical)	mA	25											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		87			87			87			87	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

SPECIFICATION Input 18 - 75 VDC (48 Vin nom) ; K = with Heatsink

	TYPE		AER20A-48S05 AER20A-48S05/K			AER20A-48S12 AER20A-48S12/K			AER20A-48S15 AER20A-48S15/K			AER20A-48S24 AER20A-48S24/K		
	ORDER NUMBER		11 75 11 2517 6 11 75 11 2518 1			11 75 11 2527 9 11 75 11 2528 4			11 75 11 2537 3 11 75 11 2538 7			11 75 11 2547 6 11 75 11 2548 1		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	18...75											
	Input Voltage Range	V	18...100 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	18											
	Under Voltage Turn-off (typical)	V	16											
	Input Current @ Full Load	mA		479			474			472			473	
	Input Current @ No Load (typical)	mA	15											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		87			88			88			88	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

SPECIFICATION Input 40 - 160 VDC (110 Vin nom) ; K = with Heatsink

	TYPE		AER20A-110S05 AER20A-110S05/K			AER20A-110S12 AER20A-110S12/K			AER20A-110S15 AER20A-110S15/K			AER20A-110S24 AER20A-110S24/K		
	ORDER NUMBER		11 75 11 2717 1 11 75 11 2718 5			11 75 11 2727 4 11 75 11 2728 8			11 75 11 2737 7 11 75 11 2738 2			11 75 11 2747 1 11 75 11 2748 5		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	40...160											
	Input Voltage Range	V	40...170 (t ≤ 100 ms)											
	Under Voltage Turn-on (typical)	V	40											
	Under Voltage Turn-off (typical)	V	37											
	Input Current @ Full Load	mA		216			212			211			211	
	Input Current @ No Load (typical)	mA	10											
	Standby Input Current (typical)	mA	2,5											
OUTPUT	Output Voltage	V	5			12			15			24		
	Output Current (typical)	mA	4000			1670			1330			833		
	Output Power	W	20											
	Max. Capacitive Load	µF			6800			1200			750			300
	Efficiency @ Full Load	%		84			86			86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery											
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5											

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TECHNICAL DATA

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

DUAL OUTPUT – A-PINNING

SPECIFICATION Input 9 - 36 VDC (24 Vin nom) ; K = with Heatsink

	TYPE		AER20A-24D12 AER20A-24D12/K			AER20A-24D15 AER20A-24D15/K		
	ORDER NUMBER		11 75 11 2257 3 11 75 11 2258 7			11 75 11 2267 6 11 75 11 2268 1		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	9...36					
	Input Voltage Range	V	9...50 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	9					
	Under Voltage Turn-off (typical)	V	7,5					
	Input Current @ Full Load	mA		969			969	
	Input Current @ No Load (typical)	mA	25					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

SPECIFICATION Input 18 - 75 VDC (48 Vin nom) ; K = with Heatsink

	TYPE		AER20A-48D12 AER20A-48D12/K			AER20A-48D15 AER20A-48D15/K		
	ORDER NUMBER		11 75 11 2557 9 11 75 11 2558 4			11 75 11 2567 3 11 75 11 2568 7		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	18...75					
	Input Voltage Range	V	18...100 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	18					
	Under Voltage Turn-off (typical)	V	16					
	Input Current @ Full Load	mA		479			479	
	Input Current @ No Load (typical)	mA	15					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		87			87	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

SPECIFICATION Input 40 - 160 VDC (110 Vin nom) ; K = with Heatsink

	TYPE		AER20A-110D12 AER20A-110D12/K			AER20A-110D15 AER20A-110D15/K		
	ORDER NUMBER		11 75 11 2757 4 11 75 11 2758 8			11 75 11 2767 7 11 75 11 2768 2		
	CHARACTERISTIC	Unit	Min	Typ	Max	Min	Typ	Max
INPUT	Input Voltage Operating	V	40...160					
	Input Voltage Range	V	40...170 (t ≤ 100 ms)					
	Under Voltage Turn-on (typical)	V	40					
	Under Voltage Turn-off (typical)	V	37					
	Input Current @ Full Load	mA		211			212	
	Input Current @ No Load (typical)	mA	10					
	Standby Input Current (typical)	mA	2,5					
OUTPUT	Output Voltage	V	±12			±15		
	Output Current (typical)	mA	±833			±667		
	Output Power	W	20					
	Max. Capacitive Load	µF			600#			380#
	Efficiency @ Full Load	%		86			86	
	Short Circuit Current (typical)		hiccup mode 150 %, pulse approx 0,7 Hz, automatic recovery					
	Transient Response 75 % / 100 % Load Step, Recovery Time< 300 µs	%	±5					

For each output

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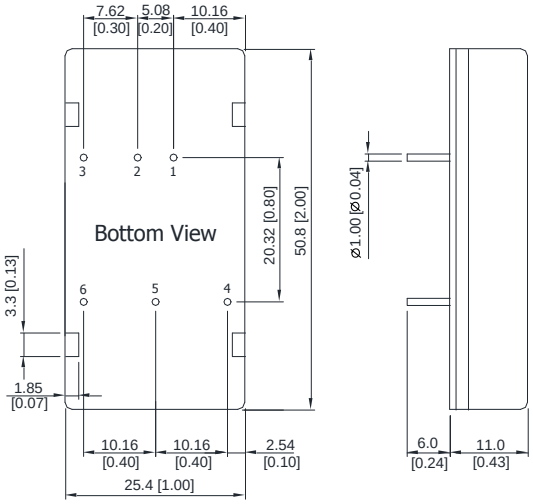
TECHNICAL DATA

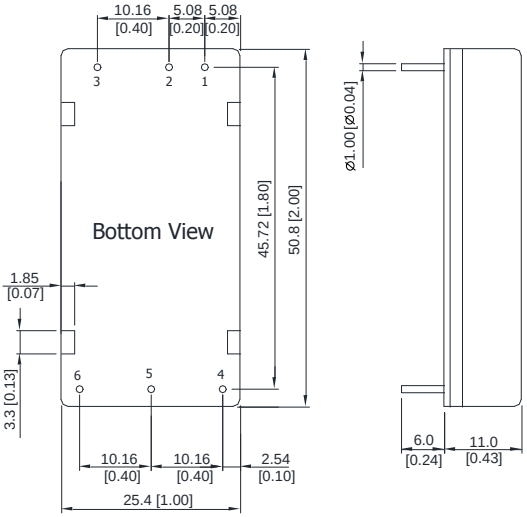
For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

MECHANICAL DETAILS

1. Dimensions are in mm [inches].
2. Tolerance: X.X±0.75 (X.XX±0.03)
   X.XX±0.25 (X.XXX±0.01)
3. Pin diameter Ø 1.0 ±0.05 (0.04±0.002)



A-Pinning



Case Material: Red Copper, Powder Coating
Base Material: FR4 PCB (flammability to UL 94V-0 rated)
Insulated Frame Material: Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material: Tinned Copper
Potting Material: Epoxy (flammability to UL 94V-0 rated)

PINNING

Pin	Single Output	Dual Output
1	$+V_{in}$	$+V_{in}$
2	$-V_{in}$	$-V_{in}$
3	Remote On/Off	Remote On/Off
4	$+V_{out}$	$+V_{out}$
5	Trim	Common
6	$-V_{out}$	$-V_{out}$

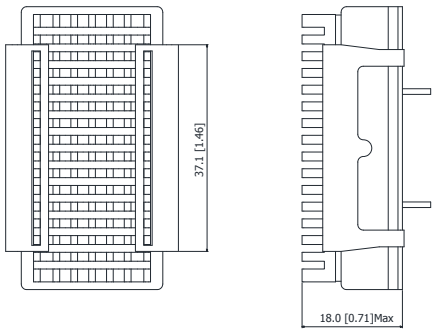
PINNING

Pin	Single Output	Dual Output
1	$+V_{in}$	$+V_{in}$
2	$-V_{in}$	$-V_{in}$
3	Remote On/Off	Remote On/Off
4	$+V_{out}$	$+V_{out}$
5	$-V_{out}$	Common
6	Trim	$-V_{out}$

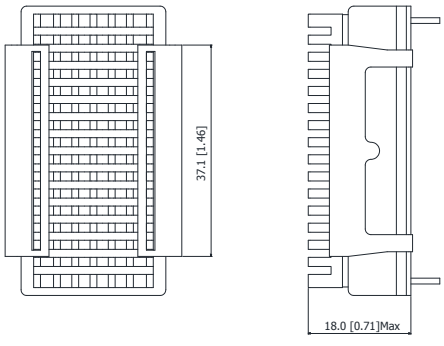
MECHANICAL DETAILS

Heatsink (Option, –HS)

The advantages of adding a heatsink are:
1. To improve heat dissipation and increase the stability and reliability of the DC/DC converters at high operating temperatures.
2. To increase operating temperature of the DC/DC converter, please refer to Derating Curve.



"A" Pinning Heatsink (Option, –HS)



Heatsink Material: Aluminium
Finish: Black Anodized Coating
Weight: 9 g

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DESCRIPTION OF FEATURES

NOTES

1 Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.

2 Transient recovery time is measured to within 1 % error band for a step change in output load of 75 % to 100 %.

3 We recommend to protect the converter by a slow blow fuse in the input supply line.

4 Other input and output voltage may be available, please contact factory.

5 To meet EN 61000-4-4 & EN 61000-4-5 an external capacitor across the input pins is required.
Suggested capacitor: 24XXX: CHEMI-CON KY Series 390 µF/63 V.
48XXX: CHEMI-CON KY Series 330 µF/100 V.
110XXX: CHEMI-CON KXJ Series 390 µF/200 V.

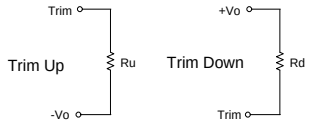
6 That "natural convection" is about 20 LFM but is not equal to still air (0 LFM).

7 Specifications are subject to change without notice.

Installation instructions:
The converters have to be installed according to the guidelines currently in force, like other open electronic component assemblies. Attention must be paid to sufficient ventilation, carry off heat, fastening and protection against accidental contact. Case temperature must not exceed +105°C. See Power Derating Curve and note 6. Fault protection: The converters have no internal fuse. In order to achieve maximum safety and system protection, always use an input a time-lag fuse corresponding to IEC 60127-2 (see note 3). Pay attention on sufficient current source in case of short circuit.

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below



AER20-XXS05 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	156.81	70.69	41.99	27.64	19.03	13.29	9.18	6.11	3.72	1.80	kOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	119.77	53.70	31.67	20.66	14.05	9.65	6.50	4.14	2.31	0.84	kOhms

AER20-XXS12 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	419.81	187.68	110.30	71.61	48.40	32.93	21.87	13.58	7.13	1.98	kOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	344.74	154.37	90.92	59.19	40.15	27.46	18.39	11.59	6.31	2.07	kOhms

AER20-XXS15 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	602.92	269.91	158.91	103.41	70.10	47.90	32.05	20.15	10.90	3.50	kOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	482.88	215.89	126.89	82.40	55.70	37.90	25.18	15.65	8.23	2.30	kOhms

AER20-XXS24 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	598.97	267.93	157.59	102.42	69.31	47.25	31.48	19.66	10.46	3.11	kOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	486.83	217.87	128.21	83.38	56.49	38.56	25.75	16.14	8.67	2.69	kOhms

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APPLICATION NOTES

REMOTE ON/OFF

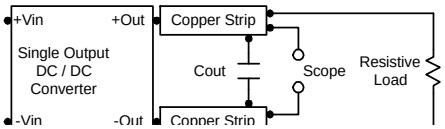
Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal. The switch can be an open collector or equivalent. A logic low is 0 V to 1,2 V. A logic high is 3,5 V to 12 V. The maximum sink current at the on/off terminal (Pin 3) during a logic low is -100 µA.
When not in use, leave Remote pin not-connected.

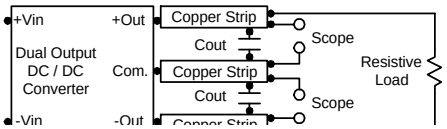
Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	3,5 V ~ 12 V or Open Circuit				
Converter Off	0 V ~ 1,2 V or Short Circuit				
Control Input Current (on)	Vctrl = 5,0 V	---	0,5	---	mA
Control Input Current (off)	Vctrl = 0 V	---	-0,5	---	mA
Control Common	Referenced to Negative Input				
Standby Input Current	Nominal Vin	---	2,5	---	mA

TEST SETUP

Peak-to-Peak Output Noise Measurement Test

Use a 1 µF ceramic capacitor and a 10 µF tantalum capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20 MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter.





TECHNICAL NOTES

Overload Protection

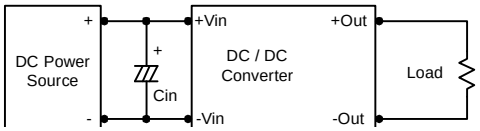
To provide hiccup mode protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

Overvoltage Protection

The output overvoltage clamp consists of control circuitry, which is independent of the primary regulation loop, that monitors the voltage on the output terminals.
The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output overvoltage.
The OVP level can be found in the output data.

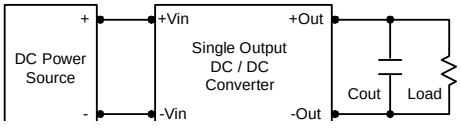
Input Source Impedance

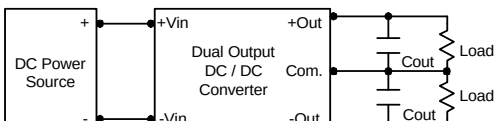
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1 Ω at 100 kHz) capacitor of a 4,7 µF for the 24 V input devices, a 2,2 µF for the 48 V devices and a 1 µF for the 110 V devices.



Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 4,7 µF capacitors at the output.





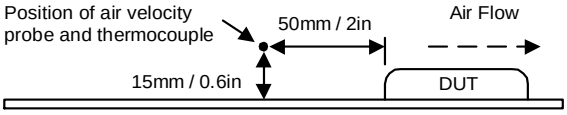
Maximum Capacitive Load

The AER20 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the output data.

APPLICATION NOTES

Thermal Considerations

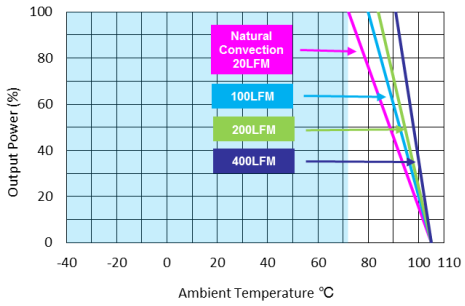
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 105°C. The derating curves are determined from measurements obtained in a test setup.



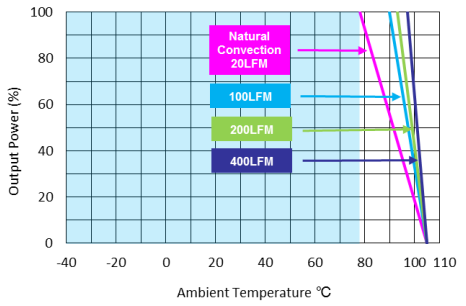
Parameter	Conditions / Model	Min.	Max.		Unit
			without Heatsink	with Heatsink	
Operating Temperature Range Natural Convection (see note 6 page 7) Nominal Vin, Load 100% Inom. (for Power Derating see relative Derating Curves)	AER20-48S12, AER20-48S15, AER20-48S24	-40	72	78	°C
	AER20-24S05, AER20-24S12, AER20-24S15 AER20-24S24, AER20-48S05, AER20-48D12 AER20-48D15		69	76	
	AER20-24D12, AER20-24D15, AER20-110S12 AER20-110S15, AER20-110S24,AER20-110D12 AER20-110D15		66	73	
	AER20-110S05		59	68	
Thermal Impedance	Natural Convection without Heatsink	12,1	---		°C/W
	Natural Convection with Heatsink	9,8	---		°C/W
	100 LFM Convection without Heatsink	9,2	---		°C/W
	100 LFM Convection with Heatsink	5,4	---		°C/W
	200 LFM Convection without Heatsink	7,8	---		°C/W
	200 LFM Convection with Heatsink	4,5	---		°C/W
	400 LFM Convection without Heatsink	5,2	---		°C/W
	400 LFM Convection with Heatsink	3,0	---		°C/W

APPLICATION NOTES

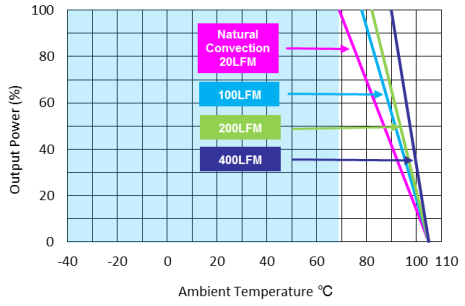
POWER DERATING CURVE



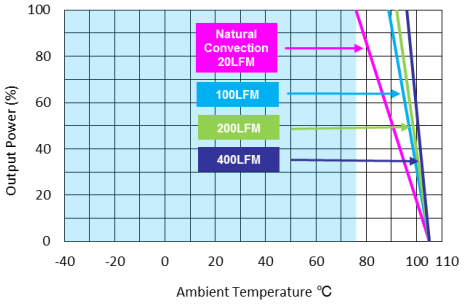
AER20-48S12, AER20-48S15, AER20-48S24
Derating Curve without Heatsink



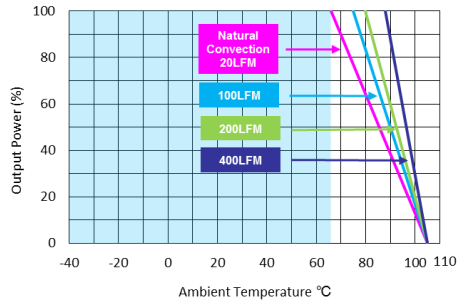
AER20-48S12, AER20-48S15, AER20-48S24
Derating Curve with Heatsink



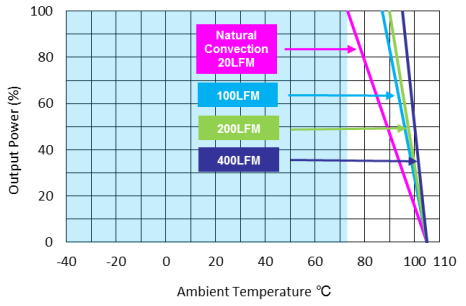
AER20-24S05, AER20-24S12, AER20-24S15, AER20-24S24,
AER20-48S05, AER20-48D12, AER20-48D15
Derating Curve without Heatsink



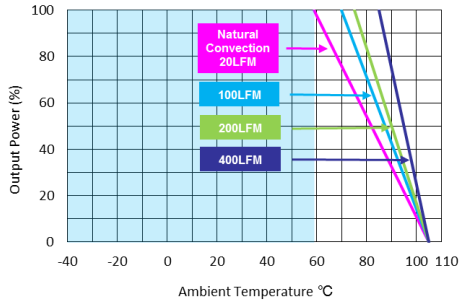
AER20-24S05, AER20-24S12, AER20-24S15, AER20-24S24,
AER20-48S05, AER20-48D12, AER20-48D15
Derating Curve with Heatsink



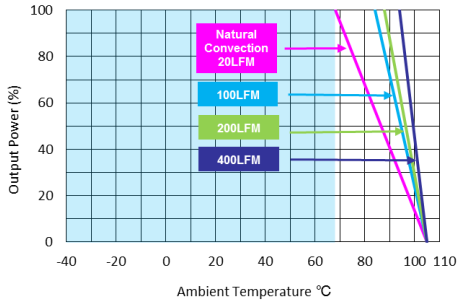
AER20-24D12, AER20-24D15, AER20-110S12, AER20-110S15,
AER20-110S24,AER20-110D12, AER20-110D15
Derating Curve without Heatsink



AER20-24D12, AER20-24D15, AER20-110S12, AER20-110S15,
AER20-110S24,AER20-110D12, AER20-110D15
Derating Curve with Heatsink



AER20-110S05 Derating Curve without Heatsink



AER20-110S05 Derating Curve with Heatsink