TECHNICAL REFERENCE NOTE

ARTESYN AVO200-48S05 Series

200 Watts Eighth-brick Converter

PRODUCT DESCRIPTION

Advanced Energy's Artesyn AVO200-48S05 is a single output DC/DC converter with standard eighth-brick form factor and pin configuration. It delivers up to 40A output current with 12V output. Ultra-high 94.5% efficiency and excellent thermal performance makes it an ideal choice for use in computing and telecommunication applications and can operate over an baseplate temperature range of -40°C to +100°C.

AT A GLANCE

Total Power

200 Watts

Input Voltage

36 to 75 Vdc

# of Outputs

Single

RoHS

SPECIAL FEATURES

- Delivering up to 40A output
- Ultra-high efficiency 94.5% typical at 60% load
- Wide input range: 36 to 75Vdc
- Excellent thermal performance
- No minimum load requirement
- Basic isolation
- High power density
- Low output noise
- Reflow soldering-able
- RoHS3.0
- Remote control function
- Remote output sense
- Trim function: 80% to 110%
- Output over current protection
- Output short protection
- Output over voltage protection
- Over temperature protection
- Industry standard eighth-brick pin-out outline

SAFETY

UL	UL/CSA 60950-1
TUV	EN 62368-1
CE	EN 62368-1
UL94,V-0	

TYPICAL APPLICATIONS

- Telecom
- Datacom

Model Numbers

Standard	Output Voltage	Structure	Remote ON/OFF logic	ROHS
AVO200-48S05-6L	5Vdc	Open-frame	Negative	RoHS3.0
AVO200-48S05B-6L	5Vdc	Baseplate	Negative	RoHS3.0
AVO200-48S05PB-6L	5Vdc	Baseplate	Positive	RoHS3.0
AVO200-48S05B-4L	5Vdc	Baseplate	Negative	RoHS3.0

Order Information

AVO200	-	48	S	05	P	B	-	6	L
①		②	③	④	⑤	⑥		⑦	⑧

①	Model series	AVO: high efficiency eighth-brick series, 200: output power 200W
②	Input voltage	48: 36 to 75V input range, rated input voltage 48V
③	Output number	S: single output
④	Rated output voltage	05: 5V output
⑤	Remote ON/OFF logic	Default: negative logic; P: positive logic
⑥	Baseplate	B: with baseplate; default: open frame
⑦	Pin length	4: 4.8mm±0.25mm 6: 3.8mm pin length S: SMT pin T: SMT pin and tape reel package
⑧	RoHS status	L: RoHS3.0

Options

None

Electrical Specifications

Absolute Maximum Ratings

Stress in excess of those listed in the "Absolute Maximum Ratings" may cause permanent damage to the power supply. These are stress ratings only and functional operation of the unit is not implied at these or any other conditions above those given in the operational sections of this TRN. Exposure to any absolute maximum rated condition for extended periods may adversely affect the power supply's reliability.

Table 1. Absolute Maximum Ratings

Parameter	Model	Symbol	Min	Typ	Max	Unit
Input Voltage Operating -Continuous Non-operating -100mS	 All All	$V_{IN,DC}$	 - -	 - -	 80 100	 Vdc Vdc
Maximum Output Power	All	$P_{O,max}$	-	-	200	W
Ambient Operating Temperature	All	T_A	-40	-	+85	^{O}C
Baseplate Operating Temperature	All	T_B	-40	-	+100	^{O}C
Storage Temperature	All	T_{STG}	-55	-	+125	^{O}C
Voltage at remote ON/OFF pin[1]	All		-0.3	-	5	Vdc
Humidity (non-condensing) Operating Non-operating	 All All		 - -	 - -	 95 95	 % %

Note 1 - Max voltage = 7.0V with oscillation noise

Electrical Specifications

Input Specifications

Table 2. Input Specifications

Parameter	Conditions[1]	Symbol	Min	Typ	Max	Unit
Operating Input Voltage, DC	All	$V_{IN,DC}$	36	48	75	Vdc
Turn-on Voltage Threshold	$I_O = I_{O,max}$	$V_{IN,ON}$	32	-	35	Vdc
Turn-off Voltage Threshold	$I_O = I_{O,max}$	VIN,OFF	31	-	34	Vdc
Lockout Voltage Hysteresis	$I_O = I_{O,max}$		1	-	3	Vdc
Maximum Input Current ($I_O = I_{O,max}$)	$V_{IN,DC}$ = 36Vdc $I_O = I_{O,max}$	$I_{IN,max}$	-	-	7.5	A
Recommended Input Fuse	Fast blow external fuse recommended		-	-	12	A
Recommended External Input Capacitance	Low ESR capacitor recommended	C_{IN}	220	-	-	µF
Input Reflected Ripple Current	Through 12uH inductor		-	50	-	mA
Operating Efficiency	T_A = 25°C $I_O = I_{O,max}$ I_O = 60%$I_{O,max}$	η	- -	94.5 95.5	- -	% %

Note 1 - Ta = 25°C, airflow rate = 400 LFM, Vin = 48Vdc, nominal Vout unless otherwise noted.

Electrical Specifications

Output Specifications

Table 3. Output Specifications

Parameter		Conditions[1]	Symbol	Min	Typ	Max	Unit
Factory Set Voltage		$V_{IN,DC}$ = 48Vdc, I_O = $I_{O,max}$	V_O	4.92	5.00	5.08	Vdc
Total Regulation		Inclusive of line, load temperature change, warm-up drift	V_O	4.85	5.00	5.15	Vdc
Output Voltage Line Regulation		All	V_O	-	-	10	mV
Output Voltage Load Regulation		All	V_O	-	-	25	mV
Output Voltage Temperature Regulation		All	V_O	-	-	0.02	%/^{O}C
Output Voltage Trim Range		All	V_O	4	-	5.5	Vdc
Output Ripple, pk-pk		0 to 20MHz bandwidth	V_O	-	120	-	mV_{PK-PK}
Output Current		All	I_O	0	-	40	A
Output DC Current-limit Inception[2]		All	I_O	44	-	60	A
V_O Load Capacitance[3]		All	C_O	220	1000	10000	µF
V_O Dynamic Response Peak Deviation Settling Time		25% ~ 50% ~ 25% $I_{O,max}$ 0.1A/µs	±V_O Ts	- -	150 200	- -	mV uS
		25% ~ 50% ~ 25% $I_{O,max}$ 1A/µs	±V_O Ts	- -	300 200	- -	mV µS
Turn-on Transient	Rise Time	I_O = $I_{O,max}$	T_{rise}	-	-	50	mS
	Turn-on Delay Time	I_O = $I_{O,max}$	$T_{turn-on}$	-	-	100	mS
	Output Voltage Overshoot	I_O = 0	%V_O	-	-	5	%
Isolation Voltage Input to Output		1mA for 60s Slew rate of 500V/1s		2250	-	-	Vdc
Switching Frequency		All	f_{SW}	-	150	-	KHz
Remote ON/OFF Control (Negative Logic)	Off-state Voltage	All		3.5	-	5	Vdc
	On-state Voltage[4]	All		-0.3	-	1.2	Vdc
Remote ON/OFF Control (Positive Logic)	Off-state Voltage	All		-0.3	-	1.2	Vdc
	On-state Voltage	All		3.5	-	5	Vdc

Note 1 - Ta = 25^{O}C, airflow rate = 400 LFM, Vin = 48Vdc, nominal Vout unless otherwise noted.
Note 2 - Hiccup: auto-restart when over-current condition is removed.
Note 3 - High frequency and low ESR is recommended
Note 4 - Max voltage = 7.0V with oscillation noise

Electrical Specifications

Output Specifications

Table 3. Output Specifications Con't

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Output Over Voltage Protection[5]	All	$\%V_O$	116	-	150	%
Output Over Temperature Protection[6] With baseplate Without baseplate	 All All	 T T	 100 110	 - -	 125 135	 ^{O}C ^{O}C
Over Temperature Hysteresis	All		-	5	-	^{O}C
+ Sense	All	$\%V_O$	-	-	5	%
- Sense	All	$\%V_O$	-	-	5	%
MTBF	Telcordia SR-332-2006; 80% load, 300LFM, 40 ^{O}C T_A		-	1.5	-	10^6 h

Note 5 - Hiccup: auto-restart when over-voltage condition is removed.
Note 6 - Auto recovery.

Electrical Specifications

AVO200-48S05 Performance Curves

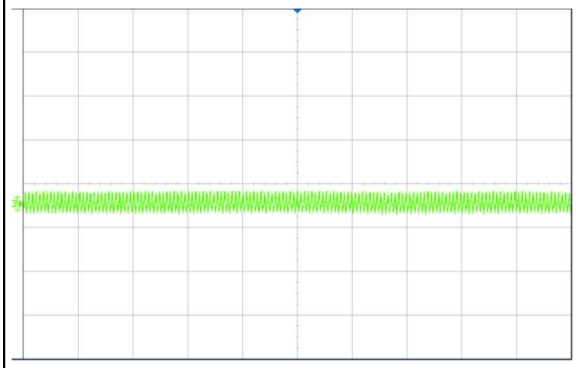


Figure 1: AVO200-48S05-6L Input Reflected Ripple Current Waveform
Vin = 48Vdc Load: Io = 40A
Ch 3: Iin (50uS/div, 50mA/div)

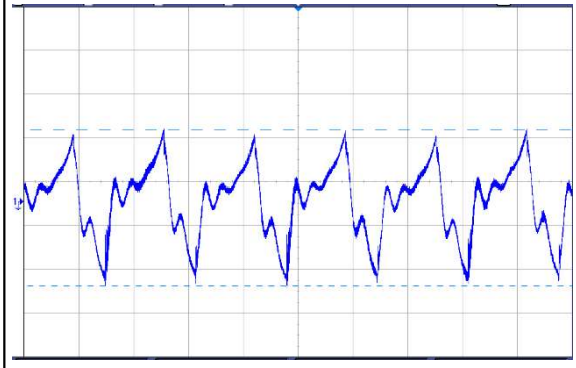


Figure 2: AVO200-48S05-6L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 40A
Ch 1: Vo (2us/div, 20mV/div)

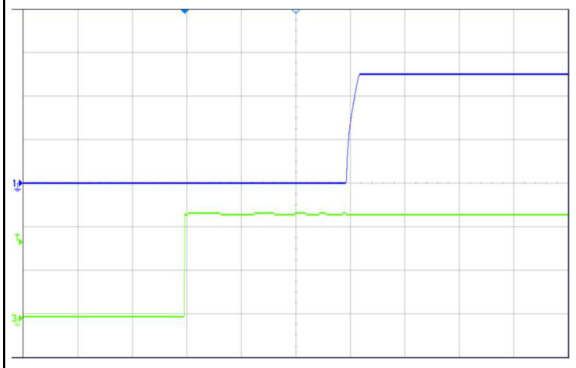


Figure 3: AVO200-48S05-6L Output Voltage Startup Characteristic
Vin = 36Vdc Load: Io = 40A (2mS/div)
Ch 1: Vo (2V/div) Ch 3: Vin (20V/div)

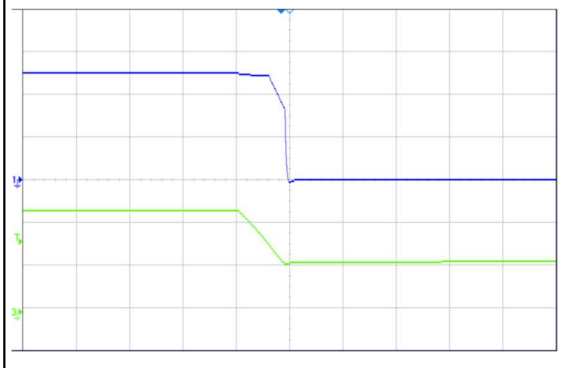


Figure 4: AVO200-48S05-6L Turn Off Characteristic (1mS/div)
Vin = 36Vdc Load: Io = 40A
Ch 1: Vo (2V/div) Ch 3: Vin (20V/div)

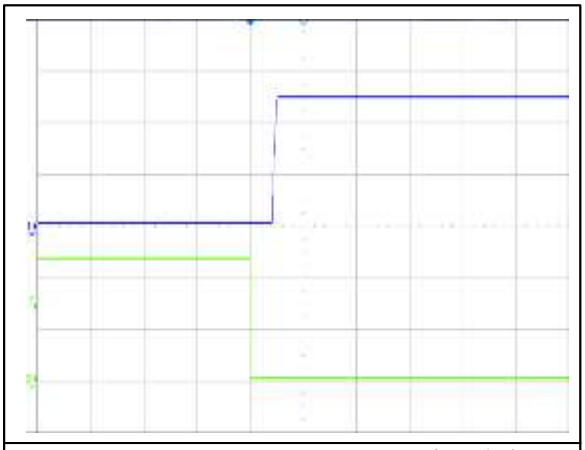


Figure 5: AVO200-48S05-6L Remote ON Waveform (50mS/div)
Vin = 36Vdc Load: Io =40A
Ch 1: Vo (2V/div) Ch 3: Remote ON (2V/div)

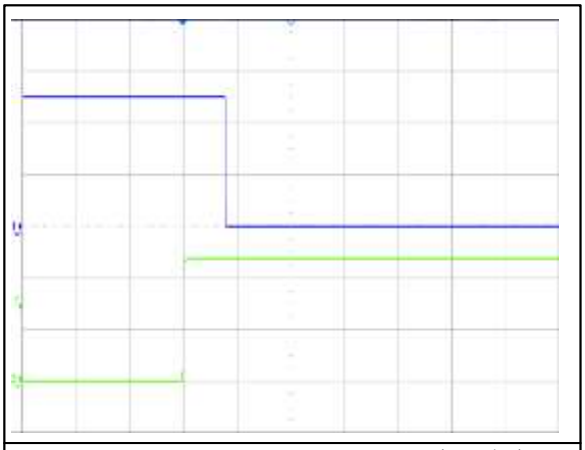


Figure 6: AVO200-48S05-6L Remote OFF Waveform (20mS/div)
Vin = 36Vdc Load: Io = 40A
Ch 1: Vo (2V/div) CH3: Remote OFF (2V/div)

Electrical Specifications

AVO200-48S05 Performance Curves

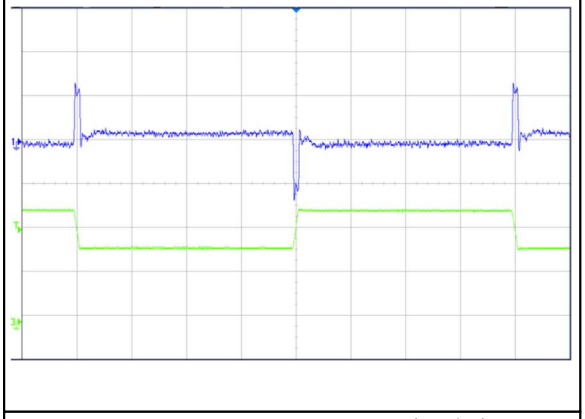


Figure 7: AVO200-48S05-6L Transient Response (1mS/div)
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (10mV/div) Ch 3: Io (10A/div)

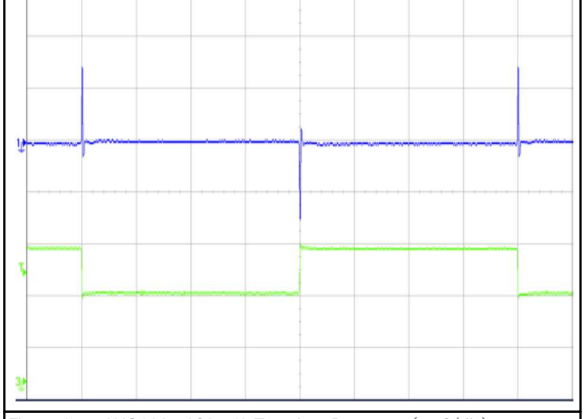


Figure 8: AVO200-48S05-6L Transient Response (1mS/div)
50%~75%~50% load change, 1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (10A/div)

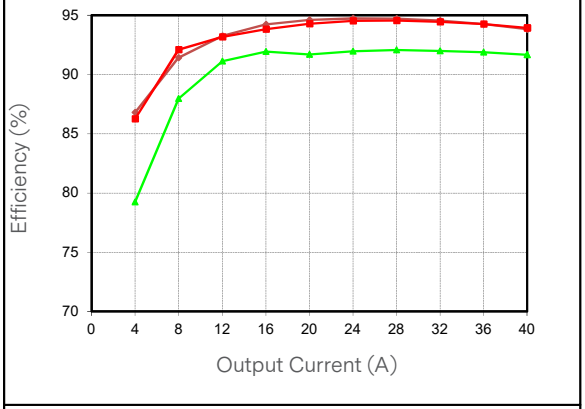


Figure 9: AVO200-48S05 Efficiency Curve
Ta=25°C, 200LFM, Vo=5.0V

Electrical Specifications

AVO200-48S05B Performance Curves

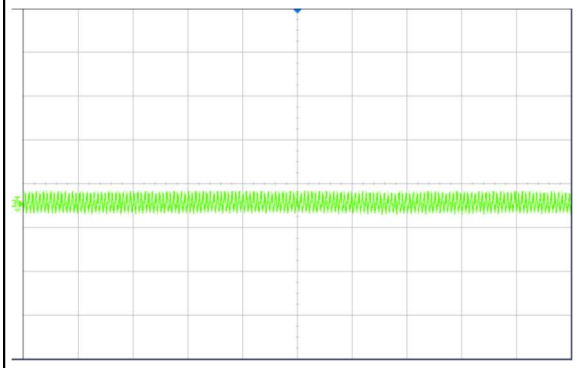


Figure 10: AVO200-48S05B-6L Input Reflected Ripple Current Waveform
Vin = 48Vdc Load: Io = 40A
Ch 3: Iin (50uS/div, 50mA/div)

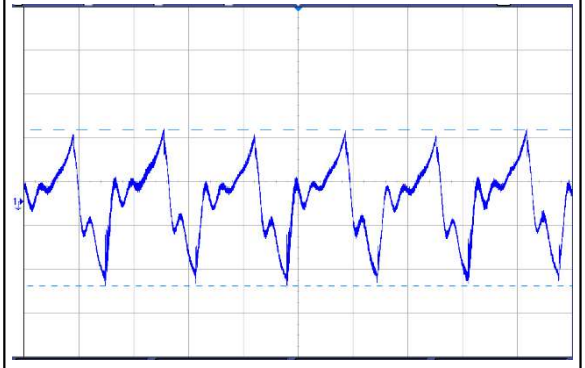


Figure 11: AVO200-48S05B-6L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 40A
Ch 1: Vo (2us/div, 20mV/div)

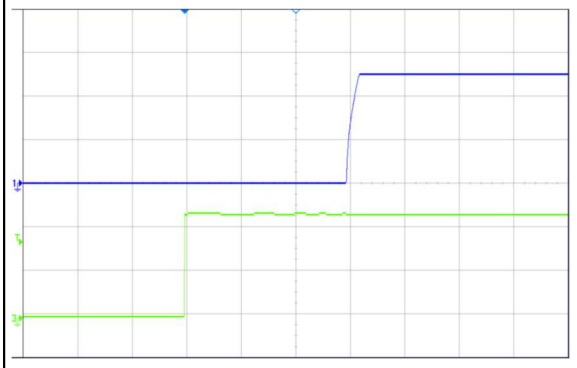


Figure 12: AVO200-48S05B-6L Output Voltage Startup Characteristic
Vin = 36Vdc Load: Io = 40A (2mS/div)
Ch 1: Vo (2V/div) Ch 3: Vin (20V/div)

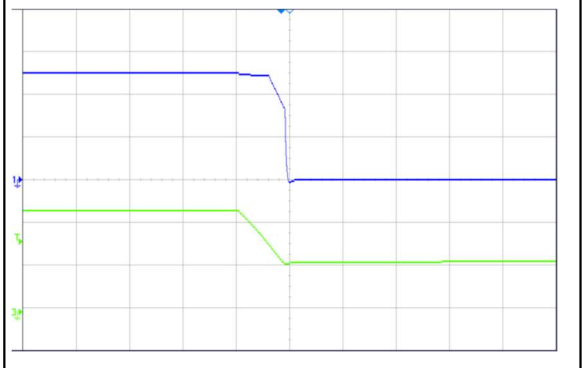


Figure 13: AVO200-48S05B-6L Turn Off Characteristic (1mS/div)
Vin = 36Vdc Load: Io = 40A
Ch 1: Vo (2V/div) Ch 3: Vin (20V/div)

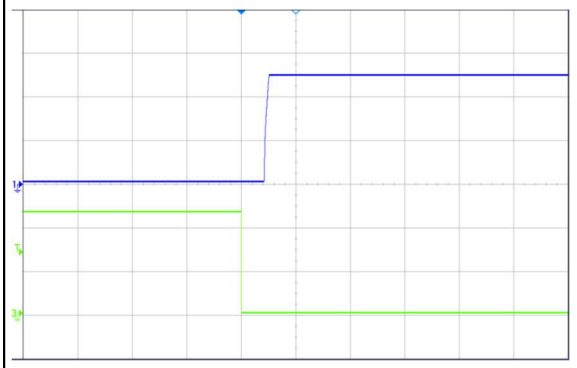


Figure 14: AVO200-48S05B-6L Remote ON Waveform (50mS/div)
Vin = 36Vdc Load: Io =40A
Ch 1: Vo (2V/div) Ch 3: Remote ON (2V/div)

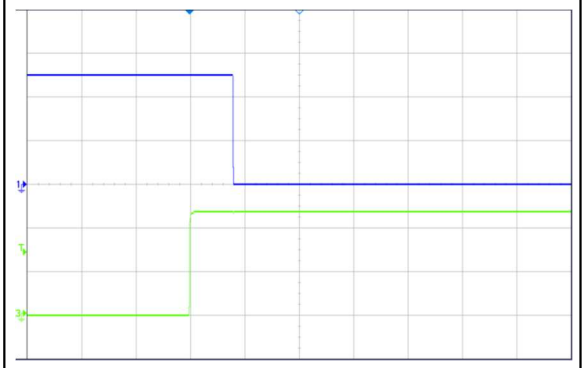


Figure 15: AVO200-48S05B-6L Remote OFF Waveform (20mS/div)
Vin = 36Vdc Load: Io = 40A
Ch 1: Vo (2V/div) CH3: Remote OFF (2V/div)

Electrical Specifications

AVO200-48S05B Performance Curves

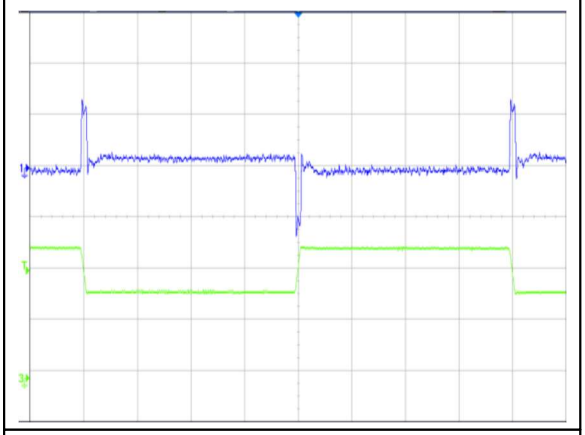


Figure 16: AVO200-48S05B-6L Transient Response (1mS/div)
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (10mV/div) Ch 3: Io (10A/div)

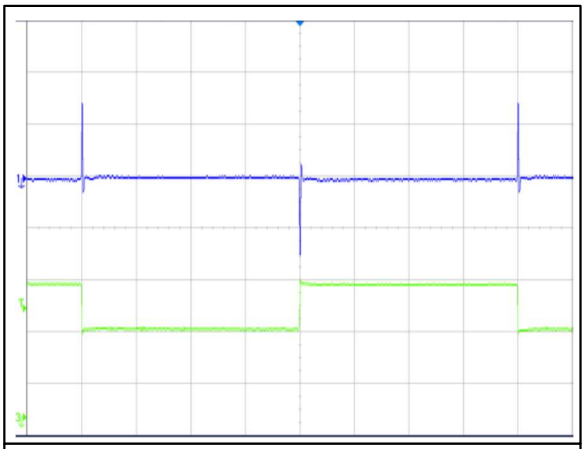


Figure 17: AVO200-48S05B-6L Transient Response (1mS/div)
50%~75%~50% load change, 1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (10A/div)

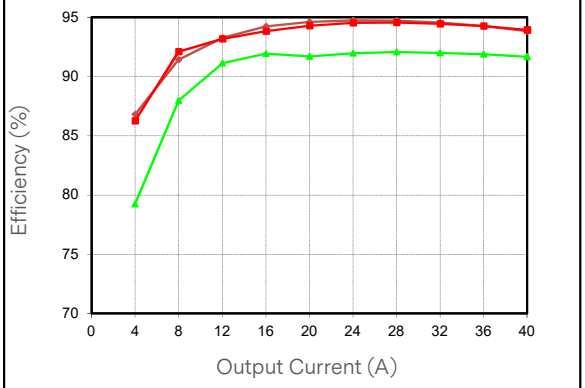
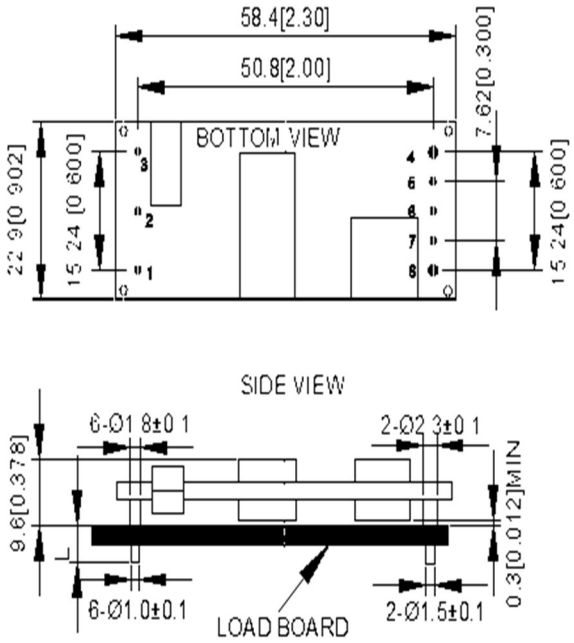


Figure 18: AVO200-48S05 Efficiency Curve
Ta=25°C, 200LFM, Vo=5.0V

Mechanical Specifications

Mechanical Outlines - Open frame

AVO200-48S05-6L



UNIT: mm[inch]

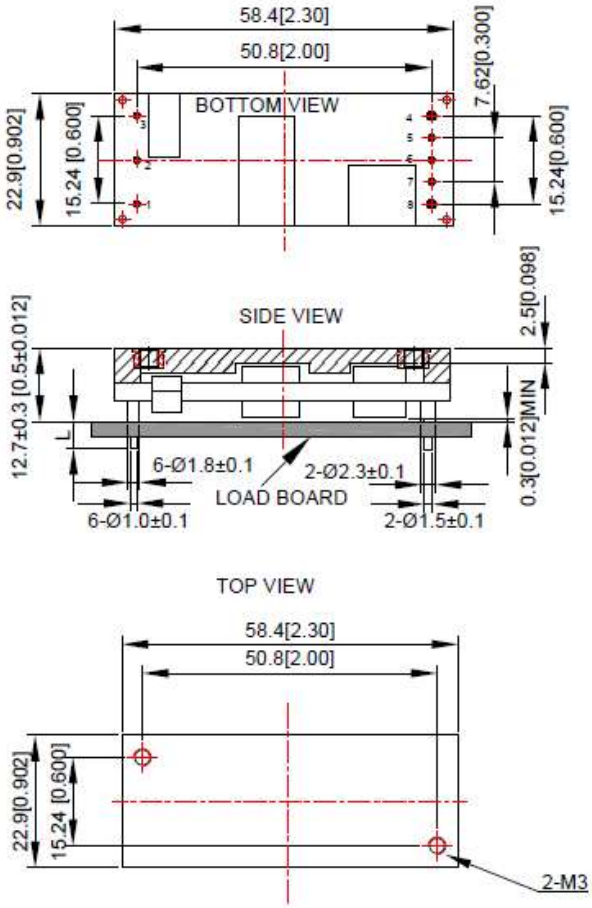
TOLERANCE: X.X mm±0.5 mm[X.XX in. ±0.02 in.]

X.XX mm±0.25 mm[X.XXX in. ±0.01 in.]

Mechanical Specifications

Mechanical Outlines - Baseplate Module

AVO200-48S05B-6L
AVO200-48S05PB-6L
AVO200-48S05B-4L



UNIT: mm[inch]

TOLERANCE: X.X mm±0.5 mm[X.XX in. ±0.02 in.]

X.XX mm±0.25 mm[X.XXX in. ±0.01 in.]

Pin length option

Table 4. Pin length option

Device code suffix	L
-4	4.8mm±0.25 mm
-6	3.8mm±0.25 mm
-8	2.8mm±0.25 mm
None	5.8mm±0.25 mm

Mechanical Specifications

Pin Designations

Pin No	Name	Function
1	$V_{IN}+$	Positive input voltage
2	Remote ON/OFF	Remote control
3	$V_{IN}-$	Negative input voltage
4	V_O-	Negative output voltage
5	-Sense	Remote sense negative
6	Trim	Voltage adjustment
7	+Sense	Remote sense positive
8	V_O+	Positive output voltage

Mechanical Specifications

Weight

The AVO200-48S05-6L (Open-frame) weight is 34g.maximum. (28g.minmum)

The AVO200-48S05B-6L (Baseplate) weight is 46g.maximum. (40g.minmum)

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Environmental Specifications

EMC Immunity

AVO200-48S05 power supply is designed to meet the following EMC immunity specifications:

Table 5. Environmental Specifications

Document	Description	Criteria
EN55032, Class A Limits	Conducted EMI Limits	A
IEC/EN 61000-4-2, Level 3	Electromagnetic Compatibility (EMC) - Testing and measurement techniques - Electrostatic discharge immunity test. Enclosure Port	B
IEC/EN 61000-4-4, Level3	Electromagnetic Compatibility (EMC) - Testing and measurement techniques, Electrical Fast Transient. DC input port.	B
IEC/EN 61000-4-5	Electromagnetic Compatibility (EMC) - Testing and measurement techniques, Immunity to surges - 600V common mode and 600V differential mode for DC ports	B
IEC/EN 61000-4-6, Level 2	Electromagnetic Compatibility (EMC) - Testing and measurement techniques, Continuous Conducted Interference. DC input port	A
EN61000-4-29	Electromagnetic Compatibility (EMC) - Testing and measurement techniques, Voltage Dips and short interruptions and voltage variations. DC input port	B

Criterion A: Normal performance during and after test.
Criterion B: For EFT and surges, low-voltage protection or reset is not allowed. Temporary output voltage fluctuation ceases after disturbances ceases, and from which the EUT recovers its normal performance automatically. For Dips and ESD, output voltage fluctuation or reset is allowed during the test, but recovers to its normal performance automatically after the disturbance ceases.

Recommend EMC Filter Configuration

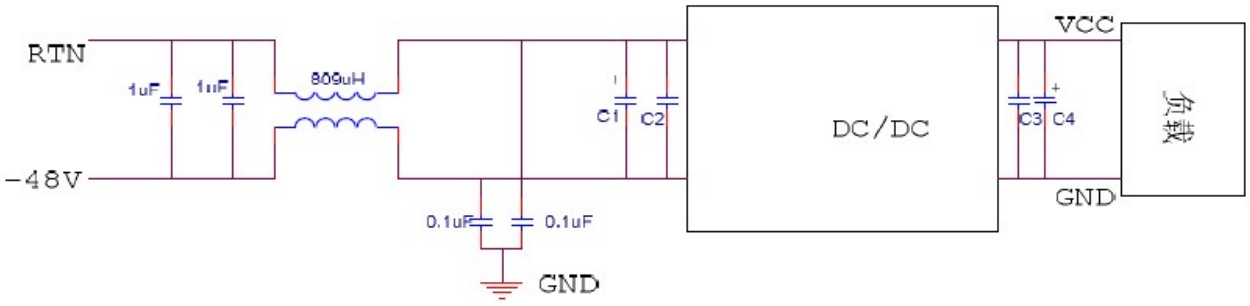


Figure 19 EMC test configuration

C1 to C4: See Figure 27

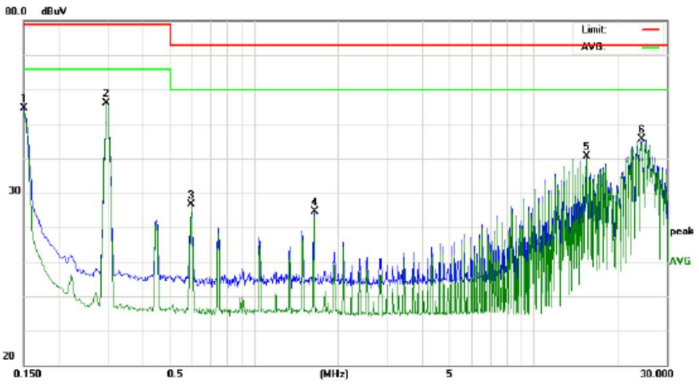
Environmental Specifications

EMI Emissions

The AVO200-48S05 series has been designed to comply with the Class A limits of EMI requirements of EN55022 (FCC Part 15) and CISPR 22 (EN55022) for emissions and relevant sections of EN61000 (IEC 61000) for immunity. The unit is enclosed inside a metal box, tested at 200W using resistive load.

Conducted Emissions

The applicable standard for conducted emissions is EN55022 (FCC Part 15). Conducted noise can appear as both differential mode and common mode noise currents. Differential mode noise is measured between the two input lines, with the major components occurring at the supply fundamental switching frequency and its harmonics. Common mode noise, a contributor to both radiated emissions and input conducted emissions, is measured between the input lines and system ground and can be broadband in nature.



The AVO200-48S05 power supplies have internal EMI filters to ensure the convertors' conducted EMI levels comply with EN55022 (FCC Part 15) Class A and EN55022 (CISPR 22) Class A limits. The EMI measurements are performed with resistive loads at maximum rated loading.

Note:

Red Line refers to Artesyn Quasi Peak margin, which is 6dB below the CISPR international limit.

Green Line refers to the Artesyn Average margin, which is 6dB below the CISPR international limit.

Conducted Emissions

Table 6. Conducted EMI emission specifications of the AVO200-48S05 series

Parameter	Model	Symbol	Min	Typ	Max	Unit
FCC Part 15, class A	All	Margin	-	-	6	dB
CISPR 22 (EN55032) class A	All	Margin	-	-	6	dB

Environmental Specifications

Safety Certifications

The AVO200-48S05 power supply is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

Table 7. Safety Certifications for AVO200-48S05 series power supply system

Standard	Agency	Description
UL 60950-1, 2nd Edition, 2011-12-19; CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12	UL+CUL	US and Canada Requirements
EN 62368-1:2014/A11:2017	TUV-SUD	European Requirements
EN 62368-1:2014/A11:2017	CE	CE Marking
UL94,V-0		Flammability Rating

Environmental Specifications

Operating Temperature

The AVO200-48S05 supplies will start and operate within stated specifications at an ambient temperature from -40°C to 85°C under all load conditions. The storage temperature is -55°C to 125°C

Thermal Considerations - Open-frame

The converter is designed to operate in different thermal environments and sufficient cooling must be provided. Proper cooling can be verified by measuring the temperature at the test points as shown in figure 10. The temperature at this point should not exceed the max values in the table 8.

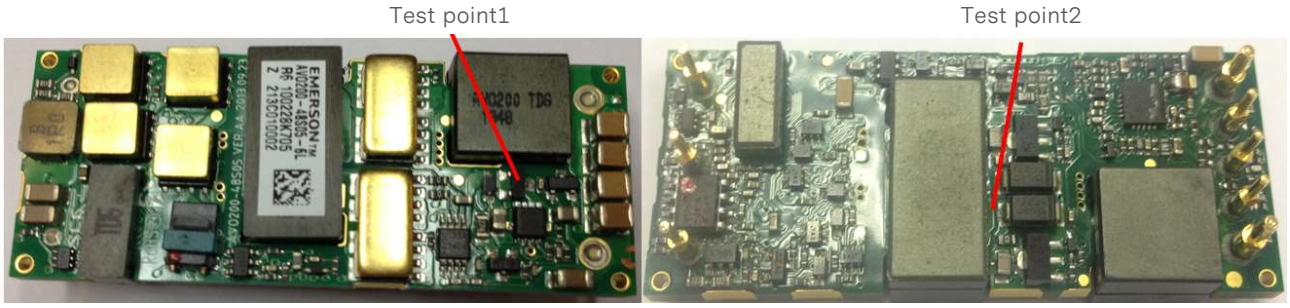


Figure 20 Thermal test points

Table 8. Temperature limit of the test point	
Test Point	Temperature limit
P1	130°C
P2	130°C

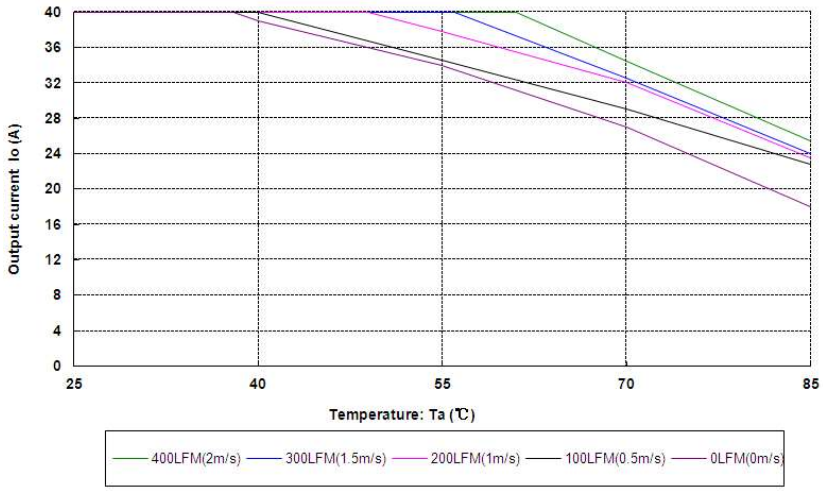


Figure 21 Output power derating, 48Vin, air flowing across the converter from pin 3 to pin 1

Environmental Specifications

Thermal Considerations - Baseplate

The converter can both operate in two different modes.

Mode 1: The converter can operate in a enclosed environment without forced air convection. Cooling of the converter is achieved mainly by conduction from the baseplate to a heat sink. The converter can deliver full output power at 85°C ambient temperature provided the baseplate temperature is kept below the max values 100°C.

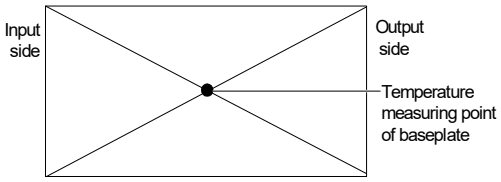


Figure 22 Temperature test point on base plate

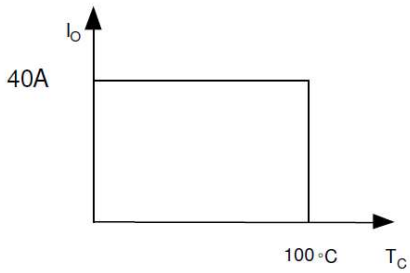


Figure 23 Output power derating curve, Tc: temperature test point on baseplate

Mode2: The converter is designed to operate in different thermal environments and sufficient cooling must be provided. Proper cooling of the DC/DC converter can be verified by measuring the temperature at the test point as shown in the Figure 24. The temperature at this point should not exceed the max values in the table 9.

Test point1 Test point2

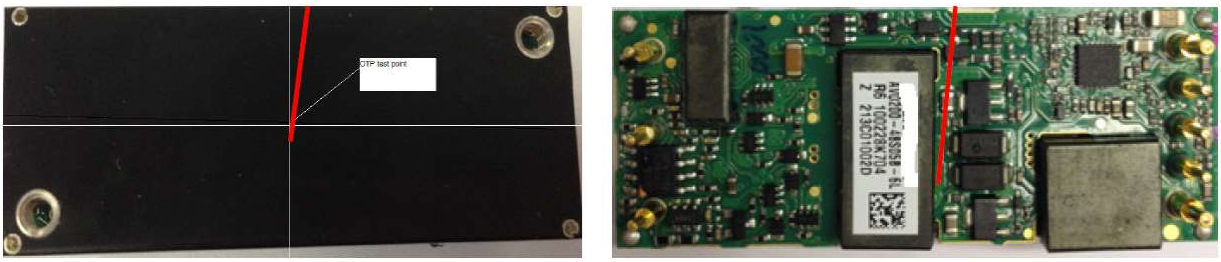


Figure 24 Temperature test points

Table 9. Temperature limit of the test point	
Test Point	Temperature limit
P1	114°C
P2	128°C

Environmental Specifications

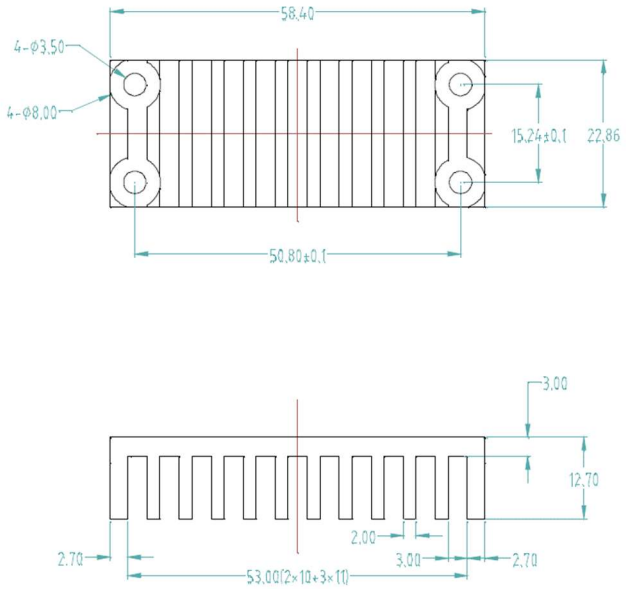


Figure 25 Heat sink mechanical diagram

For a typical application, Figure 26 shows the derating of output current vs. ambient air temperature at different air velocity @48V input.

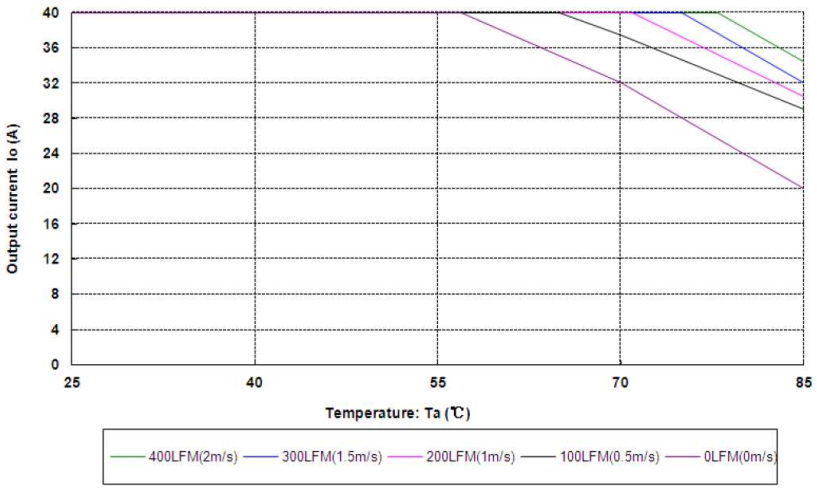


Figure 26 Output power derating, 48Vin, air flowing across the converter (from pin 3 to pin1)

Environmental Specifications

Qualification Testing

Table 10. Qualification testing		
Parameter	Unit (pcs)	Test condition
Halt test	4-5	$T_{a,min}$ -30 ^{O}C to $T_{a,max}$+25 ^{O}C, 10 ^{O}C step, V_{IN} = min to max, 0 to 100% load
Vibration	3	Frequency range: 5Hz to 20Hz, 20Hz ~ 200Hz, A.S.D: 1.0m^2/s^3, -3db/oct, axes of vibration: X/Y/Z. Time: 30min/axes. Non operational
Mechanical Shock	3	Half sine, Acceleration: 30g, 6ms, 3 axes, 6 directions, 3 time/direction. Non operational
Thermal Shock	3	-55 ^{O}C to 125 ^{O}C, Temp Dwell Time: 30min, Temp change rate: 20 ^{O}C/min, unit temperature 20 cycles. Non operational
Thermal Cycling	3	-40 ^{O}C to 85 ^{O}C, temperature change rate: 1^{O}C/min, cycles: 2cycles
Humidity	3	40 ^{O}C, 95%RH, 48h
Solder Ability	15	IPC J-STD-002C-2007

Application Notes

Typical Application

Below is the typical application of the AVO200-48S05 series power supply.

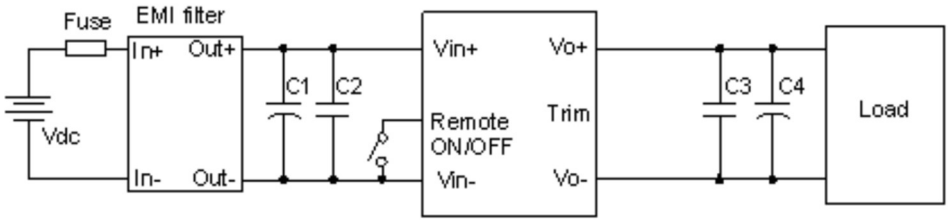
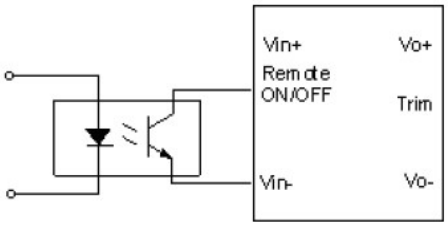


Figure 27 Typical application

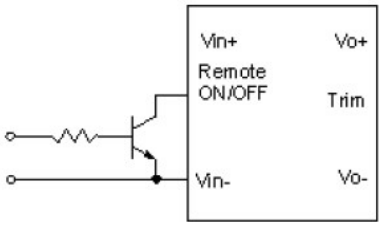
C1: 220uF/100V electrolytic capacitor; P/N: UPM2A221MPD (Nichicon) or equivalent caps
C2, C3: 1uF/100V X7R ceramic capacitor, P/N: C3216X7R2A105KT0L0S (TDK) or equivalent caps
C4:1000uF electrolytic capacitor, P/N: UPM1A102MHD (Nichicon) or equivalent caps
Fuse: External fast blow fuse with a rating of 12A. The recommended fuse model is 0314012.P from LITTLEFUSE.

Remote ON/OFF

Negative remote ON/OFF logic is available in AVO200-48S05. The logic is CMOS and TTL compatible. The voltage between pin Remote ON/OFF and pin Vin- must not exceed the range listed in table “Feature characteristics” to ensure proper operation. The external Remote ON/OFF circuit is highly recommended as shown in figure 28.



Isolated remote ON/OFF circuit



Non-isolated remote ON/OFF circuit

Figure 28 Remote ON/OFF internal diagram

Application Notes

Trim Characteristics

Connecting an external resistor between Trim pin and Vo- pin will decrease the output voltage. While connecting it between Trim and Vo+ will increase the output voltage. The following equations determine the external resistance to obtain the trimmed output voltage.

$$R_{adj-down} = \frac{511}{\Delta} - 10.22(K\Omega)$$

$$R_{adj-up} = \frac{5.11 \times V_{nom} \times (100 + \Delta)}{1.225 \times \Delta} - \frac{511}{\Delta} - 10.22(K\Omega)$$

Δ : Output e rate against nominal output voltage.

V_{norm} : Nominal output voltage.

For example, to get 5.5V output, the trimming resistor is

$$\Delta = \frac{100 \times |V_{nom} - V_0|}{V_{nom}} = \frac{100 \times (5.5 - 5)}{5} = 10$$

$$R_{adj-up} = \frac{5.1 \times 5 \times (100+10)}{1.225 \times 10} - \frac{510}{10} - 10.2 = 167.8(K\Omega)$$

When trimming up, the output current should be decreased accordingly so as not to exceed the maximum output power.

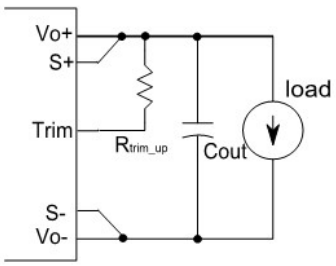


Figure 29 Trim up

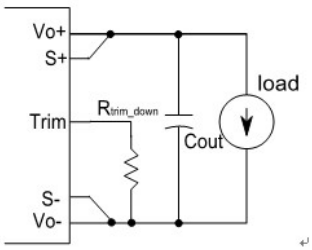


Figure 30 Trim down

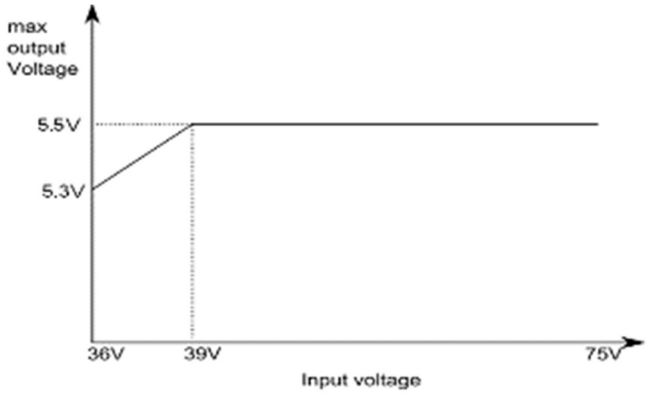


Figure 31 Max. adjustable output voltage vs. input voltage

Application Notes

Input Ripple & Inrush Current and Output Ripple & Noise Test Configuration

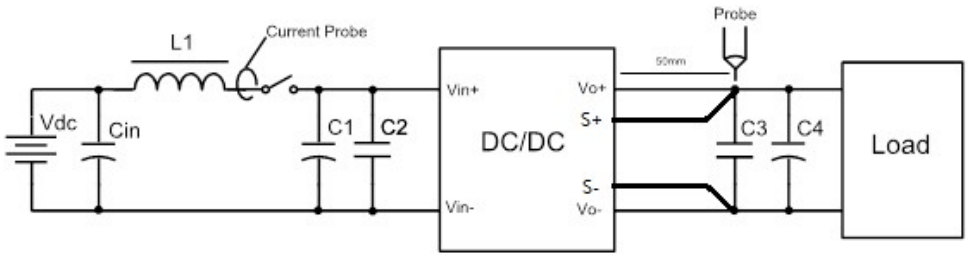


Figure 32 Input ripple & inrush current output ripple & noise test configuration

Vdc: DC power supply

L1: 12uH

Cin: 220uF/100V typical

C1 to C4: See Figure 27

Note: Using a coaxial cable with series 50Ω resistor and 0.68uF ceramic capacitor or a ground ring of probe to test output ripple & noise is recommended.

Application Notes

Soldering

The product is intended for standard manual, reflow or wave soldering.

When wave soldering is used, the temperature on pins is specified to maximum 260°C for maximum 7s.

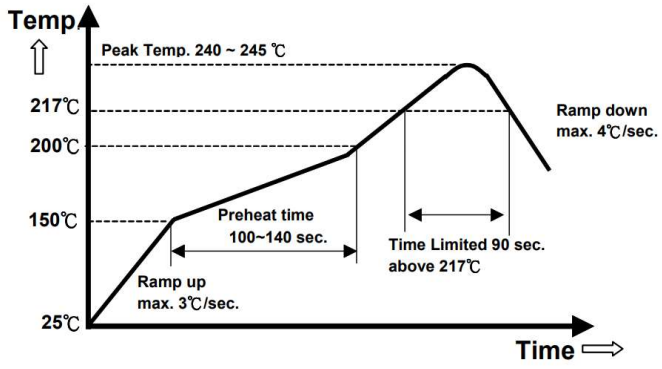
When soldering by hand, the iron temperature should be maintained at 300°C ~ 380°C and applied to the converter pins for less than 10s. Longer exposure can cause internal damage to the converter.

Cleaning of solder joint can be performed with cleaning solvent IPA or similative.

Item	Product requirement	Product Name
RoHS3.0	Wave soldering	AVO200-48S05B-6L AVO200-48S05PB-6L AVO200-48S05B-4L

Item	Product requirement	Product Name
RoHS3.0	Reflow or wave soldering	AVO200-48S05-6L

When reflow soldering is used, please refer to following figure for recommended temperature profile parameters



Record of Revision and Changes

Issue	Date	Description	Originators
1.0	08.27.2014	First Issue	K. Wang
1.1	06.11.2014	Add the condition and template error	K. Wang
1.2	09.24.2014	Type error	K. Wang
1.3	03.23.2015	Type error	K. Wang
1.4	12.21.2015	Add a note “Max voltage =7.0V with oscillation noise” in the voltage at remote on/off pin	K. Wang
1.5	06.16.2016	Update the Mechanical Drawing	K. Wang
1.6	06.28.2016	Update the note1 and 4 in page 5	K. Wang
1.7	10.25.2016	Update the soldering information	K. Wang
1.8	01.16.2017	Update the UVLO range and add the “AVO200-48S05PB-6L”	K. Wang
1.9	12.16.2019	1.Update the mechanical drawing for baseplate 2.Update solder information	K. Wang
2.0	05.26.2019	Update safety cert from 60950 to 62368-1	K. Wang
2.1	07.15.2022	Add AVO200-48S05B-4L information	J. Zhang

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Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

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